Bridging the School-University Transition: Improving the Critical Thinking Skills of Pre-Tertiary Psychology Students

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Word Count: 66,680

This thesis is submitted for the degree of

Doctor of Philosophy

August 2024

Abstract

The aim of this doctoral thesis was to design, implement, and evaluate a domain-specific, school-based critical thinking intervention to enhance the psychological critical thinking ability of pre-tertiary psychology students, thereby facilitating their transition to degree-level psychology. A mixed-methods approach guided the research, structured as a multiphase sequential mixed methods design comprising four interconnected phases. Phase 1 explored A-level psychology teachers' and university lecturers' perspectives on critical thinking instruction through semi-structured interviews, revealing significant institutional and pedagogical barriers. Phase 2 employed a causal-comparative design to examine changes in students' critical thinking skills, motivation, and perceptions across six education levels, highlighting the complexity of skill development and the impact of prior education. Phase 3 focused on the intervention's design, implementation, and evaluation, assessing its impact on year 13 A-level psychology students' critical thinking ability using a quasi-experimental pretest-posttest design with a non-equivalent control group. Phase 4 qualitatively evaluated the intervention’s long-term effectiveness through interviews with teachers and students post-transition to university.

The synthesis of cross-phase insights highlight the necessity for a paradigm shift in A-level psychology education, moving away from a narrow focus on exam outcomes toward fostering authentic critical thinking skills. The findings emphasize the need for educational reforms that support teacher autonomy, align interventions with curricula, and prioritize long-term cognitive development. This multiphase study contributes to the literature on critical thinking development by integrating diverse methodologies, theoretical perspectives, and practical recommendations to enhance psychology education, ultimately better preparing students for academic and professional challenges.

Keywords: Critical Thinking, Transition, Neoliberalism, Psychology, Intervention

Table of Contents

Abstract 2

List of Tables 14

List of Figures 14

Acknowledgements 15

Chapter 1: General Introduction 16

1.1 Chapter Introduction 16

1.2 Personal Motivation 16

1.3 Research Context 16

1.4 Aim and Research Question 19

1.5 Thesis Structure and Organization 20

1.5.1 Chapter 1: General Introduction 20

1.5.2 Chapter 2: Literature Review 20

1.5.3 Chapter 3: Methodology 20

1.5.4 Chapter 4: Study Phase 1 21

1.5.5 Chapter 5: Study Phase 2 21

1.5.6 Chapter 6: Study Phase 3 23

1.5.7 Chapter 7: Study Phase 4 23

1.5.8 Chapter 8: General Discussion and Conclusions 24

1.6 Conceptual Definitions of Key Constructs 24

1.6.1 Psychological Critical Thinking 24

1.6.2 Critical Thinking Skills 25

1.6.3 Critical Thinking Dispositions 25

1.6.4 Critical Thinking Motivation 26

1.6.5 Neoliberalism 26

1.6.6 Institutional Culture 27

1.7 Scope of this Thesis 28

1.8 Chapter Summary 28

Chapter 2: Literature Review 29

2.1 Chapter Introduction 29

2.2 History of Critical Thinking 29

2.3 Key Debates in the Field of Critical Thinking 33

2.3.1 Definitional Debate 33

2.3.2 Skills versus Dispositions Debate 39

2.3.3 Domain-General versus Domain-Specific Debate 41

2.3.4 Assessment Debate 44

2.4 Critical Thinking in Higher Education 46

2.5 Critical Thinking in Psychology 47

2.6 Critical Thinking in A-level Psychology 49

2.6.1 Relationship Between A-level and Degree Level Psychology 50

2.6.2 A-level Psychology Assessment Practice 51

2.7 Influence of Educational Neoliberalism on UK Policy and Provision 53

2.8 School-University Transition 57

2.9 Chapter Summary 60

Chapter 3: Methodology 62

3.1 Chapter Introduction 62

3.2 Research Paradigm: Pragmatism....62
3.3 Axiological Position....64
3.4 Ontological Position....65
3.5 Epistemological Position....67
3.6 Methodological Approach: Multiphase Sequential Mixed Methods Design....68
3.7 Data Integration....69
3.8 Chapter Summary....71
Chapter 4: Study Phase 1....72
4.1 Chapter Introduction....72
4.2 Importance of Psychological Critical Thinking for Psychology Undergraduates....72
4.3 Teaching and Development of Psychological Critical Thinking Skills....73
4.4 Institutional Culture and Critical thinking....74
4.5 Institutional Culture and Critical Thinking in Psychology Education....75
4.6 The Current Study....77
4.7 Method....79
4.7.1 Research Design....79
4.7.2 Participant Sample....80
4.7.3 Materials....82
4.7.3.1 Participant Materials....82
4.7.3.2 Interview Schedule....82
4.7.4 Procedure....83
4.7.5 Analytical Procedure....83
4.7.5.1 Phase 1: Familiarization with the Data....84

4.7.5.2 Phase 2: Generating Initial Codes 85

4.7.5.3 Phase 3: Searching for Themes 86

4.7.5.4 Phase 4: Reviewing Themes 87

4.7.5.5 Phase 5: Defining and Naming Themes 87

4.7.5.6 Phase 6: Producing the Report 88

4.7.6 Ethics 89

4.7.7 Reflexivity 89

4.8 Findings 92

4.8.1 Neoliberal Constraints on Critical Thinking: The Struggle to Foster Critical Thinking in Psychology Education 93

4.8.2 The Exam Divide: Navigating the Pedagogical Divide Between A-level and University Psychology Teaching 99

4.8.3 Educational Transition and Readiness for University: Bridging the Gap in Critical Thinking Skills Development 106

4.8.3.1 Challenges in Navigating the University Learning Culture: Adapting to Independent and Inquiry-Based Education 109

4.9 Discussion 110

4.9.1 Summary of Key Findings 111

4.9.2 Limitations 113

4.9.3 Conclusion 114

Chapter 5: Study Phase 2 116

5.1 Chapter Introduction 116

5.2 Psychological Critical Thinking Ability 117

5.2.1 Psychological Critical Thinking Skills 118

5.2.2 Critical Thinking Motivation 118

5.2.3 Student Perceptions of Critical Thinking in Instruction 120

5.3 Prior Education and Critical Thinking Skills 121

5.4 Empirical Studies on Critical Thinking Development in Higher Education 123

5.5 The Current Study 126

5.5.1 Research Question 127

5.5.2 Hypotheses 127

5.6 Method 127

5.6.1 Research Design 127

5.6.2 Participant Sample 129

5.6.3 Materials 130

5.6.3.1 Participant Materials 130

5.6.3.2 Measures 131

5.6.4 Procedure 135

5.6.4.1 Online Administration 135

5.6.4.2 Paper Administration 135

5.6.5 Data Analysis 136

5.6.6 Ethics 136

5.7 Results 136

5.7.1 Descriptive Statistics by Level of Study 137

5.7.2 Descriptive Statistics by A-level Psychology Qualification Status 138

5.7.3 Descriptive Statistics by A-level Qualification Grade 139

5.7.4 Multivariate Analysis of Variance (MANOVA) 140

5.7.4.1 MANOVA 1: Effects of Level of Study on Combined Dependent Variables 140

5.7.4.2 MANOVA 2: Effects of A-level Psychology Qualification Status on Combined Dependent Variables 141

5.7.4.3 MANOVA 3: Effects of A-level Psychology Grade on Combined Dependent Variables 141

5.8 Discussion 142

5.8.1 Summary of Findings 143

5.8.2 Limitations 146

5.8.3 Conclusion 148

Chapter 6: Study Phase 3 150

6.1 Chapter Introduction 150

6.2 Teachability of Critical Thinking 151

6.3 Review of Existing Empirical Critical Thinking Interventions 152

6.4 Methodological Limitations of Existing Critical Thinking Interventions 154

6.5 Synthesis of Research Findings from Prior Study Phases 155

6.6 The Current Study 157

6.6.1 Research Question 157

6.6.2 Hypotheses 157

6.7 Method 158

6.7.1 Research Design 158

6.7.2 Participant Sample 160

6.7.3 Materials 160

6.7.3.1 Participant Materials 160

6.7.3.2 Measures 161
6.7.4 Procedure 166
6.7.5 Data Analysis 167
6.7.6 Ethics 167
6.8 Results 168
6.8.1 Multivariate Analysis of Variance (MANOVA) 169
6.8.1.1 Preliminary Analyses 169
6.8.2.2 Multivariate Tests 169
6.8.2.3 Interaction Effect 169
6.9 Discussion 170
6.9.1 Summary of Findings 170
6.9.2 Insights from Domain-Specific Intervention 171
6.9.3 Institutional Culture and Intervention Effectiveness 173
6.9.4 Limitations 174
6.9.5 Conclusion 176
Chapter 7: Study Phase 4 178
7.1 Chapter Introduction 178
7.2 Emphasis on Quantitative Assessment 179
7.3 Predominant Focus on Short-Term Assessments 180
7.4 The Current Study 181
7.5 Method 182
7.5.1 Research Design 182
7.5.2 Participants 183

7.5.3 Materials 185

7.5.3.1 Interview Schedule 185

7.5.4 Procedure 186

7.5.5 Analytical Procedure 187

7.5.5.1 Phase 1: Familiarization with the Data 188

7.5.5.2 Phase 2: Generating Initial Codes 188

7.5.5.3 Phase 3: Searching for Themes 189

7.5.5.4 Phase 4: Reviewing Themes 190

7.5.5.5 Phase 5: Defining and Naming Themes 191

7.5.5.6 Phase 6: Producing the Report 192

7.5.6 Ethics 193

7.5.7 Reflexivity 193

7.6 Findings 196

7.6.1 The Neoliberal Curriculum and its Erosion of Critical Thinking 199

7.6.2 Exam-Centric Educational Culture and Its Impact on Commitment and Critical Thinking Development 202

7.6.3 Enhancing Critical Thinking Through Curriculum Integration: A Structured and Confidence-Building Approach 206

7.6.4 The Challenge of Engaging Diverse Learners: Ensuring Accessibility, Clarity, and Sustaining Motivation 210

7.6.5 The Need for Comprehensive and Sustained Support in Critical Thinking Interventions 214

7.7 Discussion 218

7.7.1 Summary of Key Findings 219

7.7.2 Limitations 221

7.7.3 Conclusion 222

Chapter 8: General Discussion and Conclusions 224

8.1 Chapter Introduction 224

8.2 Exploration of Findings Across Study Phases 224

8.2.1 Phase 1 Findings 224

8.2.2 Phase 2 Findings 226

8.2.3 Phase 3 Findings 228

8.2.4 Phase 4 Findings 229

8.3 Synthesis of Cross-Phase Insights 231

8.3.1 Institutional and Pedagogical Context (Phase 1 and Phase 4) 231

8.3.2 Critical Thinking Development and Transition (Phase 2 and Phase 3) 233

8.3.3 Implications and Recommendations 234

8.4 Cross-Phase Original Contributions and Implications 235

8.5 Cross-Phase Reflections and Limitations 239

8.6 Cross-Phase Reflections on Future Directions 241

8.7 Contextualizing Findings in Evolving Discourses 244

8.7.1 The Evolution of Thinking in Student Transitions 244

8.7.2 Critical Thinking in Psychology: A Complex and Contested Construct 245

8.7.3 Future Proofing Research: Challenges and Opportunities 246

8.8 Conclusion 247

Chapter 9: References 250

Chapter 10: Appendices 309

Appendix A: Phase 1 – Participant Information Sheet 309

Appendix B: Phase 1 – Participant Consent Form 311

Appendix C: Phase 1 – Participant Debrief Form.....312

Appendix D: Phase 1- Interview Schedule (University Psychology Lecturers).....313

Appendix E: Phase 1- Interview Schedule (A-level Psychology Teachers).....315

Appendix F: Phase 1 – Letter of Ethical Approval.....317

Appendix G: Phase 2 - Paper Participant Information Sheet.....318

Appendix H: Phase 2 – Paper Participant Consent Form 320

Appendix I: Phase 2 - Participant Debrief Form 321

Appendix J: Phase 2 – Online Participant Information Sheet 322

Appendix K: Phase 2 – Online Participant Consent Form 324

Appendix L: Critical Thinking Motivation Scale (Valenzuela et al., 2011).....325

Appendix M: Course Evaluation Form: Students Perceptions of Critical Thinking in Instruction (Foundation for Critical Thinking Press, 2007) 328

Appendix N: Revised Psychological Critical Thinking Exam (Lawson et al., 2015) 332

Appendix O: Phase 2 – SPSS Output 336

Appendix P: Phase 2 – Letter of Ethical Approval.....383

.....383

Appendix Q: Phase 3 – Participant Information Sheet (Pretest).....384

Appendix R: Phase 3 – Participant Information Sheet (Posttest) 387

Appendix S: Phase 3 – Participant Consent Form (Pretest).....390

Appendix T: Phase 3 – Participant Consent Form (Posttest) 391

Appendix U: Phase 3 – Participant Debrief Form (Pretest).....392

Appendix V: Phase 3 – Participant Debrief Form (Posttest) 393

Appendix W: Phase 3 – Critical Thinking Intervention Resources 394

Appendix X: Phase 3 – SPSS Output 455

Appendix Y: Phase 3 – Letter of Ethical Approval 498

Appendix Z: Phase 4 – Participant Information Sheet (A-level Teachers) 499

Appendix AA: Phase 4 – Participant Information Sheet (Students) 503

Appendix AB: Phase 4 – Participant Consent Form (A-level Teachers) 507

Appendix AC: Phase 4 – Participant Consent Form (Students) 509

Appendix AD: Phase 4 – Participant Debrief (A-level Teachers) 511

Appendix AE: Phase 4 - Participant Debrief (Students) 513

Appendix AF: Phase 4 – Interview Schedule (A-level Teachers) 515

Appendix AG: Phase 4 – Interview Schedule (Students) 518

Appendix AH: Phase 4 – Letter of Ethical Approval 520

List of Tables

Table 1 Demographic Characteristics of Participant Sample

Table 2 Demographic Characteristics of Participant Sample

Table 3 Descriptive Statistics for Dependent Variables by Level of Study

Table 4 Descriptive Statistics for Dependent Variables by A-level Psychology Qualification Status

Table 5 Descriptive Statistics for Dependent Variables by A-level Psychology Grade

Table 6 Descriptive Statistics for Dependent Variables by Condition and Time Point

Table 7 Demographic Characteristics of Participant Sample

List of Figures

Figure 1. Multiphase Sequential Mixed Methods Design: Integration of Qualitative and Quantitative Approaches

Figure 2. Thematic Map Illustrating Themes and their Subthemes

Figure 3. Thematic Map Illustrating Themes

Acknowledgements

I would like to express my deepest gratitude to those who have supported and contributed to this research journey.

First and foremost, I am profoundly thankful to my parents for their unwavering support and encouragement throughout my academic endeavors. Their belief in me has been a source of strength and motivation, and I am deeply grateful for their sacrifices and constant inspiration.

I extend my sincere thanks to my current PhD supervisory team. Dr. Elizabeth Bates has provided invaluable guidance, insight, and support, steering me through the complexities of my research with patience and expertise. Professor Sally Elton-Chalcraft has been instrumental in shaping my work with her thoughtful feedback and encouragement.

I am also deeply appreciative of the contributions made by the previous members of my supervisory team. Professor Pete Boyd and Dr. Paul Cammack provided crucial support and mentorship during the earlier stages of my research, and their insights were essential to the development of my thesis.

A heartfelt thanks goes to all the schools, teachers, universities, lecturers, and students who participated in and contributed to this research. Your cooperation, enthusiasm, and engagement have been fundamental to the completion of this work.

To all who have supported me along the way, whether directly or indirectly, your contributions have made this achievement possible. Thank you.

Chapter 1: General Introduction

1.1 Chapter Introduction

This chapter provides an overview of the doctoral thesis, starting with the researcher's personal motivations for undertaking this research. The research context is then established, outlining the broader social, educational and scholarly context in which the research is situated. The thesis aim and research question are then clearly stated to outline what the thesis aims to achieve and how it intends to do so. Following this, the thesis structure and organization are discussed, providing an overview of its content and how it will be presented. Key constructs are then theoretically conceptualized, clarifying key terms and concepts explored throughout the thesis. Lastly, the thesis' scope is defined, outlining the research's boundaries and limitations.

1.2 Personal Motivation

In this section, I will discuss the motivations that drove me to pursue this particular research area. Three main influences shaped my decision to pursue this doctoral thesis. Firstly, my personal experience of transitioning from A-level (i.e., pre-tertiary) to degree-level psychology highlighted a perceived lack of coherence in curricula, particularly concerning the development, transmission, and acquisition of critical thinking skills in psychology. Secondly, through my role as a Lecturer in Psychology, I have witnessed many students struggle with the acquisition of critical thinking skills when they first transition to university. Lastly, I sought to build upon my previous Master of Science (MSc) dissertation research, which explored psychology students' perceptions of critical thinking and its relevance to their education and employment (McCann & Bates, 2016).

1.3 Research Context

The following section aims to provide a brief overview of the general area of study by situating the thesis within the wider social, educational and scholarly context of existing knowledge, research and literature.

The ability to think critically is viewed prestigiously by higher education institutions and employers across the globe, with the teaching and learning of critical thinking skills being viewed as a ubiquitous goal and overarching ideal of tertiary education in the 21st century, and an important necessary outcome for those facing an everchanging and uncertain job market (Dumitru et al., 2018; Ku, 2009). The prestigious nature of critical thinking is evident from its recurrent reference in university mission statements, course evaluations, assessment rubrics, course outcomes and education reports (Arum & Roksa, 2011; Bailin et al., 1999; Dunne, 2015; Organization for Economic Cooperation and Development [OECD], 2019, 2022). The prestigious nature of critical thinking as a graduate outcome extends to the field of psychology, where the ability to think critically is considered to be a foundational skill for both psychologists and psychology graduates (British Psychological Society [BPS], 2019; American Psychological Association [APA], 2023; Quality Assurance Agency for Higher Education [QAA], 2023).

This emphasis on critical thinking as a graduate outcome has generated a substantial amount of literature focusing on intervention-based research and instructional strategies aimed at enhancing the transmission and acquisition of critical thinking skills among university students (e.g., Abrami et al., 2015; Behar-Horenstein & Niu, 2011; Huber & Kuncel, 2016; Niu et al., 2013; Puig et al., 2019; Tiruneh et al., 2014, 2016, 2018). However, the impact of students' prior learning on their ability to develop critical thinking skills at the university level is often overlooked in these studies (Evens et al., 2013). Most research on critical thinking skill development remains confined to the post-secondary level, disregarding the crucial role of secondary education in preparing students for critical thinking at university (Marin & Halpern, 2011; Van der Zanden et al., 2020).

When students transition to university, there is an expectation from lecturers that they will engage with critical thinking within their respective disciplines. However, for many students, this may be their first encounter with such expectations (Cormack et al., 2014). Koh et al. (2012) argued that students may enter university with excellent A-level grades but

lack higher order thinking skills, such as critical thinking. Qualitative inquiries have corroborated this, with students frequently expressing challenges in grasping the elusive nature of critical thinking and struggling to comprehend and demonstrate it within their work (Duro et al., 2013; Forbes, 2018; McCann & Bates, 2016).

The transition from secondary school to university in the United Kingdom (UK) has revealed a significant skill gap among first-year students (Hulme & De Wilde, 2014; Tate & Swords, 2013). Students, teachers and lecturers have observed this gap and recognized the need for additional skills, particularly in critical thinking, which may not have been automatically acquired during the transition (Conley, 2008; Van der Zanden et al., 2020). In their research, Hulme and De Wilde (2014) found that delegates questioned whether pre-tertiary education may inhibit the development of important transitional skills, such as critical thinking.

This is important in the context of the transition from A-level to degree-level psychology. A-level psychology has faced criticisms for its emphasis on rote-learning descriptive content and factual knowledge, often neglecting the development of critical thinking skills (BPS, 2013; Green, 2007; Jarvis, 2011; Kitching & Hulme, 2013). Conversely, at degree-level, psychology students receive explicit training in critical evaluation, where they are encouraged to assess arguments critically and identify their limitations (APA, 2023; BPS, 2013, 2019; Hayes, 1996; QAA, 2023).

Despite the significance of this transition for psychology students, Hulme and De Wilde (2014) argued that current research and knowledge exchange efforts between schools and universities have predominately concentrated on exploring ways in which universities and other higher education institutions can assist students after they have transitioned to university. However, insufficient attention has been given to investigating strategies to improve students' preparation before they begin their studies, or the feasibility of such preparation. In addition, Kitching and Hulme (2013) recommended collaborative working

between A-level psychology and university psychology departments as key to supporting students entering higher education.

This doctoral thesis will address this, by designing a school-based domain-specific critical thinking intervention aimed at improving the psychological critical thinking ability of pre-tertiary psychology students and facilitate their transition to degree-level psychology. By providing targeted support, tailored to the specific educational context and needs of pre-tertiary psychology students, the intervention can help develop their psychological critical thinking ability and build a strong foundation for their future studies in psychology.

Overall, this doctoral research is essential to address the gap in knowledge about how to effectively support pre-tertiary psychology students in developing their psychological critical thinking skills and facilitate their transition to degree-level psychology.

1.4 Aim and Research Question

The overall aim of the thesis is to design, implement and evaluate a domain-specific, school-based critical thinking intervention to improve the psychological critical thinking ability of pre-tertiary psychology students. Thereby, helping to facilitate their transition to degree-level psychology.

While this intervention seeks to support students during this transition, it is important to acknowledge that it represents just one approach among many. A range of strategies, including broader pedagogical methods and institutional support systems, also play a crucial role in easing students' progression to higher education. Nevertheless, by trialing this targeted intervention, this thesis seeks to make a valuable contribution to the broader effort of improving transition support, moving the research forward by exploring a focused and practical solution.

The primary research question of the thesis is: How can a school-based domain-specific intervention be designed to effectively improve the psychological critical thinking ability of pre-tertiary psychology students and facilitate their transition to study degree-level

psychology? This research question will be answered by working collaboratively with schools, teachers, universities, lecturers and students.

1.5 Thesis Structure and Organization

The following section outlines the structure and organization of the thesis by describing its overall format and providing a brief explanation of each chapters' purpose. The structure of the thesis is organized into eight chapters, which are outlined below.

1.5.1 *Chapter 1: General Introduction*

This introductory chapter provides a comprehensive overview of the thesis, encompassing the research context, aim, research question and scope. Additionally, it establishes the research's significance and provides an overview of the thesis' structure.

1.5.2 *Chapter 2: Literature Review*

This chapter presents a critical analysis and synthesis of existing literature in the fields of critical thinking, neoliberalism, psychology education and school-university transition. The literature review provides a comprehensive understanding of the research area and identifies several gaps and areas for future research. The chapter also positions the thesis in relation to key debates within the field of critical thinking.

1.5.3 *Chapter 3: Methodology*

This chapter outlines the beliefs, values, and assumptions that shaped the research's design and execution. This chapter explains the rationale behind adopting a mixed-methods approach and justifies the selection of a multiphase sequential mixed methods design (Creswell, 2012; Teddlie & Tashakkori, 2009) for addressing the research question. The thesis consists of four interconnected phases (referred to as study phases), which are presented individually in separate chapters. Each study phase has its own introduction, method, results and discussion. Therefore, each phase can be read independently. But taken together they provide a comprehensive set of evidence which addresses the overarching research question.

1.5.4 *Chapter 4: Study Phase 1*

This chapter presents the initial study phase of this thesis. The study aimed to investigate the perspectives of A-level psychology teachers and university psychology lecturers on critical thinking instruction. A qualitative research approach was employed, utilizing semi-structured interviews to explore educators' views on critical thinking instruction and the barriers they perceive in teaching these skills. The participant sample included 18 psychology educators, comprising 11 A-level psychology teachers from eight different schools and seven university psychology lecturers from four different UK universities. Data were analyzed using a reflexive thematic analysis (Braun & Clarke, 2012, 2019, 2022).

The primary objective of this study was to gain a comprehensive understanding of the institutional culture at A-level and degree-level in psychology regarding the teaching and learning of critical thinking, as well as identify barriers to effective instruction. Existing research has emphasized the role of educator approaches in fostering students' development of critical thinking skills, underscoring the significance of understanding the instructional methods employed by educators (Halx & Reybold, 2005). As emphasized by Halx and Reybold (2005), "critical thinking does not occur in a vacuum" (p. 297), and the acquisition of critical thinking skills is influenced by "the context and culture in which it is situated" (Pithers & Soden, 2000, p. 246). By examining how institutional culture shapes the interpretation and value attributed to critical thinking (Reybold, 2003), this study aimed to provide insights to inform the development of a critical thinking intervention that aligns with the pre-existing institutional culture.

1.5.5 *Chapter 5: Study Phase 2*

This chapter presents the second study phase of this thesis. The study aimed to investigate how students' psychological critical thinking skills, motivation to think critically and perceptions of the amount of critical thinking instruction received changed as a function of education level. A causal-comparative design was utilized, comparing psychology students from six education levels (year 12, year 13, first year, second year, third year

undergraduate, and postgraduate). The participant sample included 310 A-level and university psychology students. However, due to the limited number of participants, the data from third-year undergraduates and postgraduate students were excluded from the analysis. Participants completed the Revised Psychological Critical Thinking Exam (R-PCTE; Lawson et al., 2015), Critical Thinking Motivation Scale (CTMS; Valenzuela et al., 2011), and the Course Evaluation Form: Students Perceptions of Critical Thinking in Instruction (Foundation for Critical Thinking Press, 2007). Data were analyzed using a series of multivariate analysis of variance (MANOVA).

The primary objective of this study was to address gaps in knowledge regarding the development of critical thinking skills among psychology students during their transition from A-level to degree-level psychology. Additionally, it sought to investigate the influence of prior psychology education on these skills in order to inform the development of a critical thinking intervention. Existing research lacks clarity on the development of critical thinking competence and expected milestones (Evans, 2020). Concerns raised by delegates in Hulme and De Wilde's (2014) study suggested that pre-tertiary education may hinder the development of critical thinking skills needed for higher education, with critical thinking being a commonly mentioned skill deficit. Furthermore, limited empirical studies exist on the impact of prior education on critical thinking in higher education, with most research focusing on average growth scores for entire student samples rather than considering differences between student groups (Evens et al., 2013). Additionally, there is a scarcity of research on the progression of critical thinking abilities as students advance in higher education, as well as in the development of these skills in secondary schools (Lai, 2011; Marin & Halpern, 2011). This study sought to fill these gaps and provide valuable insights into the development of psychological critical thinking skills among psychology students during the transition to degree-level education, while considering the influence of prior education on these skills.

1.5.6 *Chapter 6: Study Phase 3*

This chapter presents the third study phase of this thesis, focusing on the design, implementation, and evaluation of a domain-specific, school-based critical thinking intervention. The intervention was developed using the findings from Study Phase 1 (Chapter 4, pp. 72 - 115) and Study Phase 2 (Chapter 5, pp. 116 - 149). The study aimed to assess the impact of this intervention on A-level psychology students' psychological critical thinking skills, motivation to think critically, and perceptions of the amount of critical thinking instruction received. The intervention utilized a quasi-experimental pretest-posttest design with a non-equivalent control group. The participant sample included 73 year 13 A-level psychology students from six different schools. Two schools were randomly assigned to the control condition (n = 29), and four schools were randomly assigned to the experimental condition (n = 44). Prior to the intervention, both conditions completed the R-PCTE (Lawson et al., 2015), CTMS (Valenzuela et al., 2011), and the Course Evaluation Form: Students Perceptions of Critical Thinking in Instruction (Foundation for Critical Thinking Press, 2007). After a period of 10 weeks, both conditions completed the measures again to assess the intervention's impact. The data were analyzed using a two-way mixed design MANOVA.

1.5.7 *Chapter 7: Study Phase 4*

This chapter presents the final study phase of this thesis, which aimed to qualitatively evaluate the effectiveness of the domain-specific, school-based critical thinking intervention described in Study Phase 3 (Chapter 6, pp. 150 - 177), by employing a qualitative research approach with semi-structured interviews. The participant sample consisted of four A-level teachers and four students from the experimental condition schools described in Study Phase 3. The interviews were conducted with the students after they had transitioned to study psychology at university. Data were analyzed using a reflexive thematic analysis (Braun & Clarke, 2012, 2019, 2022).

The primary objective of this study was to contribute qualitative insights into the possible effectiveness of the intervention and its impact on students' psychological critical

thinking ability by utilizing qualitative methods. Qualitative inquiry was chosen for its ability to provide rich contextual evidence beyond quantitative measures (Tsui, 2002). Behar-Horenstein and Niu (2011) emphasized the necessity of incorporating qualitative data to comprehensively capture intervention effects alongside quantitative measures. Additionally, Niu et al. (2013) highlighted the importance of qualitative reviews in understanding the diversity of critical thinking research and investigating qualitative aspects of intervention implementation.

1.5.8 *Chapter 8: General Discussion and Conclusions*

This chapter integrates the findings from the four interconnected study phases, undertaking a comprehensive critical analysis and synthesis of the results. It examines the implications and contributions of this research within the fields of critical thinking, neoliberalism, psychology education, and school-university transition. Additionally, the chapter addresses the limitations of the thesis and proposes avenues for future research. Finally, it concludes with a summary of the thesis, highlighting the key findings and original contributions.

1.6 Conceptual Definitions of Key Constructs

This section offers theoretical conceptualizations of the key terms and concepts that will be explored in this thesis. These constructs and terms tend to be multidimensional, abstruse, and ill-defined. Consequently, the following subsections aim to introduce and provide conceptual definitions of these constructs, enabling their effective operationalization in subsequent sections of the thesis.

1.6.1 *Psychological Critical Thinking*

The term *psychological critical thinking* refers to the domain-specific critical thinking that psychology students employ. The definition outlined by Lawson (1999) “psychological critical thinking involves evaluating claims using the basic principles of psychological science” will be adopted for this thesis (p. 207). The rationale for adopting this definition is covered in Chapter 2 (Section 2.3.1, pp. 33- 34).

1.6.2 *Critical Thinking Skills*

The term *critical thinking skills* refers to the cognitive components of critical thinking, which contemporary conceptualizations recognize as encompassing both cognitive and dispositional dimensions (Facione, 1990a; Facione et al., 1994, 1995; Lawrence et al., 2009). The interaction between these components is believed to equate to an individual's overall critical thinking ability (Clifford et al., 2004; Ku & Ho, 2010; Magno, 2010; Taube,1993).

Philosophical definitions of critical thinking often focus on characteristics of an ideal critical thinker or establish criteria for 'good' thinking (Lai, 2011), whereas psychological conceptualizations tend to emphasize the mastery of discrete cognitive skills and subskills (Abrami et al., 2008; Lewis & Smith, 1993), due to the inherent unobservability of the critical thinking process, which involves a series of cognitive processes. Consequently, many researchers concentrate on critical thinking skills, the overt and observable outcomes of critical thought, typically presented as a list of skills or behaviors (e.g., analysis, inference, and evaluation) performed by critical thinkers (Lai, 2011; Lewis & Smith, 1993).

The critical thinking construct is characterized by its fragmented nature, leading to multiple definitions, classifications and descriptions (Beachboard & Beachboard, 2010; Rowles et al., 2013; Grosser & Lombard, 2008), with varying emphasis on different characteristics, cognitive skills, and dispositional components (Bailin et al., 1999; Griggs et al., 1998; Halpern, 2001; McMillan, 1987; Moseley et al., 2005; Renaud & Murray, 2008; Turner, 2005).

1.6.3 *Critical Thinking Dispositions*

Critical thinking dispositions denote characteristics that reflect an individual's inclination to utilize critical thinking skills (Moseley et al., 2005). These dispositions encompass an individual's motivation to engage in effortful thinking and account for the activation and sustenance of critical thinking skills (Perkins & Ritchhart, 2004). They can be regarded as the underlying drive behind the application of critical thinking skills, i.e., the will

behind the skill. The relationship between cognitive skills and dispositions emphasizes not only the acquisition of critical thinking but also the attitude towards its development (Wang et al., 2008). Therefore, critical thinking dispositions and skills have a symbiotic relationship, as individuals need to possess both the knowledge of appropriate critical thinking skills for specific contexts and the inclination to use them. Consequently, it is the combination of these components, critical thinking skills and dispositions, that represent an individual's actual critical thinking ability (Ennis, 1987a; Facione et al., 1995; Halpern, 1998).

1.6.4 *Critical Thinking Motivation*

Critical thinking motivation is conceptualized as "the degree of motivation that people possess to think critically" (Valenzuela et al., 2011, p. 824). It represents an alternative perspective to the predominant critical thinking dispositions theory by emphasizing the role of motivation in acquiring, developing, activating and sustaining the cognitive resources involved in critical thinking (Valenzuela et al., 2011). The term *critical thinking dispositions* encompasses various conceptualizations, including motivation, which is considered to be a key activating process for critical thinking (Ennis, 1996; Halpern, 1998; Halonen, 1995; Perkins et al., 1993). However, different theorists view critical thinking as an attitude, inclination, or consolidated intellectual habit (e.g., Ennis, 1996; Paul, 1990; Siegel, 1988).

For instance, popular conceptualizations of dispositions include truth-seeking, inquisitiveness, and maturity of judgement (Facione et al., 1994; Facione, 2000). While critical thinking motivation and dispositions are theoretically related, there are sparse overarching theoretical viewpoints or empirical studies about the dispositional or motivational components of critical thinking, and the role these play in the acquisition, transmission, activation, and implementation of critical thinking skills (Sosu, 2013; Valenzuela et al., 2011).

1.6.5 *Neoliberalism*

Neoliberalism is a concept that spans various disciplines, leading to multiple definitions depending on the context (Kleinman et al., 2013). It generally refers to a set of ideological principles and practices characterized by privatization, market expansion, and

hierarchical competitive structures (Cerny, 2008; Harvey, 2005; Moore et al., 2011; Peck & Tickell, 2002; Schostak, 2014, 2017). *Educational neoliberalism*, a manifestation of neoliberalism in education, has faced criticism for its narrowness, lack of democratic engagement, and objectification of educational practices (Boas & Gans-Morse, 2009; d'Agnese, 2019). Within schools, educational neoliberalism emphasizes individualism, self-meritocracy, and competition as a means to achieve better outcomes (Bernstein et al., 2015; DeSaxe, 2015).

This has led to policies promoting standardization, accountability, and inter-school competition (Ball, 2012, 2016; McGregor & Mills, 2014). These policies restrict the autonomy of teachers, school leaders, and students, replacing it with mechanisms of control, such as government oversight in the form of the Office for Standards in Education, Children's Services and Skills (Ofsted) and performativity measures in the form of exam results and school-league tables (Ball, 2001, 2003, 2005, 2008; DiGaetano, 2015; Fuller, 2018; Marginson, 2009; Torrance, 2017). Within the neoliberal educational climate, students are viewed as consumers and human capital, with their value determined by performance indicators (Apple, 2007, 2016, 2017). Consequently, these performance indicators shape the perceived value of skills and behaviors, including critical thinking, within the educational marketplace.

1.6.6 *Institutional Culture*

Institutional culture refers to the shared values, beliefs, and practices that define an educational institution's identity and approach to teaching (Jacobs, 2016; Tierney & Lanford, 2018). It interacts with *sectoral norms*—broader expectations governing educational institutions—which influence policies, curricula, and instructional methods. While sector norms establish overarching guidelines, institutional culture shapes their interpretation and implementation (Dieudé & Prøitz, 2024).

A strong institutional culture supports critical thinking by fostering inquiry, collaboration, and innovative pedagogical practices (Halx & Reybold, 2005; Pithers & Soden,

2000; Rivas & Sánchez, 2016). Schools emphasizing inquiry-based learning and problem-solving cultivate critical engagement, whereas rigid adherence to standardized assessments may hinder it. Educators play a pivotal role in shaping institutional culture, navigating both internal expectations and external pressures (Bridwell-Mitchell, 2012).

1.7 Scope of this Thesis

This section delineates the scope and research parameters of the thesis. While the thesis extensively addresses systemic issues prevalent in the UK education system and their influence on critical thinking instruction, such as neoliberal performativity measures (Ball, 2001, 2003, 2005, 2008; DiGaetano, 2015; Fuller, 2018, Marginson, 2009; Torrance, 2017), it remains centered on the domain-specific focus of psychology and the context-bound nature of psychology education. Consequently, any references to the broader educational landscape will consistently relate back to the experiences of psychology students and educators. By contextualizing the wider educational landscape within the realm of psychology education, the thesis endeavors to provide a pragmatic assessment of the intervention's impact, identify barriers to success, and offer recommendations for future research.

1.8 Chapter Summary

In summary, this introductory chapter provided an overview of the doctoral thesis. The chapter began by discussing the researcher's personal motivation for undertaking this research. The research context was then established, outlining the broader, social, educational, and scholarly context within which the research is situated. The thesis aim and research question were clearly stated outlining what the thesis aims to achieve and how it intends to do so. Following this, the thesis' structure and organization was discussed, providing an overview of the thesis' content and how it would be presented. Key constructs were then theoretically conceptualized, clarifying key terms and concepts explored throughout this thesis. Finally, the scope of the thesis was defined, outlining the boundaries and limitations of the research.

Chapter 2: Literature Review

2.1 Chapter Introduction

This chapter aims to establish a strong rationale for the design, implementation, and evaluation of a domain-specific, school-based critical thinking intervention for pre-tertiary psychology students. It examines the history and debates in critical thinking, its relevance to higher education and psychology, and the influence of educational neoliberalism. The review also emphasizes the importance of improving psychology students' transition to higher education, forming the basis for the proposed research.

2.2 History of Critical Thinking

The critical thinking movement, which began in the early 20th century, has roots tracing back 2,500 years to ancient Greece (O'Hare & McGuinness, 2015; Paul, 1995; Thayer-Bacon, 2000; Wang & Zheng, 2016). Ancient philosophers such as Socrates, Plato, and Aristotle established the foundation of critical thinking (O'Hare & McGuinness, 2015). Socrates' technique of *Socratic questioning*, which involves analysis and evaluation supported by evidence, is considered the historical origin of critical thinking (Demir et al., 2011; Emerson, 2013; Paul et al., 1997). This method also influenced Enlightenment philosophers such as Descartes, Hobbes, Locke, and Kant (Paul et al., 1997). The ideas of these philosophers influenced 20th-century philosophers like Dewey, Ennis, Paul, Lipman, McPeck, and Facione (Gibson, 1995; Lai, 2011; O'Hare & McGuinness, 2015; Sternberg, 1986). These modern thinkers perceived critical thinking as the process of questioning assumptions, engaging in logical reasoning, and seeking truth through dialectic methods (Sternberg, 1986; Wilgis & McConnel, 2008).

The modern concept of critical thinking gained a significant amount of popularity in the early part of the 20th century, particularly in the United States (US), stemming from the work of American philosopher, psychologist, and educational reformer, John Dewey (1910, 1925, 1933). John Dewey is credited with the creation of the first concrete incarnation of critical thinking (Haber, 2020). For Dewey (1910), the essence of both reflective thinking and

critical thinking was “suspended judgement” (p. 74). Dewey’s earliest known reference to critical thinking emphasized the inductive and deductive components of critical thinking (Dewey, 1910). Describing a science-inspired method of reasoning that suggests a potential solution to a problem is provisional until evidence is gathered and tests are conducted to verify or refute the initial answer (Haber, 2020). Dewey (1910) suggested that induction is used to move detailed facts to general principles and that deduction is used to test hypotheses which are generated through the inductive process, emphasizing that critical thinking is a process rather than an outcome (Lamont, 2020). However, it is Dewey’s (1933) definition of *reflective thinking*, with its emphasis on knowledge and belief, “Active, persistent, and careful consideration of a belief or supposed form of knowledge in light of grounds which supports it and the further conclusions to which it tends” (p.9), that laid the groundwork for many of the contemporary definitions of critical thinking (Fisher, 2011). Subsequent authors would eventually substitute the word ‘reflective’ with ‘critical’ (Haber, 2020). However, Dewey’s (1933) discussion of reflective thinking in relation to the scientific method arguably created the basis for the concept of critical thinking used today (Kurfiss, 1988; Streib, 1992).

Building upon Dewey’s (1933) definition of reflective thinking and its implications for the scientific method, Glaser’s (1942) work further enhanced our understanding of critical thinking, offering additional insights and perspectives. In the 1940’s, a psychologist by the name of Edward M. Glaser, also from the US, would make an important contribution to the concept of critical thinking. Their dissertation for Teachers College at Columbia, entitled “An Experiment in the Development of Critical Thinking” created one of the first multifaceted definitions of critical thinking (Glaser, 1942). Glaser’s (1942) definition suggested that critical thinking involved three things; “(1) An attitude of being disposed to consider in a thoughtful way the problems and subjects that come from a range of one’s experience, (2) Knowledge of the methods of logical inquiry and reasoning, and (3) Some skill in applying those methods” (pp. 5-6). Glaser (1942) defined critical thinking as both an attitude and cognitive

process that involves actively and skillfully conceptualizing, analyzing, and evaluating information and arguments in a logical manner. Glaser and Watson would later go on to publish the first comprehensive test of critical thinking called the Watson-Glaser Tests of Critical Thinking (Watson & Glaser, 1942), which is still in use today as the Watson-Glaser Critical Thinking Appraisal (WGCTA; Watson & Glaser, 2002).

Building on these foundational ideas, another influential framework that provided a practical approach to fostering critical thinking skills is Bloom's Taxonomy (Bloom et al., 1956). Bloom's taxonomy of Educational Objectives (Bloom et al., 1956) was originally developed by educational psychologist Benjamin Bloom in 1956. It is a hierarchical framework that categorizes educational objectives based on levels of mental complexity, as it provides a framework for understanding and developing higher-order cognitive skills (Bloom et al., 1956). The taxonomy has found widespread application across educational contexts, originating from the need to support teachers managing post-war expansion in the US Higher Education system (Haber, 2020). Since its inception, Bloom's taxonomy has been widely used in education to guide instructional design, curriculum development, and assessment strategies (Krathwohl, 2002).

The original version of Bloom's taxonomy organized levels of mental complexity from 'Knowledge' at the bottom to 'Comprehension', 'Application', 'Analysis', 'Synthesis', and 'Evaluation' (Bloom et al., 1956). In 2001, Bloom's taxonomy was updated, adding 'Create' as the highest level and making other modifications to reflect new insights into human development, learning and information processing (Krathwohl, 2002).

The 1980s saw a renewed interest in critical thinking (Ten Dam & Volman, 2004), which challenged the traditional approach to education and advocated for a more analytical and evaluative approach to learning (Ennis, 1987b; Paul & Elder, 2006). During this time critical thinking began to emerge as an educational ideal, particularly in relation to the future of education (Facione, 2000). The educational interest was again emanating from the US, as Ronald Regan's National Commission on Excellence in Education published a report called

“A Nation at Risk” (Gardner et al., 1983). According to this report, it was observed that the American education system was lagging behind its counterparts in other countries, posing a threat to various aspects such as the nation’s economy and military security. There were several reforms taken in response to this (Dinkelman, 1990). These reforms took the form of measures to enhance school accountability through demanding academic criteria and frequent evaluations of student progress, but also sparked ongoing debates concerning the excessive dependence on standardized testing (Haber, 2020).

The educational reforms called for in “A Nation at Risk” (Gardner et al., 1983), which emphasized the need for improved quality and rigor in American schools, set the stage for subsequent developments in higher education, including the increased focus on critical thinking skills through initiatives such as California State University’s requirement for a critical thinking course before graduation (Haber, 2020). In 1983, a significant milestone occurred in higher education within the California State University system mandating the completion of a critical thinking course before graduation (Harmon, 1980). This course aimed to equip students with skills in analyzing, critiquing, advocating ideas, and reasoning deductively and inductively, based on clear knowledge or belief statements. The introduction of this requirement made assumptions about the components of quality thinking skills and implied that such skills could be taught (Haber, 2020). The California legislation garnered support from various stakeholders forming a loose ‘Critical Thinking Movement’ (Paul, 1985), with the hope of inspiring other states to adopt similar graduation requirements. While only a few states followed suit, the decision sparked a nationwide expansion of critical thinking courses in higher education, leading to numerous experimentation sites for teaching critical thinking and an ever-growing body of research on critical thinking education from the 1980s onward (Haber, 2020).

These educational transformations were not only witnessed in the US but also in global educational reforms, with critical thinking emerging as an essential graduate outcome emphasized in educational reports from various countries (Ku, 2009). This recognition

equips graduates with the necessary skills to thrive in complex and evolving work environments (Dumitru et al., 2018).

2.3 Key Debates in the Field of Critical Thinking

This section of the literature review explores key debates in critical thinking, highlighting its complexities and nuances. It addresses the *Definitional debate*, examining the challenges of defining and conceptualizing critical thinking. The *Skills vs. Dispositions debate* considers whether critical thinking consists of acquirable skills or is influenced by personality traits and attitudes. The *Domain-General vs. Domain-Specific debate* investigates whether critical thinking skills can be transferred across different domains or if they are domain dependent. Lastly, the *Assessment debate* scrutinizes the various approaches and methods used to measure and evaluate critical thinking abilities.

2.3.1 *Definitional Debate*

The definitional debate surrounding critical thinking has been a subject of contention within academic literature. Researchers have grappled with the task of formulating a universally accepted definition, resulting in a notable lack of consensus in the field (Gyenes, 2015; Halonen, 1995). McPeck (1981) described the paradoxical nature of critical thinking, often being “over-worked and under-analyzed” (p. 2), emphasizing the need for a more comprehensive examination of its conceptual boundaries. Despite significant theoretical efforts to explain and analyze the concept of critical thinking, Moore (2013) questioned whether critical thinking has truly become a coherent and readily comprehensible construct within our educational institutions. Consequently, the absence of a widely recognized definition persists, despite the global recognition of critical thinking as an essential cognitive skill (Puteh & Hamid, 2014). The definitional ambiguity fuels ongoing debates surrounding the constituent elements and overarching nature of critical thinking (Liu et al., 2014; Niu et al., 2013). The interdisciplinary nature of critical thinking further complicates matters, as it straddles the domains of philosophy and psychology, creating disparities in its conceptualization and application across academic disciplines (Ab Kadir, 2007; Gibson,

1995; Lewis & Smith, 1993). Therefore, the need for a coherent and operationally clear definition of critical thinking persists, particularly as it shapes pedagogy and influences students' practical implementation of critical thinking (Berzins & Sofo, 2008; Renaud & Murray, 2008; Rowles et al., 2013).

2.3.1.1 ***Philosophical Definitions of Critical Thinking.*** Despite efforts to define critical thinking universally, philosophers lack consensus on its definition, leading to a contentious debate (Higgins, 2014; Vieira et al., 2011; Wang & Zheng, 2016). Critical thinking combines research from education, philosophy, and psychology, each with distinct perspectives (Sternberg, 1986). These disciplines not only differ in terminology but also in their conceptualizations of critical thinking (Lewis & Smith, 1993).

Philosophers highlight the importance of questioning assumptions, evaluating arguments and information, making inferences, and justifying conclusions (Fisher & Scriven, 2001). They focus on analyzing arguments for their validity and accuracy and emphasize the role of thinking dispositions (Ennis, 1987a; Paul, 1995). Philosophers also consider the affective aspects of critical thinking, including the dispositions to exercise these skills (Ennis, 1985; Reed, 1998).

Philosophical and psychological conceptualizations of critical thinking differ in three keyways. Firstly, philosophical definitions tend to be normative (i.e., related to an evaluative standard), whereas psychological definitions describe cognitive processes and traits essential to critical thinking (Atabaki et al., 2015; Bailin & Siegel, 2002; Gibson, 1995; Vieira et al., 2011). Secondly, philosophical conceptions prioritize logical and analytical thinking, while psychological conceptions emphasize rationality and objectivity (Haskins, 2006). Lastly, philosophical definitions advocate for the idea of an ideal critical thinker, which is absent from psychological definitions (Lai, 2011).

Advocates of philosophical conceptions of critical thinking generally view it as a normative concept (Bailin, 2002; Bailin & Siegel, 2002; McPeck, 1981, 1990), closely tied to informal logic and the cognitive requirements for effective thinking (Atabaki et al., 2015;

Lewis & Smith, 1993; Sternberg, 1986). Informal logic involves examining and evaluating arguments using rules and criteria (Gibson, 1995). In philosophy, critical thinking is associated with formal logic frameworks, acquiring skills through informal logic, and assessing reasoning (Lamont, 2020; Swanick et al., 2014; Vieira et al., 2011).

Philosophers contend that descriptive definitions of critical thinking, commonly used by psychologists, overlook the crucial aspect of the quality of thinking (Higgins, 2014). In contrast, philosophical definitions prioritize the nature and quality of critical thinking outcomes, such as the analysis of arguments (Ab Kadir, 2007). Philosophers argue that critical thinking involves using criteria to make judgements and support conclusions (Case, 2005; Lipman, 1988). Therefore, many philosophical definitions center on the norms of good thinking, the rational aspect of human cognition, and the intellectual values necessary for approaching the world reasonably and impartially (Gibson, 1995).

For example, Bailin (2002) defined critical thinking as high-quality thinking, that meets specific standards of adequacy and accuracy. These standards can be principles, ideas, laws, regulations, norms, or standards used “for judging the adequacy of claims about meaning; the credibility of statements made by authorities; the strength of inductive arguments; and the adequacy of moral, legal, and aesthetic reasons” (Bailin et al., 1999, p. 291). This perspective aligns with other philosophical conceptualizations of critical thinking (e.g., Lipman, 1988,1991; McPeck, 1981, 1990; Paul, 1992, 1995; Siegel, 1988). However, defining critical thinking in terms of normative dimensions of good thinking raises the challenge of distinguishing between good and bad thinking (Halpern, 2014).

Different philosophical conceptualizations of critical thinking appear to share common issues (Atabaki et al., 2015). Scholars argue that the philosophical approach is limited because it relies on normative definitions that may not reflect how critical thinking is actually practiced, questioning the validity of these ideas (Atkinson, 1997; Moore, 2013; Norris, 1992; Sternberg, 1986).

Whilst philosophers focus on the idea of an ideal critical thinker and the normative standards of good thinking, psychologists have approached critical thinking as a psychological object of study (Brock, 2015). They emphasize the individual predispositions and purposeful reflection in developing critical thinking skills (Brock, 2015; Facione, 1990a). Unlike philosophical perspectives, psychological perspectives of critical thinking are descriptive rather than evaluative, considering psychological processes and abilities (Lai, 2011).

2.3.1.2 ***Psychological Definitions of Critical Thinking.*** The modern conception of critical thinking, as an object of psychological inquiry, stems from the 20th century philosophical traditions belief that critical thinking is something that individuals possess (i.e., a trait, attitude, skill or ability), in a quantity that can be measured (Brock, 2015; Lamont, 2020). Psychology-based theories of critical thinking are grounded in cognitive psychology and characterize critical thinking as discrete acts of behavior (Ab Kadir, 2007; Halonen, 1995). Prevailing psychological conceptions tend to suggest that learning to think critically can be understood as gaining mastery of a series of discrete skills and dispositions (Abrami et al., 2008). Research which uses these definitions tend to regard critical thinking as a multidimensional ability, rather than a unitary skill. By illustration, Bensley and Murtagh (2012) argued that critical thinking is a multidimensional construct that involves skills, dispositions, and metacognitions related to critical thinking.

Psychological definitions of critical thinking differ from philosophical ones in three ways: how critical thinking skills are acquired, the research base they rely on, and their relationship to scientific thinking. Unlike the normative philosophical definitions, psychological definitions are primarily descriptive, focusing on psychological processes, mental operations, and cognitive skills associated with critical thinking (Bailin, 1998; Bailin & Siegel, 2002). Psychological definitions encompass a broader range of skills, including problem solving, decision making and hypothesis testing (Halpern, 1998, 2014).

A common criticism of the psychological approach to critical thinking is its omission of the concept of ‘good’ thinking (Higgins, 2014). Unlike philosophical definitions, psychological definitions do not focus on a normative standard that defines what constitutes good thinking. Critics of the psychological approach argue that it is possible to go through the motions of critical thinking without truly engaging in critical thought (Bailin, 2002). They argue that simply analyzing, evaluating, and suggesting solutions does not guarantee a good outcome or meet sufficient standards. Cognitive psychologists prioritize studying how people think, rather than how they should think in ideal conditions, a distinction emphasized in the philosophical tradition (Sternberg, 1986). Philosophers focus on cognitive processes, components, and applications to investigate and address academic and practical problems (Gyenes, 2015; Reed, 1998).

Philosophers define the ideal critical thinker in terms of criteria or standards for ‘good’ thinking, while psychologists focus on observable actions or behaviors exhibited by critical thinkers (Lai, 2011). Psychologists often provide lists of skills or procedures that can be measured by researchers (Lewis & Smith, 1993). However, philosophers criticize the psychological approach for reducing complex demonstrations of knowledge and skill into disconnected steps or procedures (Lai, 2011; Sternberg, 1986). Bailin (2002) suggested that psychologists define critical thinking as discrete steps or skills due to the need for observable definitions. Since the thought process is unobservable, psychologists emphasize observable behaviors like analysis and inference. Higgins (2014) further argued that assessing critical thinking or isolated skills may fail to capture the quality of the thinking or the relationship between cognitive skills and the task being assessed. However, this criticism confuses the activity of critical thinking with its components (Facione, 1990a).

While it is true that a checklist of critical thinking skills may identify the presence or absence of thinking but not its quality or relevance (Higgins, 2014), critical thinking goes beyond the sum of its parts (Gelder, 2005). Psychological conceptions of critical thinking have an empirical research base, whereas philosophy relies more on theorizing and logical

reasoning (Ab Kadir, 2007). Psychologists focus on the growth of critical thinking and draw on cognitive psychology and intellectual theories (Bransford et al., 1999; Halpern, 1998), but there are two general issues with the empirical research base for psychology-focused theories of critical thinking (Atkinson, 1997). Firstly, studies often test performance in lab settings which may differ from real-world scenarios. Secondly, some theories prioritize testability over construct validity. Atkinson (1997) emphasized the need for external consistency between psychology-based theories of critical thinking and the behaviors they aim to describe.

Philosophical and psychological definitions of critical thinking also differ in their conceptualized relationship to scientific thinking. Psychological conceptualizations often emphasize a strong association with scientific thinking, emphasizing objective thinking, hypothesis testing, understanding probability, and reducing biased thinking (e.g., Halpern, 2014). For instance, Kurfiss (1988) described critical thinking as “an investigation whose purpose is to explore a situation, phenomenon, question, or problem to arrive at a hypothesis or conclusion about it that integrates all available information and that can therefore be convincingly justified” (p. 2).

Some psychologists conflate critical thinking with scientific thinking, suggesting that critical thinking involves the proper use of scientific research methods (Benjafield, 1994; Meltzoff & Cooper, 2018). Scientific thinking encompasses the ability to generate, test, and evaluate claims, data, and theories (Bullock et al., 2009; Koerber et al., 2015), and many psychologists consider the evaluation of claims as a central aspect of critical thinking (Allegretti & Frederick, 1995; Stanovich, 2013; Tavris & Wade, 1997). By illustration, Lawson (1999) proposed that “psychological critical thinking involves evaluating claims using the basic principles of psychological science” (p. 207).

Psychological perspectives increasingly contrast critical thinking with errors and biases that lead to erroneous and unscientific conclusions (Lamont, 2020). Many psychologists view critical thinking as a solution to pseudoscientific beliefs (Bensley, 1998;

Dunn et al., 2008; Halpern, 2014; Smith, 2011; Stanovich, 2013; Sternberg et al., 2007). Psychological definitions of critical thinking often incorporate elements of the scientific method and scientific thinking (Burke et al., 2014; Lawson, 1999; Lawson et al., 2015; Stanovich, 2013; Williams et al., 2003), emphasizing critical thinking dispositions (e.g., fair-mindedness) and skills (e.g., literature evaluation), as well as scientific literacy (Brewer, 2008). However, this emphasis on scientific literature and thinking is not consistent across all interpretations of critical thinking (Huber & Kuncel, 2016). It is widely recognized that students need skills to navigate vast amounts of information and critically evaluate its scientific integrity (Smith, 2011), although these skills are not always included in critical thinking instruction (Wright, 2002). In psychological instruction, the primary goals of critical thinking in psychology are to help students become better consumers and producers of psychological research (Burke et al., 2014). Therefore, throughout this thesis, Lawson's (1999) domain-specific, psychological definition of critical thinking will be adopted due to the unique way critical thinking is characterized within psychology (APA, 2023; BPS, 2019; QAA, 2023) and its relationship to scientific thinking and research methods, which is discussed below in section 2.5 (pp. 47- 48).

2.3.2 *Skills versus Dispositions Debate*

Critical thinking is widely considered as encompassing both cognitive skills and dispositional components (Lai, 2011). Critical thinking skills refers to the cognitive component of critical thinking (Facione, 1990a; Facione et al.,1994, 1995; Lawrence et al., 2009), whereas critical thinking dispositions refers to the characteristics that reflect an individual’s inclination to use critical thinking skills (Moseley et al., 2005). Scholars and researchers have consistently emphasized the importance of considering both skills and dispositions when discussing critical thinking.

The American Philosophical Association’s Delphi Panel highlighted the significance of skills and dispositions in the education of well-rounded critical thinkers (Facione, 1990a). This view has been endorsed by most theorists (Bailin & Siegel, 2002; Behar-Horenstein &

Niu, 2011; Dunne, 2015; Sternberg et al., 2007). Therefore, critical thinking is not solely about possessing the cognitive ability to think critically but also about having the right disposition.

Dispositions, as defined by Facione (2000), refers to a “consistent internal motivation to act towards or respond to persons, events, or circumstances in habitual, yet potentially malleable ways” (p. 64). Facione (2000) argued that effective teaching of critical thinking must involve strategies for building intellectual character, and a focus on dispositions rather than exclusively strengthening cognitive skills. Numerous studies have provided substantial evidence showing strong connections between an individual’s disposition towards critical thinking and their actual ability to engage in critical thinking (Dwyer et al., 2011; Facione et al., 1994; Facione, 2000).

While critical thinking skills are essential, possessing them does not guarantee their application without accompanying dispositions (Halonen, 1995). Developing the dispositions of a critical thinker is considered an essential component of critical thinking (Profetto-McGrath, 2003). Additionally, critical thinking dispositions are compounded with the ability to think critically, making it challenging to delineate their separate effects using assessments (Lai, 2011). This confounding relationship further emphasizes the intertwined nature of critical thinking skills and dispositions.

Abrami et al. (2008) emphasized the need for educational interventions to explicitly focus on improving critical thinking skills and dispositions in educational settings. Many critical thinking interventions focus on the teaching of critical thinking skills rather than assessing dispositions, particularly in the social sciences (Lanz et al., 2022; Puig et al., 2019; Tiruneh et al., 2014). The undervaluing of critical thinking dispositions in educational settings is a major concern (Dumitru et al., 2018).

In summary, critical thinking encompasses both cognitive skills and dispositional components. The interplay between these skills and dispositions can be seen as

interconnected and mutually reinforcing. It is beneficial for educators and researchers to consider the importance of nurturing critical thinking dispositions in conjunction with the development of cognitive skills to help foster well-rounded critical thinkers.

2.3.3 *Domain-General versus Domain-Specific Debate*

The domain-general versus domain-specific debate in critical thinking centers on whether critical thinking skills are transferable across different contexts or whether they are inherently tied to specific domains. Generalists argue that critical thinking consists of universally applicable skills such as reasoning, problem-solving, and logical analysis, which can be developed independently of subject matter (Ennis, 1989; Siegel, 1988; Paul, 1985, 1992). They advocate for content-free instruction in critical thinking, emphasizing the development of broad cognitive strategies (Bailin & Siegel, 2002; Ennis, 1989). In contrast, specifists contend that critical thinking is inextricably linked to domain-specific knowledge, requiring contextual understanding to be effectively applied (Brookfield, 2003; Glaser, 1984; McPeck, 1981; Willingham, 2008). They argue that the ability to think critically within a domain does not necessarily translate to other areas, as expertise and subject knowledge are fundamental to effective critical engagement (Angeli & Valanides, 2009; Gyenes, 2015). The contemporary literature increasingly supports a middle-ground approach, suggesting that while core critical thinking skills may have universal components, their application is heavily dependent on the learner's knowledge and contextual factors (Bailin & Siegel, 2002; Facione, 1990a; Gyenes, 2015; Lai, 2011; Pithers & Soden, 2000).

Within psychology, the domain-specific nature of critical thinking is particularly evident. Psychological critical thinking involves the ability to critically evaluate psychological theories, research methodologies, and empirical findings (Lawson, 1999). Studies indicate that targeted instruction in psychological critical thinking leads to significant gains in students' analytical abilities, enhancing their capacity to assess the credibility of psychological information (Lanz et al., 2022). Williams et al. (2003) found that students demonstrated greater improvements in critical thinking when assessed using psychology-

specific measures rather than general tests. Similarly, Renaud and Murray (2008) reported larger pretest-posttest gains in critical thinking when assessments focused on psychology-related content. These findings reinforce the argument that domain-specific instruction is particularly effective in fostering deep and contextually relevant critical thinking skills.

While domain-general critical thinking encompasses broadly applicable cognitive abilities, its limitations become apparent when applied to specialized disciplines such as psychology. General critical thinking courses may teach students to evaluate arguments and recognize cognitive biases, but they often lack the specificity needed for rigorous psychological inquiry (Schwanz & McIlreavy, 2015; Williams et al., 2003). For example, psychological research necessitates an understanding of ethical considerations, statistical reasoning, and methodological rigor—elements that are not sufficiently covered in domain-general critical thinking curricula (Richardson & Slife, 2011; Stark, 2012). Consequently, an over-reliance on generalized reasoning may lead to misconceptions when students attempt to apply broad critical thinking strategies to complex psychological issues without adequate domain knowledge (Bamberger et al., 2024; Murti et al., 2021).

From an educational standpoint, integrating both domain-general and domain-specific critical thinking approaches presents a more comprehensive framework for developing proficient psychologists. General critical thinking skills enhance overarching reasoning abilities, while domain-specific training equips students with the specialized knowledge necessary for evaluating psychological research and practice (Basterfield et al., 2023). Structured educational interventions tailored to psychological methodologies have been shown to enhance employability skills and real-world problem-solving capabilities (Cascio, 2017; Murti et al., 2021). This dual approach ensures that students are not only capable of engaging in broad critical analysis but are also adept at applying these skills within their discipline-specific contexts.

Moreover, fostering psychological critical thinking directly addresses misconceptions within the field by promoting evidence-based practice and critical evaluation of psychological

constructs (Carroll, 2013; Treadwell, 2008). Studies demonstrate that domain-specific training reduces cognitive biases and enhances informed decision-making, emphasizing the necessity of a discipline-focused approach to critical thinking education (Bamberger et al., 2024). Furthermore, workshops designed to cultivate psychological critical thinking among undergraduates have yielded positive outcomes, improving both the quality of students' analytical reasoning and their confidence in addressing complex psychological issues (Bamberger et al., 2024).

The long-term benefits of domain-specific critical thinking extend beyond academia into professional practice. Psychologists with a strong foundation in psychological critical thinking are better equipped to navigate the complexities of clinical, research, and applied psychology settings (Cascio, 2019; Penningroth et al., 2007). They demonstrate enhanced effectiveness in client interactions, accurate diagnostics, and evidence-based decision-making processes, all of which are grounded in critical engagement with psychological theories and methodologies (Blessing, 2023; Lawson, 1999; Richardson & Slife, 2011). Additionally, as psychology continues to evolve, professionals who possess both domain-specific and general critical thinking competencies are more adaptable to emerging trends and challenges within the discipline (Abdellatif & Abdel-Gawad, 2020; Buskist et al., 2012).

In conclusion, while domain-general critical thinking provides foundational cognitive tools, it is the domain-specific application of these skills that truly enhances expertise within psychology. The unique demands of psychological inquiry necessitate specialized critical thinking skills that general approaches alone cannot fully cultivate. Through targeted education and training, students can develop the competencies needed to critically evaluate psychological research and practice, ultimately leading to improved outcomes in clinical, educational, and professional settings. Emphasizing domain-specific critical thinking not only benefits individual psychologists but also contributes to the advancement of psychological science as a whole, ensuring that it remains rigorous, relevant, and responsive to societal needs. Throughout this thesis, a domain-specific view of critical thinking will be adopted due

to the unique way critical thinking is characterized within psychology, which is discussed below in section 2.5 (pp. 47- 48).

2.3.4 *Assessment Debate*

The assessment of critical thinking is a complex and debated topic in educational research (Ku, 2009). Defining and measuring critical thinking is challenging due to its abstract nature and inclusion of cognitive and dispositional components (Ku, 2009; Paul, 1985). Various assessments, including standardized tests and performance-based assessments have been developed to capture cognitive and dispositional aspects of critical thinking (Evans, 2020). However, ongoing debates exist regarding domain-specificity and transferability of critical thinking skills, and the conflation of critical thinking with subject-specific knowledge and dispositional aspects further complicates assessment (Lai, 2011).

Standardized tests such as the Watson-Glaser Critical Thinking Appraisal (WGCTA; Watson & Glaser, 2002), California Critical Thinking Skills Tests (CCTST; Facione, 1990b) and the Cornell Critical Thinking Test (CCTT; Ennis et al., 2005) primarily rely on multiple-choice items (Ku, 2009). While multiple-choice items offer objectivity, efficiency and are low cost (Lee et al., 2011), they have limitations in capturing the full range of skills and dispositional aspects. They fail to assess critical thinking in unprompted contexts and may not capture the full range of skills and dispositions, or align with content taught in classrooms (Evans, 2020; Ku, 2009; Larsson, 2021).

Studies highlight low internal consistency and poor construct validity of various critical thinking measures (Bernard et al., 2008; Ku, 2009; Leppa, 1997; Loo & Thorpe, 1999). The reliance on a single multiple-choice format may not be suitable for all measurement contexts (Alsaleh, 2020). Standardized tests often focus on general critical thinking skills, neglecting other important aspects resulting in construct underrepresentation (Evans, 2020).

To address these limitations, it is crucial to choose assessment instruments that precisely measure critical thinking and align with the context in which they are being used (Istiyono et al., 2019). Incorporating constructed-response items is particularly crucial for evaluating critical thinking skills in real-world scenarios (Liu et al., 2014). Constructed response-items offer insights into thinking processes and the ability to generate original responses, reflecting the complexity of real-life critical thinking situations (Frederiksen, 1984; Lane, 2004; Shepard, 2000). While they may have lower reliability, their inclusion enhances the validity of the assessment by capturing the multifaceted nature of critical thinking (Liu et al., 2014).

Studies have shown high correlations between multiple-choice and constructed-response items measuring the same constructs, indicating that constructed-response items offer additional insights into higher-order thinking skills, such as analysis, synthesis, and evaluation (Klein et al., 2009; Rodriguez, 2003). Multiple-choice and constructed-response items should strike a balance in assessing critical thinking. Multiple-choice items provide efficiency and reliability but limit the demonstration of reasoning and higher order thinking skills (Bassett, 2016; Ennis, 1993; Halpern, 2003; Norris, 1989, 2003). Whereas constructed-response items offer authenticity and the opportunity to showcase real-world critical thinking skills complementing multiple-choice items (Liu et al., 2014).

Content knowledge plays a role in distinguishing critical thinking across professions (Rear, 2019). However, assessments that focus solely on generic measures may overlook the domain-specific knowledge required to think critically in different disciplines (Liu et al., 2014). The Revised Psychological Critical Thinking Exam (R-PCTE; Lawson et al., 2015) has been designed to specifically measure critical thinking skills relevant to psychology students and has demonstrated excellent split-half and test-retest reliability. Notably, psychology students outperformed students from other disciplines on the measure, emphasizing the relevance of domain-specific measures. By employing domain-specific

measures, such as the R-PCTE (Lawson et al., 2015), researchers and educators can target and evaluate domain-specific abilities.

The assessment of critical thinking is a complex endeavor. While standardized tests offer advantages, they have limitations in capturing the full range of critical thinking skills. Incorporating constructed-response items and domain-specific measures provides a more authentic assessment of critical thinking abilities. Striking a balance between multiple-choice and constructed-response items is crucial, and domain-specific assessments play a valuable role in capturing the unique critical thinking skills relevant to different disciplines.

2.4 Critical Thinking in Higher Education

Critical thinking plays an important role in higher education, Arum and Roksa (2011) emphasized the significance of critical thinking as a crucial component of general education. Even without explicit attempts to foster critical thinking, universities are commonly perceived as breeding grounds for critical thinkers (Huber & Kuncel, 2016). Educational policies frequently mention the goal of cultivating critical thinking skills (Atabaki et al., 2015), reflecting the consensus among researchers and educators regarding its importance (Behar-Horenstein & Niu, 2011). McCormick et al. (2015) argued that problem-solving and critical thinking skills have broad applicability across all fields of education and are highly valued in the workplace and everyday life. Additionally, critical thinking allows individuals to move beyond simple information retention, gaining a more comprehensive understanding of the subject matter (Dwyer et al., 2012; Halpern, 2014). It equips students with the ability to make sound decisions and solve problems in social and interpersonal contexts (Ku, 2009). Institutions of higher education recognize the significance of critical thinking, as evidenced by university goals statements, accreditation standards, and government policies (Facione et al., 1995). In today's rapidly changing world, teaching critical thinking is essential for students to reason effectively about social affairs (Ku, 2009). Acquiring critical thinking skills allows students to question assumptions, analyze arguments, and evaluate information within and outside their chosen fields (Bensley & Spero, 2014). Therefore, promoting critical

thinking is a central task of higher education, aligning with the overarching goal of developing students' thinking abilities (Arend, 2009; Pithers & Soden, 2000).

2.5 Critical Thinking in Psychology

Psychological critical thinking is widely considered to be a crucial skill for psychology undergraduates (Lawson, 1999; Lawson et al., 2015), as evidenced by its reference in the British Psychological Society (BPS, 2019) standards for accreditation, American Psychological Association (APA, 2023) guidelines for the undergraduate psychology major, and the Quality Assurance Agency for Higher Education (QAA, 2023) subject benchmarks for psychology. These guidelines emphasize the development of critical thinking skills to enhance students' ability to engage with psychological research and apply the scientific method (Burke et al., 2014). Although interpretations of critical thinking may vary, the forementioned guidelines prioritize critical evaluation of research and claims while integrating the fundamental principles of psychological science (Huber & Kuncel, 2016; Koerber et al., 2015; Lawson, 1999; Lawson et al., 2015).

The BPS underscores the importance of discipline-specific critical thinking in psychology, stating that graduates should be able to "reason scientifically, understand the role of evidence, and make critical judgments about arguments in psychology" (BPS, 2019, p. 10). Similarly, the QAA highlights that critical thinking skills are a key strength of psychology education, noting that "students learn how to use a range of empirical methods of inquiry—critically and ethically—to interpret evidence and communicate it to various audiences" (QAA, 2023, p. 3). The APA also stresses the importance of "scientific inquiry and critical thinking" as essential learning objectives for undergraduate psychology programs (APA, 2023, p. 6).

This narrow focus on method-centered critical thinking within psychology has been acknowledged by various theorists (Richardson & Slife, 2011; Yanchar et al., 2008). This emphasis on research methodology and methods-based reasoning aligns with the conventional definitions of critical thinking in psychology, which generally emphasize

objectivity and the evaluation of established research principles. These principles include the assessment of research methodologies, measurements, statistical analysis, and the drawing of appropriate conclusions based on empirical data (Bensley, 1998; Halonen, 1995; Lawson, 1999, Lawson et al., 2015; Meltzoff & Cooper, 2018; Stanovich, 2013).

The excessive emphasis on critical thinking solely within the context of research methods and methods-based reasoning, while promoting the notion of objectivity and value neutrality in psychological science, has faced criticism for its limited consideration of alternative perspectives (Yanchar et al., 2008). It could be argued that this phenomenon arises from the aspiration for psychology to be considered a science, which necessitates subjecting all psychology research to scrutiny based on the criteria of good science. This argument holds true even within the framework of the A-level psychology specification. In 2008, psychology was reclassified as a science, aiming to align it more closely with other scientific disciplines (BPS, 2013). However, it is important to acknowledge that critical thinking in psychology encompasses various dimensions, and the ethos of scientific analytical reasoning fails to encompass the diverse nuances within which instructors, researchers, and practitioners employ critical thinking (Yanchar et al., 2008).

Danziger (1997) suggested that critical thinking should encompass additional criteria, such as exploring the motivations of the researcher, such as their interest in the topic, including their political, economic, and personal interests. Furthermore, it has also been argued that critical thinking should examine how empirical findings could be interpreted and the consequences that different interpretations may have on the public and within academia (Teo, 2008). Teo (2011) argued that critical thinking extends beyond the evaluation of research; it involves the questioning of the status quo and challenging research myths. This type of critical thinking poses challenges within the A-level psychology system, where the narrow constraints of the specification create apprehension among both students and staff about venturing beyond its boundaries due to the concerns about potential negative impacts on exam results (BPS, 2013).

2.6 Critical Thinking in A-level Psychology

A-level psychology has experienced significant growth in popularity since its introduction in 1971 (Banyard, 2014). From 2019 to 2023, the number of entries consistently increased: 62,685 in 2019, 63,490 in 2020, 68,315 in 2021, 76,265 in 2022, and reaching 78,015 in 2023 (GOV.UK, 2023). This trend extends to degree-level psychology, with 140,425 students enrolling in psychology programs for the 2021/22 academic year (Higher Education Statistics Agency [HESA], 2023).

There are currently four UK exam boards which offer A-level psychology (Assessment and Qualifications Alliance [AQA], 2015; Oxford, Cambridge and RSA Examinations [OCR], 2015; Pearson Edexcel, 2015; WJEC/EDQUAS, 2015). All exam boards use the same assessment objectives (AO) outlined by the Office of Qualifications and Examinations Regulation (Qfqual, 2014) and Qualifications and Curriculum Authority (QCA). These are AO1 “Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures”, AO2 “Apply knowledge and understanding of scientific ideas, processes, techniques and procedures: in a theoretical context, in a practical context, when handling qualitative data, when handling quantitative data”, and AO3 “Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to: make judgments and reach conclusions, develop and refine practical design and procedures” (Qfqual, 2014, p.5).

Since its inception, A-level psychology has undergone revisions and curriculum changes. In 2000, A-level exams transitioned away from essay assessments. Subsequently, in 2008, the coursework components of the A-level was eliminated, reducing the emphasis on practical research design and report writing (BPS, 2013). In 2012, Ofqual announced reforms for AS and A-levels in the UK, including psychology. The goal was to shift A-levels in England and Wales from a modular to a linear system (Bowyer & Carroll, 2016). These reforms resulted in the decoupling of the AS and A-level, removing the need for summative assessments at the end of students’ first year of study. The changes also promoted a review

of assessment objectives, an increased focus on mathematical and employability skills, and preparedness for further study (Hulme et al., 2015).

A-level psychology underwent revisions to align with national policy changes. The new subject criteria were published in November 2014 and four UK exam boards produced psychology specifications for teaching in September 2015 (AQA, 2015; OCR, 2015; Pearson Edexcel, 2015; WJEC/EDQUAS, 2015). However, the most recent revision missed an opportunity to address longstanding issues with the psychology A-level. These issues include the relationship between pre-tertiary and degree-level psychology and how it prepares students for the transition (Foot & Gammon, 1990; Rowley et al., 2008). Additionally, the assessment practices at A-level, which place an excessive emphasis on rote learning for exam success, neglecting critical thinking and other transferable skills (Kitching & Hulme, 2013; Rowley & Dalgarno, 2010).

2.6.1 *Relationship Between A-level and Degree Level Psychology*

Concerns regarding the alignment between A-level and degree-level psychology have been raised for the past 30 years (Banyard, 2008; Foot & Gammon, 1990; Rowley et al., 2008). At degree level, the curriculum follows the BPS (2019) standards for accreditation and the research interests of the lecturers (Banyard, 2008). The influence of the BPS on tertiary psychology education is strong due to the accreditation requirements (BPS, 2013). However, its impact on A-level (i.e., pre-tertiary psychology) is limited to discussions with the five awarding bodies regarding appropriate content (AQA, 2015; OCR, 2015; Pearson Edexcel, 2015; WJEC/EDQUAS, 2015), while the decision to follow this advice lies with the exam boards (BPS, 2013).

In June 2012, the BPS conducted a consultation on the future of A-level psychology, involving representatives from higher education, schools, colleges, and the society (BPS, 2013). The consensus reached during the meeting was that the current A-level inadequately prepares students for degree-level study. Reasons cited included outdated content, an excessive focus on content rather than skills, and assessment practices that promote rote-

learning and exam orientated resources (BPS, 2013). These findings align with previous studies that have reported a significant number of undergraduates expressing dissatisfaction with their A-level experience in relation to their subsequent undergraduate degree (e.g., Higton et al., 2012; Linnell, 2003; Rowley et al., 2008).

Although A-level is intended to prepare students for degree-level study (Banyard, 2008), research indicates that A-level psychology and the grade achieved do not correlate with undergraduate attainment (Banister, 2003; Betts et al., 2008). Smith (2010) argued that changes by the QCA and a dismissive attitude from universities, coupled with the failure of the BPS to influence decision making, have diminished the status of A-level psychology. This presents a concern considering that A-level psychology serves as a determinant for students considering studying the subject at university (BPS, 2013; Green, 2007).

The BPS (2013) consultation raised several other relevant issues for the future of A-level psychology, including the problem of language confusion between pre-tertiary and degree-level psychology. Both levels use the same terms but with different meanings. For instance, *critical evaluation* is required at both levels, but the nature of this requirement differs significantly. This disparity in understanding critical thinking leads to a lack of mutual intelligibility. At the pre-tertiary level, students often engage in a form of pseudo-critical thinking by describing the critiques of others, while at degree level, students are expected to offer their own critiques, which is considered critical evaluation.

2.6.2 *A-level Psychology Assessment Practice*

Despite multiple curriculum changes, the assessment method in A-level psychology has remained unchanged, relying on traditional exam techniques. These techniques have received widespread criticism for assessing only a limited range of cognitive skills (Banyard, 2010). It is widely acknowledged that traditional exams hinder the development of critical thinking by being highly selective and focusing excessively on content retention (Dede, 2010; Facione, 2010). In the BPS (2013), consultation on the future of A-level psychology, the excessive emphasis on knowledge assessment over critical thinking was heavily

criticized, and even when marks were awarded for evaluation, these responses were often just memorized examples. A-level psychology has faced broader criticism for its failure to cultivate transferable skills like critical thinking and its overreliance on rote learning (Kitching & Hulme, 2013).

While the issue of prioritizing lower-level thinking over higher order thinking skills, such as critical thinking, is not exclusive to A-level psychology, it is exacerbated by factors such as the extensive memorization required for achieving high grades, pressure from league tables, and an exam-driven culture (Banyard, 2008, 2010; Jarvis, 2011; Koh et al., 2012). Students often resort to memorization rather than engaging in critical inquiry to amass textbook information for retention-based tests (Ku, 2009). These assessment methods foster a “cookbook approach” to teaching, where textbooks guide students and teachers on how to pass exams at the expense of skills valued in university settings, such as critical thinking (Green, 2007, p. 610). This approach leads to formulaic teaching, drilling students to answer exam-style questions, providing textbooks with evaluative response lists, and adopting a teaching to the test approach by providing students with the answers needed for desired exam results (Baird et al., 2009; Green, 2007; Halonen et al., 2003; Hernandez-Martinez & Williams, 2013). Consequently, students often prioritize memorizing the textbook and assessed content, neglecting more advanced forms of thinking that are not essential for success in the given assessments (Bol & Strage, 1996).

Banyard (2010) argued that we have created “all powerful assessments” (p. 39), pushing students to conform to a passive learning environment and focus on reproducing predetermined exam questions. Gale (1990) suggested that this approach produces “passive learners, respecters of authority, and students whose primary purpose in learning is negative reinforcement and the removal of anxiety…” (p. 483). In the BPS (2013), consultation on the future of A-level psychology, higher education representatives observed that undergraduate students often exhibit risk aversion and resistance to independent study, attributing this behavior to A-level marking practices.

The challenge of striking a balance between short-term goals in A-level teaching, focused on exam preparation, and the long-term goals of fostering transferable skills like critical thinking, has been highlighted (Jarvis, 2011). However, the impact of these teaching and assessment practices on the development of psychological critical thinking skills during students' transition to university remains relatively unknown. Research indicates that many students arrive in higher education with strong pre-tertiary qualifications but limited knowledge of independent study methods (Smith & Hopkins, 2005). They also exhibit relative weaknesses in higher-order cognitive skills, such as critical thinking, which are crucial for university success (Koh et al., 2012). In addition, teaching critical thinking skills to university students is challenging due to significant differences in their prior experience with critical thinking (Forbes, 2018; Klimovienė et al., 2006).

2.7 Influence of Educational Neoliberalism on UK Policy and Provision

The challenges in A-level psychology are part of a broader trend influenced by neoliberal ideologies that have heavily shaped education policies and practices in the UK (Block & Gray, 2016). The rationale for discussing this broader educational context is to illustrate how the prevailing neoliberal framework has structured pre-tertiary education, subsequently influencing students' preparedness for university-level psychology studies. By understanding this educational landscape, we can better contextualize students' academic skills, expectations, and approaches to learning when entering undergraduate programs. However, it is essential to acknowledge that students arrive at undergraduate psychology degrees through diverse entry routes, including A-levels, Business and Technology Education Council (BTEC), Access to Higher Education Diplomas, and international qualifications. These different pathways introduce variability in students' academic preparation, prior exposure to psychological concepts, and familiarity with assessment formats.

Neoliberals view the market as a democratic solution and emphasize numerical measures, standardization, accountability, consumer choice, and individualized success in

educational policies (Hursh, 2016; McGregor & Mills, 2014; Torrance, 2017). This approach frames parents and students as consumers and perceives students as human capital (Apple, 2007, 2016, 2017). In the late 1980s, these neoliberal principles were implemented in the UK education system with the goal of enhancing educational outcomes (DiGaetano, 2015; Wrigley, 2013). This process was initiated by the 1988 Education Reform Act (ERA), which introduced marketisation measures (Jones, 2014). The ERA brought competition between schools through standardized performance indicators and exams, established a national curriculum, and introduced accountability measures for schools' budgeting and staffing (DiGaetano, 2015; Fuller, 2018; Hursh, 2016; Torrance, 2017). Market-driven education reforms aimed to increase parental choice and create an educational marketplace, leading to competition between schools enforced through accountability (Apple, 2016, 2017; Ball, 2003; Fitz & Hafid, 2007; Fuller, 2018). Successive governments have further strengthened the accountability cycle through curriculum standardization and intensified marketplace-based performance measures (DiGaetano, 2015).

While this system has driven performance-oriented behaviors in students and teachers, it is crucial to recognize that not all students experience this standardized curriculum in the same way. A-level students, for example, are often socialized into an exam-driven learning culture that prioritizes rote memorization and standardized testing (Torrance, 2017). In contrast, students entering university through BTEC or Access courses may have engaged with a more coursework-focused, applied, or vocational approach to learning, which can shape their expectations and preparedness for university-level psychology differently.

Neoliberal ideologies emphasizing marketization and competition have continued to dominate educational policy (Ball, 2012, 2016; Dennis, 2019; Exley & Ball, 2014; Page, 2017; Woodin, 2015). Since the 1990s, performance-based accountability policies have focused on measuring and rating teacher outcomes (Amrein-Beardsley & Holloway, 2017; Anderson & Cohen, 2015; Ball, 2016; DiGaetano, 2015; Garver, 2020). School-league

tables, which publish exam results and performance indicators, have been common practice since 1992 (Fuller, 2018). The 1998 School Standards and Framework Act empowered the central government through Ofsted inspections to place schools in special measures and potentially close them if improvements were not shown. Successful schools could expand programs and increase enrollments based on performance indicators (DiGaetano, 2015). The education reforms implemented in the past four decades have significantly influenced school culture, leading many teachers and students to adopt neoliberal principles, where success is now defined by exam results and inter-school competition has become prevalent (Hextall & Mahony, 2013; Jones, 2014).

Given this context, the transition to university can be challenging for students who have been immersed in an educational culture that values performance metrics over deep learning. For A-level students, the strong emphasis on exams may mean they arrive at university well-versed in standardized assessments but less experienced in critical thinking, independent research, or applied learning (Torrance, 2017). Conversely, students entering through alternative routes, such as BTECs, may have had more exposure to coursework and applied assessments but might find the academic rigor and theoretical focus of undergraduate psychology programs initially challenging.

The assessment system now governs the teaching of content, and teaching effectiveness is measured accordingly (Torrance, 2017). As a result, pre-tertiary education has embraced a culture characterized by performance-based mechanisms and marketization, which have become integral to the daily operation of schools (Ball, 2001, 2003, 2005, 2008, 2012, 2016). This culture of performance places stringent constraints on teachers, who must regulate and self-regulate their pedagogy to align with the expectations of measurable performance (Boxley, 2003). Exams are a prominent concern within the prevailing culture of schools, generating discussions among both teachers and students daily (Torrance, 2017). The widely publicized league tables and performance indicators contribute to the valuation of students and teachers within the educational marketplace

(Apple, 2016, 2017). These indicators serve as a punitive form of accountability, as poor results can negatively impact institutions and students (Page, 2017). Consequently, students and teachers are shaping their identities around neoliberal requirements (Anderson & Cohen, 2015; Garver, 2020; Keddie, 2016).

The intensification of neoliberal policies in schools, characterized by market-based reforms and reliance on performance indicators, has influenced teachers' behaviors (Anderson & Cohen, 2015; Garver, 2020). Teachers have embraced the identity and work behaviors of the ideal neoliberal workers by adhering to the data-driven demands of their work environment (Ball & Junemann, 2012; Keddie, 2015; Rose, 1999). School quality is now narrowly defined by a limited range of measurements and comparisons of student performance (Keddie et al., 2011). Consequently, teachers have had to align their teaching practices with quantifiable measures such as exam results and Ofsted evaluations (Ball, 2009). The pressure to achieve good exam results and evaluations drives teachers' focus on compliance (Ball et al., 2011). Non-compliance with accountability measures, which dictate school funding and quality, can have real-world consequences (Keddie et al., 2011).

This culture of accountability encourages risk aversion at all costs (Berry, 2009), leading to a resurgence of the industrialized teaching model that emphasizes standardized pedagogical techniques, such as teaching to test, while many students prioritize accumulating grades through this approach (Luke, 2006; Torrance, 2007, 2017). The influence of neoliberalism on education has resulted in classrooms resembling what Giroux (2010, p. 715) called a "dead zone," as accountability measures prioritize basic skills and testing over critical thinking (Huckle, 2008; Luke, 2006; Torrance, 2007, 2017). Neoliberalism objectifies knowledge and students, shifting the focus away from nurturing critical thinking skills towards quantifiable outcomes and market-driven values (Giroux, 2018). The development of critical thinking skills is influenced by cultural and institutional context (Pithers & Soden, 2000), with institutional culture playing a significant role in their transmission and acquisition (Halx & Reybold, 2005). This may explain the perceived skill

gap when students transition to university, particularly among those from assessment-driven educational backgrounds (Hulme & De Wilde, 2014; Tate & Swords, 2013).

2.8 School-University Transition

The transition from secondary education to university marks a crucial phase in students' academic journeys, necessitating engagement in discipline-specific critical thinking skills (Long et al., 2018). However, this shift often reveals a substantial gap between students' expected capabilities and their actual preparedness, particularly in higher-order cognitive processes such as critical analysis (Cormack et al., 2014; Koh et al., 2012). Despite achieving strong A-level results, many students lack essential critical thinking skills upon entering university (Koh et al., 2012), a challenge widely corroborated by qualitative studies (Duro et al., 2013; Forbes, 2018; McCann & Bates, 2016). This discrepancy highlights a systemic issue: secondary education often prioritizes rote learning and factual knowledge over the development of analytical and evaluative skills, leaving students unprepared for the rigors of university-level academic work (BPS, 2013; Hulme & De Wilde, 2014; Van der Zanden et al., 2020).

The literature extensively emphasizes critical thinking as a fundamental outcome for university graduates (Abrami et al., 2015; Behar-Horenstein & Niu, 2011; Huber & Kuncel, 2016; Niu et al., 2013; Puig et al., 2019; Tiruneh et al., 2014, 2016, 2018). However, the role of prior learning experiences in shaping critical thinking development remains underexplored, with most research focusing on post-secondary education while neglecting the preparatory role of secondary schooling (Evens et al., 2013; Marin & Halpern, 2011; Van der Zanden et al., 2020). Furthermore, the disparity between academic expectations and instructional methods at the secondary and university levels presents a significant challenge (Briggs et al., 2012). The market-driven pressures influencing pre-tertiary education contribute to this skill gap, as the emphasis on quantifiable outcomes frequently overshadows the cultivation of higher-order cognitive abilities (Giroux, 2018; Hulme & De Wilde, 2014; Tate & Swords, 2013). While literature calls for enhanced student preparation

for this transition (Price et al., 2011; Reay et al., 2010), most interventions focus on post-transition support rather than pre-transition initiatives, highlighting the need for collaborative efforts between secondary schools and universities (Kitching & Hulme, 2013). Addressing these deficits requires a reexamination of secondary education curricula, integrating critical thinking skill development alongside content mastery (Hulme & De Wilde, 2014).

The age range of 16 to 19 years is particularly conducive to implementing critical thinking interventions due to significant cognitive developmental changes occurring during this stage. Neuroscientific research identifies adolescence and young adulthood as critical periods for the maturation of higher-order cognitive functions (Giedd et al., 1999; Sowell et al., 1999). During these formative years, students become increasingly capable of engaging with abstract reasoning, complex problem-solving, and independent thought (Larsen & Luna, 2018). This cognitive growth allows for the effective introduction of inquiry-based learning and problem-solving strategies. Additionally, adolescence is marked by an increased willingness to question established norms and develop personal viewpoints, reinforcing the necessity of structured critical thinking interventions.

Despite the recognized importance of critical thinking education, there remains little consensus on the most effective methods for fostering these skills, particularly at the secondary school level (Marin & Halpern, 2011; Moseley et al., 2005). Most empirical studies focus on post-secondary education, leaving a gap in research concerning its implementation in secondary education (Marin & Halpern, 2011). Targeted interventions for 16- to 19-year-olds can bridge this divide, ensuring students are adequately prepared for the analytical demands of university (Evens et al., 2013; Van der Zanden et al., 2020). These skills not only enhance academic performance but also equip students with essential competencies for lifelong learning, informed decision-making, and professional success. The A-level psychology specification emphasizes the development of critical analysis, independent thinking, and research skills, which are valued by higher education institutions and

employers alike (AQA, 2015; OCR, 2015; Ofqual, 2014; Pearson Edexcel, 2015; WJEC/EDQUAS, 2015).

A strategic focus on year 13 A-level psychology students, rather than first-year undergraduates, is particularly justified due to the structured nature of pre-tertiary education, which provides an ideal environment for fostering critical thinking. While not all year 13 A-level psychology students will pursue psychology at university, the standardized curriculum ensures consistent exposure to analytical skills across student groups. The A-level psychology curriculum, despite its intensity, presents a unique opportunity for integrating critical thinking development. This curriculum inherently involves evaluating theories, analyzing research methods, and applying psychological concepts to real-world contexts, all of which align with best practices for higher-order cognitive skill development (AQA, 2015; OCR, 2015; Ofqual, 2014; Pearson Edexcel, 2015; WJEC/EDQUAS, 2015). Moreover, the psychology A-level requires students to engage with diverse perspectives, critique methodologies, and consider ethical implications, reinforcing the broad applicability of critical thinking skills beyond psychology.

Year 13 A-level psychology students are an optimal target group because pre-tertiary education provides a more controlled and uniform learning environment compared to the diverse backgrounds of first-year university students. Unlike university students, who may arrive with varying levels of preparedness, year 13 A-level psychology students share a common curriculum and structured learning framework, allowing for systematic critical thinking interventions. Additionally, university students often face numerous academic and social transitions, complicating the introduction of foundational cognitive skill development (Cheng et al., 2015). In contrast, secondary students benefit from structured guidance and scaffolding, which are essential for the effective integration of critical thinking instruction (Van de Pol et al., 2015; Wilson, 2016). Professional development for teachers further enhances the feasibility of incorporating these interventions within existing curricula.

Given the well-documented importance of critical thinking for university success, pre-tertiary interventions are essential to ensuring students arrive at university equipped with the necessary analytical tools. Furthermore, these skills extend beyond academia, fostering enhanced decision-making, problem-solving, and self-efficacy in various career paths. Encouraging reflective and inquiry-driven mindsets at this stage lays the foundation for lifelong intellectual engagement.

In summary, the integration of critical thinking skill development within secondary education is imperative for facilitating a smoother school-university transition. The A-level psychology curriculum provides a rigorous yet structured framework for fostering these skills, ensuring students develop essential analytical competencies before entering higher education (AQA, 2015; OCR, 2015; Ofqual, 2014; Pearson Edexcel, 2015; WJEC/EDQUAS, 2015). Additionally, the standardized nature of A-level education allows for effective implementation of pedagogical strategies that might be less feasible in the diverse university setting (Van der Zanden et al., 2020). Investing in pre-tertiary critical thinking development not only enhances students' academic readiness but also contributes to their long-term intellectual and professional success, equipping them to navigate an increasingly complex world with analytical rigor and intellectual independence.

2.9 Chapter Summary

The overall aim of this thesis is to design, implement, and evaluate a domain-specific, school-based critical thinking intervention to improve the psychological critical thinking ability of pre-tertiary psychology students, thereby helping to facilitate their transition to degree-level psychology. The primary research question of the thesis is: How can a school-based domain-specific intervention be designed to effectively improve the psychological critical thinking ability of pre-tertiary psychology students and facilitate their transition to study degree-level psychology? This chapter established a strong rationale for this endeavor by exploring the history and debates surrounding critical thinking, its significance in higher education and psychology, and the impact of educational

neoliberalism. Additionally, it highlighted the importance of enhancing psychology students' transition to higher education, forming the foundation for the proposed research.

Chapter 3: Methodology

3.1 Chapter Introduction

This chapter outlines the methodology employed to address the research question: How can a school-based domain-specific intervention be designed to effectively improve the psychological critical thinking ability of pre-tertiary psychology students and facilitate their transition to study degree-level psychology? To systematically address this question, a multiphase sequential mixed method design was utilized (Creswell, 2012; Teddlie & Tashakkori, 2009). The design consisted of four interconnected phases (i.e., studies), each contributing to different aspects of the research question. The following subsections justify the chosen research paradigm, as well as the axiological, ontological, epistemological, and methodological approaches, and data integration procedures. Detailed discussions on data collection and analysis methods, along with ethical considerations, can be found in the study chapters dedicated to each of the four interconnected phases.

3.2 Research Paradigm: Pragmatism

Researchers are encouraged to position their research within a specific research paradigm (Doyle et al., 2009), with the two most common paradigms being positivism/post-positivism and constructivism/interpretivism (Creswell & Plano Clark, 2007). However, in the case of this research, a pragmatic research paradigm was argued to be the most suitable approach for a number of reasons.

Firstly, pragmatism, as a research paradigm, encompasses the philosophical framework most commonly associated with mixed methods research (Creswell & Plano Clark, 2007), and it is not restricted to a specific worldview (Handema et al., 2023). It provides a comprehensive perspective that combines elements from different research paradigms, allowing the use of a variety of different approaches to address research questions that cannot be adequately addressed using a single method (Doyle et al., 2009). It advocates for eclecticism and a needs-based approach to research methods (Johnson &

Onwuegbuzie, 2004), thereby allowing the freedom to determine the most effective methods for answering research questions (Doyle et al., 2009).

In addition, pragmatism supports the integration of qualitative and quantitative methods, emphasizing the importance of producing socially useful knowledge (Feilzer, 2010). Creswell (2014) suggested that adopting a pragmatic approach allows for the utilization of a variety of research paradigms, assumptions, approaches, and methods of data collection and analysis. In the context of this thesis, this flexibility in methodological approach was particularly valuable for studying complex phenomena, such as the psychological critical thinking ability of pre-tertiary psychology students within the context of the school-university transition.

Furthermore, pragmatism offers a way to bridge the gap between subjective and objective perspectives by providing more practical and holistic solutions (Mumba & Alici, 2021). This approach involves engaging in a continuous cycle of abductive reasoning, which contributes to a deeper understanding of the phenomena under investigation (Feilzer, 2010). In this research, where the aim was to enhance pre-tertiary psychology students' psychological critical thinking ability, the use of a mixed-methods approach enhanced the breadth and depth of understanding by combining qualitative insights into participants' subjective experiences with quantitative measures of psychological critical thinking ability (Johnson et al., 2007).

The pragmatic paradigm allows for the selection of methods based on their practical effectiveness rather than rigid adherence to a specific paradigm (Brown & Dueñas, 2020). By embracing a plurality of methods, the most appropriate tools could be chosen for each stage of the research process, including data collection and analysis (Kaushik & Walsh, 2019). This approach aligned with the multiphase sequential mixed methods design employed in this thesis, enabling a comprehensive understanding of the intervention's effectiveness (Creswell, 2012; Teddlie & Tashakkori, 2009).

Pragmatism is often considered the philosophical partner of the mixed methods approach, as its underlying assumptions provide the foundation for blending research methods (Denscombe, 2008; Mitchell, 2018). It allows for the integration of paradigms, assumptions, approaches, and methods of data collection and analysis, promoting a holistic understanding of the research topic (Creswell, 2014). By adopting a pragmatic paradigm, flexibility was gained to use diverse research methods while maintaining a coherent and rigorous approach.

Given the aim of this thesis, a pragmatic approach was the most suitable choice. Pragmatism, with its emphasis on flexibility, eclecticism, and the integration of qualitative and quantitative methods, aligned well with the goals of this study. By adopting a pragmatic approach, the research could effectively address the research question, contribute to the advancement of knowledge in the field, and help facilitate the transition of students to degree-level psychology in terms of psychological critical thinking skills. A research paradigm is comprised of four elements: axiology, ontology, epistemology, and methodology. The following subsections will discuss each of these in detail.

3.3 Axiological Position

In this thesis, a pragmatic axiological position that integrates both value-free and value-laden perspectives was adopted, with axiology—encompassing the study of ethics and values—serving as the foundational aspect of the research paradigm (Biedenbach & Jacobsson, 2016; Brown & Dueñas, 2020; Ihuah & Eaton, 2013). While debates surrounding the philosophy of knowledge in mixed methods research have traditionally centered on ontology, epistemology, and methodology, axiology has often been overlooked (Biddle & Schafft, 2015; Denzin & Lincoln, 1994). This omission is particularly evident in pragmatic mixed methods research, which has tended to neglect ethical considerations and value judgments.

The positivist perspective advocates for value-free research, emphasizing objectivity and neutrality through scientific methods (Chilisa & Kawulich, 2012). However, Maarouf

(2019) argued that research cannot be truly value-free, even from a positivist perspective, as pre-understanding and subjective biases are inherent. Alternatively, constructivists acknowledge the value-laden nature of social inquiry, acknowledging the influence of values in all stages of the research process (Chilisa & Kawulich, 2012; Maarouf, 2019; Poni, 2014).

Considering these perspectives, adopting a pragmatic axiological position in this research allowed for the integration of value-free and value-laden perspectives. Acknowledging the influence of values while maintaining a rigorous and scientific approach, contributes to a comprehensive understanding of the critical thinking intervention.

3.4 Ontological Position

In this thesis, a pragmatic ontological position that combines the realist and relativist ontological approaches was adopted. The use of a pragmatic ontological position allowed for a more comprehensive understanding of the complexities involved in designing, implementing, and evaluating a domain-specific, school-based critical thinking intervention for pre-tertiary psychology students. Brown and Dueñas (2020) emphasized that different research paradigms adopt different approaches to defining the nature of reality (i.e., ontology). Ontology is related to whether there is one verifiable reality or whether multiple, socially constructed realities exist (Patton, 2002). Embracing a pragmatic ontological position in this research recognizes the existence of both an external reality and individual subjective interpretation of that reality (Morgan, 2007; Saunders et al., 2009).

As previously mentioned, this thesis utilized a multiphase sequential mixed methods design (Creswell, 2012; Teddlie & Tashakkori, 2009). Schoonenboom and Johnson (2017) suggested that a multilevel (i.e., multiphase) design presents increased ontological complexity due to the involvement of multiple realities, making the adoption of a pragmatic ontological stance even more appropriate. By recognizing the existence of multiple levels of reality, the research acknowledged the diverse perspectives that can be brought into the research process, enhancing its richness and depth.

Adhering to a pragmatic ontological belief system allowed for the integration of both positivist and interpretivist epistemological beliefs (Rehman & Alharthi, 2016). Positivists believe that reality is context-free and objective, while interpretivists believe in multiple socially constructed realities. The adoption of a pragmatic stance enabled the appreciation of both deductive and inductive approaches (Doyle et al., 2009), which was especially relevant in designing, implementing, and evaluating an intervention aimed at improving psychological critical thinking abilities, as it required a nuanced understanding of the complex interaction between the psychological construct of critical thinking and social praxis (Guyon et al., 2018).

By embracing a pragmatic ontological position, this research maintained a delicate balance between realism and relativism. Positivist researchers argue for a realist ontology, where reality exists independently of the observer (Guba & Lincoln, 1994). Alternatively, interpretivist researchers hold a relativist, anti-foundational ontology, where reality is socially constructed and dependent on individuals' perceptions (Dammak, 2015). The pragmatic stance allowed for the integration of these perspectives, acknowledging that objective reality exists while recognizing the role of subjective interpretations in shaping understanding.

Additionally, pragmatism allowed the thesis to focus on the practicalities of research and the process of inquiry rather than getting entangled in contentious philosophical debates about the nature of reality (Creswell & Plano Clark, 2011). This approach was highly beneficial for designing and implementing a school-based critical thinking intervention, where the focus should be on the effectiveness and impact of the intervention on psychology students' psychological critical thinking development rather than rigid adherence to specific ontological positions.

Adopting a pragmatic ontological position for this research offered a balanced and comprehensive approach to designing, implementing, and evaluating a domain-specific, school-based critical thinking intervention for pre-tertiary psychology students. The pragmatic stance facilitated the integration of diverse ontological assumptions and methods,

enabling a more holistic and contextually sensitive understanding of pre-tertiary psychology students' critical thinking abilities. The pragmatic approach aligned well with the aim of facilitating students' transition to degree-level psychology by equipping them with improved critical thinking skills in a real-world, school-based setting.

3.5 Epistemological Position

Epistemology, which concerns the nature of knowledge, how it is acquired, and the relationship between the knower and the known (Brown & Dueñas, 2020; Kaushik & Walsh, 2019), is pivotal in research. Kivunja and Kuyini (2017) contend that exploring diverse epistemological perspectives enables researchers to contribute significantly to advancing knowledge in their respective fields. Thus, for this research, a pragmatic epistemological stance was deemed suitable. This approach facilitates the integration of elements from positivist and interpretivist (i.e., constructivist) epistemologies. Pragmatism rejects the traditional dichotomy between objectivity and subjectivity, allowing researchers to transcend the artificial divisions imposed by positivism and interpretivism, thereby promoting a more nuanced understanding of knowledge acquisition and construction (Biesta, 2010; Creswell & Plano Clark, 2011).

The pragmatic epistemological position was chosen to reconcile the divergent perspectives of positivism and interpretivism. Pragmatism provides a framework for combining quantitative and qualitative methods to effectively address research questions (Hussain et al., 2013). It supports a relational epistemology, granting researchers the discretion to establish appropriate relationships within the study based on the specific requirements and context of the research project (Kivunja & Kuyini, 2017). This inclusivity and ability to accommodate various theorists and methodologies characterize the pragmatic approach, making it well-suited for mixed-methods research (Hussain et al., 2013). By drawing upon different perspectives within the pragmatist tradition, it was hoped that the intervention’s effectiveness could be enhanced.

Furthermore, pragmatism emphasizes the researcher's judgment and decision-making in establishing connections and associations during the research process (Kivunja & Kuyini, 2017). This approach acknowledges the existence of a real world while recognizing individual interpretations of that world (Morgan, 2007). This acknowledgment was important in exploring how psychology educators and students construct their understanding of critical thinking and how the intervention influenced the psychological critical thinking ability of pre-tertiary psychology students (Guyon et al., 2018).

In the context of this research, the pragmatic epistemological position was deemed valuable. By adopting a pragmatic approach, the research could integrate quantitative and qualitative methods, enabling a comprehensive and nuanced understanding of critical thinking development within the specific educational context. The integration of quantitative and qualitative methods allowed for the objective measurement of the effectiveness of the intervention (Poni, 2014). Simultaneously, the incorporation of qualitative methods, rooted in interpretivist principles, provided deeper insights into psychology educators' and students' subjective experiences and perceptions, contributing to a more comprehensive understanding of its effectiveness (Poni, 2014; Ulin et al., 2012).

By employing mixed methods within a pragmatic framework, an effective intervention was designed; its impact was measured quantitatively, and rich qualitative insights were gained into students' experiences and contextual factors, as well as the perspectives of psychology educators. This combination of approaches, aligned with the pragmatic epistemological position, facilitated a thorough investigation of critical thinking development in the pre-tertiary psychology education setting.

3.6 Methodological Approach: Multiphase Sequential Mixed Methods Design

The use of a multiphase sequential mixed methods design allowed for the examination of psychology students' psychological critical thinking ability within the specific educational context through separate qualitative and quantitative studies (Creswell, 2012; Teddlie & Tashakkori, 2009). The use of a multiphase mixed methods approach is

specifically designed for large-scale investigations that employ separate and equally emphasized qualitative and quantitative methodological frameworks (Caruth, 2013). It also aligns with a multilevel analysis, integrating quantitative and qualitative data to explore related aspects of the research question (Schoonenboom & Johnson, 2017). This approach offered flexibility in data collection and analysis, with each phase building on the previous, culminating in an overall fuller understanding of the intervention's impact (Caruth, 2013; Denscombe, 2008; Feilzer, 2010). By combining multiple phases, this research was able to address the research question comprehensively (Schoonenboom & Johnson, 2017). Detailed discussions on data collection and analysis methods, along with ethical considerations, can be found in the study chapters dedicated to each of the four interconnected phases.

3.7 Data Integration

In this thesis, the results from Study Phases 1 and 2 were crucial in informing the design and implementation of Phase 3. According to Caruth (2013), in sequential data analysis, data are analyzed in a specific order rather than being integrated. Therefore, the findings from Phases 1 and 2 were not immediately integrated but were used to inform the subsequent phase of the research.

As highlighted by Kroll and Neri (2009), integration in a multiphase sequential mixed methods design can occur at various stages of the research process, including the discussion section of a report or thesis. The qualitative and quantitative components of the research were meant to inform and supplement each other, as they addressed different aspects of the research question and were drawn from different research strategies (Creswell, 2012; Teddlie & Tashakkori, 2009).

Schoonenboom and Johnson (2017) argued that a true mixed methods study should have at least one point of integration where the qualitative and quantitative components are brought together. They extend Guest’s (2013) definition, defining the point of integration as any point in a study where two or more research components are mixed or connected in

some way. In this thesis, the results of Study Phases 1 and 2 informed the design of Phase 3. The results of Study Phases 3 and 4 were integrated to determine whether the quantitative and qualitative components of the intervention evaluation yielded convergent or divergent results. This integration allowed for triangulation of the findings, enhancing the validity and reliability of the overall evaluation. Figure 1 below illustrates the multiphase sequential mixed methods design, showing the integration of qualitative and quantitative approaches.

Figure 1

Multiphase Sequential Mixed Methods Design: Integration of Qualitative and Quantitative Approaches

Phase 1: Qualitative

Semi-Structured Interviews

↓

Phase 2: Quantitative

Causal-Comparative Design

↓

Phase 3: Quantitative

Quasi-Experimental Pretest-Posttest Design

↓

Phase 4: Qualitative

Semi-Structured Interviews

By following a multiphase sequential mixed methods design, this thesis not only addressed different layers of the phenomenon but also utilized the strengths of qualitative and quantitative methods to gain a comprehensive understanding of the intervention's effectiveness. This approach allowed for a rigorous evaluation of the intervention.

3.8 Chapter Summary

In summary, this chapter presented the methodology employed within this thesis and provided justification for the use of a multiphase sequential mixed methods design (Creswell, 2012; Teddlie & Tashakkori, 2009). The design consisted of four interconnected studies, each contributing to different aspects of the research question. This chapter also justified the chosen research paradigm, including axiological, ontological, epistemological, and methodological approaches, as well as the data integration procedures. As discussed within the chapter, detailed discussions on data collection and analysis methods, along with ethical considerations, can be found in the study chapters dedicated to each of the four interconnected phases.

Chapter 4: Study Phase 1

4.1 Chapter Introduction

This chapter presents the findings from the first phase of the multiphase sequential mixed methods study (Creswell, 2012; Teddlie & Tashakkori, 2009). The primary objective was to identify the nuances of teaching and learning critical thinking at A-level and degree-level in psychology, while pinpointing barriers to effective instruction. Existing research stresses the pivotal role of educator approaches in nurturing critical thinking skills (Halx & Reybold, 2005).

Critical thinking development is not isolated but shaped by the educational context and culture (Pithers & Soden, 2000). By examining how institutional culture influences the interpretation and value of critical thinking, this study aims to inform the design of a tailored critical thinking intervention aligned with the prevailing institutional culture (Reybold, 2003). This alignment is crucial for the successful integration and sustainability of interventions within educational frameworks (Caroti et al., 2022).

The research employs a qualitative approach, utilizing semi-structured interviews with A-level psychology teachers and university psychology lecturers. Key research questions guide the investigation: (1) What are the fundamental aspects of institutional culture at A-level and degree-level in psychology that influence the approach to teaching and learning critical thinking? (2) What are the significant barriers encountered in teaching critical thinking within the context of psychology education at A-level and degree-level institutions? Understanding these dynamics is fundamental for enhancing critical thinking skills among students transitioning to higher education (Van der Zanden et al., 2020).

4.2 Importance of Psychological Critical Thinking for Psychology Undergraduates

Psychological critical thinking is considered a crucial skill for psychology undergraduates, emphasized in accreditation standards and guidelines by organizations such as the British Psychological Society (BPS, 2019), American Psychological Association (APA, 2023), and Quality Assurance Agency for Higher Education (QAA, 2023). This

cognitive ability within psychology involves the rigorous evaluation of claims using core principles of psychological science (Lawson, 1999; Lawson et al., 2015). However, psychology students may face a perceived skill gap in critical thinking when transitioning to university (Hulme & De Wilde, 2014). Factors contributing to this gap may include differing academic expectations, a lack of academic preparedness and the increased complexity of psychological concepts at the university level.

4.3 Teaching and Development of Psychological Critical Thinking Skills

Teaching psychological critical thinking involves scientific reasoning using evidence derived from research literature, focusing on evaluating inferential networks, causal assumptions, operational definitions, and research designs (Barber, 2002; Daniel et al., 2004; Hamaoui, 2023). Moreover, critical thinking in psychology encompasses reflective analysis and objective judgment based on well-grounded evidence, including cognitive skills such as induction, deduction, credibility assessment of sources, and assumption identification (Penningroth et al., 2007; Shen, 2016).

Research has demonstrated that the development of critical thinking skills positively impacts academic performance and reduces susceptibility to psychological misconceptions among students (Cho, 2022; Schwanz & McIlreavy, 2015). This emphasizes the practical significance of psychological critical thinking beyond academia, as employers value graduates with strong analytical abilities (Scott, 2017).

Psychological critical thinking is integral to psychology education and fosters psychological literacy and scientific reasoning essential for addressing real-world challenges (Hulme & Cranney, 2021). Integrating critical thinking into instruction and discussions conveys that psychology is a science grounded in critical analysis and data-driven problem-solving (Muehlenkamp et al., 2015). Through its development and application, students enhance cognitive skills necessary for achieving complexity in psychology education (Ossa-Cornejo, 2019).

4.4 Institutional Culture and Critical thinking

Neoliberal ideology has profoundly reshaped secondary education, primarily through its focus on market-driven reforms, privatization, and competitive hierarchies (Cerny, 2008; Harvey, 2005; Moore et al., 2011). This ideological shift prioritizes measurable outcomes, such as exam performance and league table rankings, over broader educational objectives like fostering critical thinking (Jacobson & Bach, 2022; Joseph, 2020). Defined by a commitment to standardization and accountability (Ball, 2012, 2016; McGregor & Mills, 2014), neoliberalism has driven schools to concentrate on performance indicators, which leads to viewing students as human capital whose worth is determined by these metrics (Apple, 2007, 2016, 2017).

This emphasis on measurable success has had broader implications, including creating barriers to higher education and exacerbating existing inequalities (Lawless & Chen, 2017; van Houten, 2020). Centralized exams, a key feature of neoliberal reforms, further reinforce this focus on test outcomes, often to the detriment of critical thinking instruction (Backes-Gellner & Veen, 2008; Joseph, 2020). As a result, policies centered on standardization and commercialization frequently undermine efforts to teach critical thinking (Tiainen et al., 2019), contributing to a perceived skill gap in higher education (Hulme & De Wilde, 2014; Tate & Swords, 2013).

Compounding these issues is the erosion of teachers' professional autonomy. As schools increasingly operate under market-driven interests (Bocking, 2019), educators face growing constraints imposed by government oversight and performance metrics (Ball, 2001, 2003, 2005, 2008; DiGaetano, 2015). This shift towards a compliance-driven culture places greater value on exam results and minimizes the role of critical pedagogy, reinforcing a cycle of conformity and passive learning (Giroux, 2010; Huckle, 2008).

Moreover, the focus on accountability and competition within the neoliberal framework further restricts opportunities for cultivating critical thinking (Jopling & Harness, 2021; Muhayimana et al., 2022). This market-oriented approach tends to redefine

educational quality through hierarchical comparisons of student performance rather than promoting critical pedagogy (Giroux & Giroux, 2006; Hayes et al., 2006). Consequently, the educational environment has become what Giroux (2010, p. 715) described as a “dead zone,” where the emphasis on basic skills and testing overshadows the development of critical thinking (Huckle, 2008; Luke, 2006; Torrance, 2007, 2017).

In this context, the cultural and institutional factors influencing the development of critical thinking become increasingly significant. Prevailing educational practices shape how critical thinking is transmitted and acquired, highlighting the impact of neoliberal policies on students' critical thinking capabilities (Halx & Reybold, 2005; Pithers & Soden, 2000). As a result, the prevailing focus on measurable success and compliance within neoliberal education leads to a diminished emphasis on critical thinking skills (Ainley & Canaan, 2006), perpetuating a cycle of conformity and passive learning.

4.5 Institutional Culture and Critical Thinking in Psychology Education

In A-level psychology education, there is a prevalent emphasis on rote learning and exam performance, often at the expense of critical thinking development (Banyard, 2008, 2010; BPS, 2013; Green, 2007; Kitching & Hulme, 2013). Despite the recognized importance of critical thinking, secondary educators may have limited awareness of its significance, necessitating deliberate efforts to prioritize these skills (Ali et al., 2021; Christie et al., 2016). Research highlights the crucial role of secondary educators in bridging the gap between rote learning and critical inquiry (Van der Zanden et al., 2020). However, A-level psychology remains entrenched in assessment paradigms favoring memorization over analytical reasoning, undermining the development of critical thinking skills essential for university success (BPS, 2013; Green, 2007; Kitching & Hulme, 2013; Rowley & Dalgarno, 2010).

Although high grades are emphasized in A-level psychology, they do not consistently predict university success (Banister, 2003; Betts et al., 2008). Students often face challenges transitioning to university, where they may lack independent study methods and critical thinking skills (Koh et al., 2012; Smith & Hopkins, 2005). This gap is partly due to

limited critical thinking instruction at the secondary level compared to university demands (BPS, 2013; Green, 2007; Kitching & Hulme, 2013). University programs prioritize critical evaluation, urging students to scrutinize arguments and identify limitations (APA, 2023; BPS, 2013, 2019; Hayes, 1996; QAA, 2023), which may not be adequately developed in secondary education. The exam-focused culture in A-level psychology fosters a risk-averse attitude and hinders independent study skills (BPS, 2013).

Critics argue there is a disconnect between A-level and degree-level psychology, perpetuating misaligned expectations and educational outcomes (Banyard, 2008; Foot & Gammon, 1990). This draws attention to the need to enhance pedagogical approaches in A-level psychology to align better with higher education expectations (BPS, 2019; Jarvis, 2011). A shift towards holistic teaching methods that prioritize critical thinking and knowledge application is necessary to bridge this gap. Institutional culture significantly influences the acquisition of critical thinking skills in psychology education (Halx & Reybold, 2005; Pithers & Soden, 2000). A neoliberal shift toward quantifiable outcomes in A-level psychology often overshadows the cultivation of higher-order cognitive abilities (Giroux, 2018), contributing to the perceived skill gap at university transition (Hulme & De Wilde, 2014).

To bridge the critical thinking gap between secondary and tertiary education, essential pedagogical reforms must prioritize analytical reasoning over rote memorization (Pithers & Soden, 2000). This transformation requires a comprehensive reevaluation of institutional practices to foster a culture of independent thinking and analytical prowess among future psychologists (Hulme & De Wilde, 2014). Addressing this gap necessitates collaboration between A-level and university psychology departments (Hulme & De Wilde, 2014; Kitching & Hulme, 2013). Teachers play a pivotal role in guiding students towards questioning knowledge and developing higher-order thinking skills within dynamic learning environments (Erdoğan, 2020). This collaborative approach, centered on pedagogical innovation and teacher empowerment, is essential for nurturing psychologists equipped with critical thinking skills essential for higher education and beyond. This shift requires a

renewed commitment by educators to cultivate a culture that values critical inquiry as a cornerstone of psychology education.

4.6 The Current Study

The primary aim of this study is to gain a comprehensive understanding of the institutional culture at A-level and degree-level in psychology regarding the teaching and learning of critical thinking, as well as identify barriers to effective instruction. Existing research has emphasized the role of educator approaches in fostering students' development of critical thinking skills, underscoring the significance of understanding the instructional methods employed by educators (Halx & Reybold, 2005). As emphasized by Halx and Reybold (2005), "critical thinking does not occur in a vacuum" (p. 297), and the acquisition of critical thinking skills is influenced by "the context and culture in which it is situated" (Pithers & Soden, 2000, p. 246). By examining how institutional culture shapes the interpretation and value attributed to critical thinking (Reybold, 2003), this study aims to provide insights to inform the development of a critical thinking intervention that aligns with the pre-existing institutional culture.

Understanding the role of institutional culture in shaping critical thinking instruction is foundational to the successful implementation of interventions (Caroti et al., 2022; Zandvakili et al., 2019). By adapting the intervention to fit within the school's existing framework, educators can leverage available resources and foster collaboration among stakeholders, promoting a cohesive approach to nurturing psychological critical thinking skills (Zandvakili et al., 2019). This alignment enables the customization of interventions to address the unique challenges and demands of A-level psychology education.

Seamlessly integrating the critical thinking intervention into the curriculum and teaching practices is essential for its effectiveness and sustainability (Alnaji, 2022; Dima et al., 2020). By aligning with the pre-existing school culture, the intervention becomes a natural part of students' learning experiences, enhancing engagement and long-term impact (Mugisha et al., 2021). This integration ensures that the intervention complements and

enhances the existing educational framework, fostering a positive environment for its implementation (Christenson et al., 2002; Elia & Tokunaga, 2015).

Aligning the critical thinking intervention with institutional culture is imperative for its success and acceptance (Chen et al., 2023; Paladino et al., 2022). Institutions possess unique cultural attributes that influence the adoption and effectiveness of interventions (Bopape, 2021). This alignment facilitates stakeholder buy-in and addresses organizational barriers and facilitators, promoting the sustainability and long-term impact of the intervention (Ali et al., 2015; Paladino et al., 2022).

Furthermore, investigating the relationship between teacher practices and students' critical thinking skills is crucial for preparing A-level students for the university transition (Van der Zanden et al., 2020). Enhancing psychological critical thinking skills equips students with the ability to think independently, analyze information critically, and make informed decisions, essential for success in higher education and beyond (Nawawi & Azhari, 2020). Critical thinking skills have also been linked to improved academic performance, self-efficacy, and readiness for university-level studies (Homayoonfard & Sajjadi, 2012; Schwanz & McIlreavy, 2015).

This study investigates the perspectives of A-level psychology teachers and university psychology lecturers on critical thinking instruction using a qualitative research approach. Semi-structured interviews were employed to explore educators' views on critical thinking instruction and perceived barriers. The study is guided by two research questions:

1. What are the fundamental aspects of institutional culture at A-level and degree-level in psychology that influence the approach to teaching and learning critical thinking?
2. What are the significant barriers encountered in teaching critical thinking within the context of psychology education at A-level and degree-level institutions?

4.7 Method

4.7.1 Research Design

This qualitative research study employed a semi-structured interview methodology to explore psychology educators' perceptions of critical thinking instruction and what barriers they perceive there are to teaching students psychological critical thinking skills. The adoption of semi-structured interviews allowed for in-depth exploration of participant's narratives and the contextual factors influencing critical thinking instruction across each level of education (Pithers & Soden, 2000).

Semi-structured interviews were chosen over focus groups due to their capacity to elicit deeper individual insights while minimizing the potential influence of group dynamics (Gill et al., 2008). Given the complexity of institutional culture and its impact on teaching practices, interviews provided the flexibility needed to explore participants' unique perspectives and experiences in greater detail. Previous research suggested that individual narratives can reveal insights that may be overlooked in a group setting (Guest et al., 2017), which was a particularly salient issue when exploring barriers to educational reform and the development of critical thinking skills.

Moreover, semi-structured interviews help mitigate the risk of dominant voices overshadowing quieter participants, a common challenge in focus group settings. This concern is especially relevant in educational contexts where departmental hierarchies or institutional power dynamics may discourage some educators from expressing their views openly (Drinkwater et al., 2017). By conducting one-on-one interviews, this study ensured that all participants had an equal opportunity to share their perspectives without the potential constraints of peer influence.

Additionally, the adaptable nature of semi-structured interviews allowed the researcher to tailor follow-up questions based on participants' responses, facilitating the identification of unexpected themes and deeper insights into the barriers educators face when teaching critical thinking. Such flexibility is particularly valuable in qualitative research

exploring teaching practices, as it enables the researcher to uncover nuanced challenges that may not emerge in a more structured or group-based discussion (Brinkmann, 2014).

In summary, while focus groups can provide valuable insights into group dynamics and collective opinions, semi-structured interviews were deemed more appropriate for this study due to their ability to capture in-depth individual experiences, reduce group influence, and provide a flexible and personalized approach to data collection.

4.7.2 Participant Sample

Participants were recruited through targeted emails. A freedom of information request provided contact details for schools, while university lecturers were contacted via their Heads of Department using information from the Association of Heads of Psychology Departments (AHPD). However, recruitment proved challenging. Many schools declined due to workload pressures, exam preparation, or a perceived lack of relevance, with some expressing direct resistance to the study's premise. Similarly, uptake among university lecturers was low, as some institutions had policies restricting external research requests, while others cited time constraints or lack of perceived benefit.

The participant sample consisted of 18 psychology educators, who were purposively sampled via recruitment emails sent to schools and universities. The sample was comprised of 11 A-level psychology teachers from eight different schools and seven university psychology lecturers from four different UK universities. The schools represented various institutional types: three academy sponsor-led schools, one voluntary controlled school, and four academy converter schools. All but two schools followed the AQA (2015) A-level Psychology curriculum, with the remainder using WJEC/Eduqas (2015) and OCR (2015). The university lecturers were all from post-1992 universities. Among the total sample, three participants identified as male and 15 as female. The total years of experience as an A-level psychology teacher (M = 7.7 years) and university lecturer (M = 9.1 years) was also recorded. The demographic characteristics of each of the participant samples can be found in Table 1.

Table 1

Demographic Characteristics of Participant Sample

Pseudonym	Gender Identity	Experience in psychology education	Teaching Psychology Workload (%)
Teacher A	Female	16 years	25%
Teacher B	Female	5 years	20%
Teacher C	Female	14 years	32%
Teacher D	Female	10 years	75%
Teacher E	Female	8 years	100%
Teacher F	Female	4 years	60%
Teacher G	Female	8 years	90%
Teacher H	Female	2 years	70%
Teacher I	Male	5 years	80%
Teacher J	Female	2 years	80%
Teacher K	Male	11 years	60%
Lecturer A	Male	14 years	70%
Lecturer B	Female	10 years	25%
Lecturer C	Female	4 years	60%
Lecturer D	Female	6 years	80%
Lecturer E	Female	10 years	70%
Lecturer F	Female	4.5 years	50%
Lecturer G	Female	15 years	33%

4.7.3 Materials

4.7.3.1 *Participant Materials*

Participants were provided with a detailed participant information sheet (Appendix A, pp. 309 - 310) and consent form (Appendix B, p. 311) outlining the purpose, procedures, potential risks and benefits of the study. These documents were reviewed and signed by the participants before the commencement of each interview. Upon completion of the interviews, participants were debriefed (Appendix C, p. 312). All participant materials and informed consent procedures were designed and conducted in line with the BPS (2014) Code of Human Research Ethics.

4.7.3.2 *Interview Schedule*

The interview schedule for this research encompassed a comprehensive set of questions aimed at eliciting insights from psychology educators in terms of their perceptions of critical thinking instruction. Prior to delving into the core questions, both participant groups were asked to provide demographic information. This included details such as gender identity, years of experience as a psychology educator, the proportion of their current role dedicated to teaching psychology, the subject discipline of their first degree, and the presence of postgraduate qualifications.

Following the demographic questions, participants were asked a series of questions designed to explore the various facets of their role as educators. The interview schedule specifically delved into their general views on critical thinking, the specific nature of critical thinking and critical thinking instruction in psychology, perceptions of students' academic preparedness, and any identified obstacles to effective psychological critical thinking instruction. Whilst the focus of the questions was the same for each participant sample, the questions were altered to meet each group and their unique context (Appendix D, pp. 313-314; Appendix E, pp. 315 - 316) .

4.7.4 Procedure

Semi-structured interviews were conducted individually with each participant. The interviews were conducted face-to-face in a private room within each participants' respective institution. Prior to participating, participants were provided with a comprehensive information sheet outlining the study's aim, their role, and their rights. After providing both written and verbal consent, the interview began. Interviews ranged from 25 to 90 minutes in length. The interviews were audio-recorded using a Dictaphone with the participants' consent and transcribed verbatim. A debrief, in line with the BPS (2014) Code of Human Research Ethics, was provided to participants upon completion of the interview.

4.7.5 Analytical Procedure

The analysis was conducted using Braun and Clarke's (Braun & Clarke, 2012, 2019, 2022) reflexive thematic analysis framework, a systematic method that facilitates the identification and interpretation of themes within qualitative data (Braun & Clarke, 2012, 2019, 2022). This approach was selected for its theoretical flexibility, enabling the researcher to analyze data deductively, guided by previous research, and reflexively considering the researcher's position within the study (Braun & Clarke, 2019, 2022). Specifically, a critical realist reflexive thematic analysis was utilized, focusing on latent themes with a critical orientation and adopting an interpretative approach (Braun & Clarke, 2021). This methodological choice was driven by several factors, including its flexibility, its emphasis on identifying themes across the dataset, and its ability to describe, interpret, and analyze patterns within a broader sociocultural context (Braun & Clarke, 2021).

This structured approach is particularly suitable for exploring complex educational phenomena, such as the pedagogical divide between A-level psychology teaching and university education. Adopting a critical realist perspective posits that participants' understanding of the importance of critical thinking instruction is mediated by socio-cultural meanings (Clarke et al., 2015). Consequently, the study not only explores psychology educators' perceptions of critical thinking instruction but also situates their experiences

within a wider interpretative context, where critical thinking is normatively understood at each level of education. This approach was essential for examining how institutional culture shapes the interpretation and value attributed to critical thinking (Reybold, 2003). Existing research has highlighted the significance of understanding educator approaches in fostering students' development of critical thinking skills (Halx & Reybold, 2005). This understanding is framed by the notion that "critical thinking does not occur in a vacuum" (Halx & Reybold, 2005, p. 297) and that its acquisition is influenced by "the context and culture in which it is situated" (Pithers & Soden, 2000, p. 246).

The analytical process involved multiple stages, including data familiarization, systematic data coding, generating initial themes, developing and reviewing themes, defining, refining, and naming themes, and finally, writing the report (Braun & Clarke, 2012, 2019, 2022). This structured process highlights the depth of engagement with the data and the careful consideration of themes that were generated from the analysis. Through this method, the analysis comprehensively explored the experiences, meanings, and realities of the participants (Braun & Clarke, 2019). Importantly, the analytical process recognized the researcher’s subjectivity as an analytic resource, acknowledging the influence of their standpoint and allowing for the recognition, navigation, and unpacking of the theoretical assumptions underpinning the analysis (Braun & Clarke, 2019).

4.7.5.1 *Phase 1: Familiarization with the Data*

In the initial phase, I immersed myself in the data through a meticulous review of the interview transcripts collected from A-level psychology teachers and university lecturers. This immersion involved multiple readings of each transcript, enabling me to develop a comprehensive understanding of the participants' experiences, insights, and concerns regarding the educational divide.

During this phase, I employed active reading strategies, such as annotating key passages and highlighting significant quotes that resonated with the research questions. This approach facilitated the identification of recurring themes and concepts, such as the

pressure of exam-oriented pedagogy at the A-level and the contrasting expectations for critical thinking and autonomy at the university level. By engaging deeply with the data, I was able to discern nuances in participants' expressions of frustration, hope, and the complexities of their pedagogical realities.

To further enhance my understanding, I maintained a reflexive journal throughout this process, documenting my initial impressions and emotional responses to the data. This practice not only helped clarify my thoughts but also allowed me to recognize and bracket my biases and preconceptions about A-level and university teaching. By critically reflecting on my positionality as a researcher, I aimed to mitigate potential biases and enhance the validity of the analysis.

4.7.5.2 Phase 2: Generating Initial Codes

In the second phase, I systematically generated initial codes from the data, a process that involved identifying meaningful segments related to the research questions and the overarching themes of the study. I utilized a line-by-line coding approach, which allowed me to capture the richness of participants' narratives and the intricate details of their experiences.

I employed a combination of inductive and deductive coding methods. Inductive coding allowed themes to develop organically from the data, while deductive coding utilized existing literature on educational practices and critical thinking as a lens through which to analyze the data. This dual approach enabled me to capture both the unique perspectives of participants and the broader educational discourse.

Each code was precisely defined, and I created a coding framework that organized the data into thematic categories. For example, codes such as "exam pressure," "student independence," and "teacher authority" were generated, reflecting key issues raised by participants. Additionally, I maintained a constant comparison method, revisiting earlier codes and refining them as new insights developed from subsequent data analysis.

This phase was characterized by an iterative process of coding, where I continually engaged with the data to ensure that the codes accurately represented participants' voices. The iterative nature of this phase highlighted the complexity of the educational divide and allowed for a more nuanced understanding of how pedagogical practices influence students' transition to university.

4.7.5.3 *Phase 3: Searching for Themes*

In the third phase, I organized the initial codes into potential themes that encapsulated the findings of the analysis. This thematic mapping process involved clustering related codes into coherent categories and identifying overarching themes that represented the core issues within the data.

I began by creating a visual representation of the themes, using mind maps to illustrate the relationships between codes and how they fit into broader themes. Primary themes identified included the "Exam Divide," which captured the contrast between A-level exam-focused teaching and university-level pedagogical practices, and "Educational Transition," which emphasized the challenges students face when navigating the shift to higher education. Each potential theme was evaluated for its relevance to the research questions and the richness of the data supporting it. For example, the "Exam Divide" theme was supported by numerous quotes from A-level teachers expressing their frustrations with rigid exam criteria, while "Educational Transition" drew on university lecturers' observations of students struggling to adapt to more independent learning environments.

During this phase, I also began to consider the implications of the identified themes for educational practice and policy. By reflecting on how these themes related to existing literature on educational transitions, I aimed to ensure that the analysis contributed to a deeper understanding of the systemic issues at play in the educational divide.

4.7.5.4 *Phase 4: Reviewing Themes*

The fourth phase involved a rigorous review of the identified themes to ensure they accurately represented the data and formed a coherent narrative. I engaged in a comprehensive evaluation of each theme, revisiting the original transcripts to assess the alignment between the data and the themes.

This evaluation process involved checking for internal consistency within each theme, ensuring that the data within a theme coherently fit together and reflected a shared meaning. Additionally, I assessed the external distinctiveness of the themes, ensuring that they were sufficiently differentiated from one another. For example, I carefully considered whether themes like "The Exam Divide" and "Educational Transition" captured different aspects of the educational divide and did not overlap unnecessarily. I sought feedback from colleagues and peers during this phase, presenting my preliminary themes and inviting their insights and critiques. This collaborative approach not only enriched my analysis but also enhanced the credibility of the findings by incorporating diverse perspectives.

Through this reflective process, I refined the themes further, merging those that were too broad or redundant and delineating themes that required more specificity. This phase ultimately solidified the thematic structure of the analysis, providing a clear framework for the subsequent stages of the report.

4.7.5.5 *Phase 5: Defining and Naming Themes*

In the fifth phase, I focused on clearly defining and naming each theme to capture its core essence accurately. This involved articulating the themes in a way that conveyed their significance within the context of the research, ensuring that the names were both descriptive and reflective of the data.

For example, the theme "Neoliberal Constraints on Critical Thinking: The Struggle to Foster Critical Thinking in Psychology Education" was chosen to emphasize the impact of the exam-driven culture in A-level education, which stifles the development of critical

thinking. Meanwhile, "The Exam Divide: Navigating the Pedagogical Divide Between A-level and University Psychology Teaching" was named to reflect the stark contrast between the rote memorization at the A-level and the critical engagement expected at university.

Each theme was accompanied by a detailed description outlining its implications and relevance to the overarching research narrative. This included discussing how the themes reflected participants' lived experiences and the systemic challenges they faced. I also considered how these themes related to existing literature on educational transitions, highlighting the significance of the findings in the broader context of educational research. This phase was critical in shaping the final presentation of the findings, as it ensured that each theme was articulated with clarity and precision. By providing well-defined themes, I aimed to enhance the reader's understanding of the complex dynamics at play in the educational divide.

4.7.5.6 *Phase 6: Producing the Report*

In the final phase, I synthesized the identified themes into a cohesive narrative for the research report. This involved integrating the themes with relevant literature to contextualize the findings within the broader educational discourse. I carefully structured the report to present the themes logically, ensuring that each theme flowed naturally into the next.
In writing the report, I included verbatim quotes from participants to substantiate the findings, enriching the analysis with authentic voices that illustrated the nuances of their experiences. This qualitative richness not only enhanced the credibility of the research but also provided a more compelling narrative that resonated with readers.

I paid particular attention to discussing the implications of the findings for educational practice and policy, highlighting the need for a systemic re-evaluation of A-level pedagogy to foster critical thinking and prepare students for the demands of higher education. This included recommending strategies for bridging the gap between A-level and university education, emphasizing the importance of collaboration between educators at both levels.

By following this systematic application of Braun and Clarke's (2012, 2019, 2022) reflexive thematic analysis, I conducted a thorough exploration of the educational divide, offering insights that contribute to understanding the pedagogical challenges in preparing students for university psychology education. This rigorous analytical process ensured that the findings are grounded in the data while also contributing to the broader discourse on educational practices and student preparedness.

4.7.6 Ethics

This study received ethical clearance from the University of Cumbria Research Ethics Committee (Appendix F, p. 317) and strictly adhered to the BPS (2014) Code of Human Research Ethics. Informed consent and debriefing procedures strictly adhered to the BPS guidelines (BPS, 2014).

To prevent potential adverse effects on participants' employment or social standing, careful pseudonymization was implemented, addressing sensitive information (BPS, 2014, p.14). All interview transcripts underwent rigorous deidentification, removing or altering any identifiable details to ensure participant confidentiality and anonymity. These measures reflect a commitment to ethical principles throughout the research process.

4.7.7 Reflexivity

Conducting this research required continuous and critical engagement with my own positionality and potential biases, particularly given my experiences with the school-university transition and observations of undergraduate students struggling with psychological critical thinking skills. My background inevitably influenced the research process, shaping the framing of research questions, participant selection, data analysis, and interpretation of findings. Reflexivity was therefore integral to ensuring that my preconceptions did not unduly influence the study, while also recognizing the valuable role my insights played in guiding the research.

Throughout the research, I acknowledged how my prior experiences attuned me to specific issues, particularly in recognizing barriers to the development of critical thinking skills. For example, having personally witnessed university students struggle with independent thinking, I was initially inclined to frame the research questions around a perceived deficit in A-level education. However, through engagement with reflexive thematic analysis (Braun & Clarke, 2012, 2019, 2022), I actively challenged this assumption, ensuring the study also explored how institutional structures and pedagogical constraints shaped educators' abilities to foster critical thinking. The critical realist approach adopted in this study emphasized the role of socio-cultural influences on participants' perspectives, while also acknowledging my own interpretative lens in identifying latent themes (Braun & Clarke, 2021). This methodological approach required a balance between embracing subjectivity as an analytic resource and ensuring that generated themes were rooted in the data rather than preconceived assumptions.

During data collection, I remained cognizant of my influence on the interviews, striving to foster an open and neutral environment where participants could express their perspectives without feeling guided toward specific responses. For instance, in early interviews, I noticed my follow-up questions sometimes led participants toward discussing assessment pressures rather than allowing them to articulate their own concerns organically. Recognizing this, I refined my interview approach by adopting more open-ended prompts and pausing longer after responses to ensure participants had space to direct the conversation. Establishing rapport with A-level psychology teachers and university lecturers required careful negotiation to ensure that my own views on educational transitions and critical thinking instruction did not shape their narratives. I employed active listening techniques and iterative questioning to allow for clarification and deeper engagement with participant experiences while also maintaining awareness of potential power dynamics and researcher-participant relationships.

In the analytical process, I engaged in systematic reflexivity by documenting my evolving interpretations in a research journal. This practice helped me distinguish between insights emerging from the data and those shaped by my own experiences. For example, when analyzing discussions around the “The Exam Divide”, I initially focused on teachers' frustration with the system, resonating with my own experiences. However, upon revisiting my notes, I recognized that university lecturers also expressed concerns about student preparedness, which led me to refine my thematic analysis to incorporate both perspectives. The thematic development process involved multiple iterations of coding and theme refinement, where I critically examined whether patterns identified in the data reflected broader participant perspectives or my own expectations. Seeking feedback from academic peers further enhanced the credibility of the analysis, providing an external lens to challenge potential biases and refine theme development. One such discussion led to a reconsideration of the “Neoliberal Constraints on Critical Thinking” theme, ensuring it captured the complexity of both structural and pedagogical challenges rather than solely focusing on external pressures.

Given the focus on the transition between A-level and university psychology education, my commitment to addressing disparities in critical thinking instruction was a driving force in the recommendations made. However, I was deliberate in ensuring that these suggestions were grounded in empirical evidence rather than personal advocacy. For example, while I initially considered recommending a uniform critical thinking framework across secondary and higher education, a closer engagement with the data revealed the need for more flexible, context-sensitive interventions. The implications were drawn from participant data and existing literature, aligning with broader discussions on educational policy and pedagogy.

Ethical considerations were central to my reflexive practice, particularly in mitigating potential biases in participant selection, data interpretation, and reporting. Transparency in acknowledging my positionality was essential in maintaining research integrity. I explicitly

reflected on my role throughout each stage of the study, ensuring that findings authentically represented participants' perspectives rather than serving as an extension of my own academic concerns. By making my reflexive processes explicit, such as documenting my analytical shifts and discussing my role in knowledge production, I aimed to maintain rigor and accountability within the research.

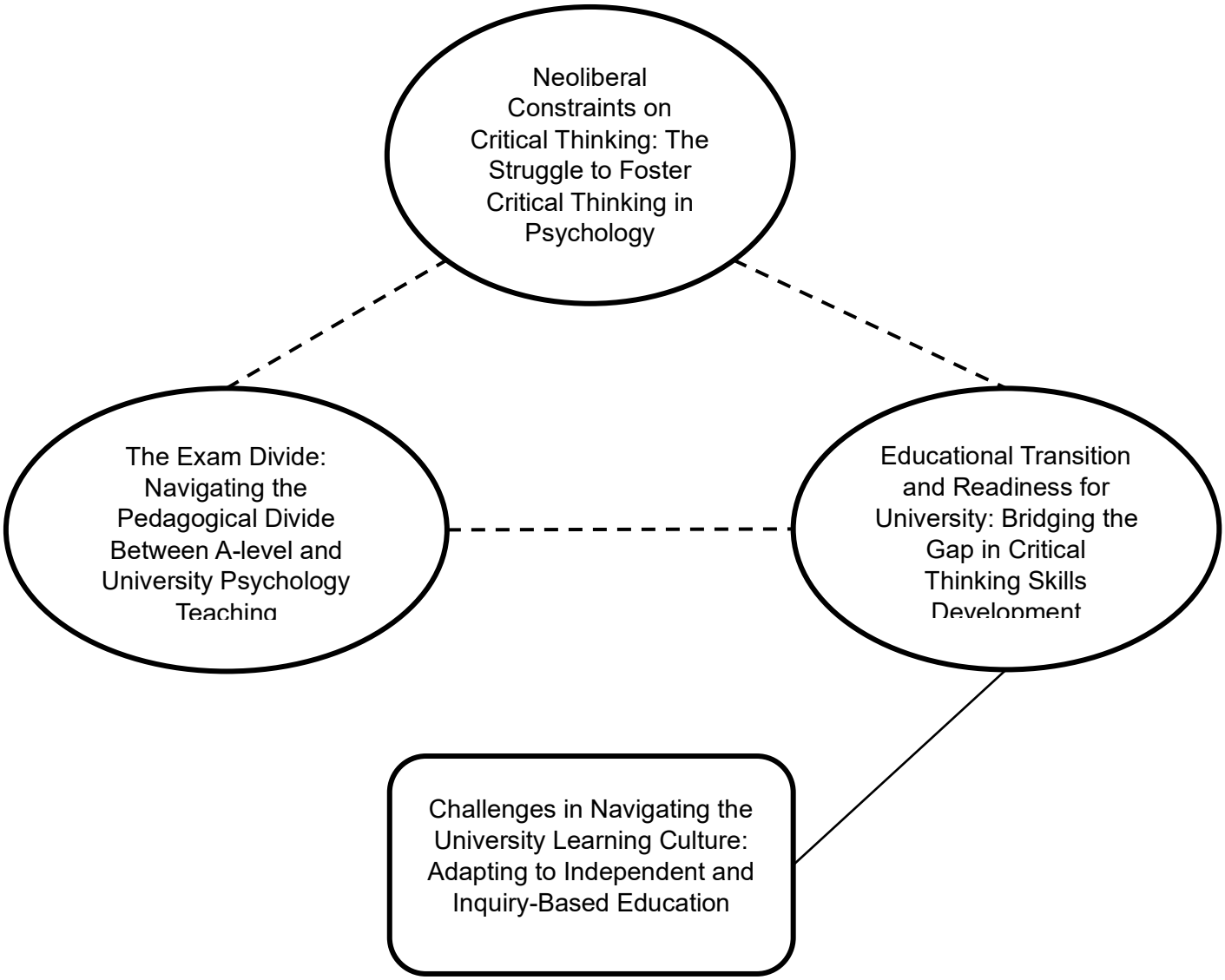
This reflexive engagement emphasized the importance of researcher subjectivity as both a resource and a challenge within qualitative research. By embracing a critically reflective stance, I navigated the complexities of interpreting data while maintaining rigor, transparency, and ethical responsibility in presenting the findings. This iterative process of self-examination allowed me to recognize the ways in which my background shaped the research while taking proactive steps to mitigate potential biases and ensure the integrity of the study's conclusions.

4.8 Findings

The analysis was conducted using Braun and Clarke's (2012, 2019, 2022) reflexive thematic analysis framework, a systematic approach that facilitates the identification and interpretation of themes within qualitative data. Specifically, a critical realist reflexive thematic analysis was employed, focusing on latent themes with a critical orientation and adopting an interpretative approach (Braun & Clarke, 2021). This analysis identified three primary themes: (1) *Neoliberal Constraints on Critical Thinking: The Struggle to Foster Critical Thinking in Psychology Education*, (2) *The Exam Divide: Navigating the Pedagogical Divide Between A-Level and University Psychology Teaching*, and (3) *Educational Transition and Readiness for University: Bridging the Gap in Critical Thinking Skills Development*. The final theme, *Educational Transition and Readiness for University: Bridging the Gap in Critical Thinking Skills Development*, includes a subtheme titled *Challenges in Navigating the University Learning Culture: Adapting to Independent and Inquiry-Based Education*. The ensuing sections illustrate each theme, with Figure 2 depicting the relationships between the themes and their subthemes.

Figure 2

Thematic Map Illustrating Themes and their Subthemes



4.8.1 Neoliberal Constraints on Critical Thinking: The Struggle to Foster Critical Thinking in Psychology Education

This theme critically examines how the structures of psychology education, particularly curricula and assessment policies, create systemic constraints that hinder A-level psychology teachers' ability to foster critical thinking. Rooted in a critical realist epistemology, it recognizes that these structures exist independently of individual perceptions, though they are interpreted and navigated differently by educators. A central

concern is the influence of neoliberalism, which permeates educational systems and prioritizes measurable outcomes, such as exam results, rankings, and league tables, over deep, meaningful learning. This focus on results cultivated a performative culture where quantifiable metrics often overshadowed broader educational goals like critical inquiry (Anderson & Cohen, 2015; Garver, 2020).

Through an analysis informed by theoretical frameworks on structural constraints (Bernstein, 2000) and assessment culture (Ball, 2003), the theme critiques the social construction of reality in education, revealing how institutional pressures shape pedagogical choices. A-level psychology teachers, in particular, often reported being caught in a results-oriented culture driven by neoliberal policies, including accountability measures, which emphasized exam performance and league table rankings (DiGaetano, 2015; Fuller, 2018; Marginson, 2009; Robinson, 2019; Schmeichel et al., 2017; Torrance, 2017). This pressure to perform resulted in a teaching environment where higher-order thinking was frequently sidelined in favor of exam preparation and rote learning, a pattern reflected in existing research on the exam-driven learning culture in schools (Backes-Gellner & Veen, 2008; Joseph, 2020). Previous research has suggested that assessment-driven accountability reshapes teaching practices, focusing on performance metrics rather than fostering critical engagement (Ainley & Cannan, 2006; Robinson, 2019; Schmeichel et al., 2017).

Furthermore, existing research highlights the extent to which this accountability-driven environment forces teachers to prioritize student performance over critical thinking (Lai, 2011; Van der Zanden et al., 2020). Through latent coding, this theme not only examines explicit teacher reflections on the pressures created by assessment but also explores the implicit ways institutional priorities shape pedagogical decisions. This theme sheds light on how the structures of psychology education constrain the development of critical thinking skills, exposing the tension between results-oriented educational policies and the need for deep, critical inquiry.

At the heart of A-level psychology education lies a results-oriented culture, where the primary focus is on achieving quantifiable outcomes, such as high exam scores and favorable league table standings (Banyard, 2010; Robinson, 2019; Schmeichel et al., 2017). Exams loomed large in the educational landscape, shaping the ethos of schools (Torrance, 2017). Teachers faced intense pressure to meet these benchmarks, with their professional reputation and school funding dependent on student performance in exams. “Teacher A” captured this sentiment, emphasizing how schools are driven by the need to perform well in league tables: “They [students] are spoon-fed for their exams; staff and schools are under an enormous amount of pressure to meet the league table results.” This environment is one where success is narrowly defined by numerical achievements, heavily influenced by exam pressures and school rankings (Jacobson & Bach, 2022; Joseph, 2020; Keddie et al., 2011). In the context of A-level psychology teaching, educators keenly felt the weight of personal responsibility for student achievements, reflecting the complex demands placed upon them (Ball, 2001, 2003, 2005, 2008, 2012, 2016). The pressure dictated teaching strategies, compelling educators to prioritize exam success over the development of broader cognitive skills. “Teacher D” openly acknowledged the lengths to which she goes to ensure students’ exam success: “…so, although it’s probably wrong, my focus is on getting them that grade. I will do anything. I will write model answers for them. I will do anything to get them that grade.” The result is a narrow focus on test preparation at the expense of fostering critical thinking, as teachers are constrained by rigid curricula and the demands of external performance metrics.

This emphasis on performance extends beyond just student achievement; it also shapes how teachers perceive their own professional value, reinforcing a performativity culture where educators operate under the pressures of a data-driven environment (Ball & Junemann, 2012; Keddie, 2015; Rose, 1999). Despite internal reservations, the imperative to achieve favorable exam results and evaluations drove teachers to prioritize conformity (Ball et al., 2011), given that non-compliance with accountability measures—which

determine school funding and quality—could have tangible repercussions (Keddie et al., 2011). The relentless focus on measurable outcomes has led to teaching strategies that prioritize exam success at the expense of broader intellectual development. In this context, teachers navigate external expectations while striving to maintain pedagogical integrity, often feeling compelled to comply with performance metrics such as exam results and Ofsted evaluations, which further standardize and constrain teaching practices. “Teacher H” underlined this, stating: “Obviously, your reputation is built on your students’ results, and that is sort of the whole point of an educational establishment. Without results, what is an educational establishment?” This sentiment reinforces the notion that success in education is often reduced to numerical outcomes rather than intellectual or skill-based development. “Teacher H” further went on to state that:

> So, unfortunately, there is a conflict between being a great psychology student and making them into a great psychologist and having them passing this exam. Because they need to pass the exam in order to get into uni and that kind of… that’s the conflict that I have because to be a great psychologist you do need critical thinking…

This performativity culture was reflected in how A-level teachers, operating under the pressures of a data-driven environment, focused on exam outcomes as the key markers of success (Ball & Junemann, 2012; Keddie, 2015; Rose, 1999). The pressure for accountability within the A-level teacher cohort often led to risk aversion and reinforced standardized teaching techniques focused solely on exam outcomes rather than holistic skill development, such as critical thinking (Luke, 2006; Torrance, 2007, 2017). The relentless emphasis on exam performance, driven by neoliberal values, created an educational setting where teaching strategies are often narrowly tailored to improve test scores rather than promoting a broader intellectual development (Ainley & Cannan, 2006). Consequently, while critical thinking was recognized as important by some educators, it was often deprioritized in favor of addressing the immediate pressures of exam success (Giroux, 2010; Jacobson & Bach, 2022; Joseph, 2020). Under these constraints, teachers found themselves balancing

external expectations with the desire to preserve their pedagogical integrity (DiGaetano, 2015; Fuller, 2018). The accountability framework, with its focus on data-driven results, has forced educators to adopt teaching methods designed to comply with performance metrics like exam scores and Ofsted evaluations (Ball, 2009). This culture of performance placed significant constraints on teachers, compelling them to regulate and adapt their pedagogy to meet the demands of measurable performance (Boxley, 2003).

This culture of accountability permeated the A-level teaching environment, where teachers felt personally responsible for their students' academic outcomes. “Teacher C” reflected on the burden of meeting target grades: “Oh yeah, that’s the whole target system. Well, it’s not just me; they have to take responsibility for their learning. But, ultimately, it’s me who would get told off if they didn’t meet their targets.” This feeling of accountability is intensified by external regulatory frameworks, such as Ofsted inspections and exam board requirements, which prioritize measurable outcomes over educational depth. These demands led teachers to adopt standardized, exam-focused teaching methods that stifle student agency and critical thinking development. For example, “Teacher G” expressed concern over the limited space for independent student learning: “That’s one of the things that as a teacher you feel responsible if they go away and do it [independent learning], and they don’t do it very well, that’s going to be an issue for their exam.” The rigid structure of the exam system left little room for fostering independent thinking or engaging students in exploratory, in-depth learning.

Additionally, students themselves often prioritize exam preparation over intellectual exploration, further reinforcing a rigid educational framework. “Teacher E” illustrated this challenge, describing students' reluctance to engage with content beyond what is directly examinable:

> So, I will be putting things up on the thing [Board] and students will be like, do I need this? ‘Yeah, but do I need this miss, do I need to write it down’. ‘Well, it’s not going to hurt because it will aid your understanding’. ‘Yeah, but do I need it’. ‘Is there going to

> be a question on it?' Because if there isn't going to be a question on it. They're not interested, and it comes down to the only things that's valued in education is the grades at the end

Participants discussed how students tended to prioritize short-term exam outcomes over the acquisition of broader analytical and critical thinking skills, perpetuating a cycle of narrowly focused exam-oriented learning (Tajudin & Chinnappan, 2016). "Teacher E" further noted that: "They [students] don't value those key skills because they don't see they are going to need them."

Conversely, university psychology lecturers discussed experiencing greater pedagogical autonomy, which allowed for a shift toward a more student-centered approach. This environment is further reinforced by accrediting bodies' emphasis on critical thinking as an essential component of academic achievement (APA, 2023; BPS, 2019; QAA, 2023). The impact of neoliberalism is evident in how it shapes educational priorities at different levels. At the A-level, the focus on standardized assessments and accountability measures has constrained the development of critical thinking, while in the university context, greater academic freedom provides the space for a more comprehensive approach to teaching and learning. This disparity in perspectives marks broader shifts in educational priorities, with A-level education often constrained by neoliberal imperatives that prioritize measurable outcomes and efficiency, while higher education embraced a more encompassing educational philosophy that valued critical thinking as a cornerstone of intellectual development (Facione et al., 1995; Ku, 2009).

This autonomy fostered an environment where students are encouraged to take responsibility for their own learning and critical thinking development. "Lecturer A" advocated for this approach, saying: "My approach to student learning is that it should be student-focused, in the sense that, it's the student's responsibility to develop their own learning skills." This contrasts sharply with the A-level experience, where the intense focus on

meeting external criteria often curtails such autonomy. In higher education, the emphasis is on empowering students to engage critically with the material, as “Lecturer B” pointed out:

> You know I am not teaching in a way that what they produce is basically what I have told them, it’s this is the basis, go off and explore this more and then tell it back to me in the assessment or whatever it might be. So yeah, The learning onus is on the students. Well it should be; if it’s not, that’s not what higher education is, it’s not happening.

Critical thinking was not merely an adjunct but rather a pervasive expectation woven into student learning experiences and assessments, reflecting a comprehensive and holistic approach to education that transcended narrow exam-based metrics.

Bridging this gap requires a reconceptualization of educational priorities, where fostering critical thinking becomes as central as achieving measurable exam outcomes, enabling a more student-centered and intellectually enriching approach to learning. The clash between these educational paradigms reflects broader trends within the neoliberal framework, where marketization and performance metrics drive educational priorities (Ball, 2016; DiGaetano, 2015; Garver, 2020). Consequently, the challenges inherent in cultivating critical thinking skills within A-level psychology education are formidable and reflect the overarching constraints imposed by an exam-centric culture.

4.8.2 The Exam Divide: Navigating the Pedagogical Divide Between A-level and University Psychology Teaching

This theme explores the pedagogical divide between A-level and university psychology teaching, focusing on the challenges students face as they transition from secondary to higher education. The shift from A-level to university represents a significant change in both teaching practices and student learning behaviors. At A-level, the educational experience is heavily influenced by exam specifications, creating an environment that prioritizes rote learning and memorization over critical thinking and intellectual inquiry.

Students are conditioned to view education through the lens of achieving high grades, often at the expense of developing independent inquiry skills (BPS, 2013; Kitching & Hulme, 2013; Rowley & Dalgarno, 2010). In contrast, university teaching provides greater autonomy for instructors, enabling a shift towards student-centered approaches that emphasize critical thinking, conceptual understanding, and independent research (Long et al., 2018). This shift fosters a more inquiry-driven learning environment, where the emphasis is placed on analysis, critique, and the synthesis of knowledge (BPS, 2019).

From a critical realist perspective, this analysis recognizes the structural constraints that shape pedagogy at both educational stages, while interpreting how these constraints affect students' learning experiences. A critical orientation is evident in how dominant discourses surrounding "successful learning" within the exam-driven culture of A-level education reinforce narrow definitions of academic success—namely, high exam marks—thereby limiting opportunities for deeper intellectual engagement (Ball, 2009; Green, 2007; Koh et al., 2012). The rigid, exam-focused A-level system conditions students to prioritize memorization, which hampers their ability to engage with the more dynamic, inquiry-driven pedagogy of university education.

The transition from A-level to university can be jarring, as students often struggle to adapt their academic identities to the expectations of independent learning at the university level (Keane, 2011; Koh et al., 2012). The ingrained habits from a heavily exam-centered education hinder their ability to embrace the more autonomous and critically engaging learning required at university. The latent meanings within participants' narratives highlight how this transition exposes deeper systemic issues in the pedagogical divide, particularly in how A-level teaching fosters a limited approach to learning that is ill-suited to the intellectual demands of higher education.

By applying a deductive, theory-driven approach, this analysis situates participants' experiences within broader educational research, shedding light on the tension between these two pedagogical models. The analysis goes beyond surface-level descriptions,

reflecting how A-level education structures students' epistemological beliefs, shaping their approach to learning. The transition to university forces students to reevaluate their academic identity and learning practices, revealing the need for a more balanced, integrated approach to teaching and learning that supports critical engagement, conceptual understanding, and independent inquiry across both educational stages (Van der Zanden et al., 2020). This theme contributes to a nuanced understanding of how the structural and ideological forces that underpin A-level and university education shape students' ability to engage with psychology at a higher level.

A central feature of this divide is the contrast in teaching autonomy. At the A-level, teachers frequently navigate external pressures such as Ofsted inspections and rigid exam criteria, which constrain their ability to adopt innovative teaching strategies. As "Teacher A" stated:

> I am governed by what I have to give them in terms of content. So, I say 'you need to learn this today', and we have objectives to meet Ofsted criteria, so often we are governed by what's on the specification and the time we have got. So, learning is often about that's what we have to get through and that's what we are told to get through.

These external constraints often lead to a pedagogy focused on rote memorization and exam preparation, limiting students' opportunities to engage critically with the material. For instance, "Teacher E" highlighted the struggle between preparing students for exams and fostering deeper thinking:

> It's getting through the content, and then you always feel then, well am I putting my students at a disadvantage, if there are teachers teaching to the exam and particularly if that formulaic approach, the critical thinking bit might work really well for my more able students, it might work really really well. But it might not work very well for my less able students, who are being compared against teachers who are just

> teaching students the specification and drilling it in to them. Does that mean that they are now at a disadvantage, even though they have got better skills they are going to be in those bottom groups, that don't get the exam grades or who are in the lower grades that actually reflect badly on them.

The fear of repercussions from external entities has cultivated a conservative pedagogical environment, characterized by adherence to traditional methods and a reluctance to deviate from prescribed specifications (Ball, 2009; Green, 2007; Luke, 2006). This constraint results in a teaching environment where educators provide students with the answers needed for desired exam results, further entrenching exam-oriented practices. These practices encourage formulaic teaching methods where teachers focus on drilling students to answer specific exam questions, providing evaluative responses, and adhering strictly to test requirements (Baird et al., 2009; Green, 2007; Halonen et al., 2003; Hernandez-Martinez & Williams, 2013). The prescribed content and assessment methods promote a "cookbook approach" to teaching, where textbooks offer step-by-step guides for passing exams, discouraging the development of skills valued at the university level, such as critical thinking (Green, 2007, p. 610). Consequently, this approach stifles creativity and deep engagement with the material.

In contrast, university lecturers benefit from greater pedagogical freedom, enabling them to encourage students' autonomy and critical thinking. "Lecturer C" illustrated this by stating:

> You can see when you offer topics for essays and they come to you and say look, I have this different idea and this is something that I would say, coming from the keener students, is they try to do different things and take more risks in my experience.

This highlights the space available for students to explore ideas beyond the prescribed curriculum. This autonomy allows for a more student-centered approach,

empowering students to become active participants in their learning. "Lecturer E" also noted, "They [students] can explore parts of the assignment that they want to explore, and they can tailor it to themselves," reinforcing the importance of individual academic freedom. Moreover, university curricula are aligned with BPS (2019) standards for accreditation and reflect the research interests of lecturers (Banyard, 2008). However, the BPS's impact on A-level psychology is limited, affecting only discussions with awarding bodies regarding appropriate content (AQA, 2015; OCR, 2015; Pearson Edexcel, 2015; WJEC/EDQUAS, 2015), with the ultimate decision resting with the exam boards (BPS, 2013).

Despite this flexibility, university lecturers often encounter students who are unprepared for this shift. Many students enter higher education conditioned by the rigid structures of A-level teaching, where learning is centered around content delivery rather than inquiry. As "Lecturer B" observed:

> The teacher… is there as an expert to plonk [sic] the content on them then what they're assessed on is their ability to be able to regurgitate that and there is no room in between that to have a dialogue about what a student's appraisal of that is…

This highlights a fundamental pedagogical disconnect. A-level students are trained to absorb and reproduce information with little room for independent interpretation, while university lecturers expect them to critically engage with material and develop their own perspectives. The shift from passive learning to active inquiry is, therefore, not just a structural difference but a cognitive and cultural adjustment for students.

The differences in educator-student relationships across these levels further accentuate the tension. A-level teachers, driven by exam pressures, often adopted an authoritarian role in which they managed students' learning closely. As "Teacher F" noted:

> They have got to see that they are taking 18-year-olds in that have just been left and essentially mothered, we have got to let go, but essentially, but we let go and we have got exams to pass. Like if that means mothering them up until May, then I will

Revealing a dual pressure to maintain control while preparing students for the demands of standardized assessments. This dynamic fosters dependence, with students relying heavily on their teachers for success. "Teacher J" expressed concern that students might struggle with the more independent demands of university education:

> I don't think they realize that how different it's going to be at university. In the sense that, you are expected to do things on your own and no one is going to push you to do things. We are constantly getting them and saying that you need to do this, and learn this and this needs done by this date, you don't necessarily have that push at university.

In contrast, at the university level, lecturers adopted a more facilitative role, guiding students rather than controlling their learning. "Lecturer B" emphasized this by stating, "I would call myself a tutor if anything else. Just because the learning isn't... I think people get mixed up between what teaching is and what learning is," suggesting a shift toward a collaborative learning environment where students are encouraged to take ownership of their education. "Lecturer C" reinforced this, stating:

> My role is not to inform you, it is to guide you. Because I think otherwise they would not necessarily expect that. I think that, that is quite different to college and even though I give them that explanation…I still think that they want me to provide information more often.

The approaches to student learning further underscore the contrast between these educational levels. At the A-level, teaching is often focused on content delivery, with limited room for critical engagement or independent thought. "Teacher D" succinctly captured this when saying, "You're just importing knowledge from your brain to their brain." This content-focused approach, though necessary for exam success, restricts opportunities for students to develop critical inquiry skills. The emphasis on exam performance over intellectual engagement highlights a broader educational issue where deeper learning often takes a

backseat to test preparation (BPS, 2013; Green, 2007; Kitching & Hulme, 2013; Rowley & Dalgarno, 2010). Critics have lamented the minimal dialogue between students and teachers, with students often being spoon-fed information to meet exam requirements (Banyard, 2010; Dede, 2010).

Conversely, university lecturers championed a student-centered approach, encouraging critical inquiry, student autonomy, and dialogue. "Lecturer C" described their approach as one of interaction: "I try to ask them a lot of questions and try to be fun and be myself and be lively and enthusiastic." This creates an environment where students are expected to engage with the material at a deeper level, contributing to their development as independent thinkers. However, university lecturers often face challenges, such as resistance from students who have been conditioned by A-level pedagogy to expect more passive learning. "Lecturer E" noted, "I think the whole independent style of it is quite scary to the point where they resist it." This resistance reflects broader concerns raised by Bol and Strage (1996) regarding students' inclination toward memorization and reluctance to engage in deeper forms of critical inquiry.

Research supports these observations, showing that students enter higher education with strong academic qualifications but limited skills in independent study and critical thinking (Koh et al., 2012; Smith & Hopkins, 2005). The prevalent culture of accountability in A-level education has reinforced risk aversion and standardized pedagogical techniques, such as teaching to the test, which can stifle innovation and creativity in teaching practices (Apple, 2016, 2017; Berry, 2009; Luke, 2006; Page, 2017; Torrance, 2007, 2017). The challenge lies in balancing the short-term goal of exam preparation in A-level teaching with the long-term aim of developing essential skills such as critical thinking (Jarvis, 2011). Bridging this divide requires a systemic shift toward pedagogies that foster critical thinking and intellectual independence at all levels of education, enabling students to transition more smoothly from exam-focused learning to a deeper, more meaningful academic experience. The BPS (2013) consultation on the future of A-level Psychology highlighted that the emphasis on rote

memorization often hinders students' preparedness for independent university study, creating a gap in critical thinking skills. Addressing this divide requires reconsideration of assessment methods and curriculum design to better align pre-university education with the demands of higher learning.

4.8.3 Educational Transition and Readiness for University: Bridging the Gap in Critical Thinking Skills Development

This theme explores the challenges students face during the transition from secondary to higher education, with a particular focus on how the A-level system fosters a surface-level approach to learning. Rooted in critical realist epistemology, it examines how these challenges are not merely the result of a shift in academic environments, but are deeply influenced by hidden causal mechanisms. Specifically, secondary education prioritizes performance over the development of critical thinking and cognitive growth, which significantly impacts students' readiness for university. Despite meeting entry requirements, many students struggle with the university's expectations for independent inquiry and critical engagement, revealing a gap between academic qualifications and true preparedness for higher-order thinking. This theme critiques the prevailing notion that university readiness is solely about obtaining entry grades, instead focusing on how institutional practices shape students' understanding of learning and academic success. In particular, the emphasis on memorization and exam outcomes in secondary education hinders the development of essential skills, such as critical thinking and independent inquiry.

The analysis is informed by several theoretical frameworks, particularly those related to the development of critical thinking skills and epistemological beliefs in education. Research emphasizes how students enter university with underdeveloped critical thinking skills due to their exam-driven learning experiences, influencing the coding process (Evens et al., 2013; Van der Zanden et al., 2020). Similarly, research highlights the disconnect between academic qualifications and readiness for higher-order thinking, which informed the identification of teacher concerns about the lack of emphasis on self-directed learning in A-

level psychology (Hulme & De Wilde, 2014; Tang & Wong, 2015). Additionally, previous research further supports this analysis, illustrating how students, conditioned by exam-based learning, often struggle with open-ended academic inquiry (Duro et al., 2013; Forbes, 2018; McCann & Bates, 2016; McMillan, 2015). By drawing on these theoretical insights, the analysis moves beyond merely summarizing participants' experiences, positioning them within broader discussions in psychology education and pedagogy, particularly the gap in critical thinking skills development as students transition from A-level psychology to degree-level education.

Previous experiences with teacher-led, exam-driven learning hinder students' ability to adapt to the more dynamic, inquiry-based learning environment of higher education. A-level educators expressed concerns that their teaching primarily focuses on helping students achieve the grades necessary for university admission rather than preparing them for the academic challenges they will face once there. As "Teacher D" stated:

> Erm, it depends in what respect do you mean? Do they tell them about applying for their student finance? Do you... they take them to university open days? Yes, they do all that kind of practical stuff. But, in terms of my primary aim it's to get them the grade to get them to go to university.

This illustrates the predominant goal of secondary education to prepare students for exams, with less attention given to fostering academic skills such as critical thinking and independent inquiry, which are crucial for success in higher education (Van der Zanden et al., 2020). "Teacher K" further emphasized this point: "I mean I think the focus is on getting them into higher education, rather than preparing them for it." "Teacher C" reinforced this concern, highlighting the gap in preparing students for the realities of university learning: "Not in terms of what they are going to encounter in terms of lectures and the work, and how they are going to have to work when they get to uni." This suggests that while students may be academically qualified for university, they often lack an understanding of the learning demands and self-directed study required at the higher education level. Research has

highlighted how varying perceptions of the importance of critical thinking among secondary education teachers contribute to this gap in student preparedness (Van der Zanden et al., 2020). The emphasis on exam success at the expense of academic readiness echoes concerns highlighted in previous research (Hulme & De Wilde, 2014; Tate & Swords, 2013; Van der Zanden et al., 2020). As a result, students enter university without the necessary skills for active, inquiry-based learning, further emphasizing the need for secondary education to reevaluate its approach to developing these competencies (Long et al., 2018).

University lecturers shared similar concerns, noting that students often arrive at university without a clear understanding of the academic expectations awaiting them. "Lecturer D" remarked: "What's expected of them is not very clear, they are not really sure what they are going to face and the things that they will have to do during their degree." Additionally, "Lecturer B" pointed out that students' perceptions of critical thinking often do not align with the more sophisticated standards expected at the university level. She explained:

> They appraise that in a way which they think is critical, but it isn't, so it's sometimes easier for them to have not done psychology because they haven't gone through a process where they have been told incorrect information [Laugh] actually. So, you almost have to deconstruct everything they know and start again from scratch.

This gap in academic preparedness highlights the need for a more balanced approach in A-level education—one that not only targets exam results but also equips students with the necessary critical thinking and academic skills required for success in university (Evens et al., 2013; Hulme & De Wilde, 2014). By fostering a shift towards prioritizing critical thinking skills and actively preparing students for the transition, educators could better equip students for success in university environments (Tang & Wong, 2015).

4.8.3.1 *Challenges in Navigating the University Learning Culture: Adapting to Independent and Inquiry-Based Education*

This subtheme explores how transitioning to university involves more than just acquiring academic knowledge; it also requires adapting to the distinctive learning environment of higher education, which contrasts significantly with the teacher-led, exam-focused approach of A-level education. Many university lecturers observed that students often struggle to adapt to this new environment, where independent learning and inquiry-based approaches are emphasized. "Lecturer B" highlighted this issue, noting that students come to university with the expectation that lecturers will provide all the answers:

> They internalize this and they come to university and think, okay I need to get all the answers off my lecturers because they are the experts they can tell me what I need to know and then that will mean I can pass the… this module… well, no not really, yeah we can give you a basis of key content, but we can't process that for you, we can't get in your mind and start turning the cogs.

This dependency on teacher confirmation was also described by "Lecturer A," who likened students' understanding of learning to a passive process, as seen in the movie *The Matrix*:

> So, they think of learning, as you know the scene from the matrix, you know you have got Neo just sitting there, and he is waiting you know and you push a couple of buttons, and you know information goes from the computer to his head.

This metaphor aptly illustrates how students' passive approach to learning can impede their adaptation to the demands of higher education, where independent inquiry and critical thinking are essential (Briggs et al., 2012; McMillan, 2015). This phenomenon is supported by research, which suggests that students often struggle to recognize that the strategies successful at A-level, such as rote memorization and reliance on direct teacher feedback, do not necessarily translate to success at university (Jones et al., 2017; Keane,

2011; Koh et al., 2012; McMillan, 2015). “Lecturer B” further emphasized this point, explaining how students’ previous education reinforces a rigid, answer-driven approach to learning: "Cos [sic] they have gone through a system that has told them, what they have been told is the right answer." This quote encapsulates how A-level students are conditioned to prioritize correctness over inquiry, leading to difficulties when they encounter the more nuanced, open-ended nature of university-level discourse (Duro et al., 2013; Forbes, 2018; McCann & Bates, 2016).

The observed gap in student preparedness reveals the need for a more holistic approach to education; one that aligns secondary education with the demands of higher education. Systemic issues such as the prioritization of exam outcomes over academic readiness and the lack of pre-emptive strategies to support students before university entry further contribute to this transition challenge (Bostock & Wood, 2014; Hulme & De Wilde, 2014; Hughes et al., 2017; Kitching & Hulme, 2013).

Moreover, the disconnect between students' academic identities shaped by secondary education and the expectations of university learning highlights the complexity of preparing students for higher-order thinking skills (Klimovienė et al., 2006; McEwan, 2017). Collaborative efforts between secondary and tertiary educators are essential to address these disparities and ensure students are better equipped to meet the intellectual challenges of university study (Kitching & Hulme, 2013; Price et al., 2011; Reay et al., 2010). By prioritizing critical thinking and academic inquiry from the outset of secondary education, we can better prepare students for the complexities and expectations of higher education, enhancing their overall success and academic engagement.

4.9 Discussion

The primary aim of this study was to gain a comprehensive understanding of the institutional culture at A-level and degree-level in psychology regarding the teaching and

learning of critical thinking, as well as identify barriers to effective instruction. The study was guided by two key research questions:

1. What are the fundamental aspects of institutional culture at A-level and degree-level in psychology that influence the approach to teaching and learning critical thinking?
2. What are the significant barriers encountered in teaching critical thinking within the context of psychology education at A-level and degree-level institutions?

Previous research has highlighted the pivotal role of educators in nurturing students' critical thinking skills, emphasizing the importance of comprehending the instructional techniques used by educators (Halx & Reybold, 2005; Pithers & Soden, 2000). By exploring how institutional culture influences the understanding and significance placed on critical thinking (Reybold, 2003), this study sought to offer insights that could guide the development of a critical thinking intervention aligned with the existing institutional culture.

This research examined the perspectives of A-level psychology teachers and university psychology lecturers on critical thinking instruction through a qualitative approach. Semi-structured interviews were conducted to explore educators' views on critical thinking instruction and the perceived barriers they face. The ensuing discussion will analyze the impact of these identified themes.

4.9.1 Summary of Key Findings

This summary explores the influence of neoliberalism on educational practices in A-level and university-level psychology, examining pedagogical differences and the challenges in preparing students for the transition between these educational levels. Based on the study's findings, it is evident that neoliberal policies heavily influence A-level psychology education, fostering a culture centered on measurable outcomes such as exam performance and accountability metrics (Anderson & Cohen, 2015; Robinson, 2019). This results-oriented approach often prioritizes immediate academic achievements over the broader development of critical thinking skills (Garver, 2020; Schmeichel et al., 2017). In contrast, university

psychology education, while also affected by neoliberal trends, integrates critical thinking instruction aligned with professional accreditation standards (APA, 2023; BPS, 2019, QAA, 2023). This juxtaposition highlights the tension between market-driven pressures and the educational goals aimed at cultivating intellectual and professional competencies (Jacobson & Bach, 2022; Joseph, 2020).

Examining pedagogical approaches reveals stark contrasts between A-level psychology teachers and university psychology lecturers. A-level educators operate within a regulated framework that emphasizes exam-focused teaching strategies and content delivery (BPS, 2013; Halonen et al., 2003). This approach often limits opportunities for critical thinking and independent exploration, reflecting a teacher-centered paradigm shaped by external standards and assessment criteria (Kitching & Hulme, 2013; Green, 2007). Conversely, university lecturers enjoy greater autonomy in curriculum design and employ student-centered approaches that promote collaborative learning and independent inquiry (Banyard, 2008; BPS, 2019). This shift in educator-student dynamics supports the development of critical thinking skills necessary for higher education and professional practice.

The transition from A-level to university presents significant challenges for students adapting to the intellectual demands of higher education. A-level education, focused on exam outcomes and teacher confirmation, may inadequately prepare students for the critical inquiry and independent learning required at university (Evens et al., 2013; Lai, 2011). This gap draws attention to systemic issues in educational continuity and demonstrates the need for collaborative efforts to bridge the divide between secondary and tertiary education (Hulme & De Wilde, 2014; Van der Zanden et al., 2020). Addressing these challenges requires proactive strategies that prioritize the development of critical thinking skills alongside academic achievement, ensuring students are well-prepared for the rigors of university life (Price et al., 2011; Reay et al., 2010).

In conclusion, these findings illuminate the complexities within educational systems influenced by neoliberal policies, contrasting pedagogical approaches, and the imperative of preparing students for transitions between educational levels. Reevaluating educational practices, within psychology education, to foster a balanced approach that promotes critical thinking, autonomy, and preparedness for lifelong learning and professional success is crucial in navigating these complexities.

4.9.2 Limitations

In this study, reflexive thematic analysis (Braun & Clarke, 2012, 2019, 2022) was employed to generate themes that illuminate how sociocultural factors influence psychology educators' attitudes towards critical thinking instruction within the UK education system. However, it is important to acknowledge certain limitations that contextualize the study's findings.

By illustration, the specific selection of A-level psychology teachers predominantly following the AQA (2015) exam specification might not adequately represent the diverse population of A-level psychology instructors across different curricula and awarding bodies in the UK. Different curricula approach psychology teaching and assessment differently, which could impact the perspectives and experiences of educators. Therefore, the views expressed by the A-level teachers in this study may not fully capture the breadth of attitudes within the broader population of psychology educators.

Despite these limitations, the study's insights are valuable and can serve as a foundational basis for future research. Recommendations for future studies include expanding sample diversity across universities and A-level providers, employing mixed-method approaches, and exploring broader sociocultural influences within the education system. By addressing these limitations, future research can offer a more comprehensive understanding of the factors shaping psychology educators' attitudes towards critical thinking instruction in the UK.

4.9.3 Conclusion

This study offers novel insights into the transition from school to university and the teaching of critical thinking. By interviewing A-level psychology teachers and university psychology lecturers, the research explores how critical thinking is taught in each educational setting. The findings reveal how sociocultural and structural factors influence educators' approaches to critical thinking instruction and impact student learning outcomes. The study also highlights the impact of neoliberal policies on the UK education system, suggesting that A-level students often adopt a passive learning approach that leads to academic success at that level but inadequately prepares them for university. As a result, students face a significant adjustment period when transitioning to university, where they must develop new learning strategies and adapt to different academic expectations. University lecturers emphasized the gradual acclimatization process, stressing the need for adaptable learning strategies and educator support to facilitate this transition.

Building on the insights gained from Study Phase 1, which highlighted the sociocultural, structural, and policy-driven factors affecting critical thinking instruction at the A-level and university stages, Study Phase 2 (Chapter 5, pp. 116 - 149) explores deeper into the developmental trajectory of critical thinking skills among psychology students. While the first study phase focused on qualitative insights from educators, the second phase employs a causal-comparative design to quantitatively assess the evolution of these skills across six educational stages. By examining the critical thinking abilities, motivations, and perceptions of students from year 12 through to postgraduate levels, this phase aims to bridge the gaps identified in Study Phase 1, providing a comprehensive understanding of how critical thinking competencies are cultivated and evolve throughout a student's academic journey. This study aims to offer empirical evidence to enhance the efficacy of the school-based critical thinking intervention, ultimately supporting students' successful transition and development in higher education.

The insights gained from this study emphasize the pressing need for a systematic examination of how critical thinking competencies develop across different educational stages. Consequently, Study Phase 2 extends this research by quantitatively investigating the developmental trajectory of critical thinking skills among psychology students. By examining students from year 12 to postgraduate levels, the next phase builds on the qualitative findings of Study Phase 1, addressing identified gaps and providing empirical data on critical thinking growth, motivations, and instructional perceptions across various academic stages.

Chapter 5: Study Phase 2

5.1 Chapter Introduction

Building on the insights gained from Study Phase 1, which identified the structural and pedagogical challenges affecting critical thinking instruction, this chapter presents the findings from the second phase of the multiphase sequential mixed-methods study (Creswell, 2012; Teddlie & Tashakkori, 2009). Study Phase 1 (pp. 72- 115) emphasized the perceived deficits in critical thinking among incoming university students and highlighted the impact of neoliberal policies and exam-focused teaching on the development of these skills. By addressing the gaps identified in the initial study, this study aims to investigate changes in psychological critical thinking ability—comprising critical thinking skills, motivation for critical thinking, and perceptions of critical thinking instruction—across various educational stages among psychology students.

A causal-comparative design was employed, comparing students across six educational stages: year 12, year 13, first year, second year, third year undergraduate, and postgraduate levels. The primary objective was to bridge gaps in understanding the development of critical thinking skills as students transition from A-level to university-level psychology education. This investigation is motivated by concerns raised in previous research about critical thinking deficits among incoming university students and the inadequacy of pre-tertiary education in cultivating the requisite critical thinking skills (Hulme & De Wilde, 2014; Tate & Swords, 2013; Van der Zanden et al., 2020).

Existing literature lacks detailed insights into critical thinking competence development and milestones, particularly during the transition from secondary to higher education (Evens et al., 2013; Lai, 2011; Marin & Halpern, 2011). This study contributes empirical evidence by examining how prior psychology education influences critical thinking skills development and informs the design of effective school-based instructional interventions. By addressing these gaps, the study aims to provide insights into the enhancement of critical thinking abilities among psychology students during their educational

journey. The findings will further contextualize the disparities highlighted in Study Phase 1, providing data-driven insights to enhance the teaching and learning of critical thinking in psychology education.

5.2 Psychological Critical Thinking Ability

Psychological critical thinking skills, critical thinking motivation, and students' perceptions of critical thinking in instruction are deeply interconnected facets that collectively contribute to assessing a student's overall psychological critical thinking ability. Within the realm of psychology education, the development of psychological critical thinking skills is fundamental, involving rigorous evaluation of claims through the lens of psychological science, as advocated by accreditation bodies such as the British Psychological Society (BPS, 2019), American Psychological Association (APA, 2023), and Quality Assurance Agency for Higher Education (QAA, 2023). This cognitive ability emphasizes the explicit application of foundational principles of psychological science, including the identification and scrutiny of implicit assumptions and values that influence thoughts, decisions, and practices (Lawson, 1999; Lawson et al., 2015).

Critical thinking motivation, as a dynamic force, underlines the importance of motivation in acquiring and perpetuating critical thinking processes, distinct from traditional dispositional views (Valenzuela et al., 2011). Motivation is shown to enhance students' engagement and performance in critical thinking tasks, complementing established critical thinking dispositions. Notable aspects of critical thinking dispositions include truth-seeking, inquisitiveness, and maturity of judgment (Facione et al., 1994; Facione, 2000).

Moreover, student perceptions of critical thinking in instruction are pivotal; recognizing explicit instruction in critical thinking empowers students to actively engage with the learning process, apply critical thinking skills effectively, and thereby enhance their overall academic performance (Clark, 2022; Doabler & Fien, 2013). This interconnectedness underlines the holistic nature of assessing and cultivating psychological critical thinking abilities among students, wherein each component informs and influences the others to

shape students' critical thinking capabilities and educational outcomes. Subsequent exploration of these interconnected elements will illuminate their mutual influences and contributions to fostering critical thinking skills in educational settings.

5.2.1 *Psychological Critical Thinking Skills*

Psychological critical thinking is considered a crucial skill for psychology undergraduates, emphasized in accreditation standards and guidelines (BPS, 2019; APA, 2023; QAA, 2023). This cognitive ability within psychology involves the rigorous evaluation of claims using core principles of psychological science (Lawson, 1999; Lawson et al., 2015).

In the educational context, psychological critical thinking for psychology undergraduates emphasizes the explicit application of foundational principles of psychological science, including identifying and scrutinizing implicit assumptions and values that influence thoughts, decisions, and practices (Richardson & Slife, 2011). Research in psychology courses, particularly in areas like research methods, is rapidly expanding, highlighting the importance of fostering critical thinking skills (Bensley et al., 2010; Stark, 2012).

5.2.2 *Critical Thinking Motivation*

Critical thinking motivation, defined as "the degree of motivation that individuals possess to engage in critical thinking" (Valenzuela et al., 2011, p. 824), represents a distinct perspective from the prevailing critical thinking dispositions theory by emphasizing the role of motivation in acquiring, developing, activating, and sustaining the cognitive resources essential for critical thinking. In contrast, critical thinking dispositions traditionally encompass a range of conceptualizations, including attitudes, inclinations, or established intellectual habits (Ennis, 1996; Halpern, 1998; Halonen, 1995; Perkins et al., 1993).

Critical thinking motivation introduces a dynamic aspect by emphasizing the role of motivation in activating and sustaining critical thinking dispositions (Valenzuela et al., 2011). Traditionally, these dispositions have been viewed as stable traits; however, the concept of

critical thinking motivation highlights the importance of motivational factors in both the acquisition and maintenance of critical thinking processes. Valenzuela et al. (2011) argued that adopting a motivational perspective may yield more comprehensive insights into critical thinking outcomes compared to a purely dispositional framework. Their development of the Critical Thinking Motivation Scale (CTMS; Valenzuela et al., 2011) provides empirical evidence for the influence of motivation on critical thinking performance. This scale suggests that individuals with higher levels of motivation are more likely to engage effectively in critical thinking tasks and demonstrate superior performance in these activities.

Despite limited consensus or empirical research on the dispositional or motivational components of critical thinking (Sosu, 2013; Valenzuela et al., 2011), studies demonstrate the role of motivation in fostering critical thinking skills. Various forms of motivation, such as intrinsic motivation, grade motivation, and self-efficacy, have been associated with enhanced critical thinking abilities (Berestova et al., 2022).

Educators play a significant role in shaping motivation for critical thinking among students, particularly by reducing academic stress and fostering a supportive learning environment (Trigueros et al., 2020). These factors directly impact students' learning strategies and engagement in critical thinking processes. Critical thinking motivation is instrumental in driving individuals to think critically and make informed decisions, complementing the traditional view of critical thinking dispositions by emphasizing motivation's activating role.

Critical thinking motivation stresses the importance of motivation in both acquiring and perpetuating critical thinking processes. By leveraging motivational factors, educators and stakeholders in education can cultivate critical thinking skills among learners, enhancing their capacity to navigate complex challenges and situations effectively.

5.2.3 *Student Perceptions of Critical Thinking in Instruction*

Understanding the benefits of explicit instruction in critical thinking and recognizing its presence are essential for students' academic growth and development. This instructional approach plays a vital role in enhancing students' critical thinking abilities and empowers them to make informed judgments across diverse academic subjects and real-world scenarios. In this context, it becomes important to explore how explicit instruction in critical thinking positively impacts students and why it is imperative for them to identify when they are being guided through this transformative educational process.

Explicit instruction in critical thinking has consistently demonstrated significant benefits for students across various disciplines. Research points out that explicit instruction, combined with practice, is crucial for improving critical thinking skills (Heijltjes et al., 2014). This instructional approach involves clearly delineating and teaching critical thinking strategies, leading to improved abilities in areas such as argument analysis and recognition of thinking errors (Bensley et al., 2010, 2021). Furthermore, studies show that employing explicit instructional methods yields substantial enhancements in students' critical thinking skills (Meyer et al., 2018).

This structured and systematic approach helps students effectively engage with the content being taught (Doabler & Fien, 2013). By understanding that they are being guided through the development of critical thinking skills, students can actively participate in the learning process and apply these skills across different contexts (Clark, 2022). Moreover, explicit instruction in critical thinking is identified as a key factor in promoting critical thinking and fostering a deeper understanding of the subject matter (Williams et al., 2003).

Explicit instruction in critical thinking is highly beneficial for students as it enhances their ability to think critically and make informed judgments. Recognizing when they are receiving this type of instruction is important for students, allowing them to actively engage with the material, apply critical thinking skills in various scenarios, and ultimately improve their overall academic performance and problem-solving abilities.

5.3 Prior Education and Critical Thinking Skills

Research emphasizes the critical role of secondary education in shaping students' essential critical thinking abilities, which are crucial for their success in higher education (Evens et al., 2013; Van der Zanden et al., 2020). Critical thinking is not only a fundamental educational goal but also a vital skill enabling students to tackle challenges in personal and professional life (Lai, 2011).

Teachers in secondary education play a key role in fostering critical thinking by aligning assignments with university practices, such as research paper writing, and implementing more sophisticated grading criteria (Van der Zanden et al., 2020). Studies show that interventions aimed at training educators in teaching critical thinking have significant impacts on students' skills (Lai, 2011).

However, despite the acknowledged importance of critical thinking, there remains a notable gap in research regarding the specific impact of secondary education on students' critical thinking skills as they transition to university (Evens et al., 2013). This gap may be attributed to differing opinions among educators on the responsibilities of secondary education versus universities in preparing students for higher education (Van der Zanden et al., 2020).

Previous research has emphasized discrepancies in students' critical thinking skills upon entering university, highlighting the need for more comprehensive preparation during secondary education (Hulme & De Wilde, 2014; Tate & Swords, 2013; Van der Zanden et al., 2020). The variation in preparation can hinder students' abilities to engage in evaluation, argumentation, and critical thinking, essential aspects of university education. This discrepancy in skill levels may be attributed to varying perceptions among secondary education teachers regarding the importance of critical thinking skills for university and the different practices employed to foster these skills (Van der Zanden et al., 2020).

Moreover, research suggests that A-level performance does not consistently predict university degree outcomes in psychology (Banister, 2003; Betts et al., 2008). Despite efforts in secondary education to develop critical thinking skills, there may still be uncertainties about how academic performance at this level translates into success at university.

Furthermore, the transition from secondary to higher education demands that students become independent learners and critical thinkers, qualities essential in modern society (Lai, 2011). However, the impact of prior education on critical thinking in higher education has not been extensively studied, indicating a critical gap in research (Evens et al., 2013).

In the weeks between students confirming their university place and arriving at university, they are expected to evolve into independent critical learners, ready to take responsibility for their own learning (De Laet et al., 2016). This transition is challenging due to the shift in academic expectations and values between secondary and university education (McMillan, 2007, 2015; Scanlon et al., 2007; Sotardi, 2016).

Despite being a well-established area of educational scholarship, there is a scarcity of comprehensive research exploring how the secondary school experience prepares students with the skills needed to successfully navigate the school-university transition, and what role teachers play in this preparation (Bostock & Wood, 2014; Hughes et al., 2017). Transition research has predominantly focused on university interventions rather than on preparing students prior to arrival, highlighting an area requiring further exploration (Hulme & De Wilde, 2014).

In conclusion, secondary education significantly influences students' critical thinking skills as they enter university. However, the lack of consistent preparation and varying perceptions among teachers highlight the need for more research and standardized approaches to effectively foster critical thinking skills in students during their transition to

higher education. Addressing these gaps and challenges can better prepare students to thrive as independent critical learners in university settings.

5.4 Empirical Studies on Critical Thinking Development in Higher Education

Researchers have investigated the effectiveness of higher education in fostering critical thinking, seeking insights into the nature and impact of educational experiences on students' cognitive abilities. Despite the prevailing belief in higher education's ability to foster critical thinkers, empirical evidence remains inconclusive. Huber and Kuncel's (2016) research suggested significant improvements in critical thinking skills and dispositions during a standard higher education experience, estimating an effect size of 0.59 standard deviations (SDs). Conversely, Arum and Roksa (2011) reported more modest gains of 0.18 SDs over three semesters and 0.47 SDs over four years, raising questions about the depth and sustainability of critical thinking development in higher education. Notably, Lane and Oswald (2016) offered a counterargument, suggesting a reinterpretation of the statistical analysis that would indicate far fewer students show gains in critical thinking.

Building upon this variability in findings, Gellin's (2003) meta-analysis of eight studies from 1991 to 2000 concluded that higher education students engaging in activities such as interacting with lecturers and peers, living on campus, and participating in student union clubs or organizations increased their measured critical thinking skills by 0.14 standard deviations compared to students who did not engage in such activities. This comprehensive impact of the university environment is further supported by older research by Dressel and Mayhew (1954) and McMillan (1987), who suggested that holistic educational experiences rather than specific interventions are key to nurturing critical thinking.

Moreover, results from the Organization for Economic Co-operation and Development (OECD, 2022), based on data from 120,000 students, highlighted concerning trends in critical thinking levels among university students. One-fifth of students performed at the lowest critical thinking level, and half of exiting students were at the two lowest levels, casting doubts on the reliability of a university qualification in signaling expected critical

thinking skills in the global marketplace. Additionally, OECD (2022) data indicated relatively small gains in critical thinking ability among students between joining higher education and exiting (d = 0.10), suggesting limited improvement over the course of higher education.

Pascarella and Terenzini (1991, 2005) found evidence of positive effects of higher education on critical thinking, even after controlling for demographic and academic variables. They emphasized the comprehensive impact of the higher education environment, suggesting that holistic educational experiences, rather than specific interventions, are key to nurturing critical thinking. Interestingly, Pascarella and Terenzini (2005) noted that the gains observed in their review of 1990s studies are “appreciably smaller in magnitude than the gains we observed in our previous synthesis” (p. 158).

Addressing the preparatory role of secondary education, Van de Zanden et al. (2020) emphasized the role of the pre-university track in cultivating students' critical thinking abilities for success at the higher education level. They argued that the nature of secondary education significantly influences students' preparedness to engage in critical thinking within higher education settings. Furthermore, Long et al. (2018) highlighted a critical expectation from higher education academics—that incoming students possess well-developed critical thinking skills. This expectation highlights the importance of understanding how secondary education shapes students' capacity for critical thinking during this transitional period.

However, empirical studies addressing students' initial critical thinking abilities as they enter higher education are scarce; as Evens et al. (2013) suggested, students do not arrive as blank slates; their prior educational experiences, particularly in secondary school, likely influence their readiness for critical thinking at the higher education level. Marin and Halpern (2011) further emphasized the deficiency in empirical research focusing on the development of critical thinking skills specifically at the secondary education level, with most existing studies concentrating on post-secondary environments, overlooking the formative role of secondary education in this critical skill development.

Transitioning to university experiences, O'Hare and McGuinness (2009) found that the critical thinking scores of third-year university students in Ireland were significantly higher than the corresponding scores of first-year students, illustrating the ongoing development of critical thinking throughout university. However, relatively little is known about what goes on during the university experience that contributes to the improvement of students' critical thinking skills (Renaud & Murray 2008).

While higher education can enhance critical thinking skills, challenges exist in ensuring the permanency and generalization of these skills. Short-term courses focusing on critical thinking may not fully address the need for integrated critical thinking practices across various subjects, potentially hindering the reform of higher education instruction (Dumitru et al., 2018). Employers' dissatisfaction with recent graduates' critical thinking competencies is evident (Schwab & Samans, 2016), underscoring the need for higher education to align with industry expectations and equip students with transferable critical thinking skills. The discrepancy between academic performance and workplace readiness highlights the importance of refining critical thinking education to bridge this gap.

Previous research has highlighted discrepancies in students' critical thinking skills upon entering higher education, emphasizing the urgent need for more robust preparation during secondary education (Hulme & De Wilde, 2014; Tate & Swords, 2013; Van der Zanden et al., 2020). These studies collectively highlight the necessity for more comprehensive investigations into how secondary education influences the development of critical thinking skills crucial for higher education-level success.

In conclusion, while higher education plays a vital role in fostering critical thinking skills, challenges remain in understanding and addressing the influence of students' prior educational experiences on their readiness for higher education-level critical thinking. Efforts to bridge gaps between secondary and tertiary education, along with comprehensive research on the developmental trajectory of critical thinking, are essential for maximizing the

effectiveness of higher education in nurturing this essential skill and meeting industry expectations for critical thinking competencies among graduates.

5.5 The Current Study

This study aims to explore changes in psychological critical thinking ability (i.e., psychological critical thinking skills, motivation for critical thinking, and perceptions of critical thinking instruction) across various education levels among psychology students. A causal-comparative design was employed, comparing students across six educational stages: year 12, year 13, first, second, third year undergraduate, and postgraduate.

The primary objective was to address gaps in understanding the development of critical thinking skills as students transition from A-level to university-level psychology education. Specifically, the study sought to examine how prior psychology education influences these skills to inform the design of an effective school-based instructional critical thinking intervention. Delegates in Hulme and De Wilde's (2014) study raised concerns that pre-tertiary education might not adequately cultivate the critical thinking skills necessary for higher education, with critical thinking deficits commonly noted. Previous research has stressed disparities in critical thinking skills among incoming university students, emphasizing the need for enhanced secondary education preparation (Hulme & De Wilde, 2014; Tate & Swords, 2013; Van der Zanden et al., 2020).

Moreover, few empirical studies have examined the impact of prior education on critical thinking in higher education, with most focusing on average growth scores across entire student populations rather than differences among student groups (Evens et al., 2013). Additionally, there is limited research on the progression of critical thinking abilities as students advance in higher education and in the development of these skills during secondary education (Lai, 2011; Marin & Halpern, 2011). Existing literature lacks clarity on critical thinking competence development and anticipated milestones (Evans, 2020). This study aims to address these gaps and offer valuable insights into the development of critical thinking skills among psychology students during their transition to university education,

while considering the influence of prior education. The study is guided by the following research question:

5.5.1 *Research Question*

1. How does psychology students' psychological critical thinking ability change as a function of education level?

5.5.2 *Hypotheses*

H_1: Psychological critical thinking skills will increase as a function of education level.

H_2: Critical thinking motivation will increase as a function of education level.

H_3: Perceptions of critical thinking in instruction will increase as a function of education level.

H_4: Previously studying A-level psychology will have no impact on students psychological critical thinking skills, motivation to think critically and student perceptions of critical thinking in instruction.

H_5: A-level grade will have no impact on students psychological critical thinking skills, motivation to think critically and student perceptions of critical thinking in instruction.

5.6 Method

5.6.1 Research Design

This study employed a causal-comparative design to investigate the link between participants' education level (independent variable) and their psychological critical thinking ability, motivation to think critically, and perceptions of the amount of critical thinking instruction they receive (dependent variables). A causal-comparative design is well-suited for this research as it allows for the examination of differences among naturally occurring groups without the need for experimental manipulation (Brewer & Kuhn, 2010). Given that education level is a pre-existing characteristic that cannot be ethically or practically

manipulated, this design provides an effective means to explore its potential effects on the dependent variables.

Causal-comparative research, also known as ex post facto research, is a widely used approach in educational and psychological studies where the independent variable has already occurred (Cham et al., 2024). This design enables the identification of patterns and relationships between education level and critical thinking-related constructs by analyzing pre-existing differences across groups.

By employing a causal-comparative approach, this study can systematically examine how differences in education level correspond with variations in psychological critical thinking ability, motivation for critical thought, and perceptions of instructional exposure. This design also aligns with the study's goal of assessing the real-world impact of educational backgrounds on cognitive and psychological constructs. Unlike experimental designs, which may introduce artificial constraints, a causal-comparative approach allows for an ecologically valid investigation into how education level naturally relates to critical thinking outcomes (Cham et al., 2024). Additionally, it enables the study to draw meaningful conclusions regarding instructional effectiveness and motivation in critical thinking without ethical concerns related to manipulating participants' educational experiences.

However, it is important to acknowledge that causal-comparative designs cannot establish definitive causation but rather indicate potential relationships that warrant further investigation through longitudinal or experimental methodologies (Brewer & Kuhn, 2010). Nonetheless, this study provides an essential foundation for understanding how educational experiences shape critical thinking abilities, motivation, and perceptions of instruction, contributing to ongoing discussions in educational research and practice.

By utilizing a causal-comparative design, this study offers valuable insights into the role of education in fostering critical thinking skills and motivation, informing educational strategies aimed at enhancing these essential competencies. The findings can help

educators tailor curricula and instructional approaches to better address students' needs, contributing to improved educational outcomes in critical thinking and related psychological constructs.

5.6.2 Participant Sample

The participant sample for this study consisted of 301 psychology students, including both A-level and university students, recruited from six schools and ten universities. The schools were diverse in type, comprising two Academy Converter Schools, one Academy School, one Voluntary Controlled School, and two Academy Sponsor-Led Schools. Most of these schools followed the AQA (2015) A-level psychology curriculum, with one using WJEC/Eduqas (2015). The universities represented in the sample included seven Post-1992 universities, two Russell Group universities, and one Plate Glass university.

The sample included 50 male, 249 female, one non-binary, and one participant who did not specify their gender. A-level students were from year 12 and year 13, while university students were primarily first- and second-year undergraduates. Due to a low number of third-year and postgraduate students, their data were excluded from the final analysis. This exclusion limits the representativeness of the sample for more advanced students.

A-level students were recruited opportunistically through their teachers, while university students were recruited through various methods, including online recruitment systems such as SONA, social media advertisements, and study links emailed to psychology departments across UK universities. First- and second-year undergraduates were offered course credits as an incentive to encourage participation.

Recruitment efforts faced several challenges. Despite outreach to schools and university psychology departments, response rates were low. Many schools that participated in Study Phase 2 had already been involved in Study Phase 1, and some declined participation, citing time constraints, a focus on exam preparation, or concerns about the study's relevance to the curriculum. A few schools expressed resistance to the study, raising

concerns about its premise. Similarly, engagement from university psychology departments was minimal, with many Heads of Department citing institutional protocols that restricted the distribution of external research or concerns about staff workload and the perceived lack of benefits to students.

While recruitment was challenging, these efforts resulted in a final sample that, despite its limitations, reflects a diverse group of students from a variety of educational backgrounds. Table 2 provides a breakdown of the demographic characteristics of the participant sample, including their education level, sample size and mean age.

Table 2

Demographic Characteristics of Participant Sample

Education Level	*N*	*M*age	*SD*
Year 12	123	16.40	.51
Year 13	67	17.72	3.05
First-year	59	23.40	8.40
Second-year	32	21.94	5.86
Third-year	11	21.40	2.01
Postgrad	9	30.60	7.80

Note. M*age represents the mean age of participants within each education level, and SD represents the standard deviation.*

5.6.3 Materials

5.6.3.1 *Participant Materials*

Participants in the study were provided with different participant materials depending on the form of administration, either online or in-person. For in-person sessions, participants

received paper participant information sheets (Appendix G, pp. 318 - 319), consent forms (Appendix H, p.320), and debriefing materials (Appendix I, p. 321). Conversely, for online sessions, participants accessed electronic versions of these materials through the Online Surveys platform (Appendix J, pp. 322- 323; Appendix K, p. 324).

The design of all materials adhered to the principles described in the BPS (2014) Code of Human Research Ethics. This ensured that participants were provided with comprehensive information about the study, their rights as participants, and the procedures involved. Furthermore, it guaranteed that participants provided informed consent prior to their involvement in the research. The debriefing materials were carefully crafted to provide participants with any necessary clarification or additional information following their participation in the study.

5.6.3.2 *Measures*

The measures were administered both online and in-person due to computer access limitations in certain secondary schools. Prior to the study, all the measures were piloted with a similar sample to the one used in this research. Data was collected using three measures: the Critical Thinking Motivation Scale (CTMS; Valenzuela et al., 2011; Appendix L, pp. 325 -327), Course Evaluation Form: Students Perceptions of Critical Thinking in Instruction (Foundation for Critical Thinking Press, 2007; Appendix M, pp. 328 - 331) and the Revised Psychological Critical Thinking Exam (R-PCTE; Lawson et al., 2015; Appendix N, pp. 332- 335). The internal consistency of each measure was tested using Cronbach's Alpha.

5.6.3.2.1 ***Critical Thinking Motivation Scale.*** The Critical Thinking Motivation Scale (CTMS; Valenzuela et al., 2011) is grounded in a theoretical approach that emphasizes motivation over dispositional factors. The scale includes 19 Likert-style items, ranging from 1 to 6, where participants indicate their level of agreement with statements (e.g., "Concerning reasoning correctly, I am better than most of my peers"). These statements assess participants' expectations about thinking critically or rigorously (i.e., expectancy) and the

value they place on such thinking (i.e., value). This includes the perceived usefulness and importance of critical thinking (i.e., utility), the cost they are willing to accept to engage in critical thinking (i.e., cost), and the intrinsic interest such thinking arouses in them (i.e., intrinsic/interest value).

The internal consistency of the scale's subscales showed considerable variation. The task value (α = .84), utility value (α = .82), and attainment (α = .78) subscales demonstrated good internal consistency. However, the cost (α = .61), intrinsic/interest value (α = .58), and expectancy (α = .53) subscales exhibited lower internal consistency, suggesting potential reliability concerns.

The scale aligns closely with the A-level psychology curriculum (Ofqual, 2014) and the BPS (2019) accreditation standards, both of which emphasize critical thinking, scientific reasoning, and the application of psychological concepts. The A-level psychology curriculum highlights the importance of evaluating psychological theories, understanding research methodology, and applying psychological concepts to real-world contexts (Ofqual, 2014). The measure captures these elements by assessing students' motivation to engage with these tasks, including their willingness to analyze and apply psychological principles. Similarly, the BPS (2019) accreditation standards stress the significance of scientific reasoning, evidence evaluation, and critical judgment. The scale supports these objectives by measuring motivational factors such as students' perceived competence and their inclination to critically engage with evidence and arguments.

By providing a multidimensional measure of motivation, the scale offers valuable insights into the factors that influence students' engagement with critical thinking. This aligns with the goals of both the A-level psychology curriculum (Ofqual, 2014) and the BPS (2019) accreditation standards, supporting the development of higher-order cognitive skills essential for success in psychology. Consequently, the measure serves as a reliable and valid tool for assessing motivation and fostering critical thinking in educational settings.

5.6.3.2.2 ***Course Evaluation Form: Students' Perceptions of Critical Thinking in Instruction.*** The Course Evaluation Form: Students Perceptions of Critical Thinking in Instruction (Foundation for Critical Thinking Press, 2007) is comprised of 20 Likert-style items. Participants are asked to rate on a scale of 1 to 5 the extent they perceive their instructor teaches them to do the described activity (e.g., To what extent did your instructor explain what critical thinking is (in a way that you could understand), with 1 indicating a low score and 5 indicating a high score. The internal consistency of this measure was found to be good (α = .90).

Additionally, this scale aligns with key educational standards, including the BPS's (2019) emphasis on critical thinking, scientific reasoning, and evidence-based judgments. It also corresponds with the A-level psychology curriculum, which focuses on evaluating research methods, interpreting empirical findings, and applying psychological concepts to real-world scenarios (Ofqual, 2014). By assessing whether instructors effectively teach these skills, the scale provides valuable feedback to improve teaching methodologies, ultimately preparing students for both academic progression and practical applications of psychology.

5.6.3.2.3 ***Revised-Psychological Critical Thinking Exam.*** The R-PCTE (Lawson et al., 2015) consists of 14 constructed-response items focused on seven specific critical thinking principles. Lawson (1999) originally developed the Psychological Critical Thinking Exam (PCTE) to assess students' ability to "think critically, or evaluate claims, in a way that explicitly incorporates the basic principles of psychological science" (p. 207). In the R-PCTE (Lawson et al., 2015), participants are presented with a research scenario and asked to identify and explain any problems with the person's conclusions, if applicable. Participants responses were scored on a 1 to 3 scale, using the R-PCTE (Lawson et al., 2015) coder training sheet and model answers. To ensure inter-rater reliability, a percentage of participant responses were cross-checked and independently coded by another researcher. The internal consistency of this measure was found to be good (α = .77).

The R-PCTE (Lawson et al., 2015) was selected for this study due to its strong alignment with both the A-level psychology curriculum (Ofqual, 2014) and the BPS (2019) accreditation standards at the university level. This validated assessment tool is specifically designed to measure critical thinking in psychology, focusing on students' ability to evaluate research claims, apply psychological theories, and critique research methodologies. These skills are central to both curricula, which emphasize the importance of critical analysis, the evaluation of scientific information, and the application of theoretical knowledge to real-world situations.

At the A-level, as defined by Ofqual (2014) and the Qualifications and Curriculum Authority (QCA), the curriculum is structured around assessment objectives that focus on demonstrating knowledge and understanding, applying knowledge in various contexts, and analyzing and evaluating scientific information. The R-PCTE (Lawson et al., 2015) aligns with these objectives, challenging students to critically evaluate research, identify flaws in reasoning, and apply psychological principles to assess research claims. Its constructed-response format mirrors the higher-order thinking required in A-level assessments, reinforcing students' ability to engage in analytical and evaluative thinking, a core aim of the curriculum.

At the university level, the BPS (2019) emphasizes the importance of discipline-specific critical thinking in psychology, stating that graduates should be able to "reason scientifically, understand the role of evidence, and make critical judgments about arguments in psychology (p.10)." The R-PCTE (Lawson et al., 2015) directly supports this guideline, encouraging students to reason scientifically and apply their understanding of evidence to critically evaluate psychological claims. Additionally, QAA (2023) emphasizes that critical thinking is a key strength of psychology education, noting that "students learn how to use a range of empirical methods of inquiry—critically and ethically—to interpret evidence and communicate it to various audiences (p. 3)." By assessing students' ability to critically analyze research designs and conclusions, the R-PCTE (Lawson et al., 2015) ensures that

students engage with evidence in a way that is both critical and ethical, fostering skills necessary for effective communication and professional judgment in psychology.

In using the R-PCTE (Lawson et al., 2015), this study ensures that the measurement of critical thinking is both theoretically grounded and directly relevant to the academic and professional development of psychology students at both the A-level and university levels.

5.6.4 Procedure

As mentioned earlier, the study was conducted using both online and in-person administration methods. In person delivery was necessary for several secondary schools that had restricted computer and internet access. Conversely, the research was exclusively administered online for university student participants.

5.6.4.1 *Online Administration*

The online version of the study utilized conditional branching, where participants were presented with different questions based on their responses to demographic questions (e.g., if participants were studying psychology at university, they were asked if they had studied psychology in further education). Prior to participating, participants accessed a comprehensive information page outlining the study's aim, their role as participants, and their rights. After providing consent, participants completed the CTMS (Valenzuela et al., 2011), Course Evaluation Form: Students Perceptions of Critical Thinking in Instruction (Foundation for Critical Thinking Press, 2007), and the R-PCTE (Lawson et al., 2015). A debrief page, in line with the BPS (2014) Code of Human Research Ethics, was provided to participants upon completion.

5.6.4.2 *Paper Administration*

The paper version of the study was exclusively administered to A-level psychology students, eliminating the need for conditional branching. The study took place during regular psychology lesson time allocated by the schools. Participants received paper versions of the participant information sheet and two copies of the participant consent form. After reading

the information sheet, both copies of the consent form were signed by the participant and principal investigator, following BPS (2014) auditing procedures. Participants then completed the measures in the same order as the online component. A debrief, in line with the BPS (2014) Code of Human Research Ethics, was provided to participants upon completion.

5.6.5 Data Analysis

Descriptive statistics provided an overview of the data, including means and standard deviations. A series of multivariate analysis of variance (MANOVA) were performed to assess the overall impact of each independent variable on the set of dependent variables (Appendix O, pp. 336 -382).

5.6.6 Ethics

This study obtained ethical clearance from the University of Cumbria's Research Ethics Committee (Appendix P, p. 383) and adhered strictly to the BPS (2014) Code of Human Research Ethics. As the research involved participants below the age of 18, procedures outlined in the BPS (2014) Code of Human Research Ethics for obtaining consent from children and young people in schools were followed. In each school, a senior staff member (e.g., A-level teacher, Head of Sixth Form, or Head teacher) assessed the research proposal and determined if it aligned with regular curriculum activities. In cases where risk assessments revealed no significant risks, consent from A-level psychology students and approval from a senior staff member were considered sufficient consent, in accordance with the BPS (2014) Code of Human Research Ethics. If the criteria were not met, individual schools made a judgement on whether parental consent should be sought.

5.7 Results

Descriptive statistics were computed to summarize the characteristics of the sample across various dimensions, including psychological critical thinking skills, perceptions of critical thinking instruction received, task value and expectancy—key indicators of motivation for critical thinking tasks. The participants were stratified into distinct categories based on

their level of study (year 12, year 13, first year undergraduate, second year undergraduate, third year undergraduate, and postgraduate - taught Masters only), pre-tertiary qualification (A-level psychology qualification vs. No A-level psychology qualification), and A-level psychology qualification grade (A*-A, B, C, D, and Other). This comprehensive categorization enabled a detailed examination of the sample's attributes within different educational and qualification frameworks, including specific analysis based on A-level psychology grade distinctions.

5.7.1 Descriptive Statistics by Level of Study

Table 3 displays the mean scores and standard deviations (± SD) for each dependent variable across the different levels of study.

Table 3

Descriptive Statistics for Dependent Variables by Level of Study

Level of Study	Psychological Critical Thinking Skills	Perceptions of Critical Thinking Instruction	Task Value	Expectancy
Year 12	15.41 ± 7.28	68.94 ± 10.49	56.91 ± 14.49	12.28 ± 3.28
Year 13	16.91 ± 6.28	71.78 ± 8.88	59.76 ± 14.53	13.48 ± 3.06
First year	16.12 ± 7.06	73.36 ± 13.89	48.93 ± 16.72	10.71 ± 3.44
Second year	16.41 ± 5.86	69.59 ± 11.38	52.81 ± 13.71	11.44 ± 3.27
Third year	22.73 ± 8.33	73.27 ± 11.51	51.00 ± 14.84	10.45 ± 3.88
Postgraduate	14.33 ± 8.26	73.33 ± 14.42	57.00 ± 19.34	10.89 ± 5.46

Examination of descriptive statistics in Table 3, reveals notable variations in mean scores of dependent variables. In terms of psychological critical thinking skills, third-year undergraduate students exhibited higher scores compared to year 12 and postgraduate students. When considering perceptions of critical thinking instruction, first-year

undergraduate students reported higher scores compared to year 12 and second-year undergraduate students. Task value showed differences with year 13 students reporting the highest score compared to first-year and second-year undergraduate students. Additionally, year 13 students also demonstrated higher expectancy scores compared to year 12 and postgraduate students. These findings emphasize the influence of academic progression on psychological critical thinking skills, perceptions of critical thinking instruction, task value, and expectancy among participants within this study context.

5.7.2 Descriptive Statistics by A-level Psychology Qualification Status

Table 4 displays the mean scores and standard deviations (± SD) for each dependent variable across A-level Psychology qualification status.

Table 4

Descriptive Statistics for Dependent Variables by A-level Psychology Qualification Status

Qualification Status	Psychological Critical Thinking Skills	Perceptions of Critical Thinking Instruction	Task Value	Expectancy	*N*
No A-level	15.78 ± 6.80	73.95 ± 13.99	51.70 ± 17.36	11.84 ± 3.42	37
A-level	17.16 ± 6.42	73.29 ± 8.44	48.53 ± 14.84	10.56 ± 3.39	45

The descriptive statistics based on A-level Psychology qualification status highlight differences in mean dependent variable scores between participants with and without A-level Psychology qualifications. Participants with A-level Psychology qualifications exhibited slightly higher psychological critical thinking skills compared to those without. Interestingly, participants without A-level Psychology qualifications reported higher task value (compared to those with A-levels). However, perceptions of critical thinking instruction and expectancy showed relatively similar mean scores across both groups.

5.7.3 Descriptive Statistics by A-level Qualification Grade

Table 5 displays the mean scores and standard deviations (± SD) for each dependent variable across A-level Psychology qualification grade.

Table 5

Descriptive Statistics for Dependent Variables by A-level Psychology Grade

A-level Psychology Grade	Psychological Critical Thinking Skills	Perceptions of Critical Thinking Instruction	Task Value	Expectancy	*N*
A*-A	18.38 ± 7.07	71.75 ± 9.84	49.13 ± 14.42	10.38 ± 4.03	8
B	18.27 ± 6.05	74.36 ± 5.41	40.27 ± 8.81	11.09 ± 2.81	11
C	16.75 ± 6.98	73.63 ± 8.12	50.38 ± 12.82	10.25 ± 3.38	16
D	16.33 ± 3.88	78.33 ± 10.39	53.83 ± 26.25	12.33 ± 3.39	6
Other	22.00 ± 1.41	59.50 ± 6.36	49.50 ± 7.78	9.50 ± 4.95	2

The descriptive statistics based on A-level Psychology qualification grade reveal distinct variations in mean dependent variable scores based on different A-level grades. Participants with 'Other' grades (i.e., those scoring lower than a D) demonstrated notably higher psychological critical thinking skills compared to those with 'B' or 'C' grades. Perceptions of critical thinking instruction were highest among participants with 'B' grades and lowest among those with 'Other' grades. Task value varied across grades, with 'B' grades reporting the lowest and 'A*-A' grades reporting the highest. Expectancy scores were highest among participants with 'D' grades and lowest among those with 'Other' (i.e., those scoring lower than a D) grades. These findings underline the impact of A-level Psychology qualification status and grade on participants' psychological critical thinking skills,

perceptions of critical thinking instruction, task value, and expectancy within the study context.

5.7.4 Multivariate Analysis of Variance (MANOVA)

A series of multivariate tests using Pillai's Trace were conducted to examine various effects on psychological critical thinking skills, perceptions of critical thinking instruction, task value, and expectancy across different levels of study, A-level Psychology qualification status, and A-level Psychology grade.

5.7.4.1 *MANOVA 1: Effects of Level of Study on Combined Dependent Variables*

Firstly, a MANOVA was performed to investigate the effects of level of study (year 12, year 13, first-year undergraduate, second-year undergraduate) on the combined dependent variables. Results indicated a significant main effect of level of study on the combined dependent variables (F (12, 828) = 3.74, $p < .001$, $\eta_p^2 = .05$). This finding suggests that differences exist among these levels of study in terms of psychological critical thinking skills, perceptions of critical thinking instruction, task value, and expectancy.

The univariate F statistics derived from the initial MANOVA were utilized to examine the specific effects of level of study on individual dependent variables. Univariate analysis of variance (ANOVA) results showed no significant effect of level of study on psychological critical thinking skills (F (3, 277) = .74, $p = .527$, $\eta_p^2 = .01$). This indicates that students' psychological critical thinking skills did not vary significantly across different levels of study. Similarly, perceptions of the amount of critical thinking instruction received did not significantly differ across levels of study (F (3, 277) = 2.5, $p = .060$, $\eta_p^2 = .03$). While the p-value is marginally above the conventional threshold of significance ($p < .05$), the effect size ($\eta_p^2 = .03$) suggests a small and non-significant impact of level of study on students' perceptions of the amount of critical thinking instruction received.

A significant effect of level of study was found for task value (F (3, 277) = 6.35, $p < .001$, $\eta_p^2 = .06$). Post-hoc comparisons, using Tukey's Honestly Significant Difference (HSD)

test, revealed that year 13 students reported significantly higher task value compared to first-year undergraduates (*MD* = 10.83, $p < .001$). Year 12 students also exhibited higher task value than first-year undergraduate students (*MD* = 7.99, $p < .01$). This suggests that A-level students perceive greater value in critical thinking tasks compared to university students. There was a significant effect of level of study on expectancy (F (3, 277) = 8.1, $p < .001$, $\eta_p^2 = .08$). Post-hoc analyses, using Tukey's HSD test, indicated that year 13 students reported significantly higher expectancy compared to both first-year undergraduates (*MD* = 2.77, $p < .001$) and second-year undergraduates (*MD* = 2.04, $p < .05$). Similarly, year 12 students had higher expectancy than first-year undergraduate students (*MD* = 1.56, $p < .05$). This implies that A-level students have higher expectations regarding the outcomes of critical thinking activities compared to university students.

While no significant differences were observed in psychological critical thinking skills or perceptions of critical thinking instruction across different levels of study, notable variations were found in task value and expectancy. A-level students tended to place higher value on critical thinking tasks and hold greater expectations for positive outcomes compared to university students.

5.7.4.2 *MANOVA 2: Effects of A-level Psychology Qualification Status on Combined Dependent Variables*

A second MANOVA was conducted to assess the effect of A-level Psychology qualification status and A-level Psychology grade on the dependent variables. The analysis concerning A-level Psychology qualification status did not yield a significant main effect (F (1, 80) = .88, $p = .351$, $\eta_p^2 = 0.1$), indicating that overall differences based on this qualification status across the dependent variables were not statistically significant.

5.7.4.3 *MANOVA 3: Effects of A-level Psychology Grade on Combined Dependent Variables*

A third MANOVA was conducted to assess the effect of A-level Psychology grade on the dependent variables. The analysis focused on A-level Psychology grade also did not

reveal a significant main effect (F (16, 152) = 1.06, p = .403, η_p^2 = .10), indicating that overall differences based on A-level Psychology grades across the dependent variables were not statistically significant.

5.8 Discussion

The current study was conducted to investigate the evolution of psychological critical thinking ability among psychology students across various educational stages, ranging from pre-university to postgraduate levels. This research was motivated by concerns raised regarding the readiness of students transitioning from A-level to university-level psychology education. Hulme and De Wilde (2014) highlighted potential deficits in critical thinking skills stemming from pre-tertiary education, which might inadequately prepare students for higher education demands. Further studies supported this perspective, highlighting the critical need for improvements in secondary education to effectively foster critical thinking competencies (Tate & Swords, 2013; Van der Zanden et al., 2020).

Prior studies have highlighted discrepancies in critical thinking skills among incoming university students, emphasizing the need for targeted interventions aimed at secondary education. However, empirical investigations into the impact of pre-university education on critical thinking within higher education remain limited (Evens et al., 2013). Most existing research has focused on general trends in critical thinking growth across student populations, neglecting nuanced differences among specific student cohorts (Evens et al., 2013). Furthermore, studies exploring the trajectory of critical thinking abilities as students' progress through higher education, and the development of these skills during secondary education, are relatively scarce (Lai, 2011; Marin & Halpern, 2011). The lack of clarity regarding critical thinking competence development and expected milestones further emphasizes the need for targeted investigations in this area (Evans, 2020).

In response to these gaps in knowledge, the current study aimed to contribute insights into the development of psychological critical thinking abilities among psychology

students during their transition to university education, while considering the influence of prior educational experiences. Specifically, a causal-comparative design was employed to compare critical thinking skills, motivation for critical thinking, and perceptions of critical thinking instruction across six educational stages: year 12, year 13, first, second, and third-year undergraduate, and postgraduate levels. This study sought to explain how pre-university psychology education impacts the readiness and development of critical thinking abilities among psychology students as they advance through higher education.

5.8.1 Summary of Findings

The results for hypothesis 1 did not align with initial expectations, as no statistically significant differences were observed in psychological critical thinking skills among students at different educational stages (year 12, year 13, first-year undergraduate, and second-year undergraduate). This finding is particularly noteworthy given the established importance of critical thinking skills for psychology undergraduates, as emphasized in various accreditation standards and guidelines (BPS, 2019; APA, 2023; QAA, 2023). The lack of observed improvement in critical thinking skills across educational levels challenges the assumption that critical thinking develops in a linear fashion with academic progression (Arum & Roksa, 2011; Huber & Kuncel, 2016; Lane & Oswald, 2016). However, this does not necessarily indicate the absence of developmental differences. An alternative interpretation is that pre-university education shapes students' cognitive approaches, potentially constraining the extent to which university instruction can further develop critical thinking skills. While previous studies have predominantly focused on critical thinking development during tertiary education (Evens et al., 2013), there is growing recognition of the role secondary education plays in shaping students' preparedness for higher education (Marin & Halpern, 2011; Van der Zanden et al., 2020).

A key factor in understanding these findings is the concept of non-mutual intelligibility, which refers to the inability of two groups to fully comprehend each other's conceptual frameworks or discourse styles (Lloyd, 2020). In the context of this study, non-

mutual intelligibility manifests as a disparity between the ways critical thinking is approached at the A-level and university levels. A-level psychology education places significant emphasis on Assessment Objective 3 (AO3), which prioritizes analyzing, interpreting, and evaluating scientific information (Ofqual, 2014). However, this often results in a form of pseudo-critical thinking—an engagement with evaluative tasks that is shaped by assessment demands rather than genuine intellectual inquiry (BPS, 2013). University-level critical thinking, in contrast, requires deeper analytical engagement, independent reasoning, and the ability to navigate epistemic uncertainty. The lack of significant differences in critical thinking scores between A-level and university students may therefore reflect an artificial similarity: A-level students perform well in tasks designed to meet assessment objectives, but these tasks do not necessarily translate into the more nuanced critical thinking expected in higher education.

The observed consistency in critical thinking skills across educational stages might also reflect differences in secondary education quality and focus (Van der Zanden et al., 2020). While the study did not find significant differences in critical thinking skills between educational levels, O'Hare and McGuinness (2009) documented substantial gains in critical thinking from the first to the third year of university. This suggests that critical thinking may develop at a later stage of university education, influenced by exposure to discipline-specific methodologies and engagement with research-based learning environments. Further, broader concerns raised by the OECD (2022) regarding limited gains in critical thinking among university students worldwide underscore the necessity of interventions that explicitly target these skills. The lack of developmental differences observed in this study highlights the need to investigate how secondary and tertiary education interact to shape cognitive development. If critical thinking skills do not significantly improve between A-level and early university years, this suggests that existing pedagogical approaches at both levels may be insufficient for fostering deep critical engagement.

Regarding hypothesis 2, the study found significant differences in task value and expectancy—key motivational indicators—across educational levels. Year 12 and year 13 students reported higher task value and expectancy compared to first-year undergraduates. This challenges the null hypothesis for task value and suggests that motivation for critical thinking tasks shifts with educational transition. One possible explanation is the structured, assessment-driven nature of A-level psychology, which reinforces a specific evaluative framework that students find meaningful and accessible. At university, where critical thinking expectations become more abstract and self-directed, students may struggle to find comparable task value, leading to a decrease in motivation. This further aligns with the issue of non-mutual intelligibility (Lloyd, 2020), as students entering university may lack the conceptual and epistemic frameworks necessary to engage effectively with university-level critical thinking tasks.

For hypothesis 3, the study found no significant differences in perceptions of critical thinking instruction across educational levels. This suggests that students' perceptions are shaped by entrenched understandings of critical thinking formed during secondary education. Research has shown that institutional culture significantly influences how critical thinking is interpreted and valued (Reybold, 2003), and prior experiences with pseudo-critical thinking may contribute to a lack of perceived differentiation between secondary and university instruction (BPS, 2013). Differences in perceptions might be attributable to diverse views among secondary education teachers on the importance of critical thinking for university success and the various approaches employed to develop these skills (Van der Zanden et al., 2020). Students' entrenched, though sometimes inaccurate, understandings of critical thinking—formed through prior educational experiences—could influence their perceptions of university-level instruction (Halx & Reybold, 2005; Pithers & Soden, 2000; Apple, 1992).

Hypotheses 4 and 5 revealed that neither possessing an A-level Psychology qualification nor the specific grades achieved had a significant impact on psychological

critical thinking skills, motivation, or perceptions of critical thinking instruction. This suggests that studying A-level psychology does not necessarily enhance critical thinking abilities or perceptions of instruction at the university level. Therefore, A-level performance might not be a reliable predictor of university outcomes in psychology (Banister, 2003; Betts et al., 2008). The lack of significant effects related to A-level grades further suggests that higher grades do not translate into differences in critical thinking-related outcomes. Instead, this finding supports the argument that A-level psychology assessment practices may cultivate pseudo-critical thinking rather than fostering the deep analytical skills needed for university success.

These findings contribute to ongoing discussions about the transition from secondary to tertiary education and the need for interventions that effectively bridge this gap. The concept of non-mutual intelligibility (Lloyd, 2020) provides a valuable lens for understanding why students may struggle with critical thinking at university despite prior exposure to evaluative tasks. A-level students, having been trained in a specific form of pseudo-critical thinking, may not immediately recognize or adapt to the expectations of higher education (BPS, 2013). Consequently, intervention efforts remain necessary to explicitly address these cognitive and epistemic transitions, ensuring that students develop authentic critical thinking skills essential for academic and professional success.

In conclusion, while the study found no significant differences in critical thinking skills between A-level and university students, this does not necessarily indicate an absence of meaningful developmental shifts. Instead, it stresses the importance of re-evaluating pedagogical approaches and assessment practices to foster deeper critical engagement. Future research should explore how different instructional methodologies influence students' ability to transition from pseudo-critical thinking to genuine analytical reasoning, ultimately informing more effective interventions for critical thinking development.

5.8.2 Limitations

The conclusions drawn from this study may be subject to certain limitations inherent in the research design and measurement tools employed. In particular, statistical power is a

critical consideration, especially in the context of the MANOVA analyses conducted. It has been noted that the second and third MANOVA were underpowered according to G* power analysis, necessitating a larger sample size for sufficient statistical power, especially with medium effect sizes (Cohen, 1988). This limitation suggests caution in interpreting the significance of findings from these analyses due to potential limitations in statistical power.

The utilization of the R-PCTE (Lawson et al., 2015) offers valuable insights into critical thinking skills specific to psychology students. However, several limitations are associated with this assessment tool. Firstly, its initial validation was based on a restricted sample size of senior psychology undergraduate students, raising concerns about the generalizability of its outcomes (Johnson et al., 2011). Additionally, criticisms regarding the narrow scope of existing critical thinking assessments highlight potential shortcomings of the R-PCTE (Lawson et al., 2015) in capturing the breadth of critical thinking skills necessary for psychology students (Williams et al., 2003). Moreover, questions persist about the transferability of critical thinking skills assessed by the R- PCTE (Lawson et al., 2015) beyond specific contexts or domains, suggesting limitations in its broader applicability (Rushing & Allen, 2022; Stark, 2012). These limitations emphasize the ongoing need for refinement and validation of the R-PCTE to ensure comprehensive measurement of critical thinking abilities among psychology students.

Although the use of constructed-response items in the R-PCTE (Lawson et al,, 2015) aligns with suggestions for assessing critical thinking skills more authentically, concerns exist regarding their reliability compared to multiple-choice questions (Liu et al., 2014). Additionally, the subjectivity inherent in scoring constructed-response items introduces potential biases despite efforts to ensure fair and consistent evaluation (Ku, 2009). These limitations highlight challenges in accurately assessing and interpreting critical thinking abilities using this approach.

The CTMS (Valenzuela et al., 2011) serves as a valuable tool for gauging motivation towards critical thinking. However, limitations are evident in its scope and ability to

comprehensively capture critical thinking disposition and motivation (Nielsen et al., 2022). Challenges in implementing pedagogical changes to enhance critical thinking skills further complicate the measurement of critical thinking motivation using the CTMS (Schendel, 2016). These limitations emphasize the importance of acknowledging external factors that may influence the measurement of critical thinking motivation when utilizing the CTMS (Valenzuela et al., 2011).

Finally, causal-comparative designs employed in this study offer valuable insights into relationships between variables. However, inherent limitations must be acknowledged. These designs face challenges in establishing causality due to the inability to manipulate variables, potentially leading to biased results and difficulties in generalizing findings (Cook et al., 2008; Hart, 2011; Uçar et al., 2021). Moreover, identifying and addressing mediating variables in causal-comparative studies poses additional challenges, hindering a comprehensive understanding of underlying mechanisms (Dorie et al., 2019; Imai et al., 2010).

In summary, while this study contributes significant findings to the field, researchers should exercise caution in interpreting results due to the inherent limitations associated with statistical power, assessment tools such as the R-PCTE (Lawson et al., 2015) and CTMS (Valenzuela et al., 2011), and the design constraints of causal-comparative methodologies. Addressing these limitations through robust study designs and rigorous methodologies will strengthen the validity and generalizability of future research in this domain.

5.8.3 Conclusion

This study aimed to investigate the evolution of psychological critical thinking ability from pre-university to postgraduate levels, addressing concerns about students' readiness for higher education. Contrary to expectations, the findings did not support the hypothesis that psychological critical thinking skills increase linearly with education level. This challenges assumptions about the progression of critical thinking across formal education and highlights the need to explore factors influencing its development in higher education.

The study found significant differences in critical thinking motivation (task value and expectancy) across education levels, yet perceptions of critical thinking instruction remained consistent. This suggests that secondary education experiences shape students' interpretations and expectations of critical thinking in higher education. Additionally, possessing an A-level Psychology qualification or specific grades did not significantly impact psychological critical thinking skills, motivation, or perceptions of critical thinking instruction among university students, challenging the assumption that A-level psychology directly enhances critical thinking at the university level.

These findings emphasize the need for targeted interventions to bridge the gap between secondary and tertiary education, ensuring students are equipped with necessary critical thinking skills for higher education success. Linking to Study Phase 3, these insights draw attention to the critical need for effective strategies to foster critical thinking skills among students before and during their university studies. This foundation informs the development of the intervention evaluated in Study Phase 3 (Chapter 6, pp. 150 - 177), which aims to enhance psychological critical thinking ability among A-level psychology students.

Chapter 6: Study Phase 3

6.1 Chapter Introduction

This chapter presents the third phase of a study aimed at evaluating the impact of a domain-specific, school-based critical thinking intervention for pre-tertiary psychology students. The intervention was designed to enhance student preparedness for degree-level psychology education by addressing a key gap in critical thinking skills between A-level and university students. Building upon the findings from Study Phases 1 and 2, this phase examines how the intervention affects A-level psychology students' critical thinking abilities, including their skills, motivation to think critically, and perceptions of the critical thinking instruction they receive.

The intervention's design was shaped by the insights gathered in the earlier phases of the study, particularly the influence of neoliberal educational policies and the exam-oriented culture prevalent in A-level contexts. These findings highlighted the challenge of fostering critical thinking in a system that prioritizes exam-based assessment. As such, the intervention was crafted to strike a balance, integrating critical thinking instruction while aligning with broader educational objectives at the degree level, ensuring that students develop skills that are both relevant to their current educational context and essential for future academic success.

Research from Study Phase 2 (pp. 116 - 149) revealed that psychological critical thinking skills did not exhibit significant variation across different educational levels, challenging the assumption that these skills naturally develop with academic progression. This highlighted a potential disconnect between the critical thinking frameworks used at the secondary and university levels. Additionally, the findings indicated significant differences in task value and expectancy related to critical thinking tasks, pointing to the role of motivation in student engagement with complex reasoning activities. These insights underlined the need for an intervention that not only targets skill acquisition but also considers the motivational factors that drive students' engagement with critical thinking.

Furthermore, the research suggested that secondary education plays a pivotal role in shaping students' conceptualization of critical thinking, with these pre-university experiences potentially influencing how students approach critical thinking in higher education. Therefore, this study seeks to bridge the gap between A-level and university-level critical thinking by exploring how the intervention can enhance psychological critical thinking ability among A-level psychology students, taking into account both skill development and motivational factors.

In summary, the findings from Study Phases 1 and 2 pointed to a need for targeted interventions that address both cognitive and motivational aspects of critical thinking. Phase 3 builds on these findings by evaluating the effectiveness of the intervention in fostering critical thinking skills, motivation, and perceptions of critical thinking instruction among A-level psychology students. By explicitly addressing the transition from structured assessment-based reasoning to open-ended university-level inquiry, this study aims to determine whether such interventions can bridge the identified gap and equip students with the necessary cognitive strategies for success in higher education.

6.2 Teachability of Critical Thinking

Critical thinking is widely acknowledged as a crucial skill for academic success and professional advancement. However, traditional educational methods often fall short in fostering this skill effectively (Lai, 2011). Research highlights the challenge that inadequate educational experiences often neglect higher-order thinking skills (Lai, 2011). Yet, promisingly, instructional interventions can significantly boost students' critical thinking abilities (Abrami et al., 2015; Evens et al., 2013; Huber & Kuncel, 2016; Liu & Pásztor, 2022; Niu et al., 2013; Tiruneh et al., 2014). To achieve this, educators are recommended to employ explicit instruction, collaborative learning, and constructivist techniques (Lanz et al., 2022; Pithers & Soden, 2000; Puig et al., 2019).

Studies reveal that critical thinking skills can be subject-specific and are effectively cultivated within subject matter instruction (Behar-Horenstein & Niu, 2011; Tiruneh et al.,

2018). Effective teaching of critical thinking necessitates clear communication of intellectual standards, explicit instruction, and consideration of metacognitive processes (Abrami et al., 2008; Loes et al., 2015).

Despite consensus on the teachability of critical thinking, ongoing debates persist regarding its nature, transferability, and optimal instructional approaches (Abrami et al., 2015; Evens et al., 2013; Huber & Kuncel, 2016; Lai, 2011; Liu & Pásztor, 2022; Niu et al., 2013; Tiruneh et al., 2014). The efficacy of teaching critical thinking in higher education hinges on various factors, including instructional strategies, relevance to subject matter, and student characteristics (Behar-Horenstein & Niu., 2011; Tiruneh et al., 2018). Educators must tailor pedagogical methods, incorporate metacognitive processes, and integrate critical thinking skills within specific disciplines to enhance students' abilities effectively (Abrami et al., 2008; Loes et al., 2015).

While challenging, research indicates that with appropriate strategies, explicit teaching, and subject-specific considerations, educators can significantly enhance students' critical thinking skills in higher education. Continuous research and evaluation of instructional interventions are imperative to advance the teaching of critical thinking continually.

6.3 Review of Existing Empirical Critical Thinking Interventions

Critical thinking interventions in higher education have received considerable attention due to the recognized teachability and learnability of critical thinking skills (Liu & Pásztor, 2022). Scholarly consensus supports the effectiveness of targeted instructional interventions in imparting and nurturing critical thinking abilities (Lai, 2011). However, a persistent debate revolves around whether critical thinking is primarily domain-specific or domain-general, with some studies advocating for the cultivation of domain-specific critical thinking skills (Lai, 2011).

In the context of higher education, various strategies have been proposed to enhance critical thinking, emphasizing the crucial role of assessing students' critical thinking

skills effectively (Abrami et al., 2015; Pithers & Soden, 2000). Nonetheless, assessing critical thinking presents challenges (Pithers & Soden, 2000; Tiruneh et al., 2018). Key proponents recognize critical thinking as a fundamental outcome of undergraduate education and advocate for dedicated programs focusing on imparting theoretical frameworks and concepts (Lanz et al., 2022; Tiruneh et al., 2014). Interventions such as problem-based learning and direct teaching strategies, offering explicit explanations of critical thinking principles, have demonstrated positive impacts on critical thinking skills in higher education contexts (Liu & Pásztor, 2022). Moreover, integrating critical thinking skills within academic subjects has proven effective in enhancing students' abilities (Pithers & Soden, 2000).

However, research reveals a significant influence of prior education on critical thinking in higher education, with a positive correlation noted between secondary education and critical thinking performance (Evens et al., 2013). Despite this correlation, concerns persist about pre-tertiary education inadequately cultivating critical thinking skills necessary for higher education, with common deficits observed (Hulme & De Wilde, 2014). This emphasizes existing disparities in critical thinking skills among incoming university students and emphasizes the need for improved secondary education preparation (Tate & Swords, 2013; Van der Zanden et al., 2020).

Despite these challenges, empirical studies exploring the impact of prior education on critical thinking in higher education remain limited, often focusing on overall student population growth rather than differences among student groups (Evens et al., 2013). Furthermore, there is a notable gap in the literature regarding the progression of critical thinking abilities as students advance in higher education and their development during secondary education (Lai, 2011; Marin & Halpern, 2011). This lack of clarity stresses the need for research to expose critical thinking competence development and identify anticipated milestones (Evans, 2020).

Critical thinking interventions have shown effectiveness in higher education. Various instructional approaches, including problem-based learning and direct teaching strategies,

hold promise in enhancing critical thinking abilities. However, there is a critical gap in the literature concerning critical thinking interventions at the secondary education level. Research exploring the development of these skills during secondary education and its impact on subsequent higher education performance is essential for a comprehensive understanding of critical thinking competence across educational levels.

6.4 Methodological Limitations of Existing Critical Thinking Interventions

Critical thinking interventions have been extensively studied to enhance cognitive abilities essential for navigating complex challenges in education and beyond. However, significant methodological limitations within this field need addressing to ensure more reliable outcomes in future interventions. A primary concern lies in the design and execution of instructional interventions. Abrami et al. (2015) emphasized that interventions are often short-term and lack the necessary depth to instill robust critical thinking skills. Sustained efforts over longer periods may be required to achieve substantial improvements. Additionally, the choice of instructional strategies remains uncertain in its effectiveness. Despite proposing various methods like problem-based learning and collaborative approaches, researchers such as Snyder et al. (2019) highlighted ongoing uncertainty regarding which strategies yield the most significant enhancements in critical thinking.

Another challenge arises from the ambiguity surrounding the definition and scope of critical thinking, leading to difficulties in evaluating intervention outcomes (Abrami et al., 2015). The absence of consensus hampers efforts to compare results across studies and draw definitive conclusions about effectiveness. Furthermore, reliance on self-reported measures of critical thinking, rather than standardized instruments, introduces biases and inaccuracies (Loes et al., 2015). This methodological flaw undermines the credibility of reported gains in critical thinking skills.

Moreover, understanding the conditions under which instruction fosters significant improvements remains elusive (Tiruneh et al., 2014). Despite the prioritization of critical thinking in higher education, debates persist regarding the effectiveness of instructional

programs. The challenge of transferring critical thinking skills to new contexts further complicates assessing intervention efficacy (Snyder et al., 2019).

Educators play a pivotal role in modeling critical thinking, yet the impact of their efforts can vary based on student characteristics and instructional responses (Loes et al., 2015). Furthermore, the level of teacher training in critical instruction significantly influences intervention outcomes (Tiruneh et al., 2014). These nuances highlight the need for more systematic approaches to assess the impact of instructional methods on critical thinking development.

In addition to methodological challenges, practical hurdles such as attrition rates, intervention design, and instructor readiness further hinder effective critical thinking interventions (Behar-Horenstein & Niu, 2011; Lanz et al., 2022; Puig et al., 2019). Combined with inconsistent reporting of student variables and outcomes, these factors complicate the evaluation and interpretation of intervention effectiveness.

Despite these challenges, empirical evidence supports the teachability and learnability of critical thinking skills across diverse educational contexts (Lai, 2011; Liu & Pásztor, 2022). Effective strategies such as explicit instruction and collaboration have shown promise in fostering critical thinking abilities (Lai, 2011). Therefore, addressing methodological limitations through rigorous study designs, clear definitions, and comprehensive evaluation methods is essential to advance critical thinking interventions effectively.

6.5 Synthesis of Research Findings from Prior Study Phases

The design of this intervention was informed by a comprehensive examination of neoliberal influences on psychology education, particularly in A-level psychology contexts, where a results-oriented culture often overshadows holistic skill development (Backes-Gellner & Veen, 2008; Jacobson & Bach, 2022; Joseph, 2020; Keddie et al., 2011; Torrance, 2017).

To counteract the narrow focus on measurable outcomes observed in A-level psychology, the intervention was strategically designed to emphasize critical thinking instruction alongside exam preparation, aligning with broader educational objectives advocated at the degree level (APA, 2023; BPS, 2019; QAA, 2023). This approach aimed to challenge exam-centric teaching practices by promoting a balanced approach that nurtures critical thinking skills while meeting exam requirements (Ball, 2009; Baird et al., 2009; Green, 2007; Halonen et al., 2003; Hernandez-Martinez & Williams, 2013).

Furthermore, insights from previous phases of this study revealed significant variations in task value and expectancy related to critical thinking tasks across educational levels (Chapter 5, pp.116 - 149). Leveraging these motivational differences, the intervention strategically aligned with the research methods component of the A-level psychology curriculum to enhance students' engagement and motivation towards critical thinking tasks (Banyard, 2010; Gale, 1990). By integrating critical thinking tasks that mirror A-level psychology research methods, students were encouraged to apply their knowledge practically, fostering deeper understanding and appreciation of critical thinking skills relevant to both pre-tertiary and university-level studies.

Additionally, the findings from previous phases stressed the influence of pre-university educational experiences on students' readiness for critical thinking at the university level (Apple, 1992). Despite the recognized importance of critical thinking skills in psychology education, previous findings indicated consistent critical thinking abilities across different educational stages, highlighting the need to enhance these skills during secondary education.

Therefore, the intervention was structured to target critical thinking skill development within the secondary education curriculum, integrating explicit critical thinking instruction and fostering analytical abilities aligned with university-level expectations (Hulme & De Wilde, 2014; Tate & Swords, 2013; Van der Zanden et al., 2020). This strategic approach aimed to bridge the gap between secondary and tertiary education by addressing foundational critical

thinking skills during pre-tertiary stages, ultimately facilitating smoother transitions for psychology students entering degree-level studies.

In summary, the design and implementation of the critical thinking intervention represented a proactive strategy to address limitations in secondary education preparation and leverage motivational differences across educational levels. By integrating these insights into educational practices, the aim was to foster meaningful skill development and empower pre-tertiary psychology students for success in degree-level studies and beyond.

6.6 The Current Study

The study aimed to assess the impact of a domain-specific, school-based, instructional critical thinking intervention on A-level psychology students' psychological critical thinking ability – which is comprised of their psychological critical thinking skills, motivation to think critically, and perceptions of the amount of critical thinking instruction received. This research is informed by the following research question:

6.6.1 *Research Question*

1. Does participation in a school-based critical thinking intervention designed to improve A-level psychology students' psychological critical thinking ability improve their psychological critical thinking skills, motivation to think critically and their ability to perceive when they are receiving critical thinking instruction?

6.6.2 *Hypotheses*

H_1: The psychological critical thinking skill scores of participants will demonstrate a statistically significant increase from pretest to post-test.

H_2: The critical thinking motivation scores of participants will demonstrate a statistically significant increase from pretest to post-test.

H_3: The perceptions of critical thinking instruction scores of participants will demonstrate a statistically significant increase from pretest to post-test.

H_4: Participants in the experimental condition will exhibit a statistically significant increase in psychological critical thinking skill scores from pretest to post-test compared to those in the control condition.

H_5: Participants in the experimental condition will exhibit a statistically significant increase in critical thinking motivation scores from pretest to post-test compared to those in the control condition.

H_6: Participants in the experimental condition will exhibit a statistically significant increase in perceptions of critical thinking instruction scores from pretest to post-test compared to those in the control condition.

6.7 Method

6.7.1 Research Design

This study used a quasi-experimental pretest posttest design with a non-equivalent control group. Participating schools were randomly assigned to either the control or experimental condition. The control condition continued with regular lessons to account for maturation effects. Only the experimental group received the intervention.

Before implementing the intervention, a baseline measure of both conditions psychological critical thinking skills, motivation to think critically, and perceptions of the amount of critical thinking instruction received were taken. After a period of 10 weeks, both the control and experimental groups were tested again to determine if the intervention had any impact.

The pretest-posttest format allowed for the measurement of changes over time within the same groups, ensuring that differences observed at the posttest stage could be attributed to the intervention rather than pre-existing disparities. This design captured baseline data before the intervention and subsequent data after its implementation, enabling a clear comparison of pre- and post-intervention results.

A non-equivalent control group design was chosen due to ethical and logistical constraints associated with randomly assigning students in educational settings. Schools were assigned to either the control or experimental condition, allowing for meaningful comparisons while acknowledging potential pre-existing differences. The control group continued regular lessons, which was essential for controlling maturation effects and ensuring any observed improvements in the experimental group could be confidently attributed to the intervention rather than natural educational development.

The study spanned 10 weeks due to limitations imposed by the participating schools, which were concerned about upcoming examinations. However, it was assumed that this timeframe, with weekly interventions, would be sufficient to observe significant changes in psychological constructs resulting from modifications in educational practices. This duration also accounts for the potential lag in outcomes due to the complexity of cognitive and motivational change.

The quasi-experimental design was consistent with best practices outlined in contemporary educational research, ensuring ecological validity while addressing methodological challenges inherent in real-world settings (Fabrigar et al., 2024). Well-structured quasi-experiments that incorporate control groups and account for external validity can yield findings comparable to randomized controlled trials.

In summary, the quasi-experimental pretest-posttest design with a non-equivalent control group was chosen to balance methodological rigor with practical feasibility, strengthening the validity of the findings by controlling for confounding variables and enhancing the reliability and interpretability of the results within the context of educational research.

6.7.2 Participant Sample

The participant sample consisted of 73 year 13 A-level psychology students (*M*age = 17.25) from six different schools. The gender distribution was 12 males and 61 females. These schools had previously participated in Study Phases 1 and 2 and were recruited through their business email addresses to invite participation in the study. One of the control schools was recruited through a referral from a participant school, further diversifying the sample. All participating schools were approached via email, with participation contingent on their willingness to be involved in this phase of the research. The recruitment process primarily used convenience sampling, with the key factor being the schools' agreement to participate.

The sample included a mix of school types: two schools in the control condition and four schools in the experimental condition. Specifically, the control condition included one voluntary controlled school and one academy converter, while the experimental condition included two academy sponsor-led schools, one academy converter, and one academy. Students were recruited through their A-level psychology teachers, who facilitated the recruitment process within their respective schools. The participants were randomly allocated to either the control (*n* = 29) or experimental condition (*n* = 44).

Most of the schools followed the AQA (2015) A-level psychology curriculum, with one school using the WJEC/Eduqas (2015) curriculum. This school was randomly assigned to the experimental condition, and there were no notable differences between the curricula that affected the study outcomes.

6.7.3 Materials

6.7.3.1 *Participant Materials*

Participants in the study were provided with different participant materials depending on the form of administration, either online or in-person. For in-person sessions, participants received paper participant information sheets (Appendix Q, pp. 384- 386; Appendix R, pp. 387-389), consent forms (Appendix S, p. 390; Appendix T, p. 391) and debriefing materials

(Appendix U, p. 392; Appendix V, p. 393). Conversely, for online sessions, participants accessed electronic versions of these materials through the Online Surveys platform.

The design of all materials adhered strictly to the principles described in the BPS (2014) Code of Human Research Ethics. This ensured that participants were provided with comprehensive information about the study, their rights as participants, and the procedures involved. Furthermore, it guaranteed that participants provided informed consent prior to their involvement in the research. The debriefing materials were carefully crafted to provide participants with any necessary clarification or additional information following their participation in the study.

6.7.3.2 *Measures*

In consideration of disparities in computer infrastructure, resource availability, and teacher autonomy among the participating schools, the study employed a combination of online and in-person administration. The pretest and posttest assessments were conducted in person using paper-based materials for all schools within the experimental condition.

6.7.3.2.1 Critical Thinking Motivation Scale. The CTMS (Valenzuela et al., 2011) adopts a theoretical framework that prioritizes motivation over dispositional factors (Appendix L, pp. 325- 327). This instrument consists of 19 Likert-scale items, rated from 1 to 6, where participants express their agreement with various statements, such as “Concerning reasoning correctly, I am better than most of my peers.” These items assess participants' expectations about critical thinking (expectancy) and the value they place on such thinking (task value). Additionally, the measure evaluates the perceived usefulness and importance of critical thinking (utility), the associated costs (cost), and the intrinsic interest it generates (intrinsic/interest value).

The A-level psychology curriculum places significant emphasis on critical thinking, requiring students to evaluate psychological theories and research, analyze methodological strengths and weaknesses, and apply psychological concepts to real-world situations

(Ofqual, 2014). The CTMS (Valenzuela et al., 2011) effectively measures students' motivation to engage with these components. Its strong theoretical basis, comprehensive assessment of motivation, and alignment with the A-level psychology curriculum justify its selection.

The CTMS (Valenzuela et al., 2011) demonstrates varied internal consistency across its subscales. For example, the Expectancy, Attainment, and Intrinsic/Interest Value subscales show adequate to good internal consistency, with improvements from pretest to posttest (e.g., Expectancy from α = .75 to α = .80, Attainment from α = .79 to α = .81, and Intrinsic/Interest Value from α = .76 to α = .83). However, there are significant concerns with the Utility Value and Task Value subscales. The posttest score for Utility Value is alarmingly low (α = .003) compared to the pretest score (α = .83), indicating almost no internal consistency. This could suggest a fundamental flaw in the measure or external factors influencing responses. Similarly, the Task Value posttest score drops significantly (α = .28) compared to the pretest score (α = .88), indicating poor reliability. These findings suggest that while certain aspects of the CTMS are reliable, the Utility and Task Value subscales require further investigation to understand their inconsistencies.

6.7.3.2.2 Course Evaluation Form: Students' Perceptions of Critical Thinking in Instruction. The Course Evaluation Form: Students' Perceptions of Critical Thinking in Instruction (Foundation for Critical Thinking Press, 2007) consists of 20 Likert-style items (Appendix M, pp. 328- 331). Participants rate the extent to which they perceive their instructor teaches the described activity on a scale from 1 to 5. For example, they may be asked, "To what extent did your instructor explain what critical thinking is (in a way that you could understand)?" with 1 indicating a low score and 5 indicating a high score.

The use of this scale is particularly appropriate for this context, as it aligns with the A-level psychology curriculum's focus on developing higher-order thinking skills, such as analysis, evaluation, and synthesis (Ofqual, 2014). A-level students are required to engage

critically with psychological theories and research, and the evaluation form's items assess how well these cognitive skills are nurtured in the classroom. By measuring students' perceptions of how effectively their instructors foster critical thinking, the form provides valuable insights into teaching practices and their alignment with the curriculum's goals.

The Course Evaluation Form demonstrates high internal consistency, with pretest (α = .93) and posttest (α = .95) scores well above the 0.70 threshold. This indicates a high level of reliability, suggesting that the items consistently measure the same construct. The slight increase from pretest to posttest suggests that the measure's reliability remained stable and even improved slightly. This improvement could be due to respondents becoming more familiar with the evaluation process over time, leading to more consistent responses.

6.7.3.2.3 Revised-Psychology Critical Thinking Exam. The R-PCTE (Lawson et al., 2015) comprises 14 constructed-response items that target seven critical thinking principles (Appendix N, pp. 332 - 335). Originally, Lawson (1999) developed the Psychological Critical Thinking Exam (PCTE) to evaluate students' ability to "think critically, or evaluate claims, in a way that explicitly incorporates the basic principles of psychological science" (p. 207). In the R-PCTE, participants are given a research scenario and asked to identify and explain any problems with the conclusions drawn in the scenario, if applicable. Responses are scored on a scale of 1 to 3 using the R-PCTE coder training sheet and model answers.

The selection of the R-PCTE (Lawson et al., 2015) in this study is justified by its specific focus on psychological critical thinking, its empirical validation, and its alignment with the A-level Psychology curriculum (Ofqual, 2014). Unlike generic critical thinking measures, the R-PCTE (Lawson et al., 2015) is designed to assess students' ability to critically analyze psychological claims, applying research methodologies and scientific reasoning within a discipline-specific context. This focus aligns with the A-level psychology curriculum, which

emphasizes the development of analytical skills necessary for evaluating psychological research and applying theoretical knowledge to real-world scenarios (Ofqual, 2014).

The A-level psychology curriculum, as defined by Ofqual (2014) and the Qualifications and Curriculum Authority (QCA), is structured around three key assessment objectives: demonstrating knowledge and understanding of scientific ideas, applying this knowledge in theoretical and practical contexts, and analyzing, interpreting, and evaluating scientific information to make judgments and refine research procedures. The R-PCTE (Lawson et al., 2015) reflects these objectives by requiring students to identify and critique flawed reasoning in psychological research, assess the validity of conclusions, and apply psychological science to evaluate research claims. The measures constructed-response format mirrors the analytical demands of A-level assessments, reinforcing students' ability to engage in higher-order thinking and critical evaluation, which are essential skills in both academic and professional psychology. By utilizing the R-PCTE (Lawson et al., 2015), this study ensures that the measurement of critical thinking skills is not only theoretically grounded but also directly applicable to the academic development of A-level Psychology students.

To ensure inter-rater reliability, a percentage of participant responses were cross-checked and independently coded by another researcher. The internal consistency scores for the R-PCTE show a decline from the pretest ($\alpha = .61$) to the posttest ($\alpha = .57$), with both scores falling below the generally accepted threshold of 0.70. This suggests that the measure lacks sufficient reliability, potentially due to inconsistencies in the responses or inadequacies in the items' ability to capture the underlying construct both before and after the intervention. The slight decrease in the alpha coefficient posttest highlights the need for a thorough review and possible revision of the measure to improve its internal consistency.

6.7.3.3 *Critical Thinking Intervention Resources*

As part of the critical thinking intervention, the experimental group were asked to complete critical thinking resources, alongside their regular psychology lessons for a period of 10-weeks (Appendix W, pp. 394 - 454). These resources followed a consistent format, presenting participants with research scenarios that summarized published studies. The scenarios were designed to reflect debates and methodological issues that are commonly found in psychological science. The critical thinking resources were mapped directly onto the A-level psychology curriculum, they covered various topics, including gender bias, cultural bias, nature versus nurture, probability and significance, validity, reliability, ethics, correlation and features of science. Participants were instructed to read the research scenario and critically evaluate the research methodology using a set of questions adapted from Roediger III and McCabe (2007, p. 34). Following this, participants were encouraged to discuss their answers with a partner. A pool of possible answers was provided to A-level psychology teachers for discussion and dissemination among the students after completing each resource.

The intervention’s design was influenced heavily by consultations with A-level teachers, who provided critical input on the form and content of the intervention. Teachers were particularly focused on ensuring that the intervention did not disrupt the existing curriculum while enhancing students' critical thinking skills, particularly in the area of research methods. They emphasized the importance of integrating the intervention with current A-level content, with a particular focus on research methodology as it was seen as foundational to broader evaluative skills students would need across the curriculum.

To ensure that the intervention aligned with the teachers' priorities, a collaborative process was followed. Teachers were consulted on the intervention's design, with discussions around the best format, content, and delivery method. Many teachers suggested that focusing on research methods would be most beneficial, as this area was foundational to understanding the broader topics within psychology and would likely result in the greatest

improvements in critical thinking. Teachers also expressed concerns about maintaining exam preparedness and avoiding content overload, and therefore requested that the intervention be non-intrusive, supplementing rather than replacing existing curriculum content.

In response to this, two intervention resources were initially designed and piloted with a year 12 psychology class. The pilot phase provided valuable feedback from both students and teachers. Teachers from the experimental group's schools were directly involved in reviewing the resources, assessing their relevance, clarity, and accessibility. They provided suggestions for improvement and fine-tuning, ensuring the resources met the needs of the students while staying aligned with the A-level syllabus. After revisions, the resources were fully implemented, with A-level teachers playing a key role in facilitating discussions around the research scenarios and guiding students through the critical thinking exercises.

6.7.4 Procedure

Prior to participating, participants were provided with a comprehensive information sheet outlining the study's aim, their role, and their rights. After providing consent, participants completed the CTMS (Valenzuela et al., 2011), Course Evaluation Form: Students Perceptions of Critical Thinking in Instruction (Foundation for Critical Thinking Press, 2007), and the R-PCTE (Lawson et al., 2015). These measures assessed participants baseline psychological critical thinking skills, motivation to think critically, and perceptions of the amount of critical thinking instruction received. A debriefing page, in line with the BPS (2014) Code of Human Research Ethics, was given to participants upon completion.

Participants randomly assigned to the control condition continued their regular psychology lessons, while the experimental condition completed 10 weekly critical thinking resources during their regular psychology lessons. These resources were administered by their A-level teacher and were integrated into the normal classroom pedagogy. After 10-weeks, both the control and experimental conditions underwent a posttest assessment to

measure changes in their psychological critical thinking skills, motivation to think critically, and perceptions of the amount of critical thinking instruction received.

6.7.5 Data Analysis

Descriptive statistics provided an overview of the data, including means and standard deviations. A two-way mixed Multivariate Analysis of Variance (MANOVA) was performed to assess the impact of the critical thinking intervention on A-level psychology students' psychological critical thinking skills, motivation to think critically, and perceptions of the amount of critical thinking instruction received (Appendix X, pp. 455 - 497).

6.7.6 Ethics

This study obtained ethical clearance from the University of Cumbria's Research Ethics Committee (Appendix Y, p. 498) and adhered strictly to the BPS (2014) Code of Human Research Ethics. As the research involved participants below the age of 18, procedures outlined in the BPS (2014) Code of Human Research Ethics for obtaining consent from children and young people in schools were followed. In each school, a senior staff member (e.g., A-level teacher, Head of Sixth Form, or Head teacher) assessed the research proposal and determined if it aligned with regular curriculum activities. In cases where risk assessments revealed no significant risks, consent from A-level psychology students and approval from a senior staff member were considered sufficient consent, in accordance with the BPS (2014) Code of Human Research Ethics. If the criteria were not met, individual schools made a judgement on whether parental consent should be sought. Additionally, since the study required a significant time commitment and repeated data collection sessions, participants were asked to renew their consent during each data collection session, following the guidelines specified in the BPS (2014) Code of Human Research Ethics.

6.8 Results

Descriptive statistics were calculated to provide an overview of the data collected in the study. Table 6 displays the means and standard deviations (± SD) for each dependent variable across the different conditions (i.e., control and experimental groups) at both pretest and posttest time points.

Table 6

Descriptive Statistics for Dependent Variables by Condition and Time Point

Measure	Condition	Pre Mean ± SD	Post Mean ± SD
Psychological Critical Thinking Skills	Control	17.38 ± 4.42	20.03 ± 5.51
	Experimental	16.27 ± 5.48	20.11 ± 4.35
Perceptions of Critical Thinking Instruction	Control	69.47 ± 12.22	68.91 ± 13.04
	Experimental	76.09 ± 11.70	78.36 ± 13.03
Task Value	Control	68.33 ± 7.06	66.95 ± 8.03
	Experimental	71.73 ± 8.82	68.27 ± 17.30
Expectancy	Control	14.21 ± 3.80	13.76 ± 3.65
	Experimental	14.32 ± 3.25	15.02 ± 3.19

For psychological critical thinking skills, both the control and experimental groups showed increases from pretest to posttest, with the experimental group exhibiting a slightly higher mean score at both time points. In terms of perceptions of the amount of critical thinking instruction received, the experimental group consistently reported higher mean scores compared to the control group at both pretest and posttest. Task value showed a decrease from pretest to posttest for both groups, with the experimental group reporting slightly higher mean scores at both time points. Lastly, expectancy scores remained relatively stable across time points for both groups, with the experimental group showing a slightly higher mean score at posttest.

6.8.1 Multivariate Analysis of Variance (MANOVA)

A two-way mixed MANOVA was conducted to examine the effects of condition (Control vs. Experimental) and pretest-posttest (Pre vs. Post) on psychological critical thinking skills, perceptions of the amount of critical thinking instruction received, task value, and expectancy.

6.8.1.1 *Preliminary Analyses*

A Box's Test of Equality of Covariance Matrices was conducted to examine the assumption of equality of covariance matrices across groups. The Box's M statistic was significant, indicating that the covariance matrices of the dependent variables were not equal across groups (*Box's M* = 91.64, *F* (36, 12168.97) = 2.22, $p < .001$). Due to this violation of the assumption of covariance homogeneity, Pillai's trace was selected as the multivariate test statistic for subsequent analyses.

6.8.2.2 *Multivariate Tests*

The two-way mixed MANOVA indicated a significant main effect of pretest-posttest (*F* (4, 68) = 7.14, $p < .001$, $\eta_p^2 = .30$), showing an overall change in the dependent variables from pretest to posttest. However, the main effect of condition was not significant (*F* (4, 68) = 2.35, $p = .063$, $\eta_p^2 = .12$), suggesting no significant difference between the control and experimental conditions.

For psychological critical thinking skills, the univariate test showed a significant improvement from pretest to posttest (*F* (1, 71) = 24.79, $p < .001$, $\eta_p^2 = .26$), explaining approximately 25.9% of the variance. Perceptions of critical thinking instruction did not significantly change (*F* (1, 71) = .45, $p = .507$, $\eta_p^2 = .01$), nor did the perceived task value (*F* (1, 71) = 2.39, $p = .127$, $\eta_p^2 = .03$), or expectancy (*F* (1, 71) = .10, $p = .756$, $\eta_p^2 = .001$).

6.8.2.3 *Interaction Effect*

The interaction effect between pretest-posttest and condition was not significant (*F* (4, 68) = .98, $p = .425$, $\eta_p^2 = .05$), showing no differential change in the dependent variables

between the control and experimental conditions. No significant differences were found for psychological critical thinking skills (F (1, 71) = .83, p = .367, η_p^2=.01), perception of the amount of critical thinking instruction received (F (1, 71) = 1.22, p = .273, η_p^2= .02), task value (F (1, 71) = .44, p = .509, η_p^2= .01), and expectancy (F (1, 71) = 1.96, p = .166, η_p^2= .03) across conditions.

These findings imply that the intervention's effects on the dependent variables were consistent across both control and experimental conditions. While there was an overall significant improvement in psychological critical thinking skills, this improvement was not influenced by the specific condition. Similarly, the intervention did not differentially impact perceptions of critical thinking instruction received, task value, or expectancy based on the condition.

6.9 Discussion

The study aimed to assess the impact of this intervention on A-level psychology students' psychological critical thinking ability – which is comprised of their psychological critical thinking skills, motivation to think critically, and perceptions of the amount of critical thinking instruction received. This research was informed by the following research question: Does participation in a school-based critical thinking intervention designed to improve A-level psychology students' psychological critical thinking ability improve their psychological critical thinking skills, motivation to think critically and their ability to perceive when they are receiving critical thinking instruction?"

6.9.1 Summary of Findings

Firstly, the two-way mixed MANOVA revealed a significant main effect of pretest-posttest, indicating an overall change in the dependent variables from pretest to posttest across both control and experimental conditions. However, the main effect of condition was not significant, suggesting that the means of the dependent variables did not differ significantly between these conditions. Furthermore, the interaction effect between pretest-

posttest and condition was also not significant, indicating that the change in dependent variables from pretest to posttest did not differ between the control and experimental conditions.

Moving to the univariate tests, it was found that psychological critical thinking skills significantly improved from pretest to posttest across both conditions. However, the lack of a significant difference between the control and experimental conditions in these improvements suggests the possibility of maturation effects—natural developmental changes over time that may have contributed to the observed enhancements in psychological critical thinking skills. Furthermore, perceptions of the amount of critical thinking instruction received, task value, and expectancy did not significantly change from pretest to posttest across the control and experimental conditions.

Additionally, the interaction effects between pretest-posttest and condition for each dependent variable were not significant. This suggests that the effects of the intervention on psychological critical thinking skills, perceptions of critical thinking instruction, task value, and expectancy were consistent across both conditions. Essentially, while psychological critical thinking skills improved overall, this improvement was not influenced by the specific condition participants were assigned to. Furthermore, the intervention did not have differential effects on perceptions of instruction, task value, or expectancy based on condition allocation.

In summary, while the study detected improvements in psychological critical thinking skills, the lack of differentiation between the control and experimental conditions suggests that these improvements may have been influenced by factors other than the intervention alone, possibly including maturation effects.

6.9.2 Insights from Domain-Specific Intervention

This study represents a pioneering effort to design, implement, and evaluate a domain-specific, school-based critical thinking intervention tailored specifically for pre-tertiary

psychology students. The decision to focus on psychological critical thinking aligns with prior research emphasizing the critical role of secondary education in shaping foundational skills necessary for success in higher education (Lai, 2011; Van der Zanden et al., 2020). Discrepancies in critical thinking preparedness identified in previous studies highlight the significance of targeted interventions aimed at addressing these skill gaps during pre-tertiary education (Hulme & De Wilde, 2014; Tate & Swords, 2013; Van der Zanden et al., 2020).

The innovative nature of this research extends beyond the assessment of critical thinking skills to propose and evaluate a tailored intervention within a specific academic discipline. By focusing on pre-tertiary psychology students, this study responds to concerns regarding the transition from A-level to degree-level psychology, where students encounter heightened expectations for critical analysis and argumentation (APA, 2023; BPS, 2013, 2019; QAA, 2023). This transition has been characterized by a notable skill gap (Hulme & De Wilde, 2014; Tate & Swords, 2013), prompting calls for collaborative strategies between secondary schools and universities to better prepare students (Kitching & Hulme, 2013).

The findings of this study offer unique insights into the effectiveness of domain-specific interventions in fostering psychological critical thinking abilities. Despite observing improvements over time, the current nuanced analysis suggests that broader maturation effects may contribute significantly to skill development, challenging simplistic interpretations of intervention efficacy. This critical perspective aligns with prior discussions on the complexity of critical thinking development within educational contexts (Lai, 2011; Van der Zanden et al., 2020), and highlights the need for multifaceted strategies that consider both instructional practices and students' developmental trajectories.

Moreover, this research emphasizes the importance of collaborative efforts between educators at different academic levels to bridge curricular gaps and enhance critical thinking pedagogy. Prior studies have emphasized the pivotal role of secondary school teachers in aligning assignments and grading criteria with university expectations (Lai, 2011; Van der

Zanden et al., 2020), signaling opportunities for enhanced collaboration and knowledge exchange to optimize students' preparedness for higher education.

6.9.3 Institutional Culture and Intervention Effectiveness

The implementation of educational interventions within institutional contexts is deeply intertwined with the prevailing culture and priorities. Existing research emphasizes the critical role of educator approaches in fostering students' development of critical thinking skills, underscoring the significance of understanding the instructional methods employed by educators (Halx & Reybold, 2005). However, critical thinking does not occur in isolation; it is influenced by the broader educational context and culture in which it is situated (Pithers & Soden, 2000).

The effectiveness of the current intervention may have been impeded by a lack of alignment with the existing results-oriented culture within each institution. The emphasis on tangible outcomes and performance metrics may have created inherent tensions with the intervention's objectives of nurturing psychological critical thinking skills. As Reybold (2003) highlight, institutional culture shapes the interpretation and value attributed to critical thinking, posing challenges to interventions that seek to promote more nuanced cognitive development.

The qualitative evaluation discussed in Study Phase 4 (Chapter 7, pp. 178 - 223) of this thesis will investigate the nuanced dynamics at play and explore how pre-existing neoliberal educational priorities and institutional school culture may have influenced intervention effectiveness. By examining the relationship between institutional culture and critical thinking instruction, the study aims to uncover potential barriers and facilitators that shaped the intervention's implementation and outcomes.

Previous research stresses the importance of customizing interventions to fit within the existing educational landscape to foster acceptance and sustainability (Caroti et al., 2022; Zandvakili et al., 2019). By engaging key players in reflective dialogue, the follow-up

study will interpret the cultural norms and expectations that may have influenced educator practices and student attitudes towards critical thinking development.

Furthermore, aligning the critical thinking intervention with institutional culture is imperative for its success and acceptance (Chen et al., 2023; Paladino et al., 2022). Institutions possess unique cultural attributes that influence the adoption and effectiveness of interventions (Bopape, 2021). This alignment facilitates buy-in from interested parties and addresses organizational barriers and facilitators, promoting the sustainability and long-term impact of the intervention (Ali et al., 2015; Paladino et al., 2022).

6.9.4 Limitations

The study encountered several significant limitations that should be carefully considered when interpreting its findings and generalizing conclusions. Firstly, the sample size of 73 year 13 A-level psychology students from six different schools, with uneven group allocation (control n = 29, experimental n = 44), presents challenges related to school-level variability and statistical power. Variability across schools, including differences in teaching quality and student demographics, could introduce confounding factors that impact internal validity. Moreover, a G* power analysis revealed that the minimum required participant sample for sufficient statistical power would be n = 125. Therefore, the relatively small sample size may limit the study's ability to detect small but potentially meaningful effects of the critical thinking intervention. This finding highlights the importance of larger sample sizes in future research to enhance the reliability and robustness of intervention studies in educational settings. Caution is advised when generalizing the findings beyond this specific cohort of A-level psychology students, given the limitations imposed by the sample size and school variability.

Secondly, the use of a quasi-experimental pretest-posttest design with a non-equivalent control group introduces potential confounding variables that may impact the validity of the results. Random assignment was applied at the school level, but individual differences within schools were not controlled, which could affect internal validity. Without

random assignment of participants to groups, there is a higher risk of selection bias and confounding variables affecting the results. The lack of randomization means that the groups may not be equivalent at the outset, leading to potential differences that could impact the study outcomes (Safaruddin et al., 2020). This lack of equivalence can threaten the internal validity of the study and make it challenging to draw causal inferences from the results (Ladachart et al., 2022). Furthermore, the non-equivalent control group in quasi-experimental designs introduces the possibility of differential group characteristics that may influence the outcomes. Factors such as pre-existing differences between groups, participant self-selection, or other unmeasured variables can affect the results and limit the ability to attribute any observed changes solely to the intervention being studied (Animola & Bello, 2019). This lack of comparability between groups undermines the ability to confidently attribute any observed effects to the treatment or intervention being tested (Bulus, 2021).

Thirdly, the observed improvements in critical thinking skills over time may be attributed to maturation effects rather than the intervention itself. Since both the control and experimental groups experienced natural developmental changes during the study period, the reported enhancements in critical thinking skills might reflect typical growth rather than the efficacy of the intervention. Additionally, due to the nature of the intervention, blinding participants and teachers to the experimental condition was not feasible, potentially introducing bias in participant responses and teacher interactions. This lack of blinding could influence the reported outcomes, particularly in subjective measures like perceptions of critical thinking instruction. Furthermore, the intervention spanned 10 weeks within regular psychology lessons, which might not have been sufficient to observe significant changes in critical thinking abilities. Longer-term interventions could be more effective in fostering sustainable improvements in critical thinking skills.

Lastly, the implementation of the intervention by different A-level psychology teachers across schools could have introduced variability in instructional quality and delivery, impacting the consistency and effectiveness of the intervention. Potential teacher variability

can significantly impact the implementation of instructional critical thinking interventions. Teachers play a crucial role in fostering students' critical thinking skills through various instructional strategies (Demiral, 2018). The effectiveness of critical thinking interventions is influenced by factors such as teacher attitudes, understanding of critical thinking, and teaching skills (Nguyen et al., 2023). Additionally, teachers need to be critical thinkers themselves to effectively engage students in critical thinking activities (Abu Ayyash, 2022). Research suggests that the success of critical thinking interventions is closely tied to teachers' perceptions, attitudes, and instructional practices (Swanson et al., 2022). Positive teacher attitudes towards critical thinking directly impact students' engagement in critical thinking activities (Laabidi, 2021).

In conclusion, while this study provides valuable insights into the effects of a critical thinking intervention among year 13 A-level psychology students, several limitations must be acknowledged to contextualize and interpret the findings accurately. The small sample size and school-level variability introduce challenges related to statistical power and internal validity, emphasizing the need for larger and more controlled studies in similar educational settings. The use of a quasi-experimental design with non-equivalent groups further complicates the interpretation of causal relationships between the intervention and observed outcomes. Maturation effects, lack of blinding, insufficient intervention duration, and teacher variability also pose additional constraints on drawing definitive conclusions about the effectiveness of the intervention.

6.9.5 Conclusion

This study evaluated the impact of a domain-specific critical thinking intervention on A-level psychology students' critical thinking skills, motivation, and perceptions of instruction. Results showed significant improvement in critical thinking skills over time, indicated by a two-way mixed MANOVA with a main effect of pretest-posttest. However, no differentiation between control and experimental conditions suggests improvements may stem from factors like maturation effects, highlighting the complexity of assessing intervention efficacy. Despite

the lack of significant differences between conditions, the study provides valuable insights into tailored interventions for pre-tertiary psychology students. It addresses skill gaps identified in prior research and emphasizes preparing students for higher education's demands.

In conclusion, while this study advances critical thinking interventions in pre-tertiary psychology education, future research should adopt robust methodologies to overcome current limitations and provide comprehensive insights into preparing students for successful transitions to degree-level study. This study's findings set the stage for the next phase of research, which explores the qualitative impacts of the critical thinking intervention. Study Phase 4 (Chapter 7, pp. 178 - 223) examines the design, implementation, and evaluation of the intervention, emphasizing the importance of understanding long-term and nuanced effects through qualitative inquiry.

Despite the intervention not demonstrating a significant effect beyond maturation, it is crucial to investigate the mechanisms underpinning these findings. The broader educational and institutional culture may have influenced the extent to which students engaged with and benefitted from the intervention. The qualitative evaluation discussed in Study Phase 4 (Chapter 7, pp. 178 - 223) will explore these issues, examining how pre-existing neoliberal educational priorities and institutional school culture may have influenced intervention effectiveness. This additional phase will provide crucial insights into potential barriers and facilitators, including educator attitudes and instructional practices, that may have shaped the observed results.

Chapter 7: Study Phase 4

7.1 Chapter Introduction

This chapter examines the final phase of the multiphase sequential mixed methods study (Creswell, 2012; Teddlie & Tashakkori, 2009), focusing on the design, implementation, and evaluation of a domain-specific, school-based critical thinking intervention for pre-tertiary psychology students. The intervention aimed to enhance psychological critical thinking ability, facilitating a smoother transition to degree-level psychology. Building on the findings of the previous phase, this chapter links quantitative results observed in Study Phase 3 (Chapter 6, pp. 150 - 177) with qualitative insights from Study Phase 4, providing a comprehensive evaluation of the intervention's effectiveness.

Critical thinking interventions have significant potential to enhance students' cognitive capabilities and decision-making skills. However, understanding their long-term effects has been challenging due to a reliance on quantitative assessments. While these measures offer valuable insights, they often fail to capture the nuanced and enduring impacts of interventions. Recognizing the limitations of quantitative approaches, this study incorporates qualitative inquiry to offer a more holistic understanding of intervention effectiveness (Behar-Horenstein & Niu, 2011; Niu et al., 2013; Tsui, 2002). Through semi-structured interviews, this research aims to capture in-depth perspectives on the intervention's efficacy, transcending mere numerical evaluations and exploring the subjective experiences and perspectives of participants.

In light of the findings from Study Phase 3, which did not identify a significant effect of the intervention beyond maturation effects, it becomes essential to explore why the intervention did not yield stronger results. The quantitative data, while informative, could not explain the underlying reasons behind the observed changes in psychological critical thinking ability or the participants' experiences with the intervention. To address this gap, Study Phase 4 uses qualitative methods to examine whether institutional factors, educator delivery styles, or student engagement levels mediated the intervention’s impact. This

qualitative inquiry aims to provide an in-depth understanding of the broader learning environment, including institutional culture, pedagogical approaches, and student engagement, and how these factors may have influenced the intervention's effectiveness.

Thus, the rationale for conducting interviews in this phase is to complement the findings from Study Phase 3 by investigating factors beyond statistical significance—such as student and teacher perspectives—that may explain why the intervention did not produce differential effects. By exploring these contextual elements, this phase contributes to a more nuanced understanding of how critical thinking instruction can be optimized in pre-tertiary education, ultimately offering qualitative insights into the lasting impact of the intervention on students' psychological critical thinking abilities. This mixed-methods approach aligns with best practices in educational research, advocating for comprehensive evaluations that incorporate both quantitative and qualitative perspectives (Behar-Horenstein & Niu, 2011; Niu et al., 2013; Tsui, 2002).

The primary objective of this study is to provide qualitative insights into the effectiveness and lasting impact of the critical thinking intervention on students' psychological critical thinking ability. Through semi-structured interviews, this research captures in-depth perspectives on the intervention's efficacy, transcending mere numerical evaluations. This study addresses the research question: How effective was the school-based instructional critical thinking intervention at improving A-level psychology students' psychological critical thinking ability?

7.2 Emphasis on Quantitative Assessment

The prevailing literature predominantly relies on quantitative assessments to evaluate critical thinking interventions (McCrackin, 2020; Penningroth et al., 2007). While quantitative data provide valuable statistical evidence, they often overlook the contextual nuances and qualitative dimensions of skill development (Sulaiman, 2018). This oversimplification in evaluation methodologies can limit our understanding of intervention effectiveness (McCrackin, 2020).

Incorporating qualitative research methods is imperative to complement quantitative assessments in evaluating instructional critical thinking interventions (Gharib et al., 2016; Sanavi & Tarighat, 2014). Qualitative studies offer a deeper understanding of participant attitudes, perceptions, and experiences, providing valuable insights into intervention mechanisms and participant engagement (Tsui, 2002). By exploring the diversity of critical thinking research qualitatively, researchers can uncover insights often overlooked by quantitative measures (Niu et al., 2013).

Despite the emphasis on quantitative assessments, there is a critical gap in the qualitative evaluation of instructional critical thinking interventions. Incorporating qualitative assessments enables researchers to design more contextually relevant and effective instructional strategies aligned with empirically valid principles (Behar-Horenstein & Niu, 2011; Tiruneh et al., 2014). By delving into the intricacies of critical thinking development, qualitative evaluations provide a holistic assessment of intervention effectiveness beyond numerical metrics (Bonell et al., 2022).

7.3 Predominant Focus on Short-Term Assessments

The existing discourse in instructional critical thinking interventions often revolves around short-term assessments, with limited attention to long-term impacts (Espinosa et al., 2013). While immediate gains in critical thinking skills have been observed post-intervention, understanding the durability and transferability of these skills requires longitudinal investigation (Rivas & Sánchez, 2016). The literature emphasizes the necessity of extending assessments beyond the immediate post-intervention period to capture sustained impacts (Bilad et al., 2022).

In addition to the prevailing focus on short-term assessments, there is a notable scarcity of rigorous long-term follow-up studies (Heijltjes et al., 2014; Puig et al., 2019). This gap impedes our ability to assess whether improvements in critical thinking skills persist over time or diminish after the intervention ends (Lanz et al., 2022). Many studies fail to

differentiate the impact of specific instructional conditions and overlook sustained effects (Espinosa et al., 2013).

Understanding the enduring impact of instructional critical thinking interventions is essential for informing evidence-based educational practices (Nor & Sihes, 2022). Without robust follow-up studies, policymakers and educators lack essential insights into the lasting benefits and practical implications of these interventions (Kyaw et al., 2019). Moreover, understanding the mechanisms through which critical thinking skills evolve and are retained over time is crucial for refining intervention strategies (Bonell et al., 2022).

There is a pressing need for researchers to prioritize rigorous follow-up studies to assess the long-term impact of instructional critical thinking interventions (Alwehaibi, 2012; Fikriyatii et al., 2022). These studies can provide valuable insights into the sustainability and real-world applicability of acquired critical thinking skills. Moreover, they can inform the development of evidence-based pedagogies aimed at fostering enduring cognitive development among students (Behar-Horenstein et al., 2009).

7.4 The Current Study

Critical thinking interventions are instrumental in fostering students' cognitive abilities and decision-making skills. Despite their acknowledged potential, a critical gap exists in understanding the lasting impact of these interventions. The literature predominantly relies on quantitative assessments, which offer limited insights into the nuanced and enduring effects of critical thinking interventions.

Qualitative inquiry offers a distinct advantage in unraveling the complexities surrounding intervention effectiveness. Unlike quantitative measures, qualitative methods provide rich contextual evidence that delves deeper into the subjective experiences and perspectives of participants (Tsui, 2002). This approach is crucial for capturing the multifaceted nature of intervention effects. Behar-Horenstein and Niu (2011) argued that

qualitative data are essential for a comprehensive understanding of interventions alongside quantitative measures.

The primary aim of this study is to contribute qualitative insights into the effectiveness of the intervention and its impact on students' psychological critical thinking ability using qualitative methods. Given the acknowledged limitations in existing evaluations, the primary aim of this study is to contribute qualitative insights into the effectiveness and lasting impact of the intervention on students' critical thinking abilities (Niu et al., 2013). By employing semi-structured interviews, this research seeks to gather in-depth perspectives on the intervention's effectiveness, going beyond numerical evaluations to capture the multifaceted nature of its effects. This study is guided by the following research question:

1. How effective was the school-based instructional critical thinking intervention at improving A-level psychology students' psychological critical thinking ability?

7.5 Method

7.5.1 Research Design

This study employed semi-structured interviews to assess the efficacy of the school-based intervention. Semi-structured interviews were chosen over focus groups to provide participants, including A-level teachers who implemented the intervention and A-level students who experienced it before transitioning to university for psychology studies, the opportunity to offer detailed and contextualized insights.

The decision to use semi-structured interviews rather than focus groups was informed by several key methodological advantages. Firstly, semi-structured interviews allow for a deeper exploration of individual experiences and perspectives. Unlike focus groups, where dominant voices may overshadow others or groupthink may occur, interviews provide a more personal and detailed account of participants' thoughts. This ensures that the evaluation captures the nuanced experiences of both facilitators and recipients, offering a richer understanding of the intervention's impact.

Secondly, the flexibility of semi-structured interviews enables researchers to probe specific areas of interest that arise during conversations, leading to a more comprehensive exploration of how the intervention was implemented and perceived. In contrast, focus groups may limit such depth due to their structured and collective nature, making it challenging to explore individual perspectives thoroughly.

Additionally, interviews help mitigate the power dynamics often present in focus groups, where some participants may feel pressured to conform to majority opinions. In educational settings, this is particularly relevant, as students or teachers might hesitate to share critical perspectives in a group setting. One-on-one interviews create a more comfortable and equitable environment, fostering open and honest discussions (Morgan-Trimmer & Wood, 2016).

Furthermore, the semi-structured interview format facilitates stronger rapport between the interviewer and the interviewee. Establishing this connection enhances participant comfort, encouraging candid responses and yielding more authentic and meaningful data. Given the sensitive nature of discussing the effectiveness of an intervention, this rapport is crucial in ensuring that participants feel at ease expressing both positive and critical perspectives.

In summary, while both semi-structured interviews and focus groups have their merits, the advantages of semi-structured interviews—including greater depth of data, flexibility in exploration, mitigation of group influence, and improved rapport—made them the more suitable choice for evaluating this school-based critical thinking intervention. This approach ensured that individual experiences were captured effectively, providing a clearer and more comprehensive assessment of the intervention’s efficacy.

7.5.2 Participants

Two distinct participant groups were involved in this study, both of whom had consented to post-intervention follow-up interviews initiated through email contact. The initial

group comprised current university students (*n* = 4, *M*age = 18.5 years, all identified as female) who had previously participated in the school-based critical thinking intervention. These students had progressed to university to study psychology and had successfully completed their first semester.

The second participant group consisted of A-level psychology teachers (*n* = 4, *M*age = 39.8 years) who had previously played an instrumental role in facilitating the intervention. Within this group, two teachers identified as female, while the other two identified as male. The mean years of teaching experience as a psychology educator was 11 years. This diverse composition of participants ensured a comprehensive exploration of the intervention's effectiveness, considering both the perspectives of those who implemented it and those who directly experienced its impact during the transition to university. The demographic characteristics of each of the participant samples can be found in Table 7.

Table 7

Demographic Characteristics of Participant Sample

Participant	Gender Identity	Age	Years of Teaching Experience	Years of Psychology Teaching Experience
Teacher A	Male	52	12	7
Teacher B	Female	34	12	12
Teacher C	Female	36	12	7
Teacher D	Male	37	13	13
Participant	**Gender Identity**	**Age**	**Current Course of Study**	**Mode of Study (Part-time or Full-Time)**
Student A	Female	19	Criminology with Applied Psychology	Full-time
Student B	Female	18	Applied Psychology	Full-time
Student C	Female	19	Psychology	Full-time
Student D)	Female	18	Applied Psychology	Full-time

7.5.3 Materials

Participants were provided with a detailed participant information sheet (Appendix Z, pp. 499 - 502; Appendix AA, pp. 503- 506) and consent form (Appendix AB, p. 507; Appendix AC, p. 509) outlining the purpose, procedures, and potential risks and benefits of the study. Before each interview, participants reviewed and signed a detailed information sheet and consent form. Informed consent procedures were rigorously followed, allowing participants to ask questions and ensure a clear understanding. Following interviews, participants were debriefed to clarify study aspects (Appendix AD, p. 511; Appendix AE, p. 513). All participant-related documentation and informed consent procedures were meticulously devised and implemented in accordance with the ethical guidelines set forth by the British Psychological Society (BPS, 2014) Code of Human Research Ethics. For online interviews, participants received and submitted consent and debrief forms through Online Surveys which aligned with the BPS (2017) Ethics Guidelines for Internet-Mediated Research. Similarly, participants in telephone interviews followed this online procedure.

7.5.3.1 *Interview Schedule*

The interview schedule for this research was created to gather qualitative insights into the effectiveness of the intervention and its impact on students' psychological critical thinking ability. Initially, both participant groups were asked to provide demographic information. For A-level teachers, this encompassed details such as gender identity, age, years of teaching experience, years of experience specifically in psychology teaching, their subject discipline for their first degree, and any additional qualifications they held. For the student sample, demographic questions covered gender identity, current course of study, and mode of study (part-time or full-time).

Following the demographic questions, A-level teachers were guided through a series of questions addressing various aspects: the delivery of intervention, its perceived effectiveness, suggestions for improvement, approaches to critical thinking instruction, and assessments of academic preparedness (Appendix AF, pp. 515 - 517). In contrast, students

were directed through questions regarding their academic preparedness, perceptions of the transition between A-level and university education, reflections on critical thinking skills, and assessments of intervention effectiveness (Appendix AG, pp. 518 - 519). Although the core focus remained consistent across both participant groups, questions were tailored to each group's distinct context and experiences. The interview questions were not constrained by the predefined scope of the study aim (i.e., evaluating the critical thinking intervention), as to avoid potentially overlooking broader contextual factors or unanticipated outcomes that could enrich the analysis.

7.5.4 Procedure

Participants preferred mode of interview was determined through initial communication via email, facilitated prior to the scheduled interview date. Interviews were conducted using various modes: face-to-face meetings in private rooms located on the University of Cumbria campus, online sessions via Skype for Business, or telephone conversations. Before engaging in the interviews, participants were given a comprehensive information sheet explaining the study aim, their role within it, and their rights as participants. For face-to-face interviews, participants were presented with paper copies of the participant information sheet and consent forms. Conversely, for online or telephone interviews, participants received electronic versions of the participant information sheet, consent form, and debriefing materials via the Online Surveys platform. The duration of interviews ranged from 25 to 35 minutes, allowing for an in-depth exploration of the topics under investigation. To ensure accuracy and thorough analysis, all interviews were audio-recorded, using a Dictaphone, with explicit consent from the participants and subsequently transcribed verbatim. In accordance with the guidelines outlined in the BPS (2014) Code of Human Research Ethics, participants were provided with a debriefing session upon the conclusion of the interview, ensuring their understanding of the research process and addressing any concerns they might have had.

7.5.5 Analytical Procedure

The analysis was conducted using Braun and Clarke's (2012, 2019, 2022) reflexive thematic analysis framework, a systematic method designed to identify and interpret themes within qualitative data (Braun & Clarke, 2012, 2019, 2022). This approach was chosen due to its theoretical flexibility, enabling the researcher to analyze the data both deductively, based on existing literature, and inductively, by allowing insights to develop from the data itself. Specifically, a critical realist reflexive thematic analysis was applied, focusing on latent themes with an interpretative critical orientation (Braun & Clarke, 2021). This choice was driven by the need to understand the broader socio-cultural dynamics influencing the critical thinking intervention, particularly in an educational context shaped by neoliberalism and exam-driven culture.

The analysis was designed to explore complex educational issues, including the ways in which critical thinking is taught, supported, and hindered within institutional structures. Through this critical realist framework, the study not only focused on participants' perceptions of critical thinking development but also situated these within broader educational and socio-cultural contexts. The research aimed to understand how institutional norms, curriculum structure, and pedagogical approaches shaped the effectiveness of the critical thinking intervention.

The analysis followed several stages: data familiarization, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and writing the report (Braun & Clarke, 2012, 2019, 2022). Each phase was iterative, with regular engagement with the data to refine and clarify the themes. The analysis process was also reflexive, acknowledging the researcher’s positionality and ensuring that subjective insights were incorporated in a way that enhanced the richness and validity of the findings.

7.5.5.1 *Phase 1: Familiarization with the Data*

The first phase involved an immersive engagement with the interview transcripts through multiple close readings. This was not a passive process but an active and interrogative approach in which preliminary observations, contradictions, and interpretative tensions were documented. A researcher journal was maintained to capture evolving thoughts on how participants' narratives intersected with broader ideological structures, such as neoliberal educational policies and the pressures of exam-oriented pedagogy.

Through repeated readings, I developed a deep understanding of the participants' perspectives, particularly regarding their experiences with teaching critical thinking and navigating the challenges of exam-driven curricula. During this phase, I took a detailed, active reading approach, annotating significant excerpts and noting key concepts and ideas that resonated with the research question. Particular attention was paid to participants' expressions of uncertainty or frustration with the limitations of the curriculum, as well as their efforts to foster critical thinking despite institutional constraints. These moments were treated as significant indicators of how institutional structures shaped—and at times constrained—their engagement with critical thinking development.

Additionally, I maintained a reflexive journal to document my initial impressions, evolving interpretations, and personal reactions to the data. This process fostered greater self-awareness of how my own perspectives might influence the interpretation of findings, allowing me to critically engage with my positionality as a researcher. By reflecting on my biases and assumptions, I sought to deepen my understanding of the participants' lived experiences and the broader ideological tensions embedded within their narratives.

7.5.5.2 *Phase 2: Generating Initial Codes*

In this phase, coding was approached as a fluid and evolving process, incorporating both inductive and deductive strategies. A line-by-line coding approach was used to systematically generate initial codes from the dataset, capturing meaningful segments related to the research question and broader study themes. Inductive coding allowed for

openness to unanticipated insights, while deductive coding ensured that the analysis remained theoretically anchored in critical perspectives on education and pedagogy. This dual approach facilitated an analysis that accounted for both participants' unique experiences and broader educational discourses, such as critical thinking frameworks and institutional constraints.

The coding process involved systematically identifying patterns across the dataset, focusing on recurring ideas related to critical thinking instruction, institutional barriers, and student engagement. Codes such as “Exam-driven priorities,” “surface-level engagement,” and “structural barriers to critical thinking” were developed early in the process. Similarly, codes like “pressure from neoliberal policies,” “lack of critical thinking integration,” and “exam-focused pedagogy” reflected key concerns voiced by participants. These codes were iteratively refined, with ongoing critical interrogation of how the researcher’s positionality influenced the prominence given to particular aspects of the data.

Instances where participants expressed ambivalence or contradiction — such as valuing critical thinking but deprioritizing it in favor of exam preparation — were coded as sites of ideological tension. These tensions became central to theme development, as codes were organized into categories that laid the foundation for identifying underlying patterns within the data.

7.5.5.3 *Phase 3: Searching for Themes*

The transition from coding to theming was not a simple act of grouping similar codes together; it involved a deeper interpretative engagement with how different codes coalesced to form meaningful patterns. This phase focused on uncovering the relational dynamics within the data, exploring how participants' experiences were shaped by, and in turn reproduced, institutional structures. For instance, codes relating to exam pressures and time constraints were examined together to understand how pedagogical choices were influenced by external accountability measures. Similarly, codes highlighting resistance to critical thinking expectations were analyzed in relation to broader educational discourses.

Once initial codes were generated, the next step was to organize them into potential themes that captured the broader patterns in the data. This process involved grouping related codes into categories that reflected the key concerns and insights of the participants. For example, codes related to the pressure exerted by neoliberal educational frameworks and the erosion of critical thinking were grouped into a theme that illustrated the negative impact of institutional constraints on pedagogy. Other related codes regarding teaching practices and student independence were organized into a theme highlighting the challenges of fostering critical thinking in an exam-centric culture.

To facilitate this, visual tools such as thematic maps, mind maps, and matrices were used to explore the interconnections between codes and identify latent themes. These tools helped surface broader structural tensions, such as the contradiction between students' enjoyment of deep engagement with critical thinking and their simultaneous disengagement due to workload concerns. At this stage, I considered how each theme related to the overall research question and evaluated how well they captured the diversity and complexity of the data.

7.5.5.4 *Phase 4: Reviewing Themes*

In this phase, the identified themes were carefully reviewed and refined to ensure they accurately represented the data and captured the participants' experiences with both coherence and analytical depth. The first step in this process involved revisiting the full dataset, including the original transcripts, to verify that the themes were well-supported and truly reflective of participants' concerns. This also involved assessing whether the themes retained internal consistency—meaning that the codes within each theme were logically related and cohesive—and external distinctiveness, ensuring that each theme was clearly differentiated from others without unnecessary overlap.

Throughout this review, a reflexive approach was taken, where I actively sought disconfirming evidence that might challenge initial interpretations. For instance, early categorizations of student disengagement as passive resistance were revisited, revealing a

more nuanced dynamic where students were not rejecting critical thinking per se, but rather struggling to integrate it within the rigid frameworks of their existing learning environments. This exemplified the process of critically engaging with themes as sites of power, resistance, and structural constraint, rather than simply as descriptive categories.

Peer discussions played a critical role in this phase, offering opportunities for external input to challenge assumptions and refine the boundaries of the themes. Feedback from colleagues and peers was instrumental in enhancing the credibility and interpretative depth of the analysis, ensuring that the themes remained firmly grounded in the data. By engaging in this iterative process, the themes were not only refined for clarity and precision but also enriched in terms of their analytical and theoretical significance.

7.5.5.5 *Phase 5: Defining and Naming Themes*

In this phase, the focus was on defining and naming each theme to capture its core meaning and significance within the research context, while also articulating its underlying conceptual and theoretical dimensions. Rather than simply labeling themes descriptively, this stage aimed to convey the deeper, critical insights drawn from the data, ensuring that each theme reflected the complexity and contradictions present within the participants' experiences.

To achieve this, each theme was named in a way that not only described its central concept but also reflected the socio-educational structures influencing the data. For example, a theme exploring the impact of neoliberal educational policies on critical thinking was not simply labeled “Exam Pressures,” but was reframed as “The Neoliberal Curriculum and Its Erosion of Critical Thinking,” highlighting both structural and ideological aspects. Similarly, themes that initially appeared to focus on individual motivation were reframed to emphasize the systemic conditions shaping those patterns.

This phase required continuous engagement with critical theory to ensure the analysis remained attuned to the deeper socio-political underpinnings of the data. Through

this reflective process, the language used to define and name the themes was refined, ensuring it was both accessible and reflective of the data's complexity. Each theme's definition was carefully crafted to communicate the underlying patterns and insights while remaining aligned with the research question and broader context of the study.

7.5.5.6 *Phase 6: Producing the Report*

The final phase involved synthesizing the refined themes into a cohesive and critically engaged narrative, extending beyond mere descriptive reporting. The research report was structured to foreground the interpretative depth of the analysis, weaving in participant insights in a way that highlighted both individual voices and broader structural patterns. Each theme was presented in detail, with verbatim participant quotes illustrating the findings, and discussed in relation to existing literature, ensuring that the results were situated within broader debates on critical thinking education, neoliberal policy, and pedagogical practice.

Rather than positioning the findings as neutral representations of reality, the discussion explicitly acknowledged the active role of interpretation in constructing the thematic account. Reflexivity remained a central commitment throughout the analysis, with continual self-interrogation about the assumptions underlying interpretations, the influence of positionality, and the ethical responsibility of representing participants' voices in a manner that did justice to their lived realities. The narrative not only illuminated the tensions and contradictions within participants' experiences but also critically interrogated the educational policies and institutional practices that shaped those experiences.

The report's logical structure allowed each theme to be discussed in turn, ensuring a clear flow of ideas and highlighting the interconnections between them. The adoption of a critical realist reflexive thematic analysis enabled the study to move beyond surface-level thematic descriptions and engage in a deeper, more theoretically informed exploration of the dynamics of critical thinking education. The final report concluded with reflections on the implications for educational practice and policy, offering recommendations for improving

critical thinking interventions in educational settings. Through this systematic application of Braun and Clarke's (2012, 2019, 2022) thematic analysis, the study provided a detailed exploration of the factors influencing critical thinking development and contributed to the broader discourse on educational practices and policy.

7.5.6 Ethics

This study received ethical approval from the University of Cumbria Research Ethics Committee (Appendix AH, p. 520) and strictly adhered to the BPS (2014) Code of Human Research Ethics and the BPS (2017) Ethics Guidelines for Internet-Mediated Research (2017). Informed consent and debriefing procedures strictly adhered to the BPS (2014) guidelines. Participants provided initial consent to be contacted after the post-test data collection session before the intervention was completed. Due to the study's extended time commitment, participants reaffirmed their consent during the data collection phase (BPS, 2014, p. 21).

To prevent potential adverse effects on participants' employment or social standing, careful pseudonymization was implemented, addressing sensitive information (BPS, 2014, p.14). All interview transcripts underwent rigorous deidentification, removing or altering any identifiable details to ensure participant confidentiality and anonymity. These measures reflect a commitment to ethical principles throughout the research process.

7.5.7 Reflexivity

Conducting this reflexive thematic analysis required continual critical engagement with my role as a researcher, particularly given my dual position as both investigator and designer of the intervention under study. Reflexive thematic analysis, as conceptualized by Braun and Clarke (2022), acknowledges that researchers do not merely extract themes from data but actively construct them through interpretation. My prior involvement in designing the intervention introduced an additional layer of complexity to this interpretative process, necessitating heightened reflexivity to ensure that my positionality did not unduly shape the

analysis in a way that privileged confirmatory narratives over a more nuanced understanding of the data.

Given that the preceding quantitative phase indicated that the intervention did not significantly improve students' psychological critical thinking ability, I was acutely aware of how my own expectations and investment in the intervention's effectiveness could influence my engagement with the qualitative data. This awareness compelled me to scrutinize my assumptions at every stage, particularly when coding and developing themes. For example, I recognized a tendency to focus on instances where participants articulated benefits of the intervention, as these narratives aligned more comfortably with my own hopes for its impact. To mitigate this, I actively engaged with counter-narratives—those that problematized or critiqued the intervention's effectiveness—ensuring that such perspectives were given equal weight in the thematic development.

Moreover, as Braun and Clarke (2022) emphasize, thematic analysis is an iterative and evolving process rather than a linear or mechanical one. Throughout my engagement with the data, I continuously reflected on how my own interpretative lens shaped theme construction. Initially, I was inclined to frame themes around tangible successes of the intervention, but through sustained reflexivity, I recognized the importance of foregrounding structural and systemic constraints that shaped participants' experiences. This shift was facilitated through prolonged engagement with the data, ongoing memo-writing, and discussions with peers, which challenged me to consider alternative readings and acknowledge the inherent subjectivity of my interpretations.

My theoretical orientation also influenced the analytic process. Adopting a critical realist stance meant that I sought to explore not only participants' subjective experiences but also the broader educational structures influencing those experiences. This theoretical commitment required careful balancing—ensuring that my interpretation remained faithful to participants' voices while also critically interrogating the socio-educational contexts in which their perspectives were embedded. Reflexivity played a crucial role in maintaining this

balance, as I remained vigilant against the risk of over privileging my theoretical framework at the expense of the participants' lived realities.

Additionally, the process of selecting data extracts for thematic illustration necessitated further reflexive engagement. In choosing which excerpts to present, I was mindful of how different choices could subtly reinforce particular interpretations while marginalizing others. I revisited my selections multiple times, questioning whether they accurately represented the diversity and complexity of participant perspectives. This iterative checking process aimed to uphold the integrity of the analysis and ensure that my own subjectivity, while inevitably present, did not unduly dictate the shape of the findings.

Beyond my influence in shaping the analysis, I also had to consider how my role as the intervention’s designer may have influenced the responses of participants. Given my prior involvement, there was a possibility that participants, particularly teachers, felt hesitant to openly critique the intervention in my presence. Some may have softened their criticisms or framed their responses in ways that they perceived as more palatable to me, either due to professional courtesy or out of concern for how negative feedback might be received. This potential for defensiveness or hesitancy was especially relevant when teachers discussed the limitations of the intervention. For instance, while some expressed frustrations regarding the time constraints of implementing the intervention, their phrasing often suggested an effort to couch criticisms in more neutral or constructive language rather than outright rejection of the intervention’s efficacy.

Similarly, students’ responses may have been subtly influenced by a perceived power dynamic. Although I endeavored to foster an open and non-judgmental interview environment, students may have felt pressure to provide responses that aligned with what they assumed I wanted to hear. This could have led to instances of social desirability bias, where participants downplayed their struggles or framed their experiences in a more positive light. For example, when discussing their engagement with critical thinking tasks, some students provided affirmations of the intervention’s usefulness but later expressed

reservations about its applicability beyond the study context. This inconsistency in responses suggests a potential tension between their genuine experiences and their perceptions of what was expected of them in the interview setting.

To mitigate these potential influences, I adopted several strategies throughout data collection and analysis. I explicitly reassured participants that all perspectives—both positive and negative—were valuable and encouraged open dialogue. I also remained mindful of how my verbal and non-verbal cues could shape responses, ensuring that I maintained a neutral stance when discussing the intervention's impact. In analyzing the data, I actively sought out instances where participants demonstrated ambiguity or contradictions in their responses, treating these as meaningful sites of inquiry rather than disregarding them as inconsistencies. Engaging with these complexities allowed for a richer, more reflexive interpretation of the data, acknowledging that participants' responses were shaped not only by their experiences but also by the relational dynamics of the research process itself.

Embracing reflexivity allowed me to engage with the data more transparently and critically, acknowledging my interpretative role rather than attempting to suppress or neutralize it. By recognizing and interrogating my own positionality throughout the analysis, I sought to produce a nuanced and credible account of the intervention's impact, one that does justice to the complexities inherent in qualitative inquiry. In doing so, I aimed to move beyond a mere acknowledgment of subjectivity to actively integrating reflexivity as an analytical tool that deepened the study's interpretative rigor.

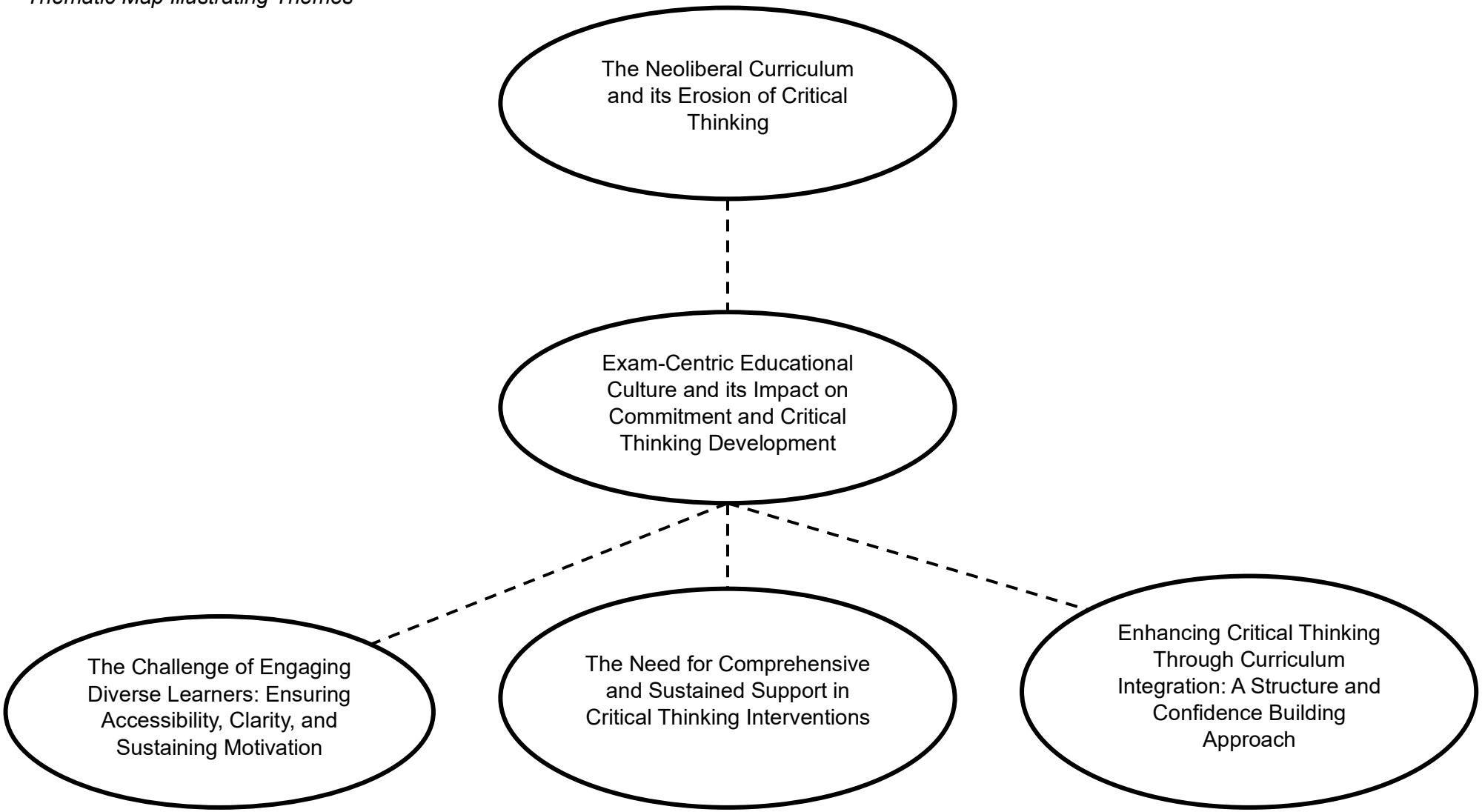
7.6 Findings

The analysis was conducted using Braun and Clarke's (2012, 2019, 2022) reflexive thematic analysis framework, a systematic approach that facilitates the identification and interpretation of themes within qualitative data. Specifically, a critical realist reflexive thematic analysis was employed, focusing on latent themes with a critical orientation and adopting an interpretative approach (Braun & Clarke, 2021). This analysis identified five

primary themes: (1) *The Neoliberal Curriculum and its Erosion of Critical Thinking*, (2) *Exam-Centric Educational Culture and Its Impact on Commitment and Critical Thinking Development*, (3) *Enhancing Critical Thinking Through Curriculum Integration: A Structured and Confidence-Building Approach*, (4) *The Challenge of Engaging Diverse Learners: Ensuring Accessibility, Clarity, and Sustaining Motivation*, and (5) *The Need for Comprehensive and Sustained Support in Critical Thinking Interventions*. The ensuing sections illustrate each theme, with Figure 3 depicting the relationships between the themes.

Figure 3

Thematic Map Illustrating Themes



7.6.1 The Neoliberal Curriculum and its Erosion of Critical Thinking

This theme examines the profound impact of neoliberal educational structures on students' cognitive engagement, particularly within the context of A-level psychology. Underpinned by a critical realist epistemology, the analysis explores how systems such as standardized testing and rote learning—central elements of educational neoliberalism—shape students' intellectual development. Critical realism posits that these structures, existing independently of individual perceptions, exert a powerful influence on human behavior and educational outcomes. By critically engaging with these frameworks, the analysis reveals how the prioritization of memorization over critical thinking leads to a disconnect between the intellectual demands of higher education and the realities of classroom practices at the A-level. Students are often unprepared for higher education due to these educational practices, which emphasize memorization over deep, evaluative, or independent thought. This disconnect is evident in the "cookbook approach" to learning (Green, 2007, p. 610), a concept explored through deductive coding to highlight the ideological structures shaping educational practices.

The data aligns with critiques from existing literature, which underscore concerns that A-level psychology often prioritizes rote learning over the development of genuine critical thinking skills (BPS, 2013; Green, 2007; Jarvis, 2011; Kitching & Hulme, 2013). Furthermore, by applying latent coding, this analysis uncovers the hidden power relations and social norms that perpetuate this system, demonstrating how both teachers and students are complicit in a structure that marginalizes independent analysis and critical thought. In doing so, the theme interrogates the ideological underpinnings of neoliberal education and its implications for student autonomy and intellectual engagement.

Educators and students alike reflected on how critical thinking is treated as foreign and irrelevant to academic success. "Teacher A" noted how students are often unfamiliar with engaging critically with academic texts, emphasizing their struggle to move beyond

surface-level understanding due to a lack of exposure to tasks requiring deeper cognitive engagement: "I think maybe it's because it's a foreign thing for them to do. They are not required to delve into academic extracts and journals, and what have you, and then pull out key bits of information from that." This quote highlights how neoliberal educational policies, with their focus on efficiency and standardized testing, leave little room for nurturing critical thinking skills, which are seen as secondary to exam preparation (Giroux, 2018; Kitching & Hulme, 2013). The literature further supports this notion, emphasizing that exam pressure, league tables, and the need for high grades contribute to the prioritization of lower-level thinking over critical inquiry (Ainley & Cannan, 2006; Giroux, 2010; Robinson, 2019; Schmeichel et al., 2017). "Teacher A" further observed, "If you asked them to think critical thinking, for them it's just thinking. So, if you think, did some of them think a bit harder. Perhaps…some of them tried not to think…". This suggests that students do not perceive critical thinking as a distinct cognitive skill, reinforcing its marginalization in A-level learning.

Similarly, "Teacher B" expressed uncertainty about whether students even understood what critical thinking entailed, reflecting a broader lack of familiarity and practice: "Erm…I'm still not sure that they would understand what critical thinking is… And that's why when they go and do those worksheets, they find it difficult. Because they are not used to it." This lack of exposure is compounded by the narrow focus on exams, with little room for students to engage in independent critical thought. Additionally, the analysis indicates that the absence of explicit critical thinking instruction during A-level education results in students being inadequately prepared for the demands of higher education (BPS, 2013; Green, 2007; Kitching & Hulme, 2013). "Teacher B" acknowledged their own role in perpetuating this system: "Probably what I mean is that I am more aware of what I am getting my students to do isn't critical thinking and that actually I am just spoon-feeding them." This illustrates how educators themselves feel constrained by the exam-driven curriculum, unable to foster genuine intellectual engagement.

"Student A" reflected on the stark contrast between A-levels and university, explaining how critical thinking was not emphasized at the previous level: "Yeah…like at A-level it's like 'this is how it is and here is where it came from'… erm…then you didn't really have to further research it. Unless you needed like a very specific part that they weren't mentioning." This reveals how the A-level education system prioritizes surface-level understanding and rote memorization over deeper, more independent cognitive processes that are necessary for higher education. The literature highlights that students often experience difficulties in understanding and applying critical thinking skills when transitioning to university (Cormack et al., 2014; Duro et al., 2013; Koh et al., 2012; McCann & Bates, 2016). "Student D" also discussed the lack of explicit instruction in critical thinking at A-level, acknowledging that their difficulty in understanding it stemmed from insufficient practice:

> I think it was difficult. I think it was just difficult because I hadn't come across anything like that before. Like, I think that it was like a lack of practice. Like if I think like I was still doing those questions and reading the passages, I think now I'd be like a pro [laugh].

The findings reveal significant issues identified in previous research concerning the exam-oriented nature of A-level education, which emphasizes memorization over critical analysis (Banyard, 2010; BPS, 2013; Kitching & Hulme, 2013).

The data also highlights the way students engage in "pseudo-critical thinking," which can be attributed to rote learning and an over-reliance on memorized evaluation points rather than engaging with ideas critically (BPS, 2013; Green, 2007; Jarvis, 2011; Kitching & Hulme, 2013). "Teacher C" noted that students often regurgitate evaluation points from textbooks without deeper analysis: "There are two or three who spring to mind, whose essays are always brilliant, and they'll learn the evaluation points from the textbook and regurgitate them." This reflects broader concerns regarding assessment practices, in which students present critiques from other sources rather than developing their own evaluative skills (Kitching & Hulme, 2013; Rowley & Dalgarno, 2010)."Teacher D" observed that

students are trained to reproduce specific structures for the sake of marks, rather than engaging in genuine critical thinking: "But even they are trained into preparing for an exam, they are learning structures to get marks. They are not necessarily thinking genuinely critically all the time."

Moreover, the analysis supports the notion of a "cookbook approach" to teaching, where textbooks and prescribed methods dictate learning practices, thereby limiting the cultivation of higher-order cognitive skills (Green, 2007, p. 610). "Student D" recounted how rote memorization was explicitly encouraged by teachers, reinforcing the idea that rote learning was a safe strategy to succeed in exams: "I remember asking her 'Can I use my own evaluation points to evaluate studies?' And she [her A-level teacher] told me to like rote learn the majority, to play it on the safe side." Teachers advising students to memorize set notes for exams further institutionalizes rote learning within educational practices (Baird et al., 2009), echoing concerns raised in the literature about the dominance of memorization-driven assessment methods (Hernandez-Martinez & Williams, 2013).

In conclusion, this theme demonstrates the profound impact of neoliberal educational practices on the development of critical thinking skills in A-level students. The current system prioritizes memorization and exam outcomes over intellectual engagement, leaving students unprepared for the more rigorous demands of university education. The stark contrast between A-level and degree-level thinking highlights the pressing need for educational reforms that emphasize critical thinking, independent analysis, and intellectual curiosity (APA, 2023; BPS, 2019; Hayes, 1996; QAA, 2023). Without such changes, students will continue to face significant challenges in higher education, where genuine critical thinking and evaluation are essential.

7.6.2 Exam-Centric Educational Culture and Its Impact on Commitment and Critical Thinking Development

This theme examines the constructed nature of exam-centric education, illustrating how neoliberal ideologies shape educational priorities and influence both teaching and

learning experiences. By applying a critical realist epistemology, the analysis uncovers the structural mechanisms—such as market-driven policies and accountability pressures—that shape the behaviors of students and teachers. It critiques the power dynamics embedded within educational practices, where neoliberalism enforces a system focused on exam outcomes rather than fostering deeper intellectual engagement. The tension between prioritizing measurable outcomes, such as exam performance, and fostering critical thinking underscores the complex dynamics in which educators and students operate. This theme connects participants' experiences with the impact of performance-driven educational cultures, revealing the contradictions and systemic constraints that limit opportunities for genuine critical thinking development. It also examines how these forces shape the effectiveness of interventions, particularly those aimed at promoting critical thinking, and how issues like commitment and time limitations intersect to shape the perceptions and experiences of students.

The first key element of this theme is the perception that the success of the intervention was largely evaluated through its impact on exam results rather than its ability to foster genuine critical thinking. This view, prevalent among both teachers and students, reflects the neoliberal emphasis on accountability and market-driven education (Jacobson & Bach, 2022; Joseph, 2020). As noted by "Teacher A," students primarily viewed the intervention's utility in terms of its direct benefit to their exam success, with little regard for broader intellectual development: "It’s about for them, I suppose, what's the benefit of doing it? In what way does it enhance my ability to pass my exams?" This sentiment was echoed by "Teacher D," who expressed disappointment over the students’ focus on grades rather than intellectual growth: "It’s a market at the end of the day and it’s all about grades." These reflections underscore how neoliberal policies push both educators and students to center exam results as the key measure of success (Ainley & Cannan, 2006; Giroux, 2010).

While participants acknowledged the practical benefits of the intervention in preparing students for exams (e.g., "Teacher B" noted that the intervention helped students

"do things they would have to do anyway in the exam"), it also highlighted concerns about the superficial nature of such interventions. "Student C" encapsulated this critique, noting how the exam-driven mindset shaped their approach to critical thinking: "Answering things to get the grades on an exam is an A-level habit. Knowing what the examiner wants to hear." This tendency reflects broader concerns regarding the influence of neoliberal policies on students' educational behaviors and identities (Garver, 2020; Keddie, 2016). Similarly, "Student A" described how the intervention helped them refine their writing skills in a way that aligned with examiner expectations:

> Because I wasn't good at wording my essays and things like that, and having the mark scheme to look at for critical thinking and stuff and having it worded that way is how you should word it. I think it really helped up my marks in that part because the examiners and the teachers finally understood what I was trying to get at.

This highlights the tension between short-term academic goals and the more meaningful development of transferable skills, such as critical thinking (Jarvis, 2011).

The second key element of this theme is the commitment to the intervention, which was significantly shaped by the exam-centric educational environment. Participants indicated that their engagement with the intervention was contingent upon its perceived relevance to exam outcomes. "Teacher A" openly admitted to the minimal involvement in preparing students for the intervention:

> Well I think…I never really did. I never gave the students any prep or any help doing it. I just…it was on a Wednesday on one of the periods and I just gave them the documentation. Never explained it to them. Made them do it.

The lack of clear connection to assessment objectives led to resistance from students, as captured in "Teacher A's" observation: "Awwwh they [the students] hated it."

"Student A"'s disillusionment over the perceived lack of relevance to the exam further illustrates the challenge of motivating engagement within a neoliberal educational context:

"There is really no point then." The findings reveal a recurring pattern where both educators and students struggled to connect the intervention to immediate academic rewards, highlighting how neoliberal pressure can stifle genuine interest in intellectual growth (Ku, 2009; Ball & Junemann, 2012). "Teacher A" described how students often questioned the purpose of the intervention:

> So, a lot of them were questioning, so what, are we doing this? It has no benefit. 'We have got exams coming up' and, it's like 'no, we know you have got exams coming up but… this will help you with your research methods and stuff like that'

This highlights the restrictive nature of performance-oriented cultures, which impose stringent constraints on educators' pedagogical approaches (Boxley, 2003; Banyard, 2010).

Lastly, the theme addresses the time restrictions imposed by the examination-driven culture, which exacerbated the challenges in implementing the critical thinking intervention. Participants repeatedly described how the need to meet exam requirements constrained their ability to provide in-depth, reflective learning experiences. "Teacher C" emphasized the limitations on time due to the rigid curricular schedules: "We haven't got time or we haven't had the time just yet." "Teacher A" reinforced this issue, noting that "The time when we started, the focus is on examinations and stuff like that." This reflects the broader educational concern about how time-restricted environments, driven by exam schedules, undermine meaningful engagement with the learning process (Jopling & Harness, 2021).

The challenge of balancing short-term goals in A-level teaching, focused on exam preparation, with the long-term goals of fostering transferable skills like critical thinking, has been highlighted multiple times (Jarvis, 2011). "Student D" described how the need to adhere to a strict teaching schedule left little room for deeper engagement with course content: "There was no elaboration of information...you were just basically talked at." The findings reveal significant pressures on educational practices driven by neoliberal ideologies,

which emphasize performance metrics over holistic educational goals (Ball, 2009; Ball & Junemann, 2012).

In conclusion, this theme highlights the ways in which neoliberal policies shape educational practices by emphasizing measurable outcomes, such as exam performance, at the expense of holistic intellectual growth. The tension between meeting immediate exam requirements and fostering critical thinking skills underlines the challenge faced by educators and students in navigating an education system increasingly driven by market logic. As "Teacher D" aptly put it, the need for students to achieve higher grades often supersedes the desire for broader, more meaningful intellectual development. This theme calls for a re-evaluation of educational priorities, advocating for a balance that fosters both exam success and the cultivation of lifelong critical thinking skills—skills that transcend the limitations of standardized assessments (Giroux, 2018; Hulme & De Wilde, 2014).

7.6.3 Enhancing Critical Thinking Through Curriculum Integration: A Structured and Confidence-Building Approach

The third theme of this reflexive thematic analysis, deeply rooted in critical realism, maintains a critical orientation while shifting towards a more constructive framing. It moves away from directly critiquing neoliberal education systems and instead emphasizes how well-structured interventions can function effectively within existing institutional frameworks, such as the AQA (2015) curriculum. In this context, the intervention not only complemented the A-level psychology curriculum but also fostered student confidence and engagement through its design, which was aligned with existing educational frameworks, particularly in research methods. Participants consistently highlighted its role in equipping students with critical thinking skills necessary for deeper engagement with course material. This theme acknowledges both the subjective experiences of students—such as their increased confidence and engagement—and the underlying structures that shape their learning, including the impact of structured learning approaches and assessment frameworks. By applying deductive analysis and leveraging established theories of curriculum design and

cognitive engagement, the theme explores how curriculum integration can foster deeper critical thinking. Latent coding further uncovers the deeper meanings behind structured interventions, highlighting the tensions between surface-level learning and the need for more profound cognitive engagement. This theme offers a nuanced view, positioning structured learning not as a constraint but as a potential catalyst for transformative change within the constraints of formal education.

Participants emphasized the intervention's strong synergy with the A-level psychology curriculum, particularly its relevance to research methods and critical analysis components. "Teacher A" noted its direct applicability: "So, like relevant for them so like you know, that would fit in where we were fitting in with research methods." Expanding on this, they highlighted its flexibility within different psychology topics: "You know cos it fits with research methods. As a standalone document, if you are doing one of the components and looking at the approaches in psychology and to go back and look at research methods…" Similarly, "Teacher B" reinforced its suitability: "I think it did complement it definitely, but particularly for the research methods section. Erm, yeah definitely…" The intervention provided structured resources that aligned with the AQA (2015) specification, reinforcing key psychological concepts and debates. "Teacher D" further emphasized its strong compatibility: "I mean we do AQA and the AQA specification and it worked very well with that." Additionally, "Teacher C" reflected on how the intervention exposed students to studies beyond their usual syllabus: "…there [are] some of the studies that I wouldn't necessarily have taught them, but they are all relevant to issues and debates and it's quite nice for them to have those longer synopsis of the studies."

The theme also highlights the significance of embedding critical thinking within subject-specific content, particularly in research methods (Ennis, 2018; Nygren et al., 2019; Ten Dam & Volman, 2004; Simpson & Courtney, 2008). This approach not only enhances critical thinking skills but also fosters deeper understanding and application of these skills within the context of the subject matter. The alignment with the curriculum was crucial for the

sustainability of the critical thinking intervention, as research suggests that embedding such programs within existing frameworks enhances their impact (Alnaji, 2022; Dima et al., 2020). By integrating seamlessly with established educational structures, the intervention not only reinforced curriculum content but also provided students with an enriched learning experience that extended beyond rote memorization (Christenson et al., 2002; Elia & Tokunaga, 2015).

Beyond curriculum integration, the intervention played a pivotal role in increasing students' confidence in engaging with academic challenges. "Teacher C" highlighted this transformation:

> So, I think it will have had an impact and I think with class discussions they were a little bit more confident in coming up with… sort of critical analysis for themselves and not just coming up with stuff out of the book.

Similarly, "Teacher D" noted that students demonstrated greater proficiency in discussing and analyzing course content: "They became more able to do… discuss what the answers would be to those at different points in the course, just by looking at it." Furthermore, "Teacher C" observed a clear distinction between students of different ability levels, emphasizing the necessity of critical thinking for higher academic achievement:

> For those ones that were in the middle, they were able to regurgitate the rote learning, learning evaluation points and they knew that wasn't enough, and to access those higher grades they really needed to be able to construct their own.

These findings are consistent with research demonstrating that structured critical thinking instruction enhances students' analytical abilities and academic confidence (Liu & Pásztor, 2022; Lanz et al., 2022). While Niu et al. (2013) acknowledged the variability in the effectiveness of such interventions, the participants' observations suggest that students developed greater self-efficacy in their evaluative skills, contributing to their overall academic growth.

The structured approach of the intervention appeared as a key factor in its effectiveness, providing students with a clear and systematic method for engaging with complex material. “Teacher A” praised the organization of resources: “I think the resources are well laid out and things like that. I think that bit is quite good.” Additionally, they recognized its potential for further refinement: “…I think it has the potential to complement it very well. I really do. I think with tweaks and modifications. I think it could be a very good addition to it.” Meanwhile, “Teacher B” highlighted the value of repeated questioning patterns: “…they wouldn’t admit it, [but] the pattern… of asking the same set of questions… almost became like a flow chart of how to critically evaluate a study.” This consistency in structure allowed students to internalize a framework for analysis, fostering independent critical thinking.

Specifically, the structuring of curriculum objectives to foster high-level cognitive performance and the alignment of teaching activities to promote such performances have been shown to enhance critical thinking development (Biggs, 1996). The participants observed that the organization of resources and the implementation of repetitive questioning provided a structured approach for evaluating research and formulating evaluation points. A well-structured approach to teaching critical thinking has been shown to enhance cognitive engagement and academic performance (Koh et al., 2019; Lai, 2011). By offering a scaffolded method for analyzing and evaluating research, the intervention provided students with a replicable process for constructing their own arguments and interpretations, a crucial skill for academic success (Behar-Horenstein & Niu, 2011; Huber & Kuncel, 2016). Participants emphasized that the structured nature of the intervention not only enhanced accessibility but also empowered students to navigate complex tasks with confidence.

The success of the intervention stemmed from its seamless integration with the A-level psychology curriculum, its role in boosting student confidence, and its well-structured approach to critical thinking development. By aligning with existing educational frameworks and providing systematic guidance, the intervention fostered a learning environment that

encouraged deeper engagement and analytical proficiency. These findings emphasize the importance of designing critical thinking interventions that are both curriculum-aligned and structurally coherent, ensuring their long-term effectiveness and impact in educational settings.

7.6.4 The Challenge of Engaging Diverse Learners: Ensuring Accessibility, Clarity, and Sustaining Motivation

The fourth theme in this reflexive thematic analysis builds on the foundations of critical realism, a critical orientation, deductive analysis, and latent coding, while introducing a deeper focus on accessibility and learner diversity. It engages with both the observable struggles of students and the underlying structural mechanisms influencing these struggles, expanding the lens to explore nuanced pedagogical challenges such as cognitive load, terminology barriers, and fluctuations in student motivation. Central to this theme is the challenge of engaging diverse learners in the critical thinking intervention, particularly regarding accessibility, clarity, and sustaining motivation. Teachers and students expressed concerns about the ability of the intervention to meet the needs of students with varying academic capabilities while maintaining interest over time. By examining how power dynamics and pedagogical practices intersect, this theme critiques the current intervention design, which, although rigorous, may inadvertently favor certain student groups over others. The analysis shifts from broad systemic critiques to a more refined exploration of how equitable access to critical thinking is shaped by diverse learner needs, reinforcing the argument that even well-designed interventions must account for these complexities to be truly inclusive and effective.

A core issue identified across participants was the need for tailored interventions that accommodate different levels of academic proficiency. "Teacher A" highlighted a discrepancy in student engagement, pointing out that high-achieving students found the tasks enjoyable, while many others struggled to connect with the material. They observed:

> I think all of it. Maybe one or two did, the most academic and highfliers probably enjoyed it. But a lot of them just did not like it and really didn't… I mean they engaged with it, but they really didn't want to.

This statement captures the tension between providing rigorous content and ensuring it resonates with all learners, particularly those less academically inclined. Engagement levels varied among participants, with some finding the intervention enjoyable and impactful, while others struggled to connect with the material. This observation is consistent with the notion that accessible interventions promote increased engagement and subsequently improve learning outcomes (Kowalczyk, 2011). By incorporating features that cater to different learning preferences, such as visual, auditory, or tactile modalities, interventions can better support a wide range of learners (Loes et al., 2015).

This concern was echoed by "Teacher C," who noted that students with lower academic proficiency faced challenges in accessing the content. They suggested simplifying tasks to make them more manageable, explaining, "But they found it really difficult to access and what I might do is try and simplify it down. So, there is something quite snappy that they can remember to think, this, this, this and this." Similarly, "Teacher A" proposed a structured approach to scaffolding difficulty levels, stating, "Maybe there is an easy one and then it progressively gets harder and harder. Rather than it all being at the same level." These perspectives are consistent with recommendations for tiered difficulty levels and simplified tasks, which are essential for ensuring interventions are effective across varying levels of ability, promoting equity and inclusion in educational settings (Loes et al., 2015). Additionally, "Teacher D" recognized the importance of scaffolding support, especially for lower-ability students. They proposed adding critical thinking frames and sentence starters to help guide students through complex tasks, noting, "But, maybe some examples of critical thinking answers or some sort of frames or some sentence starters for some of them, for the lower ability students found it difficult." Scaffolding helps students build and apply critical thinking skills progressively, ensuring that all learners, regardless of academic ability, are

supported (Abrami et al., 2015). Furthermore, ensuring that interventions are accessible to all students not only enhances learning outcomes but also supports rigorous assessment methods and the use of validated measurement tools in educational research (Niu et al., 2013).

However, as “Student D” articulated, even with these supports, some students found the material overwhelming. They reflected, “It was a challenge and kind of shocking and like why is this so hard? Before that, I used to think everything came quite easy.” This perspective reinforces the need for a balanced approach in interventions—one that offers appropriate challenge without overwhelming students, a balance essential for fostering both engagement and learning outcomes.

A critical component in fostering engagement and comprehension developed in the use of terminology. The complexity and inconsistency of terminology used in the intervention posed a significant barrier for students. As "Teacher A" noted, “I think sometimes the terminology was quite difficult for some of them to understand.” The difficulty of comprehending certain terms was consistently highlighted by both teachers and students. “Student A” voiced their struggle with the phrasing of tasks, asking, “Just cos I have struggled with wording and stuff and understand what the question is actually asking?” Similarly, “Student B” echoed this sentiment, expressing frustration over unfamiliar vocabulary, stating, “...some people thought it was boring and some of the words in it. They didn’t understand the words in it.” The critical role that accessible language plays in enabling effective student engagement and comprehension has been emphasized (Kowalczyk, 2011; Lanz et al., 2022). These observations also elucidate broader issues related to terminology inconsistencies across educational levels (BPS, 2013). They emphasize the need for standardized terminology to ensure clear and consistent understanding and communication in critical thinking education.

The repetitive nature of the intervention also appeared to be a critical issue, leading to disengagement over time. "Teacher B" noted that students began to feel “fed up” with tasks that seemed too similar, observing:

> They [students] did get a bit fed up with it. I think, I don’t know whether it was a combination of possibility…I don’t know if they just thought the tasks were very samey [sic]… erm…but also the fact that they felt that because they were year 13, they just wanted me to teach them.

This feeling of monotony was echoed by "Teacher D," who remarked, “Erm…some got a little bit bored and saw it as kind of repetitive when they had done a number of them positively.” “Student A” also reflected on the decline in engagement, saying, “It was good the first couple of weeks, but once it got to the late weeks it was like, ‘Oh, we are doing another one of these.’” These reflections indicate that while the intervention may have been engaging initially, its repetitive nature likely contributed to a loss of enthusiasm and motivation among students. Niu et al. (2013) highlighted how repetitive educational interventions can lead to disengagement and diminished student interest. To address this, participants suggested diversifying task formats, such as incorporating mind maps or group activities. "Teacher B" recommended:

> Maybe just do some of them in a slightly different way. Instead of just asking questions. You know, maybe have one well they… I don’t know, they do it as… I don’t know, a mind map or you know one week, they do it, you know in groups or in pairs or just kind of mix it up a little bit maybe.

Research asserts that variety in instructional strategies helps to sustain motivation, accommodate different learning styles, and promote more effective learning outcomes (Dumitru et al., 2018; Lanz et al., 2022).

Taken together, these findings emphasize the complexity of designing and implementing critical thinking interventions that are inclusive, engaging, and accessible for

diverse learners. The evidence suggests that interventions need to be adaptable to students' academic abilities, employ clear and consistent terminology, and incorporate variety in task formats to maintain motivation and engagement. By addressing these concerns—through tiered difficulty levels, the simplification of terminology, and the diversification of task formats—educators can create more effective interventions that promote sustained engagement and deeper learning.

7.6.5 The Need for Comprehensive and Sustained Support in Critical Thinking Interventions

This theme builds on the foundation of critical realism, a critical orientation, deductive analysis, and latent coding, while expanding the focus to address the structural and pedagogical challenges in sustaining critical thinking interventions. Rooted in a critical realist epistemology, it highlights how gaps in curriculum design—not student ability—underlie difficulties in developing critical thinking skills. It critiques short-term, reactive interventions and the late introduction of critical thinking in education, emphasizing the importance of sustainable, long-term strategies. This theme further engages with systemic barriers, such as the tension between research-based interventions and practical classroom needs, revealing how rigid educational structures hinder the scaffolding of critical thinking. Through a theory-driven approach, it uncovers deeper, latent issues that contribute to the ineffectiveness of the current intervention, offering a crucial shift from critique to potential pedagogical solutions for a more structured and sustainable approach to teaching critical thinking. In alignment with these findings, the participants' consensus emphasized the need for a more comprehensive, sustained, and structured approach to critical thinking interventions. They argued that, for these interventions to be truly effective, they must be introduced earlier in students' academic journeys, extended in duration, and supported by clear scaffolding throughout the learning process. Participants pointed to the necessity of gradually building critical thinking skills over time, rather than relying on brief, isolated interventions. This ensures that students have the time and support they need to develop a

deeper understanding of complex concepts and integrate critical thinking into their broader academic and professional skills. By providing earlier, more consistent, and well-supported opportunities for practice, these interventions can significantly enhance students' readiness for future academic challenges.

A recurring point across the data was the suggestion to implement critical thinking interventions at an earlier stage in students' academic careers. Participants emphasized the importance of introducing critical thinking exercises by the end of year 12 or even at the GCSE level. As "Teacher A" noted, students are often expected to demonstrate critical thinking skills close to examination periods, which can leave them unprepared. They stated, "I think it probably needs to be conducted earlier…maybe at the end of year 12…I mean if you think about it they start trying to do it when examinations are not far off." This concern is echoed by "Teacher B," who proposed introducing the intervention as a baseline test for both year 12 and year 13 students to assess their current critical thinking abilities, stating:

> I am thinking about doing it, almost as like a baseline test. So, when year 12 come in and possibly for when year 13 come in as well. To see what they would say about things and to see where the gaps are.

"Teacher C" also stressed the importance of introducing critical thinking exercises early in the academic year, asserting,

> Because I think actually going through and doing a lot of those types of exercises then will bring in that sense of bringing in those higher levels of evaluation points and critical thinking skills, as early as possible in that year.

Furthermore, "Student C" advocated for earlier integration of critical thinking exercises, stating:

> Yeah…I think it should be done at GCSE to be honest… yeah cos it’s such a high cognitive function to be able to critically think and it’s difficult to do and the more practice you get at it the more easier it’s going to be.

These insights are supported by existing literature that emphasizes the importance of early intervention in developing foundational critical thinking skills (Evens et al., 2013; Behar-Horenstein & Liu, 2011), ensuring that students build a solid base for higher-level academic challenges. Additionally, positioning GCSE as a key entry point for critical thinking interventions sets the stage for a longitudinal approach to skill development (Niu et al., 2013), allowing for sustained reinforcement of critical thinking abilities.

In addition to the timing of the intervention, participants emphasized the importance of its duration. Both "Teacher A" and "Teacher B" suggested extending the intervention throughout the academic year, rather than limiting it to a brief block of time. "Teacher A" proposed using the full academic year to deepen students' engagement with critical thinking, stating, "Yeah, yeah I think so and for it to be done over the full academic year." "Teacher B" highlighted the need for more time allocation, suggesting that spreading the intervention tasks over a longer period would alleviate time pressure and allow for in-depth discussions, saying, "I would probably give some of it for homework and give them more time." "Teacher C" added a nuanced perspective, noting, "From a teaching point of view, but obviously for the study, it needed to be done as a block." These suggestions emphasize the need for sustained engagement to promote deeper understanding, as shorter interventions might not allow students to fully grasp complex critical thinking concepts. "Student D" shared a similar sentiment about the limitations of brief interventions, stating, "It was just because like it was such a small part of the year that I don’t really think I thought much about it after we completed it." Furthermore, "Teacher C" recommended integrating intervention resources throughout the entire course, rather than confining them to a 10-week block, stating, "Erm I think if it wasn’t for the study, what I do and what I will do is use those resources." Research supports this idea, noting that longer interventions allow for a more profound understanding and mastery of critical thinking skills over time (Lai, 2011). Participants also suggested that spreading intervention tasks over time could help ingrain critical thinking skills as habitual practices, reinforcing them continuously rather than treating them as isolated exercises.

Interestingly, participants' suggestions also highlighted the challenge of balancing research objectives with pedagogical preferences. While acknowledging the necessity of a block intervention for research purposes, participants advocated for flexibility and adaptability in intervention design to better align with diverse student needs and course structures (Lanz et al., 2022). This emphasizes the importance of integrating critical thinking interventions in ways that accommodate varying academic contexts, ensuring their applicability beyond controlled study conditions.

Finally, the importance of scaffolding in supporting students through the complexities of critical thinking was a key point emphasized by participants. "Teacher A" suggested a structured approach to guide students in extracting key information from complex texts, stating:

> Then perhaps with one extract and then that extract would be highlighted and you'd be able to see what are the key things you would be able to extract from this. Then you have produced the examples already…so really scaffolding.

Similarly, "Teacher B" echoed the need for more scaffolding, proposing a modeling approach where the teacher guides students through the critical thinking process, saying:

> I'd just think more time is fair and maybe what I could have done is modeled to them at first…and gone through it and answered the questions together and set them as homework and maybe not as regularly once a week.

Research stresses the importance of modeling techniques, guided exercises, and structured tasks in fostering critical thinking development (Evens et al., 2013; Lanz et al., 2022). Additionally, student feedback revealed that allocating time for detailed explanations, contextualizing information, and engaging deeply with the material enhances comprehension and application of critical thinking concepts. These practices contribute to a better understanding and skill development in critical thinking and align with scaffolding principles,

where substantial support is initially provided and then gradually reduced as students develop proficiency (Behar-Horenstein & Niu, 2011; Huber & Kuncel, 2016).

Together, these suggestions point to a broader theme of how a more comprehensive, sustained, and structured intervention could facilitate the deeper and more lasting development of critical thinking skills. Participants indicated that early intervention, coupled with sufficient time and scaffolding, would provide students with the support they need to navigate the complexities of critical thinking and better prepare them for future academic and professional challenges. By integrating the insights from this study with existing research, educators and policymakers can design more effective interventions that are not only timely but also sustained and well-supported, ensuring that critical thinking skills are developed in a meaningful and enduring way.

7.7 Discussion

The aim of this study was to contribute qualitative insights into the effectiveness of a critical thinking intervention and its impact on students' psychological critical thinking abilities using qualitative methods. Existing evaluations have acknowledged limitations, prompting a focus on qualitative dimensions of intervention effectiveness (Niu et al., 2013). This study was guided by the following research question: How effective was the school-based instructional critical thinking intervention at improving A-level psychology students' psychological critical thinking ability? The research question centered on the effectiveness of the school-based instructional critical thinking intervention in improving A-level psychology students' psychological critical thinking ability. Previous research emphasizes the pivotal role of qualitative measures in providing rich contextual evidence that delves deeper into subjective experiences and perspectives related to critical thinking instruction and skill acquisition (Behar-Horenstein & Niu, 2011; Tsui, 2002).

7.7.1 Summary of Key Findings

Participants primarily assessed the success of the intervention through students' performance on exams (Jacobson & Bach, 2022; Joseph, 2020). However, this focus often overshadowed holistic intellectual growth (Hextall & Mahony, 2013; Sharma & Portelli, 2014), reflecting broader critiques of market-oriented educational ideologies (Ball, 2001, 2003; Torrance, 2017). Participants highlighted the challenge of balancing short-term exam preparation with long-term educational goals, such as developing critical thinking skills (Jarvis, 2011), emphasizing the need to reconsider priorities to encompass both outcomes and holistic development.

The intervention engagement among teachers and students varied, with teachers sometimes perceiving it as irrelevant to exam content due to neoliberal pressures (Anderson & Cohen, 2015; Banyard, 2010). Similarly, students' engagement was driven by its relevance to exam preparation, reflecting performance-oriented cultures (Ku, 2009; Garver, 2020). This is somewhat problematic as effective interventions require genuine engagement through consistent implementation and timely feedback (Boxley, 2003).

Time constraints from exam preparation significantly challenged activities promoting psychological critical thinking, exacerbated by neoliberal policies favoring standardized testing (Ball & Junemann, 2012; Keddie, 2015). Participants felt constrained by rigid exam schedules, limiting opportunities for deeper learning experiences (Banyard, 2010; Boxley, 2003). These challenges highlight broader issues of accountability and marketization in education (Joplin & Harness, 2021), necessitating reforms that allow for more meaningful learning beyond standardized testing.

Students transitioning from A-level to university education faced difficulties applying psychological critical thinking skills due to the A-level system's emphasis on memorization over critical analysis (BPS, 2013; Kitching & Hulme, 2013). This challenge was exacerbated

by neoliberal policies that prioritize testing over comprehensive skill development (Giroux, 2018), prompting calls for reforms to better prepare students for higher education (BPS, 2013; Green, 2007; Kitching & Hulme, 2013).

Participants discussed how the structure of the A-level psychology qualification means students often engaged in superficial psychological critical thinking by memorizing evaluation points rather than critically analyzing them (BPS, 2013; Green, 2007; Jarvis, 2011; Kitching & Hulme, 2013; Rowley & Dalgarno, 2010). This approach contrasts sharply with university expectations, where independent psychological critical thinking skills are essential (APA, 2023; BPS, 2019; Hayes, 1996; QAA, 2023), necessitating educational reforms to prioritize genuine psychological critical thinking abilities.

Participants appreciated the interventions alignment with the A-level psychology curriculum, particularly in research methods, enhancing their cognitive development and problem-solving abilities (Ennis, 2018; Nygren et al., 2019; Simpson & Courtney, 2008; Ten Dam & Volman, 2004). Skills gained from the intervention, such as interpreting research results and identifying biases, was thought to have improved students' psychological critical analysis abilities (Lanz et al., 2022), boosting their confidence and participation in class discussions, albeit with varying outcomes (Niu et al., 2013).

The structured nature of the intervention was praised for its accessibility and ease of use, although some students faced barriers due to its repetitive nature (Biggs, 1996; Koh et al., 2019). To enhance engagement and outcomes, more adaptable intervention designs are recommended to cater to diverse learning needs and preferences (Abrami et al., 2015; Kowalczyk, 2011; Loes et al., 2015). Addressing challenges such as terminology comprehension and incorporating varied instructional approaches are crucial for sustaining intervention engagement and effectiveness (Dumitru et al., 2018; Kowalczyk, 2011; Lanz et al., 2022).

Early and continuous psychological critical thinking interventions, integrated into existing curricula and tailored to specific educational contexts, were advocated for by participants to ensure sustained skill development (Behar-Horenstein & Liu, 2011; Evens et al., 2013; Niu et al., 2013). Overall, balancing exam preparation with fostering psychological critical thinking and holistic intellectual growth is crucial. The current emphasis on exams often limits comprehensive skill development and deep engagement. Policy reforms and adaptable, integrated educational interventions focused on psychological critical thinking are crucial for bridging the gap between pre-tertiary and tertiary psychology education, creating a more effective educational framework prioritizing genuine psychological critical thinking skills.

7.7.2 Limitations

This study employed reflexive thematic analysis (Braun & Clarke, 2012, 2019, 2022) to explore the effectiveness of a critical thinking intervention and its impact on students' psychological critical thinking abilities. While the findings offer valuable insights, several limitations should be considered to contextualize the interpretation and generalizability of the results.

Firstly, the participant sample comprised exclusively of female students transitioning from A-level to university psychology studies, along with predominantly female A-level psychology teachers. This homogeneity in the sample may limit the generalizability of the study's findings to broader student populations or different educational contexts, particularly those characterized by diverse demographic compositions or varied academic experiences. Therefore, the study's findings may not fully capture the experiences or perceptions of male students or educators, potentially overlooking important insights that could vary across gender or other demographic factors.

Secondly, the researcher played a pivotal role in designing and implementing the intervention, which could introduce bias in data interpretation and analysis. The researcher's close involvement with the intervention may have influenced the selection and emphasis of certain themes or data points, potentially skewing the interpretation towards confirming the intervention's effectiveness. This potential bias could undermine the objectivity of the study's analysis and conclusions.

Lastly, the post-intervention follow-up interviews were conducted after the students' first semester at university. The short-term nature of the follow-up may not fully capture longer-term effects of the intervention on students' psychological critical thinking ability. Consequently, the study's findings may primarily reflect immediate impressions rather than sustained impacts over time.

7.7.3 Conclusion

This research study has illuminated critical aspects of the educational landscape, particularly within the realm of psychology education, where an entrenched exam-oriented culture often eclipses the cultivation of genuine critical thinking skills. The findings highlight a prevailing theme of intervention effectiveness being narrowly defined by exam performance, emblematic of broader trends in education driven by neoliberal policies favoring quantifiable outcomes. While the intervention aimed at enhancing psychological critical thinking skills showed promise in aiding exam preparation, concerns persist regarding its long-term impact on fostering deep cognitive abilities beyond immediate test-taking tactics.

The commitment to the intervention was intricately tied to the academic environment, where time constraints imposed by impending exams restrict flexibility for alternative pedagogical approaches. This tension highlights a critical imbalance between traditional evaluation methods and the imperative to foster authentic critical thinking abilities within educational practices. Moreover, the study's exploration of intervention implementation

challenges—ranging from accessibility issues to concerns over terminology comprehension and intervention monotony—underlines the need for tailored, inclusive educational approaches that accommodate diverse learning styles and abilities.

Transitioning from the culmination of data collection and analysis in Chapter 7 (pp. 178- 223), Chapter 8 (pp. 224- 249) integrates the findings across the four interconnected study phases. The next chapter undertakes a rigorous critical analysis and synthesis, exploring the implications and contributions of this thesis. Moreover, it addresses the thesis' limitations while suggesting promising directions for future research. Ultimately, Chapter 8 concludes with a succinct summary, emphasizing the thesis' key findings and original contributions to the field.

Chapter 8: General Discussion and Conclusions

8.1 Chapter Introduction

The overall aim of the thesis was to design, implement and evaluate a domain-specific, school-based critical thinking instruction intervention to improve the psychological critical thinking ability of pre-tertiary psychology students. The goal of this was to help facilitate their transition to degree-level psychology. The primary research question of the thesis was: How can a school-based domain-specific intervention be designed to effectively improve the psychological critical thinking ability of pre-tertiary psychology students and facilitate their transition to study degree-level psychology? To effectively address this research question, a multiphase sequential mixed method design was utilized (Creswell, 2012; Teddlie & Tashakkori, 2009). The design consisted of four interconnected studies each contributing to different aspects of the research question.

8.2 Exploration of Findings Across Study Phases

8.2.1 *Phase 1 Findings*

The study investigated the perspectives of A-level psychology teachers and university lecturers on critical thinking instruction, focusing on understanding the institutional culture at both levels and identifying barriers to effective teaching. Existing research had highlighted the importance of educator approaches in fostering critical thinking skills and noted that these skills were influenced by the context and culture in which they were taught (Halx & Reybold, 2005; Pithers & Soden, 2000). By examining how institutional culture shaped the interpretation and value of critical thinking (Reybold, 2003), the study phase aimed to provide insights for developing an intervention that aligned with the existing institutional culture.

A qualitative research approach was employed, utilizing semi-structured interviews to explore educators' views on critical thinking instruction and the barriers they perceive in teaching these skills. The participant sample included 18 psychology educators, comprising 11 A-level psychology teachers from eight different schools and seven university psychology

lecturers from four different UK universities. Data was analyzed using a reflexive thematic analysis (Braun & Clarke, 2019, 2012, 2022).

The study explored the institutional culture and instructional barriers influencing the teaching and learning of critical thinking in psychology education at both A-level and degree-level settings. The findings revealed a significant impact of neoliberal ideologies on educational practices, particularly in A-level psychology education. A-level educators operate within a results-oriented culture driven by neoliberal policies, where exam outcomes and standardized assessments hold paramount importance (Banyard, 2010; Jacobson & Bach, 2022; Joseph, 2020). This environment fosters a focus on measurable achievements at the expense of broader educational objectives such as critical thinking development (Ainley & Cannan, 2006; Giroux, 2010). The study highlighted the prevalence of a performativity culture among A-level teachers, characterized by pressure to conform to market-driven values and accountability measures (Anderson & Cohen, 2015; Ball & Junemann, 2012; Garver, 2020; Keddie, 2016; Rose, 1999). In contrast, university-level psychology education tends to prioritize critical thinking as foundational to disciplinary knowledge, reflecting a more nuanced and pedagogically cohesive approach (APA, 2023; BPS, 2019; QAA, 2023).

Furthermore, the study identified distinct pedagogical disparities between A-level and degree-level settings. A-level educators often navigate rigid curriculum guidelines and exam-focused teaching methods, resulting in a passive learning environment characterized by rote memorization and conformity to exam specifications (Baird et al., 2009; Green, 2007; Halonen et al., 2003; Hernandez-Martinez & Williams, 2013). In contrast, university lecturers enjoy greater autonomy in curriculum design and promote student-centered pedagogies that foster critical inquiry and independent learning (Banyard, 2008; BPS, 2019).

The findings also stressed challenges related to preparing students for the transition from A-level to degree-level education. A substantial gap exists between secondary and tertiary education expectations, with A-level education prioritizing exam success over equipping students with essential academic skills and critical thinking abilities necessary for

university-level studies (Evens et al., 2013; Lai, 2011; Van der Zanden et al., 2020). This discrepancy highlights systemic challenges in educational preparation and the need for pedagogical interventions that bridge the gap between educational levels (Bostock & Wood, 2014; Hughes et al., 2017; Hulme & De Wilde, 2014).

In conclusion, the study provides valuable insights into the institutional and pedagogical factors shaping critical thinking instruction in psychology education. Addressing the identified barriers and disparities is essential for fostering a more cohesive and progressive educational landscape that prioritizes the development of critical thinking skills necessary for navigating complex societal challenges. Building on the initial phase's findings, which highlighted perceived deficits in critical thinking among incoming university students, the second phase of this multiphase study sought to empirically examine how prior psychology education influences the development of these skills.

8.2.2 *Phase 2 Findings*

The study aimed to investigate how students' psychological critical thinking skills, motivation to think critically, and perceptions of critical thinking instruction evolved across different educational levels. A causal-comparative design was utilized, comparing psychology students from six educational stages (year 12, year 13, first, second, and third-year undergraduate, and postgraduate). The participant sample included 310 A-level and university psychology students. However, due to the limited number of participants, data from third-year undergraduates and postgraduate students were excluded from the analysis. Participants completed the R-PCTE (Lawson et al., 2015), CTMS (Valenzuela et al., 2011), and the Course Evaluation Form: Students' Perceptions of Critical Thinking in Instruction (Foundation for Critical Thinking Press, 2007). Data was analyzed using a series of MANOVAs.

This cross-sectional study, motivated by concerns about students' readiness for university-level psychology education (Hulme & De Wilde, 2014; Van der Zanden et al., 2020), aimed to investigate the evolution of psychological critical thinking ability among

psychology students from pre-university to postgraduate levels. It identified gaps in understanding how pre-university education impacts critical thinking development in higher education (Evens et al., 2013; Lai, 2011; Marin & Halpern, 2011). Findings indicated no significant differences in psychological critical thinking skills across educational levels, challenging assumptions about linear improvement in critical thinking as students' progress (Arum & Roksa, 2011; Huber & Kuncel, 2016; Lane & Oswald, 2016). However, significant differences were observed in task value and expectancy, with pre-university students exhibiting higher motivation for critical thinking tasks compared to first-year undergraduates. This discrepancy could be attributed to the emphasis on critical evaluation in pre-tertiary education (BPS, 2013), which may lead to 'pseudo-critical thinking,' where the appearance of critical engagement is prioritized over genuine inquiry. This culture of assessment may influence students' perceptions of critical thinking instruction in higher education (Halx & Reybold, 2005; Reybold, 2003).

The study found that possessing A-level Psychology qualifications or achieving specific grades does not affect critical thinking outcomes among university students. This result suggests that A-level performance may not be a reliable predictor of university-level critical thinking capabilities in psychology (Banister, 2003; Betts et al., 2008). Although A-level psychology often serves as an entry point for students pursuing psychology at the university level (BPS, 2013; Green, 2007), the data indicated that A-level psychology education and grades have a limited direct influence on critical thinking-related outcomes at the university level. This points to broader issues in effectively preparing students for the critical thinking demands of higher education through A-level education. Therefore, the study emphasizes the need for improved secondary education and targeted university-level interventions to develop authentic critical thinking skills among psychology students. It advocates for ongoing efforts to address the educational gap between pre-university and university studies and to implement effective strategies for fostering critical thinking abilities crucial for academic achievement.

8.2.3 *Phase 3 Findings*

The intervention was developed using the findings from Study Phase 1 (Chapter 4, pp. 72- 115) and Phase 2 (Chapter 5, pp. 116 - 149) to inform its design and implementation. The study aimed to assess the impact of this intervention on A-level psychology students' psychological critical thinking skills, motivation to think critically, and perceptions of the amount of critical thinking instruction received. The intervention utilized a quasi-experimental pretest-posttest design with a non-equivalent control group. The participant sample included 73 year 13 A-level psychology students from six different schools. Three schools were randomly assigned to the control condition (n = 29), and four schools were randomly assigned to the experimental condition (n = 44). Prior to the intervention, both conditions completed the R-PCTE (Lawson et al., 2015), CTMS (Valenzuela et al., 2011), and the Course Evaluation Form: Students Perceptions of Critical Thinking in Instruction (Foundation for Critical Thinking Press, 2007). After a period of 10 weeks, both conditions completed the measures again to assess the intervention's impact. The data was analyzed using a two-way mixed design MANOVA.

The results indicated an overall improvement in psychological critical thinking skills from pretest to posttest across both the control and experimental conditions. However, there was no significant difference in improvement between these conditions, suggesting that observed enhancements might be influenced by natural maturation processes rather than the intervention alone. Additionally, perceptions of critical thinking instruction, task value, and expectancy did not change significantly over time across conditions.

Although the study did not reveal condition-specific effects, it introduces a new methodology for designing and assessing a critical thinking intervention tailored for pre-tertiary psychology students. This approach addresses the need for targeted interventions in secondary education to build foundational skills crucial for success in higher education (Evens et al., 2013; Lai, 2011; Van der Zanden et al., 2020). The focus on critical thinking preparedness during the transition from A-levels to degree-level studies highlights the

importance of such interventions, as indicated by concerns regarding this transitional period (Hulme & De Wilde, 2014; Tate & Swords, 2013; Van der Zanden et al., 2020).

The findings emphasize the complexity of critical thinking development and challenge simplistic interpretations of intervention efficacy, suggesting a need for multifaceted strategies that consider both instructional practices and students' developmental trajectories (Lai, 2011; Van der Zanden et al., 2020). The study also highlights opportunities for enhanced collaboration between secondary schools and universities to bridge curricular gaps and optimize students' preparedness for higher education (Kitching & Hulme, 2013; Lai, 2011; Tate & Swords, 2013; Van der Zanden et al., 2020).

In conclusion, this research advances educational understanding by proposing and evaluating a tailored critical thinking intervention for pre-tertiary psychology students. It contributes to ongoing discussions on critical thinking development and emphasizes the importance of domain-specific interventions to address skill gaps in transitioning from secondary to tertiary education in psychology (BPS, 2013; Hulme & De Wilde, 2014).

8.2.4 *Phase 4 Findings*

This study aimed to qualitatively evaluate the effectiveness of the domain-specific, school-based critical thinking intervention discussed in Study Phase 3 (Chapter 6, pp. 150 - 177), employing a qualitative research approach with semi-structured interviews. The participant sample consisted of four A-level teachers and four students from the experimental condition schools described in Chapter 6, with interviews conducted after students had transitioned to study psychology at university. Data was analyzed using reflexive thematic analysis (Braun & Clarke, 2012, 2019, 2022).

The findings shed light on the prevailing results-oriented educational culture within A-level Psychology education. Participants emphasized a pronounced emphasis on quantifiable outcomes and tangible achievements, often at the expense of nurturing critical thinking abilities (Backes-Gellner & Veen, 2008; Jacobson & Bach, 2022; Joseph, 2020;

Smith & Jeffery, 2013). This culture is perpetuated by a systematic prioritization of exam performance as the primary metric of intervention effectiveness, reflecting broader educational trends influenced by neoliberal policies that prioritize measurable results and standardized testing (Ball, 2001, 2003; Torrance, 2017).

The study revealed a tension between traditional evaluation methods focused on exam outcomes and the imperative to foster deeper cognitive skills among students. Participants expressed concerns about the cycle of memorization and test-taking tactics that dominate educational practices, highlighting a need for a paradigm shift towards holistic intellectual growth (Hextall & Mahony, 2013; Sharma & Portelli, 2014).

Commitment to the educational intervention varied among educators and students, influenced by the perceived relevance of the intervention to exam preparation (Anderson & Cohen, 2015; Ball, 2009; Banyard, 2010). Time constraints driven by imminent exams further limited flexibility for alternative approaches to learning, posing challenges to the implementation of the intervention.

A central theme developed around the perceived inadequacy of current educational practices in fostering genuine critical thinking. Participants noted a disparity between the theoretical concept of critical thinking and its practical application within A-level psychology curricula. The prevalence of rote memorization and pseudo-critical thinking practices within exam-focused learning environments underlines the need for comprehensive educational reforms that prioritize the development of authentic critical thinking abilities (BPS, 2013; Green, 2007; Jarvis, 2011; Kitching & Hulme, 2013).

Despite challenges, the intervention aimed at enhancing critical thinking skills was positively received by participants. It was perceived to complement the A-level curriculum by providing structured frameworks for critical thinking development (Alnaji, 2022; Behar-Horenstein & Niu, 2011; Dima et al., 2020; Huber & Kuncel, 2016; Lai, 2011; Zandvakili et al., 2019). Increased student confidence and improved engagement were notable outcomes,

suggesting the intervention's potential efficacy in fostering meaningful learning experiences within the existing educational framework (Liu & Pásztor, 2022; Lanz et al., 2022). However, implementation challenges were evident, particularly related to accessibility issues, terminology barriers, and the repetitive nature of the intervention (Kowalczyk, 2011; Loes et al., 2015; Niu et al., 2013). Participants offered valuable insights for improvement, advocating for conducting the intervention earlier in students' academic journey, increasing intervention duration, and providing more scaffolding and examples to support critical thinking skill development.

In conclusion, this study contributes to the discourse on educational reform by highlighting the complexities of nurturing critical thinking skills within exam-oriented educational systems. The findings emphasize the necessity of reevaluating pedagogical strategies and assessment methods to create space for meaningful learning experiences that extend beyond standardized testing requirements, ultimately fostering the development of authentic critical thinking abilities among students. Future educational initiatives should heed the recommendations put forth by participants to optimize the efficacy and sustainability of interventions aimed at cultivating critical thinking skills within the A-level Psychology curriculum.

8.3 Synthesis of Cross-Phase Insights

The multiphase sequential mixed method design (Creswell, 2012; Teddlie & Tashakkori, 2009) of this study provided a comprehensive exploration of the factors influencing critical thinking instruction and development in pre-tertiary psychology education. Across the four interconnected phases, several key insights emerged, shedding light on the challenges and opportunities for enhancing critical thinking skills among pre-tertiary psychology students.

8.3.1 *Institutional and Pedagogical Context (Phase 1 and Phase 4)*

The exploration of A-level psychology education reveals entrenched institutional and pedagogical barriers shaped by a pervasive results-oriented culture, heavily influenced by

neoliberal policies. A-level educators operate within a framework where exam outcomes and standardized assessments reign supreme (Banyard, 2010; Jacobson & Bach, 2022; Joseph, 2020). This emphasis on measurable achievements often overshadows broader educational objectives, such as the cultivation of critical thinking skills (Ainley & Cannan, 2006; Giroux, 2010).

Central to these findings is the concept of performativity culture among A-level educators, characterized by pressures to conform to market-driven values and stringent accountability measures (Anderson & Cohen, 2015; Ball & Junemann, 2012; Garver, 2020; Keddie, 2016; Rose, 1999). This culture not only shapes teaching practices but also influences the educational environment, prioritizing quantifiable outcomes at the expense of fostering deeper cognitive abilities essential for genuine critical thinking (Backes-Gellner & Veen, 2008; Smith & Jeffery, 2013; Jacobson & Bach, 2022; Joseph, 2020). Moreover, the perpetuation of this paradigm reflects broader societal trends where educational success is narrowly defined by performance metrics and standardized testing (Ball, 2001, 2003; Torrance, 2017). The pressure to achieve high exam scores as the primary indicator of educational effectiveness highlights a systemic challenge within A-level psychology education.

Participants in the study voiced concerns about the prevalent cycle of rote memorization and exam-focused teaching methods dominating educational practices. This approach not only limits students' intellectual growth but also undermines the development of skills necessary for critical engagement with psychological concepts (Hextall & Mahony, 2013; Sharma & Portelli, 2014). Furthermore, the commitment to the intervention varied significantly among educators and students, often influenced by perceptions of how directly the intervention contributed to exam preparation (Anderson & Cohen, 2015; Ball, 2009; Banyard, 2010). This variability highlights the tension between meeting immediate academic demands and fostering a learning environment conducive to holistic intellectual development.

In summary, the findings from Study Phase 1 and Phase 4 highlight the urgent need for a paradigm shift in A-level psychology education. This shift should move away from a narrow focus on exam outcomes and towards a pedagogical approach that fosters authentic critical thinking and intellectual curiosity. Addressing these challenges involves reevaluating institutional priorities and adopting educational practices that emphasize deep learning and meaningful engagement with psychological concepts.

8.3.2 *Critical Thinking Development and Transition (Phase 2 and Phase 3)*

The subsequent phases of the study focused on examining critical thinking development among pre-tertiary psychology students and assessing the effectiveness of interventions aimed at bridging the gap between A-level and degree-level education. Contrary to assumptions of linear improvement in critical thinking skills across educational stages, the findings revealed no significant differences in psychological critical thinking skills (Arum & Roksa, 2011; Huber & Kuncel, 2016; Lane & Oswald, 2016). This challenges simplistic views and emphasizes the complexity of critical thinking development.

The pervasive culture of assessment in educational settings may influence students' perceptions of critical thinking instruction in higher education, potentially shaping their approach to learning and intellectual inquiry (Halx & Reybold, 2005; Reybold, 2003). This highlights how institutional practices can impact students' readiness for higher cognitive engagement.

Research consistently emphasizes the foundational role of secondary education in preparing students for success in higher education, particularly in terms of critical thinking readiness (Evens et al., 2013; Lai, 2011; Van der Zanden et al., 2020). Concerns over the transition from A-level to degree-level education emphasize the importance of targeted interventions, such as those explored in this study, to enhance critical thinking skills and prepare students effectively (Hulme & De Wilde, 2014; Tate & Swords, 2013; Van der Zanden et al., 2020).

Moreover, the findings highlight the multifaceted nature of critical thinking development and challenge simplistic interpretations of intervention efficacy. Effective strategies must consider diverse instructional practices and account for the varied developmental trajectories of students (Lai, 2011; Van der Zanden et al., 2020). This nuanced approach is essential for fostering genuine critical thinking abilities among pre-tertiary psychology students, moving beyond mere knowledge acquisition to deeper intellectual engagement and analytical thinking.

In conclusion, addressing the complexities of critical thinking development requires a holistic approach that integrates effective instructional methods with an understanding of students' evolving cognitive capabilities. It could be argued that such efforts are crucial for preparing students not only for academic success but also for lifelong learning and professional growth in psychology and related fields.

8.3.3 *Implications and Recommendations*

The synthesis of findings emphasizes the necessity of reevaluating pedagogical strategies and assessment methods within pre-tertiary psychology education to foster authentic critical thinking abilities. Educational initiatives should prioritize the development of domain-specific interventions that complement existing curricula and provide structured frameworks for critical thinking skill development. Enhanced collaboration between secondary schools and universities is essential to bridge curricular gaps and optimize students' preparedness for higher education. Moreover, future interventions should address implementation challenges by conducting interventions earlier in students' academic journey, increasing intervention duration, and providing more scaffolding and examples to support critical thinking skill development.

In conclusion, this study advances educational understanding by highlighting the complexities of nurturing critical thinking skills within pre-tertiary psychology education. By addressing institutional, pedagogical, and transitional challenges, educators and policymakers can work towards creating a more cohesive and progressive educational

landscape that prioritizes the development of authentic critical thinking abilities essential for navigating complex societal challenges and facilitating successful transitions to higher education.

8.4 Cross-Phase Original Contributions and Implications

The comprehensive investigation across the four phases of this study yields significant original contributions and implications for the field of psychology education, particularly concerning critical thinking instruction. The initial phase significantly enriches the literature by integrating the rationale and findings, emphasizing the nuanced relationship between institutional culture and critical thinking development among pre-tertiary psychology students. This phase uniquely highlights the impact of institutional contexts on educational practices, offering insights that bridge gaps in existing literature (Halx & Reyold, 2005; Pithers & Soden, 2000; Reybold, 2003). Methodologically, the qualitative interviews with A-level psychology teachers and university lecturers provide a rich exploration of how institutional norms influence critical thinking instruction. These interviews reveal barriers and challenges inherent in psychology education contexts, offering deep insights into the complexities of teaching and learning critical thinking. The theoretical contributions lie in extending discourse on critical thinking by emphasizing how institutional culture shapes educational practices. By aligning critical thinking interventions with existing institutional norms, the study advances theoretical perspectives and offers practical implications for educators and policymakers (Alnaji, 2022; Caroti et al., 2022). This approach ensures that interventions are not only effective but also sustainable within educational frameworks, thereby enhancing the relevance and applicability of the findings (Ali et al., 2015; Chen et al., 2023).

Additionally, the findings demonstrate the impact of neoliberal policies on psychology education, emphasizing market-oriented pressures and their influence on pedagogical priorities (Backes-Gellner & Veen, 2008; Jacobson & Bach, 2022). By examining pedagogical differences between A-level and university educators, the study highlights

disparities in teaching approaches and student-educator relationships. These differences contribute to a nuanced understanding of educational practices across different levels, highlighting the need for policies and pedagogical reforms that prioritize teacher autonomy and support the development of critical thinking skills across educational levels. The study's practical implications for enhancing teaching and learning practices in psychology education are significant, advocating for interventions and policies that foster a supportive environment for critical thinking instruction.

Building on these insights, the second phase offers a nuanced examination of the developmental dynamics of psychological critical thinking across educational stages, addressing gaps in understanding how these skills evolve from secondary to university education (Evans, 2020; Lai, 2011). By integrating cognitive skills, motivational factors, and instructional perceptions, this phase provides a holistic view of critical thinking development, challenging conventional assumptions and highlighting the complexity of influencing factors (Arum & Roksa, 2011; Huber & Kuncel, 2016). Despite not observing significant differences in psychological critical thinking skills across educational stages, the research contextualizes these results within broader debates on critical thinking trajectories in higher education. This critical examination highlights the need for targeted interventions to support students' cognitive growth, emphasizing the importance of understanding and addressing the factors that influence critical thinking readiness.

Moreover, the study reveals significant differences in students' motivation for critical thinking, particularly in task value and expectancy, across educational levels. These findings challenge prevailing assumptions about motivation related to critical thinking tasks and emphasize the influence of assessment emphasis within pre-tertiary education (BPS, 2013; Qfqual, 2014). Additionally, the research explores students' perceptions of critical thinking instruction, revealing consistent perceptions across educational levels despite the emphasized importance of explicit critical thinking instruction within accreditation guidelines (e.g., APA, 2023; BPS, 2019; QAA, 2023). This finding emphasizes the enduring influence of

prior educational experiences and institutional culture on students' interpretations of critical thinking within higher education contexts (Apple, 1992).

Addressing these gaps, the third phase implements a domain-specific intervention within the A-level psychology curriculum, designed to enhance psychological critical thinking abilities. This phase's innovative approach integrates critical thinking instruction within the curriculum, moving away from traditional exam-centric practices (Hulme & De Wilde, 2014). The intervention was strategically designed to enhance psychological critical thinking abilities among A-level psychology students, aligning with the identified challenges and gaps in pre-tertiary psychology education highlighted by prior research. By embedding critical thinking instruction within the established curriculum framework, the intervention aligns with broader educational objectives while specifically addressing challenges observed at the pre-tertiary level.

Leveraging insights from motivational research, the study acknowledges significant variations in task value and expectancy related to critical thinking tasks across educational levels. By strategically aligning critical thinking tasks with the A-level psychology curriculum, the intervention aimed to enhance student engagement and motivation towards critical thinking activities, ultimately fostering deeper understanding and application of critical thinking skills within the specific subject domain. The empirical assessment of the intervention's impact highlights the complex interplay between instructional practices and students' developmental trajectories, calling for comprehensive strategies in promoting critical thinking (Kitching & Hulme, 2013). This phase significantly advances educational scholarship by proposing tailored interventions that foster collaboration and curriculum alignment between secondary schools and universities.

Finally, the fourth phase contributes to the literature by innovatively combining qualitative insights with quantitative assessments to evaluate instructional critical thinking interventions, addressing a critical methodological gap (Niu et al., 2013; Tsui, 2002). This phase utilized semi-structured interviews to gather in-depth contextual evidence and extends

the evaluation to examine long-term effects, thus offering a comprehensive view of intervention effectiveness (Abrami et al., 2015; Bilad et al., 2022). This approach responds to the need for more nuanced evaluation methods that capture the complexity of intervention outcomes beyond mere numerical data (Behar-Horenstein & Niu, 2011).

Moreover, the study extends beyond immediate post-intervention assessments to investigate the lasting impact of the instructional critical thinking intervention. This longitudinal perspective addresses another significant gap in the literature by exploring sustained cognitive development over time, which is often overlooked in short-term-focused studies. Through rigorous follow-up studies and qualitative inquiry, the study aimed to explicate the enduring benefits and real-world applicability of acquired critical thinking skills among A-level psychology students. Additionally, the study critically examined how the prevailing culture of quantifiable outcomes and standardized testing shapes perceptions of intervention success, highlighting the need to cultivate authentic critical thinking abilities beyond short-term improvements in exam performance.

The findings also identify various implementation challenges encountered when integrating interventions aimed at enhancing critical thinking skills. Issues such as accessibility, terminology comprehension, and intervention monotony are explored, emphasizing the importance of tailored and inclusive educational approaches to address diverse learning needs and abilities. By providing actionable recommendations for reforms in assessment practices, curriculum integration, and intervention design, this study contributes to ongoing discussions on enhancing educational practices to better equip students for academic and professional challenges. Ultimately, this final phase advocates for a paradigm shift towards holistic educational approaches that prioritize genuine critical analysis and problem-solving skills, paving the way for transformative changes in educational practices and policies.

Collectively, these phases provide a multi-faceted understanding of critical thinking instruction within psychology education. They emphasize the importance of institutional

culture, developmental dynamics, tailored interventions, and holistic evaluation strategies. The study advocates for educational reforms that support teacher autonomy, align interventions with existing curricula, and prioritize long-term cognitive development. These contributions are poised to influence pedagogical practices, policy discussions, and future research, ultimately enhancing the quality of psychology education and better preparing students for academic and professional challenges. By integrating diverse methodologies, theoretical perspectives, and practical recommendations, this study offers a comprehensive framework for improving critical thinking instruction in psychology education.

8.5 Cross-Phase Reflections and Limitations

Across the multiphase sequential mixed-method design employed in this thesis, several overarching limitations emerged, underscoring the complexities and intricacies of investigating domain-specific critical thinking instruction for pre-tertiary psychology students.

A pervasive issue throughout the study was participant sampling. In Study Phase 1, geographical constraints, a restricted sample size, and a lack of diversity limited the generalizability of the findings. The insights gathered from this narrow group may not reflect the broader educational context or the diverse perspectives of other educators. This issue resurfaced in Study Phase 4, where the study's exclusive focus on female students further narrowed the demographic scope, potentially skewing the results. These sampling limitations highlight the critical need for future research to incorporate a broader and more diverse participant pool, ensuring that findings are more representative and applicable across various educational settings and demographic groups.

Methodological challenges were another significant concern, particularly in relation to the assessment tools used and the design of the study. In Study Phase 2, the evaluation of critical thinking skills and motivation using tools like the R-PCTE (Lawson et al., 2015) and CTMS (Valenzuela et al., 2011) revealed substantial limitations. These instruments faced criticism regarding their scope and ability to accurately capture the multifaceted nature of

critical thinking. This calls for the ongoing refinement and validation of assessment tools to ensure they comprehensively and accurately measure the targeted cognitive domains.

In Study Phase 3, the quasi-experimental design encountered issues with statistical power and internal validity due to sample size constraints and school-level variability. These methodological hurdles emphasize the importance of employing more robust experimental designs and innovative methodological approaches. Such strategies would help mitigate these challenges, enhance the reliability of findings, and allow for more definitive conclusions about the effectiveness of instructional interventions.

Researcher bias and participant homogeneity presented additional concerns, particularly in Study Phase 4. The researcher's involvement in the intervention design and interpretation may have introduced biases that influenced data analysis and outcomes. This potential bias is a significant limitation, as it could affect the objectivity of the findings. Furthermore, the homogeneity of participants, focusing solely on female students, limits the generalizability of the results to a broader demographic. To address these issues, future studies should incorporate strategies to minimize bias, such as employing independent evaluators or blinding techniques, and strive for a diverse participant pool to ensure findings are more widely applicable.

The temporal scope of the study also posed a limitation. The reliance on short-term follow-up interviews, especially in Study Phase 4, may not have fully captured the sustained impacts of the intervention. Critical thinking skills and their development over time require longitudinal studies to provide a more comprehensive assessment of the long-term efficacy of educational interventions. Such studies would help determine whether the observed benefits are maintained and how they evolve, offering deeper insights into the enduring impacts of critical thinking instruction.

In summary, the cross-phase limitations identified in this thesis illuminate the inherent challenges of conducting research on educational interventions. Addressing these limitations

involves broadening participant sampling to include more diverse and representative groups, refining assessment tools to better capture the multifaceted nature of critical thinking, adopting more robust and innovative study designs to enhance validity and reliability, minimizing potential biases through objective evaluation methods, and extending the temporal scope to include long-term follow-up assessments. By prioritizing these considerations, future research can build on the findings of this study to develop more effective, generalizable, and enduring critical thinking instructional interventions for pre-tertiary psychology students.

8.6 Cross-Phase Reflections on Future Directions

The synthesis of future directions across the study's phases highlights several key areas for advancing research on critical thinking in psychology education. Each phase provides a unique perspective and set of recommendations, which collectively point towards a comprehensive and multifaceted approach to enhancing critical thinking skills among psychology students.

Firstly, there is a clear emphasis on the need for comparative studies and longitudinal research. Study Phase 1 suggests comparing the perspectives of teachers using different A-level specifications to understand the impact on educators' perceptions and student outcomes in critical thinking. By examining whether certain specifications inherently foster better critical thinking, researchers could identify which educational frameworks are most effective. This idea is echoed in Study Phase 2, which advocates for longitudinal studies that track students from secondary education through to postgraduate levels. Such research would provide valuable insights into the developmental trajectory of critical thinking skills, allowing educators to understand how these abilities evolve and pinpoint the stages where students might need additional support or intervention.

Complementing this, Study Phase 2 highlights the importance of integrating quantitative research with qualitative methods, such as interviews and focus groups. This mixed-methods approach can provide a richer, more nuanced understanding of students'

lived experiences and the contextual factors influencing critical thinking development. For instance, qualitative data might reveal specific classroom dynamics or cultural influences that quantitative data alone could not capture. Future studies should continue to integrate qualitative insights to deepen our comprehension of how critical thinking skills evolve and are applied in various educational contexts, providing a holistic view that combines numerical trends with personal experiences.

Designing and implementing targeted interventions is a recurring theme, particularly in Study Phases 2 and 3. These interventions should be rigorously evaluated using experimental designs to identify best practices for fostering critical thinking at different educational levels. For example, researchers could develop specific programs aimed at enhancing critical thinking among secondary school students and then assess their effectiveness through controlled trials. Study Phase 3 specifically calls for standardized teacher training programs to ensure consistent delivery of instructional content, highlighting the crucial role of educators in shaping students' critical thinking abilities. Standardizing teacher training would help minimize variability in how critical thinking is taught, ensuring that all students receive high-quality instruction regardless of their school.

In addition, Study Phase 4 emphasizes the need for reforming assessment practices within psychology education. Current assessment methods often emphasize rote memorization and exam performance, which do not necessarily promote deep critical thinking. Future research should explore alternative methods that go beyond rote memorization, focusing instead on deeper cognitive skills such as critical analysis and problem-solving. Longitudinal studies could assess the impact of these new assessment paradigms on students' critical thinking development, potentially informing broader educational reforms that prioritize cognitive skills over mere content recall.

Integrating critical thinking across the psychology curriculum is another key direction, as noted in Study Phase 4. This involves embedding critical thinking skills into various aspects of psychology courses to promote holistic intellectual growth. For example, critical

thinking could be integrated into research methods courses, theoretical discussions, and applied psychology topics, ensuring that students consistently engage with and refine their critical thinking abilities throughout their education. Collaborative partnerships with educators, policymakers, and students are essential for tailoring interventions to the specific needs of educational settings, ensuring their sustainability and effectiveness. By involving these key players in the design and implementation of critical thinking initiatives, interventions can be more relevant and impactful.

Moreover, enhancing the generalizability and inclusivity of research findings is imperative, as highlighted in Study Phase 4. Future studies should diversify participant samples to include students and educators from varied demographic backgrounds. This could involve conducting research in different regions, schools with varying levels of resources, and among students from different cultural backgrounds. Exploring gender differences and cultural influences on critical thinking development can provide nuanced insights for designing effective, inclusive interventions. Such research would help ensure that critical thinking education is equitable and effective for all students, regardless of their background.

Addressing methodological considerations is crucial for enhancing the reliability and validity of research findings. Study Phase 3 emphasizes the importance of larger, controlled samples, randomization, and longitudinal designs to control for maturation effects and other biases. For instance, by using randomized controlled trials, researchers can more accurately determine the effects of specific interventions on critical thinking development. Additionally, expanding assessments to include a broader range of critical thinking dimensions, such as metacognitive strategies and problem-solving abilities, will provide a comprehensive understanding of intervention impacts. These broader assessments would capture a fuller picture of how students' critical thinking skills develop and interact with their overall cognitive abilities.

Exploring these future research directions will significantly advance our understanding of critical thinking development among psychology students. By integrating comparative studies, mixed-methods approaches, targeted interventions, and inclusive research designs, educators and researchers can develop effective strategies for fostering critical thinking skills. These efforts are crucial for preparing students to navigate the complex challenges of higher education and their professional careers. Ultimately, this comprehensive approach will contribute to a more robust and adaptable psychology education system, ensuring that students are well-equipped with the critical thinking skills necessary for success in an increasingly complex world.

8.7 Contextualizing Findings in Evolving Discourses

Recent developments in psychology education, student transitions, and critical thinking highlight key shifts in theoretical and pedagogical understandings that significantly contextualize the findings of this study. These evolving discourses challenge traditional deficit-based models and call for a reconceptualization of how critical thinking and transitions are fostered in educational settings. By engaging critically with these debates, this section evaluates the implications of these shifts for the study's findings and identifies areas where existing educational frameworks may require further interrogation.

8.7.1 *The Evolution of Thinking in Student Transitions*

The traditional deficit-based perspective on student transitions, which views students—especially those from non-traditional backgrounds—as lacking the necessary skills and preparedness for higher education, has been increasingly problematized (Winstone & Hulme, 2019). The recognition of transition as an ongoing, non-linear process (Gravett, 2021) challenges deterministic models and underscores the inadequacies of policies that assume students must simply 'adjust' to university life. Instead, contemporary research frames transition as a process of "becoming" (Gravett, 2021), emphasizing the active role of students in shaping their academic identities.

This evolving perspective raises critical questions about the extent to which existing institutional structures support student agency. Findings from this study indicate that the rigid, exam-driven culture in pre-tertiary psychology education may inhibit students' ability to engage in deep learning, thereby complicating their transition to higher education. The shift away from deficit models suggests that institutions should prioritize participatory approaches that allow students to shape their learning environments (Gravett et al., 2020; Winstone & Hulme, 2019). However, while recognizing student agency is essential, the question remains whether institutional changes are sufficient to dismantle entrenched educational hierarchies that privilege particular forms of knowledge and learning.

Moreover, research highlighting the intersectionality of student transitions—where factors such as race, socio-economic background, and prior educational experiences intersect (Gravett, 2021; Winstone & Hulme, 2019)—points to the limitations of universal transition models. The findings from this study suggest that transition challenges are not uniform, yet educational policies often fail to account for these differences. A more critical lens is required to examine how institutional frameworks perpetuate inequalities by offering standardized transition support rather than addressing the specific needs of diverse student populations.

8.7.2 *Critical Thinking in Psychology: A Complex and Contested Construct*

Critical thinking remains a contested concept in psychology education, with ongoing debates surrounding its generalizability across disciplines versus its specificity within psychology (Murdoch, 2016; Newell et al., 2020). While some argue for a domain-general approach—suggesting that critical thinking skills are transferable across subjects (Liu & Pásztor, 2022)—others contend that psychological critical thinking is distinct, requiring engagement with discipline-specific methodologies and theoretical frameworks (Murdoch, 2016; Roberts et al., 2015).

This debate has significant implications for the current findings, which revealed no significant differences in psychological critical thinking skills across educational transitions. A

possible explanation is that existing educational interventions fail to integrate both general and domain-specific elements of critical thinking effectively. If psychological critical thinking is indeed distinct, then broad instructional strategies that emphasize generic critical thinking skills may be insufficient. Conversely, if critical thinking is domain-general, then the persistence of deficits across educational transitions signals a broader failure of pedagogical approaches to embed critical thinking effectively within curricula.

Furthermore, the relationship between psychological literacy and psychological critical thinking warrants deeper scrutiny. While psychological literacy aims to bridge generalist and specialist thinking (Murdoch, 2016; Newell et al., 2020, 2021), its effectiveness as a pedagogical framework remains debatable. Current models of psychological literacy advocate for real-world application and metacognitive engagement (Pownall et al., 2023), yet the findings of this study suggest that many pre-tertiary students struggle with applying critical thinking beyond assessment-driven contexts. This raises a critical question: does the current conceptualization of psychological literacy adequately prepare students for higher-order cognitive engagement, or does it risk becoming another educational buzzword that fails to translate into meaningful learning practices?

8.7.3 *Future Proofing Research: Challenges and Opportunities*

The evolving discourses in psychology education, student transitions, and critical thinking highlight the need to ‘future-proof’ research by ensuring its relevance within shifting theoretical and pedagogical landscapes. While this study contributes valuable insights into pre-tertiary psychology education, it also highlights areas where prevailing assumptions may require reevaluation. For example, the dominance of performativity culture in A-level education remains a formidable barrier to fostering authentic critical thinking (Ball, 2003; Torrance, 2017), raising doubts about whether incremental pedagogical reforms are sufficient or if more radical restructuring of assessment practices is necessary.

Moreover, recent scholarship urges educational institutions to move beyond viewing students as passive recipients of knowledge towards fostering co-constructive learning

environments (Gravett et al., 2020). However, institutional inertia and resistance to change pose significant challenges. While this study's findings advocate for a shift towards student-centered approaches, the reality remains that educational policies and assessment structures often reinforce hierarchical knowledge transmission rather than encourage critical engagement.

In conclusion, critically examining the evolution of thinking in student transitions, critical thinking, and psychology education exposes tensions between emerging theoretical advancements and the persistence of traditional institutional constraints. While recent research calls for greater student agency, interdisciplinary integration, and contextualized approaches to critical thinking, the practical implementation of these ideas remains uneven. Addressing these challenges requires not only pedagogical innovation but also a willingness to challenge entrenched power dynamics within education. Future research should explore how these tensions can be navigated effectively to foster a more inclusive and intellectually rigorous learning environment.

8.8 Conclusion

This thesis undertook a multifaceted exploration aimed at designing, implementing, and evaluating a domain-specific, school-based critical thinking instructional intervention to enhance the psychological critical thinking ability of pre-tertiary psychology students and facilitate their transition to degree-level psychology education. Through a multiphase sequential mixed method design (Creswell, 2012; Teddlie & Tashakkori, 2009), this research addressed the primary question: How can a school-based domain-specific intervention effectively improve the psychological critical thinking ability of pre-tertiary psychology students and facilitate their transition to degree-level psychology?

The synthesis of findings across the four interconnected phases revealed profound insights into the challenges and opportunities within pre-tertiary psychology education concerning critical thinking instruction and development. The study highlighted the institutional and pedagogical barriers entrenched in A-level psychology education, driven by

a results-oriented culture that prioritizes exam outcomes over broader educational objectives. This culture perpetuates a cycle of rote memorization and exam-focused teaching methods, hindering authentic critical thinking skill development. Additionally, the tension between traditional evaluation methods and the imperative to nurture deeper cognitive skills stresses the inadequacy of current educational practices in fostering genuine critical thinking.

Furthermore, the research emphasized the complexity of critical thinking development and the need for targeted interventions tailored to students' developmental trajectories. While the intervention did not yield significant improvements in psychological critical thinking skills compared to natural maturation processes, it highlighted the necessity of multifaceted strategies integrating instructional practices and motivational factors to cultivate authentic critical thinking abilities.

The implications derived from this study call for a reevaluation of pedagogical strategies and assessment methods within pre-tertiary psychology education. Educational initiatives should prioritize domain-specific interventions that complement existing curricula and provide structured frameworks for critical thinking skill development. Enhanced collaboration between secondary schools and universities is essential to bridge curricular gaps and optimize students' preparedness for higher education.

This thesis contributes to educational understanding by addressing institutional, pedagogical, and transitional challenges inherent in nurturing critical thinking skills within pre-tertiary psychology education. By proposing tailored interventions, challenging traditional pedagogical paradigms, and advocating for comprehensive educational reforms, this research offers a compelling roadmap for enhancing critical thinking instruction and facilitating successful transitions to degree-level psychology education.

Moving forward, future research directions should focus on methodological refinements, longitudinal studies tracking critical thinking development, interdisciplinary

curriculum integration, and stakeholder engagement to advance critical thinking interventions within psychology education and support students' academic and professional success.

In conclusion, this study highlights the transformative potential of targeted interventions and collaborative efforts in enriching psychology education practices at both secondary and tertiary levels, ultimately equipping students with essential analytical and problem-solving skills for academic and professional success in a complex and evolving world.

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Chapter 10: Appendices

Appendix A: Phase 1 – Participant Information Sheet

About the study

The project aims to explore A-level Psychology teacher's and University lecturer's perceptions and attitudes towards critical thinking and critical thinking instruction. Previous research suggests that students may transition to university from A-level with very good grades, but lack the necessary critical thinking skills to fully engage with university level work. As the concept of critical thinking can be both alien and daunting. The proposed study aims to explore this further by utilising semi-structured interviews to allow practitioners to reflect on their work and identify issues that may hinder the teaching and learning of critical thinking skills.

Some questions you may have about the research project:

Why have you asked me to take part and what will I be required to do?

You have been asked to take part as you are either an A-level psychology teacher or a university psychology lecturer and we wish to explore your perceptions of critical thinking. This will involve taking part in a semi-structured interview that will last approximately 45-60 minutes. You will be asked various questions about your perceptions of critical thinking and critical thinking instruction. Additionally, you may bring materials along to the interview to discuss them (i.e. module guides).

What if I do not wish to take part or change my mind during the study?

Your participation in this study is entirely voluntary. You are free to withdraw from the study at any point without providing a reason for doing so. There will be no penalty for withdrawing from the study.

What happens to the research data?

Only the research team will have access to your data (Joseph McCann, Dr Elizabeth Bates and Professor Pete Boyd). The interview data will be kept securely in a password protected file for 5 years. After this period the data will be destroyed. All information will be kept in

accordance with the Data Protection Act (1998) and the British Psychology Society (BPS) guidelines.

How will the research be reported?

The research will be reported as part of a PhD thesis. In addition, the research will also be written up for publication in a peer-reviewed journal and further disseminated at future conferences.

How can I find out more information?

A summary of the findings can be made available to you upon request (via email). Please contact joseph.mccann@uni.cumbria.ac.uk for more information.

What if I want to complain about the research?

Initially you should contact the researcher directly. However, if you are not satisfied or wish to make a more formal complaint you should contact Diane Cox, Director of Research Office, University of Cumbria, Bowerham Road, Lancaster, LA1 3JD. diane.cox@cumbria.ac.uk

Appendix B: Phase 1 – Participant Consent Form

Please answer the following questions by circling your responses:

Have you read and understood the information sheet about this study? YES/ NO

Have you been able to ask questions about this study? YES/ NO

Have you received enough information about this study? YES/ NO

Do you understand that you are free to withdraw from this study at any time, and without having to give a reason for withdrawal? YES/ NO

Your responses will be anonymised before they are analysed.

Do you consent to your interview being audio recorded? YES/ NO

Do you agree to take part in this study? YES/ NO

Your signature will certify that you have voluntarily decided to take part in this research study having read and understood the information in the sheet for participants. It will also certify that you have had adequate opportunity to discuss the study with an investigator and that all questions have been answered to your satisfaction.

Please sign here if you wish to take part in the research and feel you have had enough information about what is involved:

Signature of participant: ..... **Date:** .....

Name (block letters): .....

Please keep your copy of the consent form and the information sheet together.

Joseph McCann

University of Cumbria, Fusehill Street, Carlisle, CA1 2HH

Email: joseph.mccann@uni.cumbria.ac.uk

Appendix C: Phase 1 – Participant Debrief Form

Thank you for taking the time to complete this study. Your responses will be transcribed and will be used as the basis for constructing a pedagogical action research model that aims to better prepare students for the transition from A-level to University.

The project aimed to explore A-level Psychology teacher's and University Psychology lecturer's perceptions and attitudes towards critical thinking and critical thinking instruction. Previous research has suggested that many students leave A-level with good grades, but lack the necessary critical thinking skills to fully engage with work at university level. The proposed project aimed to explore this further by utilizing interviews to allow practitioners to reflect on their work and identify issues that may hinder the teaching and learning of critical thinking skills.

Please be assured that all the data obtained from this study will be anonymous, and will be kept confidential and be used only for academic purposes. Additionally, you have the right to withdraw from the study within four weeks of participation, by contacting us via email. If any of the issues in this study were distressing and you feel you need support, please contact your line manager to discuss an appropriate course of action.

If you have any questions regarding any aspect of this study, please do not hesitate to ask us

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THANK YOU AGAIN FOR YOUR CO-OPERATATION!

Appendix D: Phase 1- Interview Schedule (University Psychology Lecturers)

Thank you for agreeing to participate in this research. The purpose of the today's interview is to explore your views of critical thinking instruction. Specifically, the interview aims to determine the role critical thinking plays on your course and how your course is structured, in terms of teaching and learning. After being fully informed on the nature of the study, are you happy to proceed? If yes, can you verbally consent to agreeing to take part in the study?

Initial biographical information for teachers and lecturers

- Gender:
- Years of experience as a teacher / lecturer of Psychology:
- Estimated proportion of current role that involves *teaching* Psychology:
- Subject discipline of first degree:
- Higher degrees at Masters or Doctoral level:

The Role of the Educator

- As an educator, what role do you play in student learning?
- What are the skills and competencies you expect your new students to be able to demonstrate?
- What role do you play in the enabling of these skills and competencies?
- What do you think is the best approach for empowering students to be independent thinkers?

Critical Thinking (In general)

- In your opinion, what is critical thinking?
- Are there any specific components of critical thinking?
    - For example, skills, disposition (individual characteristics).
- Could you tell me how you came to learn about critical thinking?
- Could you give me an example of where you have used critical thinking?

Critical Thinking (Course Specific)

- How does critical thinking apply to the study of psychology?
- How do you foster critical thinking in your lecturers/ seminars?
- Could you give me one or two examples of tasks/activities you have used to facilitate critical thinking in your students?
- Could you describe the three most important concepts in your subject matter that students must understand to become successful?

Preparedness

- How prepared do you feel students are for the transition to Higher Education?
- Could you describe to me what skills you think a student needs to be successful at A-level?
- What expectation do you feel students have about University?
- What expectation do you feel students have about the student-lecturer relationship?
- How prepared do you feel students are to engage with University level work? Explain

Obstacles

- What if any are the obstacles that prevent you from incorporating critical thinking instruction?
- In your opinion, are there any changes need to be made to facilitate more critical thinking?

Appendix E: Phase 1- Interview Schedule (A-level Psychology Teachers)

Thank you for agreeing to participate in this research. The purpose of the today's interview is to explore your views of critical thinking instruction. Specifically, the interview aims to determine the role critical thinking plays on your course and how your course is structured, in terms of teaching and learning. After being fully informed on the nature of the study, are you happy to proceed? If yes, can you verbally consent to agreeing to take part in the study?

Initial biographical information for teachers and lecturers

- Gender:
- Years of experience as a teacher / lecturer of Psychology:
- Estimated proportion of current role that involves *teaching* Psychology:
- Subject discipline of first degree:
- Higher degrees at Masters or Doctoral level:

The Role of the Educator

- As an educator, what role do you play in student learning?
- What are the skills and competencies you expect your students to be able to demonstrate?
- What role do you play in the enabling of these skills and competencies?
- What do you think is the best approach for empowering students to be independent thinkers?

Critical Thinking (In general)

- In your opinion, what is critical thinking?
- Are there any specific components of critical thinking?
    - For example, skills, dispositions (individual characteristics).
- Could you tell me how you came to learn about critical thinking?
- Could you give me an example where you have used critical thinking?

Critical Thinking (Course Specific)

- How does critical thinking apply to the study of Psychology?
- How do you foster critical thinking in the classroom (generally)?
- Could you give me any examples of task/ activities you have used to facilitate critical thinking in your students?
- What do you think is the best approach for empowering students to be independent thinkers?
- Could you describe the three most important concepts in your subject matter that students must understand to become successful?

Preparedness

- How do you prepare students for their transition to Higher Education?
- Could you give me an example or two of how you prepare students for the transition to Higher Education?
- Could you describe to me what skills you think a student needs to be successful in Higher Education?
- What expectation do you feel students have about University?

Obstacles

- What if any are the obstacles that prevent you from incorporating critical thinking instruction?
- Which of these is the most significant?
- In your opinion, what changes need to be made to facilitate more critical thinking?

Appendix F: Phase 1 – Letter of Ethical Approval

2 December 2016

Our Ref: DC/SB 16/27

Joseph McCann
HPSS
Fusehill Street

University of Cumbria
Research Office
University of Cumbria
Lancaster Campus
Lancaster, LA1 3JD

Tel: 01524 384175
Fax: 01524 384385
Email: sonia.barnes@cumbria.ac.uk

Dear Joseph

Request for Ethical Clearance – Our Ref 16/27
Project: Thematic Analysis of A-level Psychology teacher's and University Psychology Lecturer's perceptions of Critical Thinking Instruction

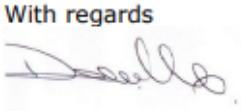
The ethics panel have reviewed your application, and commented that it is well-structured and has the information needed, and has no major issues.

There are some points that they suggest you consider in discussion with your supervisors.

1. Q13: the different interview for A level and University teachers your noted; do you need to make sure the sample has good representation from both groups?
2. suggest that instead of stating that the interview will be terminated if the respondent becomes distressed regarding their ability to answer a question fully, the interviewer could move onto other questions if the interviewee is struggling with any particular question, and only terminate the interview if the respondent requests this. That way the respondent will not feel they have "failed" in any way.
3. Participant Information Sheet: The emphasis on the barriers to critical thinking and it would be good to mention levers or mechanisms that foster critical thinking as well in that first summary paragraph.

However, as there are no ethical issues approval is granted.

With regards



Professor Diane Cox
Chair
Ethics Panel

Appendix G: Phase 2 - Paper Participant Information Sheet

About the study

This research project aims to explore how psychology students' critical thinking skills, motivations and perceptions of critical thinking instruction change as they transition through various levels of education. This study involves completing a number of questionnaires.

Some questions you may have about the research project:

Why have you asked me to take part and what we l be required to do?

You have been asked to take part in this study as you are a psychology student. The study involves completing a number of questionnaires. It is estimated that this will take around 35-45 minutes. It is normal to find the questions quite difficult, as they are measuring your higher order cognitive (thinking) skills.

What if I do not wish to take part or change my mind during the study?

Your participation is entirely voluntary. You are free to withdraw at any point during the study without giving a reason and there is no penalty for doing so. You will also be asked to give a memorable number/word, this will act as a unique identifier and allow you to withdraw from the study up to 4 weeks after participating, by contacting a member of the research team. Contact details for the researchers can be found below.

What will happen to research data?

All information will be kept in accordance with the Data Protection Act 1998 and British Psychology Society (BPS) guidelines. Research data will be kept securely in a locked filling cabinet for a period of 5 years. After this period, the data will be destroyed.

Who will have access to the data?

Only the research team will have access to the research data Joseph McCann (University of Cumbria), Dr Elizabeth Bates (University of Cumbria), Professor Pete Boyd (University of Cumbria) and Dr Linda Kaye (Edge Hill University).

How will the research be reported?

The research will be reported as part of a PhD thesis. In addition, the research will also be written up for publication in a peer-reviewed journal and further disseminated at future conferences.

How can I find out more information?

A summary of the findings can be made available to you (via email). Please contact joseph.mccann@uni.cumbria.ac.uk for more information

What if I want to complain about the research?

Initially you should contact the researcher directly. However, if you are not satisfied or wish to make a more formal complaint you should contact Diane Cox, Director of Research Office, University of Cumbria, Bowerham Road, Lancaster, LA1 3JD. diane.cox@cumbria.ac.uk

Who should I contact if I have any further questions?

Please contact the researcher/s directly (details below) at any time even after completion of the study

Joseph McCann	Dr Elizabeth Bates
PhD Student	Senior Lecturer of Psychology (PhD Supervisor)
University of Cumbria	University of Cumbria
Fusehill Street	Fusehill Street
Carlisle	Carlisle
Cumbria	Cumbria
CA1 2HH	CA1 2HH
Joseph.mccann@uni.cumbria.ac.uk	Elizabeth.bates@cumbria.ac.uk

Appendix H: Phase 2 – Paper Participant Consent Form

Please answer the following questions by circling your responses:

Have you read and understood the information sheet about this study? YES/ NO

Have you been given a relevant contact, so you can ask the researcher/s questions about this research? YES/ NO

Have you received enough information about this study? YES/ NO

Do you understand that you are free to withdraw from this study at any time, and without having to give a reason for withdrawal? YES/ NO

Your responses will be anonymised. Do you give permission for members of the research team to analyse your anonymous responses? YES/NO

Do you agree to take part in this study? YES/ NO

Your signature will certify that you have voluntarily decided to take part in this research study having read and understood the information in the sheet for participants. It will also certify that you have had adequate opportunity to discuss the study with an investigator and that all questions have been answered to your satisfaction.

Please sign here if you wish to take part in the research and feel you have had enough information about what is involved:

Signature of participant: ..... Date: .....

Name (block letters): .....

Memorable Word/ Number :……

Appendix I: Phase 2 - Participant Debrief Form

Thank you for taking the time and effort to complete this study! This research would not be successful without your assistance. The current study aimed to investigate how psychology students' critical thinking skills, motivations and perceptions towards critical thinking instruction change as they transition from A-level through to university. Your responses will be analysed and compared against other psychology students who have also completed this study.

We intend to use your responses as a basis for constructing an intervention which aims to better prepare psychology students for the transition from A-level into University in terms of critical thinking skills. A summary of the findings can be made available to you (via email). Please contact joseph.mccann@uni.cumbria.ac.uk for more information

Please be assured that all the data obtained from this study will be anonymous, and will be kept confidential and only used for academic purposes. Additionally, you have the right to withdraw from the study within 4 weeks of participating, by contacting a member of the research team with your memorable number. If you have found any part of this study distressing and you feel you need support, please contact your personal tutor/supervisor to discuss an appropriate course of action.

If you have any questions regarding any aspect of this study, please do not hesitate to ask us.

Joseph McCann
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THANK YOU AGAIN FOR YOUR CO-OPERATION!

Appendix J: Phase 2 – Online Participant Information Sheet

About the study

This research project aims to explore how psychology students' critical thinking skills, motivations and perceptions of critical thinking instruction change as they transition through various levels of education. This study involves completing a number of questionnaires.

Some questions you may have about the research project:

Why have you asked me to take part and what we l be required to do?

You have been asked to take part in this study as you are a psychology student. The study involves completing a number of questionnaires. It is estimated that this will take around 35-45 minutes. It is normal to find the questions quite difficult, as they are measuring your higher order cognitive (thinking) skills.

What if I do not wish to take part or change my mind during the study?

Your participation is entirely voluntary. You are free to withdraw at any point during the study without giving a reason for doing so, there will be a quit button on each page which terminates the study and will trigger the debriefing page. You will also be asked to give a memorable number/word, this will act as a unique identifier and allow you to withdraw from the study up to 4 weeks after participating, by contacting a member of the research team. Contact details for the researchers can be found below

What will happen to research data?

All information will be kept in accordance with the Data Protection Act 1998 and British Psychology Society (BPS) guidelines. Online research data will be kept securely in a password-protected file for 5 years. After this period, the data will be destroyed.

Who will have access to the data?

Only the research team will have access to the research data Joseph McCann (University of Cumbria), Dr Elizabeth Bates (University of Cumbria), Professor Pete Boyd (University of Cumbria) and Dr Linda Kaye (Edge Hill University).

How will the research be reported?

The research will be reported as part of a PhD thesis. In addition, the research will also be written up for publication in a peer-reviewed journal and further disseminated at future conferences.

How can I find out more information?

A summary of the findings can be made available to you (via email). Please contact joseph.mccann@uni.cumbria.ac.uk for more information.

What if I want to complain about the research?

Initially you should contact the researcher directly. However, if you are not satisfied or wish to make a more formal complaint you should contact Diane Cox, Director of Research Office, University of Cumbria, Bowerham Road, Lancaster, LA1 3JD. diane.cox@cumbria.ac.uk

Who should I contact if I have any further questions?

Please contact the researcher/s directly (details below) at any time even after completion of the study

Joseph McCann	Dr Elizabeth Bates
PhD Student	Senior Lecturer of Psychology (PhD Supervisor)
University of Cumbria	University of Cumbria
Fusehill Street	Fusehill Street
Carlisle	Carlisle
Cumbria	Cumbria
CA1 2HH	CA1 2HH
Joseph.mccann@uni.cumbria.ac.uk	Elizabeth.bates@cumbria.ac.uk

Appendix K: Phase 2 – Online Participant Consent Form

Please answer the following questions by selecting your responses:

Have you read and understood the information sheet about this study? YES/ NO

Have you been given a relevant contact, so you can ask the researcher/s questions about this research? YES/ NO

Have you received enough information about this study? YES/ NO

Do you understand that you are free to withdraw from this study at any time, and without having to give a reason for withdrawal? YES/ NO

Your responses will be anonymised. Do you give permission for members of the research team to analyse your anonymous responses? YES/NO

Do you agree to take part in this study? YES/ NO

Answering “Yes” to all the above questions will certify that you have voluntarily decided to take part in this research study having read and understood the information in the sheet for participants. It will also certify that you have had adequate opportunity to discuss the study with an investigator and that all questions have been answered to your satisfaction.

Memorable Word/ Number :……

Appendix L: Critical Thinking Motivation Scale (Valenzuela et al., 2011)

The Critical Thinking Motivation Scale (CTMS)

Please rate, on a scale of 1 to 6, your overall assessment of the statements provided below, with **1** indicating **strong disagreement** with the statement and **6** indicating **strong agreement**.

	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
Concerning reasoning correctly, I am better than most of my peers.	1	2	3	4	5	6
I feel capable of understanding everything related to thinking in a rigorous way.	1	2	3	4	5	6
I am able to learn how to think in a rigorous way.	1	2	3	4	5	6
I am able to learn how to reason correctly better than most of my peers.	1	2	3	4	5	6
For me it is important to learn how to reason correctly.	1	2	3	4	5	6

For me it is important to be good at reasoning.	1	2	3	4	5	6
For me it is important to use my intellectual skills correctly.	1	2	3	4	5	6
For me it is important to be good at solving problems.	1	2	3	4	5	6
Thinking critically will help me to become a good professional.	1	2	3	4	5	6
Thinking critically will be useful in my future.	1	2	3	4	5	6
Thinking critically is useful in my everyday life.	1	2	3	4	5	6
Thinking critically is useful for other subjects and courses.	1	2	3	4	5	6
I like to reason properly before deciding about something.	1	2	3	4	5	6
I like to learn things that will be improve my way of thinking.	1	2	3	4	5	6

I like thinking critically.	1	2	3	4	5	6
I like to reason in a rigorous manner.	1	2	3	4	5	6
If I have a problem that requires me to reason in a critical way, I am disposed to sacrifice the time I would otherwise have devoted to other things.	1	2	3	4	5	6
I am disposed to sacrifice quite a lot of time and effort in order to improve my way of reasoning.	1	2	3	4	5	6
It is worth investing time and efforts to acquire and use critical thinking	1	2	3	4	5	6

Appendix M: Course Evaluation Form: Students Perceptions of Critical Thinking in Instruction (Foundation for Critical Thinking Press, 2007)

COURSE EVALUATION FORM:

Student Perceptions of Critical Thinking in Instruction

Please rate on a scale of 1 to 5 with the extent you perceive your instructor teaches you to do the described activities, with 1 indicating a low score and 5 indicating a high score.

Instructions: Circle appropriate number for each item.

	Low Score			High Score
1) To what extent does the instructor teach so that you must THINK to understand the content, or are you able to get a good grade by simply memorizing without really understanding the content?	1	2	3	4 5
2) To what extent did your instructor explain what critical thinking is (in a way that you could understand)?	1	2	3	4 5
3) To what extent does your instructor teach so as to encourage critical thinking in the learning process?	1	2	3	4 5

4) To what extent does your instructor teach so as to make clear the reason why you are doing what you are doing (the purpose of the assignment, activity, chapter, test, etc…)? 1 2 3 4 5

5) To what extent does your instructor teach so as to make clear the precise question, problem, or issue on the floor at any given time in instruction? 1 2 3 4 5

6) To what extent does your instructor teach so as to help you learn how to find information relevant to answering questions in the subject? 1 2 3 4 5

7) To what extent does your instructor teach so as to help you learn how to understand the key organizing concepts in the subject? 1 2 3 4 5

8) To what extent does your instructor teach so as to help you learn how to identify the most basic assumptions in the subject? 1 2 3 4 5

9) To what extent does your instructor teach so as to help you learn how to make inferences justified by data or information? 1 2 3 4 5

10) To what extent does your instructor teach so as to help you learn how to distinguish assumptions, inferences, and implications? 1 2 3 4 5

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	Low Score			High Score
11) To what extent does your instructor teach so as to help you learn how to think within the point of view of the subject (think historically, think scientifically, think mathematically)?	1	2	3	4 5
12) To what extent does your instructor teach so as to help you learn how to ask questions that experts in the subject routinely ask?	1	2	3	4 5
13) To what extent does your instructor teach so as to enable you to think more clearly?	1	2	3	4 5
14) To what extent does your instructor teach so as to enable you to think more accurately?	1	2	3	4 5
15) To what extent does your instructor teach so as to enable you to think more deeply?	1	2	3	4 5

16) To what extent does your instructor teach so as to enable you to think more logically? 1 2 3 4 5

17) To what extent does your instructor teach so as to enable you to think more fairly? 1 2 3 4 5

18) To what extent does your instructor teach so as to help you learn how to distinguish what you know from what you don't know? 1 2 3 4 5

19) To what extent does your instructor teach so as to help you learn how to think within the point of view of those with whom you disagree? 1 2 3 4 5

20) To what extent does your instructor teach so as to encourage you to think for yourself using intellectual discipline? 1 2 3 4 5

This evaluation can be administered only with the permission of the Foundation for Critical Thinking CCT@criticalthinking.org

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Appendix N: Revised Psychological Critical Thinking Exam (Lawson et al., 2015)

Psychological Critical Thinking Exam

Mount St. Joseph University

For the following examples, state whether or not there is a problem with the person's conclusions and explain the problem (if there is one).

1. A researcher located 100 pairs of identical twins who had been reared apart and reunited them. The twins discovered that they had an extraordinary number of things in common. For example, one set discovered that, among other things, both have a daughter named Cindy, a workshop where they restore old cars, cocker spaniels, and they both crush their beer cans with their left hands. The other pairs of twins also had numerous similarities. The researcher concluded that these stories are evidence that our personalities are influenced by genetics.

2. A group of researchers claim that they have discovered THE cause of aggression. One of their studies showed that individuals with damage to an area of the brain called the amygdala were less aggressive than individuals without such damage. Another study found that surgically destroying a small area of the amygdala in cats caused them to behave less aggressively than normal cats. A third study found that electrically stimulating the amygdala in hamsters caused them to behave more aggressively. The researchers concluded that the cause of aggressive behavior is abnormalities of the amygdala.

3. A researcher tested a new drug designed to decrease depression. She gave it to 100 clinically depressed patients and discovered that their average level of depression, as

measured by a standardized depression inventory, declined after 4 months of taking the drug. She concluded that the drug reduces depression.

4. Sylvia claims she can use her psychic powers to determine what happened to individuals who have been reported missing. She points out that she correctly predicted that several individuals who had been missing for months were dead. A skeptical researcher asks her about several additional people who were recently reported missing, and she predicts that they are also dead. However, the researcher discovers that all of them are still living. The researcher asks Sylvia whether these cases cast doubt on her psychic abilities. Sylvia explains that skeptical researchers' negative vibes often disrupt psychic abilities, and if she had made the predictions without the presence of the researcher she would have been accurate. Thus, she believes the evidence supports her psychic abilities.

5. Years ago, some psychologists observed that the parents of autistic children appeared very aloof and detached from their autistic children than were parents of normal children. These psychologists concluded that parental detachment was the cause of autism.

6. A survey research company hired by the Democratic party contacted a large, representative sample of Americans to examine their beliefs about new legislation designed to reduce crime. They asked the respondents, "Would you agree that this new legislation that will reduce crime and make our streets safer is a good piece of legislation for America?" Close to 92% of the sample answered "yes." The research company concluded that most Americans support the legislation.

7. A developmental psychologist conducted a longitudinal study of moral development using a group of 1,000 boys beginning at age 8 and continuing through age 14. The findings demonstrated that there are identifiable stages of development occurring across the age periods studied. In the publication of the results, the psychologist named the stages and

concluded that they represent the stages of typical moral development for all children, ages 8-14.

8. An animal advocacy group studied the effects of animal ownership on owners' health. They studied a large, representative sample of older adults and obtained their medical records. Their findings showed that adults who had owned pets (i.e., dogs or cats) for a longer period of time had fewer medical problems than did adults who never owned pets or owned them for a shorter time period. They concluded that owning pets decreases the likelihood of developing health problems.

9. In order to test-market their new detergent, a company sent free samples to 300 randomly selected households. A few weeks later, they called them and asked, "Are you amazed at how much cleaner and brighter your clothes are after using our new detergent?" About 90% of the 300 respondents said, "yes." The company concluded that their new detergent cleans and brightens clothes very effectively.

10. Researchers randomly assigned male juvenile offenders to conditions where they watched either violent or nonviolent films. They discovered that those in the violent film group were less likely to go for help when they witnessed a later real-life violent episode than those in the nonviolent film group. On that basis, the researchers concluded that violent films harden all film-goers to real-life aggression.

11. Dr. Jones is testing a new treatment for cancer. He administered the treatment to a large sample of patients and kept track of who lived and who died after receiving the treatment. For each person who lived, he attributed the success to the treatment. For each person who died, he attributed the death to the severity of the person's cancer. He concluded that his treatment was effective.

12. A researcher tested a new weight loss supplement. She gave it to 200 overweight adults and discovered that their average weight, as measured by a precise weight scale, declined after two months of taking the supplement. She concluded that the supplement promotes weight loss.

13. A group of biological researchers concluded that they have found THE cause of alcoholism. They discovered that alcoholics do not have a small cluster of cells, common to nonalcoholics, located near the hypothalamus. They have also demonstrated that destroying this area of the brain in normal rats caused them to develop a preference for alcohol in their water. Moreover, in another study they found that normal humans who had this part of the brain damaged in accidents later became alcoholics.

14. Over the past few years, Jody has had several dreams that apparently predicted actual events. For example, in one dream she saw a car accident, and later that week she saw a van run into the side of a pickup truck. In another dream she saw dark black clouds and lightning, and two days later a loud thunderstorm hit her neighborhood. She believes these events are evidence that she has a psychic ability to predict the future through her dreams.

Appendix O: Phase 2 – SPSS Output

Descriptive Statistics

Level of Study		N	Mean	Std. Deviation
Year 12	PCTE_Total	123	15.4065	7.28218
	POCTI_Total	123	68.9350	10.49257
	CTMS_TaskValue	123	56.9106	14.48912
	CTMS_Expectancy	123	12.2764	3.27509
	Valid N (listwise)	123		
Year 13	PCTE_Total	67	16.9104	6.28064
	POCTI_Total	67	71.7761	8.87595
	CTMS_TaskValue	67	59.7612	14.52802
	CTMS_Expectancy	67	13.4776	3.06178
	Valid N (listwise)	67		
First year undergraduate	PCTE_Total	59	16.1186	7.05663
	POCTI_Total	59	73.3559	13.88594

	CTMS_TaskValue	59	48.9322	16.72172
	CTMS_Expectancy	59	10.7119	3.43938
	Valid N (listwise)	59		
Second year undergraduate	PCTE_Total	32	16.4063	5.85777
	POCTI_Total	32	69.5938	11.38153
	CTMS_TaskValue	32	52.8125	13.70763
	CTMS_Expectancy	32	11.4375	3.27195
	Valid N (listwise)	32		
Third year undergraduate	PCTE_Total	11	22.7273	8.33176
	POCTI_Total	11	73.2727	11.50731
	CTMS_TaskValue	11	51.0000	14.83914
	CTMS_Expectancy	11	10.4545	3.88236
	Valid N (listwise)	11		
Postgraduate (Taught Masters Only)	PCTE_Total	9	14.3333	8.26136
	POCTI_Total	9	73.3333	14.42221

	CTMS_TaskValue	9	57.0000	19.33908
	CTMS_Expectancy	9	10.8889	5.46453
	Valid N (listwise)	9		

```
SPLIT FILE OFF.

USE ALL.

COMPUTE filter_$=(LevelofStudy = 1 | LevelofStudy = 2 | LevelofStudy = 3 | LevelofStudy =
4).

VARIABLE LABELS filter_$ 'LevelofStudy = 1 | LevelofStudy = 2 | LevelofStudy = 3 |
LevelofStudy '+
    '= 4 (FILTER)'.

VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.

FORMATS filter_$ (f1.0).

FILTER BY filter_$.

EXECUTE.

GLM PCTE_Total POCTI_Total CTMS_TaskValue CTMS_Expectancy BY LevelofStudy
  /METHOD=SSTYPE(3)
  /INTERCEPT=INCLUDE
  /POSTHOC=LevelofStudy(TUKEY)
  /PRINT=DESCRIPTIVE ETASQ HOMOGENEITY
```

/CRITERIA=ALPHA(.05)

/DESIGN= LevelofStudy.

General Linear Model

Between-Subjects Factors

		Value Label	N
Level of Study	1	Year 12	123
	2	Year 13	67
	3	First year undergraduate	59
	4	Second year undergraduate	32

Descriptive Statistics

	Level of Study	Mean	Std. Deviation	N
PCTE_Total	Year 12	15.4065	7.28218	123

	Year 13	16.9104	6.28064	67
	First year undergraduate	16.1186	7.05663	59
	Second year undergraduate	16.4063	5.85777	32
	Total	16.0285	6.84778	281
POCTI_Total	Year 12	68.9350	10.49257	123
	Year 13	71.7761	8.87595	67
	First year undergraduate	73.3559	13.88594	59
	Second year undergraduate	69.5938	11.38153	32
	Total	70.6157	11.13946	281
CTMS_TaskValue	Year 12	56.9106	14.48912	123
	Year 13	59.7612	14.52802	67
	First year undergraduate	48.9322	16.72172	59
	Second year undergraduate	52.8125	13.70763	32
	Total	55.4484	15.33221	281
	Year 12	12.2764	3.27509	123

CTMS_Expectancy	Year 13	13.4776	3.06178	67
	First year undergraduate	10.7119	3.43938	59
	Second year undergraduate	11.4375	3.27195	32
	Total	12.1388	3.38251	281

Box's Test of Equality of Covariance Matrices[a]

Box's M	53.930
F	1.737
df1	30
df2	60689.763
Sig.	.007

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.[a]

a. Design: Intercept + LevelofStudy

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.980	3379.733[b]	4.000	274.000	.000
	Wilks' Lambda	.020	3379.733[b]	4.000	274.000	.000
	Hotelling's Trace	49.339	3379.733[b]	4.000	274.000	.000
	Roy's Largest Root	49.339	3379.733[b]	4.000	274.000	.000
LevelofStudy	Pillai's Trace	.154	3.737	12.000	828.000	.000
	Wilks' Lambda	.850	3.835	12.000	725.227	.000
	Hotelling's Trace	.172	3.912	12.000	818.000	.000
	Roy's Largest Root	.140	9.646[c]	4.000	276.000	.000

Multivariate Tests[a]

Effect		Partial Eta Squared
Intercept	Pillai's Trace	.980
	Wilks' Lambda	.980
	Hotelling's Trace	.980
	Roy's Largest Root	.980
LevelofStudy	Pillai's Trace	.051
	Wilks' Lambda	.053
	Hotelling's Trace	.054
	Roy's Largest Root	.123

a. Design: Intercept + LevelofStudy

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
PCTE_Total	1.406	3	277	.241

POCTI_Total	1.893	3	277	.131
CTMS_TaskValue	.745	3	277	.526
CTMS_Expectancy	.804	3	277	.492

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.[a]

a. Design: Intercept + LevelofStudy

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F
Corrected Model	PCTE_Total	104.747[a]	3	34.916	.743
	POCTI_Total	914.125[b]	3	304.708	2.495
	CTMS_TaskValue	4236.703[c]	3	1412.234	6.352
	CTMS_Expectancy	258.292[d]	3	86.097	8.097
Intercept	PCTE_Total	59006.219	1	59006.219	1254.871
	POCTI_Total	1129238.245	1	1129238.245	9246.101

	CTMS_TaskValue	669511.136	1	669511.136	3011.369
	CTMS_Expectancy	32204.734	1	32204.734	3028.801
LevelofStudy	PCTE_Total	104.747	3	34.916	.743
	POCTI_Total	914.125	3	304.708	2.495
	CTMS_TaskValue	4236.703	3	1412.234	6.352
	CTMS_Expectancy	258.292	3	86.097	8.097
Error	PCTE_Total	13025.026	277	47.022	
	POCTI_Total	33830.366	277	122.131	
	CTMS_TaskValue	61584.799	277	222.328	
	CTMS_Expectancy	2945.295	277	10.633	
Total	PCTE_Total	85322.000	281		
	POCTI_Total	1435971.000	281		
	CTMS_TaskValue	929763.000	281		
	CTMS_Expectancy	44609.000	281		
Corrected Total	PCTE_Total	13129.772	280		
	POCTI_Total	34744.491	280		
	CTMS_TaskValue	65821.502	280		

	CTMS_Expectancy	3203.587	280		

Tests of Between-Subjects Effects

Source	Dependent Variable	Sig.	Partial Eta Squared
Corrected Model	PCTE_Total	.527	.008
	POCTI_Total	.060	.026
	CTMS_TaskValue	.000	.064
	CTMS_Expectancy	.000	.081
Intercept	PCTE_Total	.000	.819
	POCTI_Total	.000	.971
	CTMS_TaskValue	.000	.916
	CTMS_Expectancy	.000	.916
LevelofStudy	PCTE_Total	.527	.008
	POCTI_Total	.060	.026
	CTMS_TaskValue	.000	.064
	CTMS_Expectancy	.000	.081
Error	PCTE_Total		
	POCTI_Total		
	CTMS_TaskValue		

	CTMS_Expectancy		
Total	PCTE_Total		
	POCTI_Total		
	CTMS_TaskValue		
	CTMS_Expectancy		
Corrected Total	PCTE_Total		
	POCTI_Total		
	CTMS_TaskValue		
	CTMS_Expectancy		

a. R Squared = .008 (Adjusted R Squared = -.003)

b. R Squared = .026 (Adjusted R Squared = .016)

c. R Squared = .064 (Adjusted R Squared = .054)

d. R Squared = .081 (Adjusted R Squared = .071)

Post Hoc Tests

Level of Study

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) Level of Study	(J) Level of Study	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
PCTE_Total	Year 12	Year 13	-1.5039	1.04121	.473	-4.1951	1.1873
		First year undergraduate	-.7121	1.08594	.913	-3.5190	2.0947
		Second year undergraduate	-.9997	1.36078	.883	-4.5169	2.5175
	Year 13	Year 12	1.5039	1.04121	.473	-1.1873	4.1951
		First year undergraduate	.7918	1.22425	.917	-2.3725	3.9561
		Second year undergraduate	.5042	1.47352	.986	-3.3044	4.3128
	First year undergraduate	Year 12	.7121	1.08594	.913	-2.0947	3.5190
		Year 13	-.7918	1.22425	.917	-3.9561	2.3725
		Second year undergraduate	-.2876	1.50546	.998	-4.1788	3.6035

	Second year undergraduate	Year 12	.9997	1.36078	.883	-2.5175	4.5169
		Year 13	-.5042	1.47352	.986	-4.3128	3.3044
		First year undergraduate	.2876	1.50546	.998	-3.6035	4.1788
POCTI_Total	Year 12	Year 13	-2.8412	1.67803	.329	-7.1784	1.4960
		First year undergraduate	-4.4210	1.75013	.058	-8.9445	.1026
		Second year undergraduate	-.6588	2.19307	.991	-6.3272	5.0096
	Year 13	Year 12	2.8412	1.67803	.329	-1.4960	7.1784
		First year undergraduate	-1.5798	1.97304	.854	-6.6795	3.5199
		Second year undergraduate	2.1824	2.37475	.795	-3.9556	8.3204
	First year undergraduate	Year 12	4.4210	1.75013	.058	-.1026	8.9445
		Year 13	1.5798	1.97304	.854	-3.5199	6.6795

		Second year undergraduate	3.7622	2.42624	.409	-2.5089	10.0333
	Second year undergraduate	Year 12	.6588	2.19307	.991	-5.0096	6.3272
		Year 13	-2.1824	2.37475	.795	-8.3204	3.9556
		First year undergraduate	-3.7622	2.42624	.409	-10.0333	2.5089
CTMS_TaskValue	Year 12	Year 13	-2.8506	2.26404	.590	-8.7025	3.0012
		First year undergraduate	7.9784*	2.36132	.005	1.8751	14.0816
		Second year undergraduate	4.0981	2.95893	.510	-3.5499	11.7460
	Year 13	Year 12	2.8506	2.26404	.590	-3.0012	8.7025
		First year undergraduate	10.8290*	2.66207	.000	3.9484	17.7096
		Second year undergraduate	6.9487	3.20407	.135	-1.3328	15.2302
	First year undergraduate	Year 12	-7.9784*	2.36132	.005	-14.0816	-1.8751

		Year 13	-10.8290*	2.66207	.000	-17.7096	-3.9484
		Second year undergraduate	-3.8803	3.27353	.637	-12.3414	4.5808
	Second year undergraduate	Year 12	-4.0981	2.95893	.510	-11.7460	3.5499
		Year 13	-6.9487	3.20407	.135	-15.2302	1.3328
		First year undergraduate	3.8803	3.27353	.637	-4.5808	12.3414
CTMS_Expectancy	Year 12	Year 13	-1.2012	.49512	.075	-2.4809	.0785
		First year undergraduate	1.5646*	.51639	.014	.2298	2.8993
		Second year undergraduate	.8389	.64709	.566	-.8336	2.5114
	Year 13	Year 12	1.2012	.49512	.075	-.0785	2.4809
		First year undergraduate	2.7657*	.58217	.000	1.2610	4.2705
		Second year undergraduate	2.0401*	.70070	.020	.2290	3.8512

	First year undergraduate	Year 12	-1.5646*	.51639	.014	-2.8993	-.2298
		Year 13	-2.7657*	.58217	.000	-4.2705	-1.2610
		Second year undergraduate	-.7256	.71589	.742	-2.5760	1.1247
	Second year undergraduate	Year 12	-.8389	.64709	.566	-2.5114	.8336
		Year 13	-2.0401*	.70070	.020	-3.8512	-.2290
		First year undergraduate	.7256	.71589	.742	-1.1247	2.5760

Based on observed means.

The error term is Mean Square(Error) = 10.633.

*. The mean difference is significant at the .05 level.

```
USE ALL.
COMPUTE filter_$=((LevelofStudy = 1 | LevelofStudy = 2 | LevelofStudy = 3 | LevelofStudy
= 4)  &
    (FEQualificationType = 0 | FEQualificationType = 1)).
VARIABLE LABELS filter_$ '(LevelofStudy = 1 | LevelofStudy = 2 | LevelofStudy = 3 |
LevelofStudy '+
    '= 4)  &  (FEQualificationType = 0 | FEQualificationType = 1) (FILTER)'.
```

```
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.

FORMATS filter_$ (f1.0).

FILTER BY filter_$.

EXECUTE.

GLM PCTE_Total POCTI_Total CTMS_TaskValue CTMS_Expectancy BY
FEQualificationType
  /METHOD=SSTYPE(3)
  /INTERCEPT=INCLUDE
  /POSTHOC=FEQualificationType(TUKEY)
  /PRINT=DESCRIPTIVE ETASQ HOMOGENEITY
  /CRITERIA=ALPHA(.05)
  /DESIGN= FEQualificationType.
```

General Linear Model

Between-Subjects Factors

		Value Label	N
FE Qualification Type	0	No FE Qualification	37
	1	A-level	45

Descriptive Statistics

	FE Qualification Type	Mean	Std. Deviation	N
PCTE_Total	No FE Qualification	15.7838	6.79924	37
	A-level	17.1556	6.41715	45
	Total	16.5366	6.58692	82
POCTI_Total	No FE Qualification	73.9459	13.99195	37
	A-level	73.2889	8.44130	45
	Total	73.5854	11.21722	82
CTMS_TaskValue	No FE Qualification	51.7027	17.35714	37
	A-level	48.5333	14.83638	45
	Total	49.9634	15.99957	82
CTMS_Expectancy	No FE Qualification	11.8378	3.41982	37
	A-level	10.5556	3.38819	45
	Total	11.1341	3.44180	82

Box's Test of Equality of Covariance Matrices[a]

Box's M	27.199
F	2.571
df1	10
df2	28021.331
Sig.	.004

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.[a]

a. Design: Intercept + FEQualificationType

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df
Intercept	Pillai's Trace	.984	1188.987[b]	4.000	77.000

	Wilks' Lambda	.016	1188.987[b]	4.000	77.000
	Hotelling's Trace	61.766	1188.987[b]	4.000	77.000
	Roy's Largest Root	61.766	1188.987[b]	4.000	77.000
FEQualificationType	Pillai's Trace	.052	1.061[b]	4.000	77.000
	Wilks' Lambda	.948	1.061[b]	4.000	77.000
	Hotelling's Trace	.055	1.061[b]	4.000	77.000
	Roy's Largest Root	.055	1.061[b]	4.000	77.000

Multivariate Tests[a]

Effect		Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.000	.984
	Wilks' Lambda	.000	.984
	Hotelling's Trace	.000	.984
	Roy's Largest Root	.000	.984
FEQualificationType	Pillai's Trace	.381	.052
	Wilks' Lambda	.381	.052
	Hotelling's Trace	.381	.052
	Roy's Largest Root	.381	.052

a. Design: Intercept + FEQualificationType

b. Exact statistic

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
PCTE_Total	.423	1	80	.517
POCTI_Total	6.545	1	80	.012
CTMS_TaskValue	1.439	1	80	.234
CTMS_Expectancy	.234	1	80	.630

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.[a]

a. Design: Intercept + FEQualificationType

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F
Corrected Model	PCTE_Total	38.209[a]	1	38.209	.879
	POCTI_Total	8.766[b]	1	8.766	.069

	CTMS_TaskValue	203.961[c]	1	203.961	.795
	CTMS_Expectancy	33.386[d]	1	33.386	2.884
Intercept	PCTE_Total	22030.794	1	22030.794	507.011
	POCTI_Total	440171.108	1	440171.108	3458.040
	CTMS_TaskValue	204008.448	1	204008.448	794.931
	CTMS_Expectancy	10182.167	1	10182.167	879.538
FEQualificationType	PCTE_Total	38.209	1	38.209	.879
	POCTI_Total	8.766	1	8.766	.069
	CTMS_TaskValue	203.961	1	203.961	.795
	CTMS_Expectancy	33.386	1	33.386	2.884
Error	PCTE_Total	3476.181	80	43.452	
	POCTI_Total	10183.136	80	127.289	
	CTMS_TaskValue	20530.930	80	256.637	
	CTMS_Expectancy	926.138	80	11.577	
Total	PCTE_Total	25938.000	82		
	POCTI_Total	454206.000	82		
	CTMS_TaskValue	225435.000	82		

	CTMS_Expectanc y	11125.000	82		
Corrected Total	PCTE_Total	3514.390	81		
	POCTI_Total	10191.902	81		
	CTMS_TaskValue	20734.890	81		
	CTMS_Expectanc y	959.524	81		

Tests of Between-Subjects Effects

Source	Dependent Variable	Sig.	Partial Eta Squared
Corrected Model	PCTE_Total	.351	.011
	POCTI_Total	.794	.001
	CTMS_TaskValue	.375	.010
	CTMS_Expectancy	.093	.035
Intercept	PCTE_Total	.000	.864
	POCTI_Total	.000	.977
	CTMS_TaskValue	.000	.909
	CTMS_Expectancy	.000	.917
FEQualificationType	PCTE_Total	.351	.011
	POCTI_Total	.794	.001

	CTMS_TaskValue	.375	.010
	CTMS_Expectancy	.093	.035
Error	PCTE_Total		
	POCTI_Total		
	CTMS_TaskValue		
	CTMS_Expectancy		
Total	PCTE_Total		
	POCTI_Total		
	CTMS_TaskValue		
	CTMS_Expectancy		
Corrected Total	PCTE_Total		
	POCTI_Total		
	CTMS_TaskValue		
	CTMS_Expectancy		

a. R Squared = .011 (Adjusted R Squared = -.001)

b. R Squared = .001 (Adjusted R Squared = -.012)

c. R Squared = .010 (Adjusted R Squared = -.003)

d. R Squared = .035 (Adjusted R Squared = .023)

GLM PCTE_Total POCTI_Total CTMS_TaskValue CTMS_Expectancy BY FEGrade

```
/METHOD=SSTYPE(3)

/INTERCEPT=INCLUDE

/POSTHOC=FEGrade(TUKEY)

/PRINT=DESCRIPTIVE ETASQ HOMOGENEITY

/CRITERIA=ALPHA(.05)

/DESIGN= FEGrade.
```

General Linear Model

Between-Subjects Factors

		Value Label	N
FE Grade	1	A*- A	8
	2	B	11
	3	C	16
	4	D	6
	6	Other	2

Descriptive Statistics

	FE Grade	Mean	Std. Deviation	N
PCTE_Total	A*- A	18.3750	7.06981	8

	B	18.2727	6.05130	11
	C	16.7500	6.98093	16
	D	16.3333	3.88158	6
	Other	22.0000	1.41421	2
	Total	17.6279	6.16064	43
POCTI_Total	A*- A	71.7500	9.83797	8
	B	74.3636	5.40875	11
	C	73.6250	8.12301	16
	D	78.3333	10.38589	6
	Other	59.5000	6.36396	2
	Total	73.4651	8.59775	43
CTMS_TaskValue	A*- A	49.1250	14.41663	8
	B	40.2727	8.81012	11
	C	50.3750	12.82121	16
	D	53.8333	26.24817	6
	Other	49.5000	7.77817	2
	Total	48.0000	14.77450	43
CTMS_Expectancy	A*- A	10.3750	4.03334	8
	B	11.0909	2.80908	11
	C	10.2500	3.37639	16

	D	12.3333	3.38625	6
	Other	9.5000	4.94975	2
	Total	10.7442	3.34588	43

Box's Test of Equality of Covariance Matrices[a]

Box's M	51.245
F	1.281
df1	30
df2	1525.277
Sig.	.142

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.[a]

a. Design: Intercept

+ FEGrade

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.983	500.167[b]	4.000	35.000	.000
	Wilks' Lambda	.017	500.167[b]	4.000	35.000	.000
	Hotelling's Trace	57.162	500.167[b]	4.000	35.000	.000
	Roy's Largest Root	57.162	500.167[b]	4.000	35.000	.000
FEGrade	Pillai's Trace	.400	1.055	16.000	152.000	.403
	Wilks' Lambda	.643	1.045	16.000	107.564	.416
	Hotelling's Trace	.490	1.026	16.000	134.000	.434
	Roy's Largest Root	.284	2.698[c]	4.000	38.000	.045

Multivariate Tests[a]

Effect		Partial Eta Squared
Intercept	Pillai's Trace	.983

	Wilks' Lambda	.983
	Hotelling's Trace	.983
	Roy's Largest Root	.983
FEGrade	Pillai's Trace	.100
	Wilks' Lambda	.105
	Hotelling's Trace	.109
	Roy's Largest Root	.221

a. Design: Intercept + FEGrade

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
PCTE_Total	.694	4	38	.600
POCTI_Total	.748	4	38	.566
CTMS_TaskValue	4.383	4	38	.005
CTMS_Expectancy	.712	4	38	.589

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.[a]

a. Design: Intercept + FEGrade

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F
Corrected Model	PCTE_Total	69.656[a]	4	17.414	.434
	POCTI_Total	565.069[b]	4	141.267	2.114
	CTMS_TaskValue	965.860[c]	4	241.465	1.119
	CTMS_Expectancy	24.569[d]	4	6.142	.524
Intercept	PCTE_Total	8903.612	1	8903.612	221.949
	POCTI_Total	135288.322	1	135288.322	2024.294
	CTMS_TaskValue	62535.258	1	62535.258	289.722
	CTMS_Expectancy	3034.171	1	3034.171	258.739
FEGrade	PCTE_Total	69.656	4	17.414	.434
	POCTI_Total	565.069	4	141.267	2.114
	CTMS_TaskValue	965.860	4	241.465	1.119

	CTMS_Expectancy	24.569	4	6.142	.524
Error	PCTE_Total	1524.390	38	40.116	
	POCTI_Total	2539.629	38	66.832	
	CTMS_TaskValue	8202.140	38	215.846	
	CTMS_Expectancy	445.617	38	11.727	
Total	PCTE_Total	14956.000	43		
	POCTI_Total	235181.000	43		
	CTMS_TaskValue	108240.000	43		
	CTMS_Expectancy	5434.000	43		
Corrected Total	PCTE_Total	1594.047	42		
	POCTI_Total	3104.698	42		
	CTMS_TaskValue	9168.000	42		
	CTMS_Expectancy	470.186	42		

Tests of Between-Subjects Effects

Source	Dependent Variable	Sig.	Partial Eta Squared
Corrected Model	PCTE_Total	.783	.044

	POCTI_Total	.098	.182
	CTMS_TaskValue	.362	.105
	CTMS_Expectancy	.719	.052
Intercept	PCTE_Total	.000	.854
	POCTI_Total	.000	.982
	CTMS_TaskValue	.000	.884
	CTMS_Expectancy	.000	.872
FEGrade	PCTE_Total	.783	.044
	POCTI_Total	.098	.182
	CTMS_TaskValue	.362	.105
	CTMS_Expectancy	.719	.052
Error	PCTE_Total		
	POCTI_Total		
	CTMS_TaskValue		
	CTMS_Expectancy		
Total	PCTE_Total		
	POCTI_Total		
	CTMS_TaskValue		
	CTMS_Expectancy		
Corrected Total	PCTE_Total		

	POCTI_Total		
	CTMS_TaskValue		
	CTMS_Expectancy		

a. R Squared = .044 (Adjusted R Squared = -.057)

b. R Squared = .182 (Adjusted R Squared = .096)

c. R Squared = .105 (Adjusted R Squared = .011)

d. R Squared = .052 (Adjusted R Squared = -.048)

Post Hoc Tests

FE Grade

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) FE Grade	(J) FE Grade	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
PCTE_Total	A*- A	B	.1023	2.94301	1.000	-8.3237	8.5283

	C	1.6250	2.74256	.975	-6.2271	9.4771
	D	2.0417	3.42058	.975	-7.7517	11.8350
	Other	-3.6250	5.00722	.950	-17.9610	10.7110
B	A*- A	-.1023	2.94301	1.000	-8.5283	8.3237
	C	1.5227	2.48074	.972	-5.5798	8.6252
	D	1.9394	3.21447	.974	-7.2638	11.1426
	Other	-3.7273	4.86874	.939	-17.6668	10.2122
C	A*- A	-1.6250	2.74256	.975	-9.4771	6.2271
	B	-1.5227	2.48074	.972	-8.6252	5.5798
	D	.4167	3.03202	1.000	-8.2642	9.0975
	Other	-5.2500	4.75026	.803	-18.8503	8.3503

	D	A*- A	-2.0417	3.42058	.975	-11.8350	7.7517
		B	-1.9394	3.21447	.974	-11.1426	7.2638
		C	-.4167	3.03202	1.000	-9.0975	8.2642
		Other	-5.6667	5.17143	.808	-20.4728	9.1395
	Other	A*- A	3.6250	5.00722	.950	-10.7110	17.9610
		B	3.7273	4.86874	.939	-10.2122	17.6668
		C	5.2500	4.75026	.803	-8.3503	18.8503
		D	5.6667	5.17143	.808	-9.1395	20.4728
POCTI_Total	A*- A	B	-2.6136	3.79865	.958	-13.4894	8.2621
		C	-1.8750	3.53992	.984	-12.0100	8.2600
		D	-6.5833	4.41506	.574	-19.2239	6.0573

		Other	12.2500	6.46299	.337	-6.2539	30.7539
	B	A*- A	2.6136	3.79865	.958	-8.2621	13.4894
		C	.7386	3.20198	.999	-8.4288	9.9061
		D	-3.9697	4.14902	.872	-15.8486	7.9092
		Other	14.8636	6.28425	.147	-3.1286	32.8558
	C	A*- A	1.8750	3.53992	.984	-8.2600	12.0100
		B	-.7386	3.20198	.999	-9.9061	8.4288
		D	-4.7083	3.91353	.750	-15.9130	6.4964
		Other	14.1250	6.13133	.166	-3.4294	31.6794
	D	A*- A	6.5833	4.41506	.574	-6.0573	19.2239
		B	3.9697	4.14902	.872	-7.9092	15.8486

		C	4.7083	3.91353	.750	-6.4964	15.9130
		Other	18.8333	6.67495	.055	-.2774	37.9441
	Other	A*- A	-12.2500	6.46299	.337	-30.7539	6.2539
		B	-14.8636	6.28425	.147	-32.8558	3.1286
		C	-14.1250	6.13133	.166	-31.6794	3.4294
		D	-18.8333	6.67495	.055	-37.9441	.2774
CTMS_TaskValue	A*- A	B	8.8523	6.82664	.695	-10.6928	28.3974
		C	-1.2500	6.36169	1.000	-19.4639	16.9639
		D	-4.7083	7.93442	.975	-27.4251	18.0084
		Other	-.3750	11.61480	1.000	-33.6289	32.8789
	B	A*- A	-8.8523	6.82664	.695	-28.3974	10.6928

	C	-10.1023	5.75436	.414	-26.5774	6.3728
	D	-13.5606	7.45632	.378	-34.9085	7.7873
	Other	-9.2273	11.29359	.924	-41.5615	23.1070
C	A*- A	1.2500	6.36169	1.000	-16.9639	19.4639
	B	10.1023	5.75436	.414	-6.3728	26.5774
	D	-3.4583	7.03311	.988	-23.5946	16.6779
	Other	.8750	11.01877	1.000	-30.6724	32.4224
D	A*- A	4.7083	7.93442	.975	-18.0084	27.4251
	B	13.5606	7.45632	.378	-7.7873	34.9085
	C	3.4583	7.03311	.988	-16.6779	23.5946
	Other	4.3333	11.99572	.996	-30.0111	38.6778

	Other	A*- A	.3750	11.61480	1.000	-32.8789	33.6289
		B	9.2273	11.29359	.924	-23.1070	41.5615
		C	-.8750	11.01877	1.000	-32.4224	30.6724
		D	-4.3333	11.99572	.996	-38.6778	30.0111
CTMS_Expectancy	A*- A	B	-.7159	1.59120	.991	-5.2716	3.8398
		C	.1250	1.48283	1.000	-4.1204	4.3704
		D	-1.9583	1.84941	.826	-7.2533	3.3366
		Other	.8750	2.70726	.998	-6.8760	8.6260
	B	A*- A	.7159	1.59120	.991	-3.8398	5.2716
		C	.8409	1.34127	.970	-2.9992	4.6810
		D	-1.2424	1.73797	.952	-6.2183	3.7335

		Other	1.5909	2.63239	.974	-5.9458	9.1276
	C	A*- A	-.1250	1.48283	1.000	-4.3704	4.1204
		B	-.8409	1.34127	.970	-4.6810	2.9992
		D	-2.0833	1.63932	.710	-6.7768	2.6102
		Other	.7500	2.56833	.998	-6.6033	8.1033
	D	A*- A	1.9583	1.84941	.826	-3.3366	7.2533
		B	1.2424	1.73797	.952	-3.7335	6.2183
		C	2.0833	1.63932	.710	-2.6102	6.7768
		Other	2.8333	2.79604	.848	-5.1719	10.8386
	Other	A*- A	-.8750	2.70726	.998	-8.6260	6.8760
		B	-1.5909	2.63239	.974	-9.1276	5.9458

	C	-.7500	2.56833	.998	-8.1033	6.6033
	D	-2.8333	2.79604	.848	-10.8386	5.1719

Based on observed means.

The error term is Mean Square(Error) = 11.727.

Homogeneous Subsets

PCTE_Total

Tukey HSD[a,b,c]

FE Grade	N	Subset 1
D	6	16.3333
C	16	16.7500
B	11	18.2727
A*- A	8	18.3750
Other	2	22.0000
Sig.		.597

Means for groups in homogeneous subsets are displayed.

Based on observed means.

The error term is Mean Square(Error) = 40.116.

a. Uses Harmonic Mean Sample Size = 5.291.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

c. Alpha = .05.

POCTI_Total

Tukey HSD[a,b,c]

		Subset	
FE Grade	N	1	2
Other	2	59.5000	
A*- A	8	71.7500	71.7500

C	16	73.6250	73.6250
B	11		74.3636
D	6		78.3333
Sig.		.057	.687

Means for groups in homogeneous subsets are displayed.

Based on observed means.

The error term is Mean Square(Error) = 66.832.

a. Uses Harmonic Mean Sample Size = 5.291.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

c. Alpha = .05.

CTMS_TaskValue

Tukey HSD[a,b,c]

		Subset
FE Grade	N	1

B	11	40.2727
A*- A	8	49.1250
Other	2	49.5000
C	16	50.3750
D	6	53.8333
Sig.		.568

Means for groups in homogeneous subsets are displayed.

Based on observed means.

The error term is Mean Square(Error) = 215.846.

a. Uses Harmonic Mean Sample Size = 5.291.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

c. Alpha = .05.

CTMS_Expectancy

Tukey HSD[a,b,c]

FE Grade	N	Subset 1
Other	2	9.5000
C	16	10.2500
A*- A	8	10.3750
B	11	11.0909
D	6	12.3333
Sig.		.665

Means for groups in homogeneous subsets are displayed.

Based on observed means.

The error term is Mean Square(Error) = 11.727.

a. Uses Harmonic Mean Sample Size = 5.291.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

c. Alpha = .05.

Appendix P: Phase 2 – Letter of Ethical Approval

5th October 2017

Our Ref: DC/SB

Joe McCann
Health, Psychology and Social Studies
Carlisle, Fusehill Street Campus

Research Office
University of Cumbria
Lancaster Campus
Lancaster, LA1 3JD

Tel: 01524 384175
Fax: 01524 384385
Email: research.office@cumbria.ac.uk

Dear Joe

Request for Ethical Clearance – Our Ref 17/02
Project: The Psychology Student Critical Thinking Journey

Thank you for your revised application regarding the points raised in review.

Approval is granted with no further changes or amendments required

With regards

Professor Diane Cox
Chair
Research Ethics Panel

Appendix Q: Phase 3 – Participant Information Sheet (Pretest)

Title of Study: Critical Thinking Intervention (Pre-test)

About the study:

This research project aims to explore A-level Psychology student's critical thinking ability and is the first data collection session for the critical thinking intervention study you previously consented to participate in. This study involves completing a number of questionnaires.

Some questions you may have about the research project:

Why have you asked me to take part and what will I be required to do?

You have been asked to take part in this study as you are an A-level (or equivalent) psychology student. This research study involves completing a number of questionnaires. It is estimated that this will take approximately 35-45 minutes. It is normal to find the questions quite difficult, as they are measuring your higher order cognitive (thinking) skills.

What if I do not wish to take part or change my mind during the study?

Your participation in the study is entirely voluntary. You are free to withdraw from the study at any time and there are no consequences for doing so. You will be asked to give a unique identifier, in the form or a memorable word/ number which will allow you to withdraw from the study up to 4 weeks after participation, by contacting a member of the research team. Contact details for the researchers can be found below.

Are there any risks of participation?

It is important to acknowledge that it can be difficult to determine all potential risks at the outset of a piece of research. Some potential risks of participating in this research are; the potential for the research to induce mild psychological stress, anxiety or humiliation. It is normal to find the questions on these quite hard as they are measuring a higher order cognitive (thinking) skill. If distress does occur, you have the right to withdraw from the study without consequence and you will be adequately debriefed.

What if the researcher requests information I do not want to give out?

You have the right to decline any particular information requested by the researcher without giving a reason for doing so.

What happens to the research data?

All research data will be stored in accordance with the Data Protection Act (2018), General Data Protection Regulation (2018) and University of Cumbria Data Storage guidelines. Therefore, paper consent forms and completed questionnaires will be stored in locked filing cabinets for no longer than 5 years after which they will be destroyed. After the data has been processed, the data will be stored on an encrypted and password protected USB drive, as well as an encrypted password protected files marked confidential on one drive. The only people that will have access to the research data will be the research team (Joseph McCann, Dr Elizabeth Bates and Professor Pete Boyd). After this period all the data will be destroyed.

Who will have access to the data?

Only the research team will have access to the research data Joseph McCann (Principle Investigator), Dr Elizabeth Bates (Secondary Investigator) and Professor Pete Boyd (tertiary Investigator).

How will the research be reported?

The research will be reported as part of a PhD thesis. In addition, the research will also be written up for publication in a peer-reviewed journal and further disseminated at future conferences.

How can I find out more information?

A summary of the findings can be made available to you (via email). Please contact joseph.mccann@uni.cumbria.ac.uk (Principle Investigator) for more information

What if I want to complain about the research?

Initially you should contact the researcher directly. However, if you are not satisfied or wish to make a more formal complaint you should contact Diane Cox, Director of Research Office, University of Cumbria, Bowerham Road, Lancaster, LA1 3JD. diane.cox@cumbria.ac.uk

Who should I contact if I have any further questions?

Please contact the researcher/s directly (details below) at any time even after completion of the study

Joseph McCann
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Joseph.mccann@uni.cumbria.ac.uk

Dr Elizabeth Bates
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Appendix R: Phase 3 – Participant Information Sheet (Posttest)

Title of Study: Critical Thinking Intervention (Post-test

About the study

This research project aims to explore A-level Psychology student's critical thinking ability and is the second data collection session for the critical thinking intervention study, you previously consented to participate in. This study involves completing a number of questionnaires.

Some questions you may have about the research project:

Why have you asked me to take part and what will I be required to do?

You have been asked to take part in this study as you are an A-level (or equivalent) psychology student. This research study involves completing a number of questionnaires. It is estimated that this will take approximately 45 minutes. It is normal to find the questions quite difficult, as they are measuring your higher order cognitive (thinking) skills.

What if I do not wish to take part or change my mind during the study?

Your participation in the study is entirely voluntary. You are free to withdraw from the study at any time and there are no consequences for doing so. You will be asked to give a unique identifier, in the form or a memorable word/ number which will allow you to withdraw from the study up to 4 weeks after participating, by contacting a member of the research team. Contact details for the researchers can be found below.

Are there any risks of participation?

It is important to acknowledge that it can be difficult to determine all potential risks at the outset of a piece of research. Some potential risks of participating in this research are; the potential for the research to induce mild psychological stress, anxiety or humiliation. It is normal to find the questions on these quite hard as they are measuring a higher order cognitive (thinking) skill. If distress does occur, you have the right to withdraw from the study without consequence and you will be adequately debriefed.

What if the researcher requests information I do not want to give out?

You have the right to decline any particular information requested by the researcher without giving a reason for doing so.

What happens to the research data?

All research data will be stored in accordance with the Data Protection Act (2018), General Data Protection Regulation (2018) and University of Cumbria Data Storage guidelines. Therefore, paper consent forms and completed questionnaires will be stored in locked filing cabinets for no longer than 5 years after which they will be destroyed. After the data has been processed, the data will be stored on an encrypted and password protected USB drive, as well as an encrypted password protected files marked confidential on one drive. The only people that will have access to the research data will be the research team (Joseph McCann, Dr Elizabeth Bates and Professor Pete Boyd). After this period all the data will be destroyed.

Who will have access to the data?

Only the research team will have access to the research data Joseph McCann (Principle Investigator), Dr Elizabeth Bates (Secondary Investigator) and Professor Pete Boyd (tertiary Investigator).

How will the research be reported?

The research will be reported as part of a PhD thesis. In addition, the research will also be written up for publication in a peer-reviewed journal and further disseminated at future conferences.

How can I find out more information?

A summary of the findings can be made available to you (via email). Please contact joseph.mccann@uni.cumbria.ac.uk (Principle Investigator) for more information

What if I want to complain about the research?

Initially you should contact the researcher directly. However, if you are not satisfied or wish to make a more formal complaint you should contact Diane Cox, Director of Research Office, University of Cumbria, Bowerham Road, Lancaster, LA1 3JD. diane.cox@cumbria.ac.uk

Who should I contact if I have any further questions?

Please contact the researcher/s directly (details below) at any time even after completion of the study

Joseph McCann Dr Elizabeth Bates

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Appendix S: Phase 3 – Participant Consent Form (Pretest)

Title of Investigation: Critical Thinking Intervention (Pre-test)

Please answer the following questions by circling your responses:

Have you read and understood the information sheet about this study? YES/ NO

Have you been given a relevant contact, so you can ask the researcher/s questions about this research? YES/ NO

Have you received enough information about this study? YES/ NO

Do you understand that you are free to withdraw from this study at any time, and without having to give a reason for withdrawal? YES/ NO

Your responses will be anonymised. Do you give permission for members of the research team to analyse your anonymous responses? YES/NO

Do you agree to take part in this study? YES/ NO

Your signature will certify that you have voluntarily decided to take part in this research study having read and understood the information in the sheet for participants. It will also certify that you have had adequate opportunity to discuss the study with an investigator and that all questions have been answered to your satisfaction.

Please sign here if you wish to take part in the research and feel you have had enough information about what is involved:

Memorable Word/ Number :……

Signature of participant:..... Date:.....

Name (block letters):.....

Signature of investigator:..... Date:.....

Name (block letters):.....

Appendix T: Phase 3 – Participant Consent Form (Posttest)

Please answer the following questions by circling your responses:

Have you read and understood the information sheet about this study? YES/ NO

Have you been given a relevant contact, so you can ask the researcher/s questions about this research? YES/ NO

Have you received enough information about this study? YES/ NO

Do you understand that you are free to withdraw from this study at any time, and without having to give a reason for withdrawal? YES/ NO

Your responses will be anonymised. Do you give permission for members of the research team to analyse your anonymous responses? YES/NO

Do you agree to take part in this study? YES/ NO

Your signature will certify that you have voluntarily decided to take part in this research study having read and understood the information in the sheet for participants. It will also certify that you have had adequate opportunity to discuss the study with an investigator and that all questions have been answered to your satisfaction.

Please sign here if you wish to take part in the research and feel you have had enough information about what is involved:

Memorable Word/ Number :……

Signature of participant:..... Date:.....

Name (block letters):.....

Signature of investigator:..... Date:.....

Name (block letters):.....

Appendix U: Phase 3 – Participant Debrief Form (Pretest)

Thank you for taking the time and effort to take part in the first data collection study for this intervention. This research project aimed to investigate the effect of a research-informed critical thinking intervention on the critical thinking ability of A-level psychology students.

Your responses will be analysed and compared against other psychology students who have also completed this study. A summary of the findings can be made available to you (via email). Please contact joseph.mccann@uni.cumbria.ac.uk (Principle Investigator) for more information. Please be assured that all the data obtained from this study will be anonymous and will be kept confidential and only used for academic purposes.

Additionally, you have the right to withdraw from the study within 4 weeks of participating, by contacting a member of the research team with your memorable number. If you have found any part of this study distressing and you feel you need support, please contact your personal tutor/supervisor to discuss an appropriate course of action.

If you have any questions regarding any aspect of this study, please do not hesitate to ask us.

Joseph McCann
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THANK YOU AGAIN FOR YOUR CO-OPERATION!

Appendix V: Phase 3 – Participant Debrief Form (Posttest)

Thank you for taking the time and effort to take part in the second data collection session for this intervention. This research project aimed to investigate the effect of a research-informed critical thinking intervention on the critical thinking ability of A-level psychology students.

Your responses will be analysed and compared against other psychology students who have also completed this study. A summary of the findings can be made available to you (via email). Please contact joseph.mccann@uni.cumbria.ac.uk (Principle Investigator) for more information. Please be assured that all the data obtained from this study will be anonymous and will be kept confidential and only used for academic purposes.

Additionally, you have the right to withdraw from the study within 4 weeks of participating, by contacting a member of the research team with your memorable number. If you have found any part of this study distressing and you feel you need support, please contact your personal tutor/supervisor to discuss an appropriate course of action.

If you have any questions regarding any aspect of this study, please do not hesitate to ask us.

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THANK YOU AGAIN FOR YOUR CO-OPERATION!

Appendix W: Phase 3 – Critical Thinking Intervention Resources

Research Scenario 1: Influence of a consistent minority

Below is a short piece of text (adapted from Moscovici, Lage & Naffrechoux (1969) *Influence of a Consistent Minority in a Color Perception task*). Read through the text and answer the questions below. Examples are given for possible answers on the supplementary worksheet.

1.1 Research Summary

Moscovici et al. (1969) conducted a conceptual replication of Asch's (1951) Conformity experiment with one key difference. Instead of focusing on how the majority affected the minority they investigated the effect of a consistent minority on a majority.

To do this, the researchers sampled 128 female humanities, law, and social science undergraduates. Participants were told that they were taking part in an experiment on colour perception. Prior to experiment, the whole participant group were asked to complete a Polack test, which screened for visual abnormalities. Everyone who participated in the study had "normal vision".

Participants were separated into either the control group or the experimental group. Each experimental group consisted of four naïve participants and two confederates. During the experiment, participants were sat in rows. They were shown 36 slides which were clearly different shades of blue and asked to state the colour of each. Each slide was shown for 15 seconds and were separated by 5 seconds of darkness. In the first part of the experiment, the confederate participants answered green for all 36 of the slides. The confederates in the experimental group were internally consistent from one slide to the next, giving the same response each time. In the second part of the study, confederates answered "green" 24 times and "blue" 12 times, with the dispersion of the answers being randomised. The control group were shown the same 36 slides as the experimental group, however, there were no confederates in the group.

A Mann Whitney's U test (Z =2.10, p <. 05) found that the difference in "green" responses given between the control group and the experimental group was statistically significant. Out of the 22 participants in the control group only two participants gave "green" responses, which formed 0.25% of the overall responses in the control condition. In the first part of the study, "green" responses formed 8.42% of the responses when the minority behaved consistently. In comparison, in the second part of the study when the minority acted inconsistently only 1.25% of responses obtained were "green".

Researchers concluded that minorities can influence a majority, but only when the behaviour of the minority is consistent (e.g. in this experiment the minority consistently gave the response of green).

1.2 Research Breakdown

When critically thinking about a piece of research it often helps to breakdown the research and think about how each individual part of the research process may have affected the conclusion the researcher(s) made. Take some time to think about the research and how it was conducted, discuss it with a partner and then answer the questions below[1].

1. What is the research question/ aim of the research?
2. What data collection method(s) did the researcher(s) use to collect their data?
    a. What is a potential strength of the method(s) they have used?
    b. What is a potential weakness of the method(s) they have used?
3. Based on your answers to the previous question. What other method(s) could they have used to collect their data?
4. What participant sample have the researcher(s) used?

[1] (Questions adapted from Sternberg, R. J., Roediger III, H. L., & Halpern, D. F. (2007) *Critical Thinking in Psychology*. New York NY: Cambridge University Press. Pg. 34)

5. Explain your answer. Do you think the researcher(s) would have got the same result if:-
    a. They used a different participant sample.
    b. They used a different data collection method.
    c. They used different materials, measures, examples or procedure.
6. Can you identify any potential ethical issues with the study?
7. Based on your answers to the previous questions. Are there any problems with the researcher(s) conclusions and explain the problems (If there are any)?

1.3 Possible Answers to the questions:

1. The aim of Moscovici et al. (1969) study was to conceptually replicate Asch's (1951) study on conformity with one key difference**, they wanted to examine the effect of a minority on the majority**, as opposed to a majority on a minority.
2. Since Moscovici et al., (1969) was a conceptual replication of Asch's (1951) the researchers used a **lab experiment** to gather their research data.
    a. One potential strength of lab experiments is they allow for precise **control** of **extraneous** and **independent** variables.
    b. One potential limitation of lab experiments is they **lack ecological validity**. For example, is judging the colour of a slide with a group of strangers, an appropriate reflection of how minority influence works in the real-world.
3. There are several other methods the researchers could have used to examine the effect of a consistent minority on the majority. For example, the researchers could have conducted **a field experiment** using a sample that knew each other. Collecting the data using a field experiment means the research is likely to have **higher ecological validity** than a lab experiments and is more likely to be **reflective of real-life**.
4. The researchers used a sample of **128 female** humanities, law and social science undergraduate students.

5.

a. **No!** The sample used within this study is **not representative**. The sample consists of only **128 female liberal arts, law and social science undergraduate students**, so it would be inaccurate to generalise the findings of this study to the rest of the population for two key reason; firstly, the sample is **entirely female**, there may be **gender differences** in the way males and females react to minority influence. Particularly, since research has shown that males score lower on agreeableness than females. Secondly, the sample is WERID (White, Educated, Industrialised, Rich and Democratic). This is a serious threat to the **external validity** of the findings. Only studying minority influence in one population, **limits generalisability** as we don't know how or if it works in others.

b. **No!** Since the study is a lab experiment a strong argument could be made that the study **lacks ecological validity**. By illustration, the task (judging the colour of a slide) lacks **mundane realism**, due to the task being **artificial** and **low stakes**. Particularly in comparison to a real-world example of minority influence for example, The Suffragette movement. It would be hard to replicate the real-world social pressures, entrenched opposition and abuse of power the minority of women experienced in a laboratory. This lack of **ecological validity** raises questions about how **generalizable** the results are.

c. **No!** The groups only consisted of **six participants**, two confederates and four naïve participants. Are four participants an adequate number of people to represent a majority? When one third of the participants in the room were confederates.

6. A potential ethical issue with this study is that the researchers **deceived** the participants. However, this was a necessary **deception** because they wouldn't have been able to study conformity if participants knew the true nature of the research.

7. **Yes!** Researchers from this study concluded that minorities can influence a majority, but only when the minority is consistent. However, the sample they used was **unrepresentative** of the population, the study sample consisted solely of **highly**

educated females (beta-bias). This limits the generalisability of the results. A more accurate conclusion would have been **"at least as far as female participants are concerned, in this laboratory context, a consistent minority are capable of influencing a majority".**

1.4. References

Asch, S. E., & Guetzkow, H. (1951). Effects of group pressure upon the modification and distortion of judgments. *Groups, leadership, and men*, 222-236.

Moscovici, S., Lage, E., & Naffrechoux, M. (1969). Influence of a consistent minority on the responses of a majority in a color perception task. *Sociometry*, 365-380.

Sternberg, R. J., Roediger III, H. L., & Halpern, D. F. (2007) *Critical Thinking in Psychology*. New York NY: Cambridge University Press. Pg. 34

Van Dyne, L., & Saavedra, R. (1996). A naturalistic minority influence experiment: Effects on divergent thinking, conflict and originality in work-groups. *British Journal of Social Psychology*, *35*(1), 151-167.

Research Scenario 2: "A Nation of Morons"

Below is a short piece of text (adapted from Gould, S. J. (1982). A nation of morons. *New Scientist*, *6*, 349-352). Read through the text and answer the questions below. Examples are given for possible answers on the supplementary worksheet.

1.1 Research Summary

Yerkes (1918) wanted to establish Psychology as a "hard science". Yerkes believed that the best way to do this was to promote the use of intelligence testing to the United States (US) Army, with the aim of assigning recruits' roles that best suited their intellectual ability.

To do this, Yerkes (1918) administered intelligence tests to 1.75 million US male army recruits during the First World War. The sample consisted of a mixture of American citizens and immigrants who had recently immigrated to America from Northern, Southern, Central and Eastern Europe. As well as a significant proportion of Black men, who had either recently immigrated to the US or were of Afro-Caribbean ancestry.

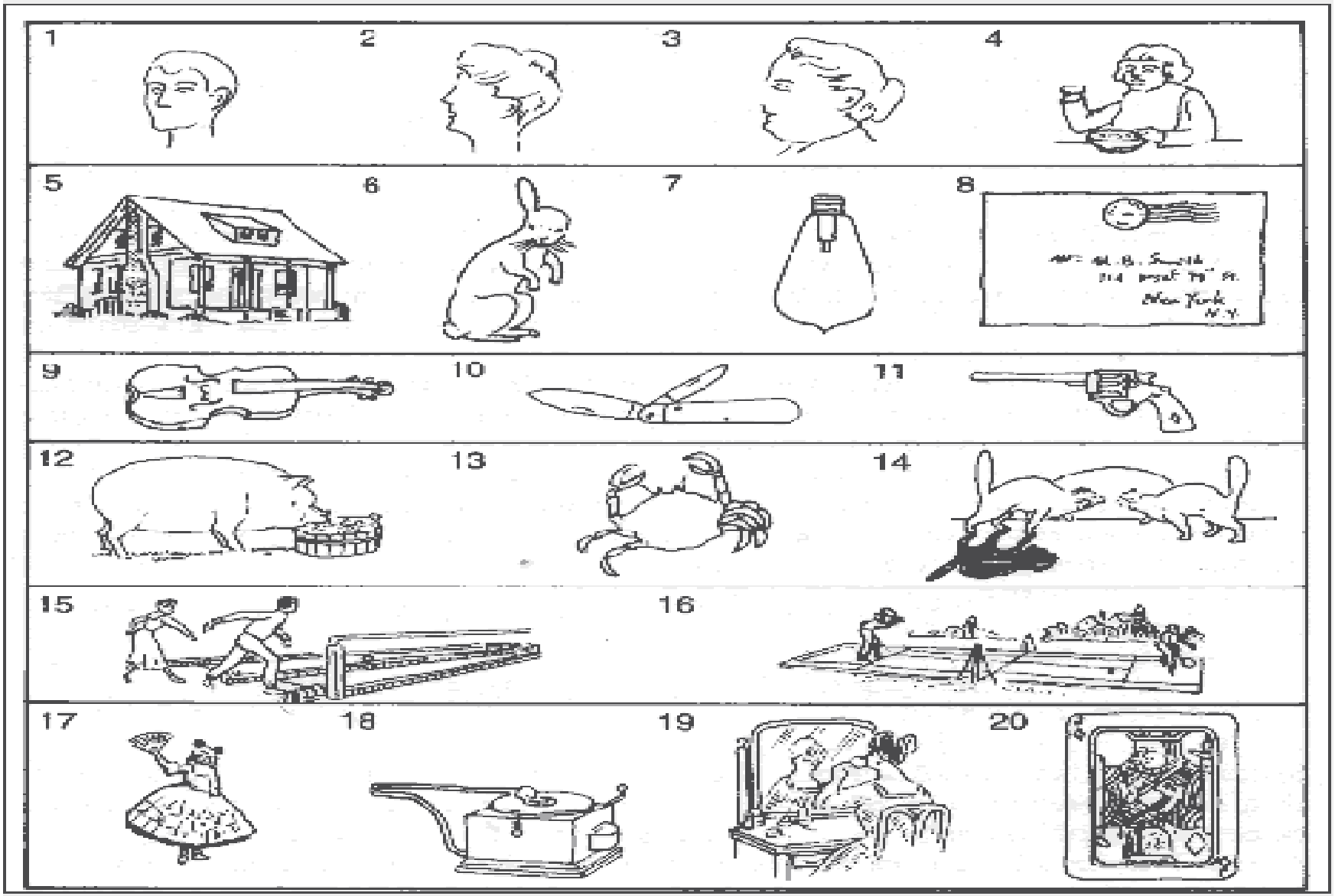
In order to assess intelligence Yerkes devised three different measures, which he suggested measured "native intellectual ability". In other words, intelligence that was innate and unaffected by culture or education level. The first of these tests was known as the "Army Alpha test", this test was reserved for literate recruits. It was a written test that consisted of eight parts, the test involved using a pencil to fill in missing numbers or sentences. For example, "Washington is to Adams as first is to…… or Christy Mathewson is famous as a: (a) writer, (b) artist, (c) baseball player, (d) comedian". The second type of test was known as the "Army Beta test", this was a pictorial test reserved for recruits who were illiterate or those who had failed the Alpha. This test consisted of seven parts, with activities such as running a maze, numerical work and picture completion tasks, where participants were asked to identify what was missing from the picture (See figure 1). The Army Alpha and Beta tests were administered in large groups of around 50 recruits, each test was timed and estimated to take less than one hour to complete.

Finally, there was an individual examination which was a spoken test for recruits who failed to pass the Army Beta. All recruits were graded from A+ to E-, these grades were then used as the basis for army role assignment. Those who did not score above a C were not eligible for officer roles and would be sent to the front line.

Results of the study found that the average mental age for White Americans was 13 years, which placed them in the “moron” category. European immigrants were graded by their country of origin. The average recruit in many countries was labelled a “moron”. Recruits from Northern and Western European countries tended to score higher in mental age (Russia = 11.34 years) than the Slavs (Poland = 10.74 years) and the darker southern Europeans (Italian = 11.01 years). Afro-Caribbean recruits scored considerably lower than their white counterparts with a mental age of 10.4 years. Results also showed that the average score on the intelligence tests rose with the amount of time the recruits lived in America.

Yerkes (1918) concluded that average scores from the different national groups reflected innate genetic differences regarding intelligence. Yerkes used the results to support the idea that there are genetic differences between races. Brigham one of his fellow researchers, used the data to advocate for the intellectual superiority of the Nordic (white) race.

Figure 1: Yerkes (1918) Army Beta Picture completion task example – Identify what is missing from each picture.



1.2 Research Breakdown

When critically thinking about a piece of research it often helps to breakdown the research and think about how each individual part of the research process may have affected the conclusion the researcher(s) made. Take some time to think about the research and how it was conducted, discuss it with a partner and then answer the questions below[2].

1. What is the research question/ aim of the research?
2. What data collection method(s) did the researcher(s) use to collect their data?
    a. What is a potential strength of the data collection method(s) they have used?
    b. What is a potential weakness of the data collection method(s) they have used?
3. Based on your answers to the previous question. What other method(s) could they have used to collect their data?
4. What participant sample have the researcher(s) used?
5. Explain your answer. Do you think the researcher(s) would have got the same result if:-
    a. They used a different participant sample.
    b. They used a different data collection method.
    c. They used different materials, measures, examples or procedure.
6. Can you identify any potential ethical issues with the study?
7. Based on your answers to the previous questions. Are there any problems with the researcher(s) conclusions and explain the problems (If there are any)?

[2] (Questions adapted from Sternberg, R. J., Roediger III, H. L., & Halpern, D. F. (2007) *Critical Thinking in Psychology*. New York NY: Cambridge University Press. Pg. 34)

1.3 Possible Answers to the questions:

1. Yerkes (1918) aim for the research was **very unclear**. Yerkes (1918) wanted to establish Psychology as a "hard science", in order to do this, he promoted the use of intelligence testing within the United States Army. Yerkes (1918) wanted his tests to be used as a means of discerning which Army recruits were suitable for Officer roles.
2. Yerkes (1918) used **three different intelligence tests** he devised himself to collect the data. These consisted of the "**Army Alpha test"** which was a written test for literate recruits, the "**Army Beta test"** for illiterate recruits which was a pictorial test and finally the "**individual examination"** was a spoken test.
    a. One potential strength of the method used is that questions were **standardised.** All respondents who completed the **Army Alpha** and **Army Beta** were asked the same questions in the same order. Meaning that the questionnaire can be easily **replicated** to check for **reliability**.
    b. One potential weakness of the method used is that the questions in all the measures were **culturally bias** when they were intended to measure **"innate native intelligence".** By illustration, if participants were asked "Washington is to Adams as first is to…". This question depends on cultural knowledge gained from living in the United States. Which if you were an immigrant that had just moved there you wouldn't have.
3. There are several different methods for measuring intelligence, the standard and most widely used method is "Intelligence Quotient" **(IQ)**. IQ is measured using a series of tests which assess various types of abilities including maths, spatial, verbal, logic and memory. The IQ test had been around a few of years before this study was published. The researcher could have obtained the IQ test and had it translated into each participant's native language in order to **minimise bias**.

4. The sample used in this study was **1.75 million Army recruits**, who were either **American citizens** or individuals from **European** and **Afro-Caribbean** nations who had recently immigrated to the United States.
5.
    a. **No!** The participant sample consisted almost entirely of **recent immigrants** to the United States. If the researcher had considered this, the results would almost definitely be different. By illustration, it was found that participants test scores **rose with the amount of time they had spent within the United States**.
    b. **No!** The measurement of intelligence is certainly shrouded in controversy. The most common and widely accepted way to measure intelligence is the "intelligence quotient' or IQ. IQ research has shown that there are **no significant differences between races**, and if there are any differences these are more down to environmental factors such as, **socioeconomic status** then any genetic factor.
    c. **No!** The measures used were **culturally biased**. For example, "Washington is to Adams as first is too… or Christy Matthewson is a famous (a) Writer, (b) Artist, (c) Baseball Player and (d) Comedian. These questions could have only been answered correctly by someone who was **familiar with American culture**. Therefore, the **validity** of the measures is questionable. Since the participants had only recently immigrated, they were unlikely to know this. By illustration, it was found that participants test scores **rose with the amount of time they had spent within the United States.**
6. **Yes!** A significant ethical issue is the lack of acknowledgement of the in-built **cultural bias** of the intelligence measures used. The science of intelligence and race has been criticised as a form of **scientific racism.** Yerkes (1918) study is a classic example of this. The results of Yerkes (1918) was used to advocate the intellectual superiority of the white race and was the start of the eugenics movements in America. His work was used for several years to support social inequality and oppression across the United States.

7. **Yes!** As mentioned in the previous answer, there is a lack of acknowledgment on Yerkes (1918) part of the in-built **cultural bias** of the tests Yerkes (1918) designed. This is also an example of **imposed etic,** Yerkes (1918) assumed that the US-model of intelligence was the norm, additionally he also made **ethnocentric** conclusions about other races.

1.4. References

Yerkes, R. M. (1918). Psychology in relation to the war. *Psychological Review*, 25(2), 85-115.

http://dx.doi.org/10.1037/h0069904

Gould, S. J. (1981). A nation of morons. *New Scientist*, *6*, 349-352

Research Scenario 3: Minnesota Twin Family study

Below is a short piece of text (adapted from Bouchard, Lykken, McGue, Segal & Tellgen (1990) *Sources of Human Psychological Differences: The Minnesota Study of Twins Reared Apart*). Read through the text and answer the questions below. Examples are given for possible answers on the supplementary worksheet.

1.1 Research Summary

Bouchard et al. (1990) reported on one of a series of studies conducted in the 1980s and '90s which aimed to investigate the role genes, and our environment play in shaping who we are.

The participant sample consisted of more than 100 sets of reared-apart monozygotic (identical) twins or triplets who had spent their formative years (i.e. years that made them who they are) as an adult apart. Participants were recruited in several ways, for example, through friends, family, social workers or other professionals who encountered the twins as intermediaries. Total contact time for the reared-apart twins prior to the study beginning ranged from 1 week to 1233 weeks. The twins were recruited from across the United States, United Kingdom, Australia, Canada, China, New Zealand, Sweden and West Germany.

Participants completed approximately 50 hours of medical and psychological assessments. Two or more test instruments were used in each major domain of psychological assessment to ensure adequate coverage (e.g. four personality inventories and two mental ability batteries were used). Separate examiners administered IQ tests, life history interviews, psychiatric interviews and sexual history interviews with each twin. Tests were completed under constant supervision by staff.

Researchers found that the reared apart twins had a significant number of similarities, for example, the "Jim twins" were identical twins who were separated at birth and didn't meet until age 39. Both were named Jim, had first wives named Linda and second wives named Betty.

Both chain-smoked, drove Chevys, served as Sherriff's deputies, and vacationed on the same beach in Florida.

In fact, the researchers found that many behavioural traits for example, reaction times, intelligence, religiosity and social attitudes, demonstrated some genetic influence.

Researchers concluded that genes are very pervasive, they affected virtually every measured trait. Therefore, they concluded genes strongly influence aspects of our personality, intelligence and behaviour traits that had long been thought to be shaped by the environment.

1.2 Research Breakdown

When critically thinking about a piece of research it often helps to breakdown the research and think about how each individual part of the research process may have affected the conclusion the researcher(s) made. Take some time to think about the research and how it was conducted, discuss it with a partner and then answer the questions below[3].

1. What is the research question/ aim of the research?
2. What data collection method(s) did the researcher(s) use to collect their data?
    a. What is a potential strength of the method(s) they have used?
    b. What is a potential weakness of the method(s) they have used?
3. Based on your answers to the previous question. What other method(s) could they have used to collect their data?
4. What participant sample have the researcher(s) used?
5. Explain your answer. Do you think the researcher(s) would have got the same result if:-
    a. They used a different participant sample.
    b. They used a different data collection method.
    c. They used different materials, measures, examples or procedure.
6. Can you identify any potential ethical issues with the study?
7. Based on your answers to the previous questions. Are there any problems with the researcher(s) conclusions and explain the problems (If there are any)?

[3] (Questions adapted from Sternberg, R. J., Roediger III, H. L., & Halpern, D. F. (2007) *Critical Thinking in Psychology*. New York NY: Cambridge University Press. Pg. 34)

1.3 Possible answers to the questions:

1. Bouchard et al. (1990) aimed to investigate the role **genes**, and our **environment** play in shaping who we are.
2. Bouchard et al. (1990) used a series of **medical** and **psychological assessments**. The researcher used a mixture of both qualitative and quantitative data collection methods.
    a. One potential strength of the data collection method they have used is that it is very comprehensive. The participants not only completed a series of **medical and psychological tests**, but participants also completed multiple tests which aimed to measure the same factor (e.g. four personality tests) which ensured that the results had **concurrent validity**.
    b. One potential weakness of the data collection method is the researcher(s) asked participants to recount **their life history through interviews**. Even though participants were **interviewed separately**, a significant number of participants had spent a large amount of time in contact prior to the study (e.g. 1233 weeks). This may have **unintentionally biased participants accounts**, as they may have discussed their life history, prior to the interviews.
3. The researchers could have conducted a **longitudinal study** with a group of monozygotic (identical) twins that had been reared-apart but raised in **different socioeconomic and cultural environments**. By illustration, one could assume the **"Jim twins"** grew up in similar **socioeconomic** and **cultural environments**, since they vacationed at the same beach. This would also allow researchers to gain an **unbiased account** of participants lives, as they could record **significant life events,** and **conduct medical** and **psychological assessments**, without the chance of the **other twin** or **growing up in similar environments** biasing the results.

4. The participant sample used in Bouchard et al. (1990) consisted of more than **100 identical twins or triplets** that had spent the formative years of their adult life apart. The total contact time for the **reared-apart** twins ranged from **1 week to 1233 weeks**. The twins were recruited from all over the world.
5.
    a. **No!** As previously mentioned, the participant contact time varied considerably, this would have no doubt affected the results. For example, would the twins have described such **similar events** if they had been tested before they had met? In addition, some of the twins grew up in **similar environments**, which means their interests would have no doubt been alike as they would have been exposed to **similar environmental factors**.
    b. **Possibly!** It is unknown how much having prior contact with their twin affected their **perception of events in the life history interviews**. Conducting a **longitudinal study** and **completing the assessments prior to the twins** meeting would have produced a more **valid result**.
    c. **Possibly!** Again, if participants were interviewed prior to meeting their twin, this may have led to a different outcome.
6. **Yes!** The researchers used **snowball sampling** to recruit their participants. They recruited participants through **family, friends and social workers.** This may have affected a participant's right to **confidentiality and anonymity**. Also, there are concerns about how long the twins have known about each other. By illustration, one set of twins had only known each other for **one week**. This would have been a very emotional and distressing time for them.
7. **Yes!** Firstly, the twins had been in contact prior to the study. This would have allowed them to discuss similarities and differences in their lives and may have **biased** the result. Secondly, participants **contact time with their twin varied considerably**, this could have also biased the results. Finally, the researcher has not considered how

growing up in similar **socio-cultural and economic environments** would have affected the results.

1.4. References

Bouchard, T. J., Lykken, D. T., McGue, M., Segal, N. L., & Tellegen, A. (1990). Sources of human psychological differences: The Minnesota study of twins reared apart. *Science*, *250*(4978), 223-228.

Research Scenario 4: Feeling the Future

Below is a short piece of text (adapted from Bem (2011) *Feeling the Future: Experimental Evidence for Anomalous Retroactive Influences on Cognition and Affect*). Read through the text and answer the questions below. Examples are given for possible answers on the supplementary worksheet.

1.1 Research Summary

The aim of Bem's (2011) study was to provide a well-controlled replicable experimental demonstration of "*Psi"*. The term "*Psi"* refers to two phenomena; precognition (i.e. foreknowledge of an event) and premonition (i.e. a strong feeling that something is about to happen). Bem believed the ability to foresee future events may aid reproductive success. Bem hypothesised based on the principles of evolutionary psychology, that humans have the innate ability to avoid future negative stimuli, and approach future positive stimuli.

Bem was a Professor at Cornell University, he recruited 100 Cornell undergraduates, 50 males and 50 females. The participants were recruited via Cornell University's Psychology departments automated online sign-up. Participants either received one course credit for their participation or were paid $5.

After signing a consent form, participants were seated in front of a computer. Participants were instructed to take a 3-minute relaxation period, during which time the computer screen displayed a slowly moving photograph taken by the Hubble telescope of a starry sky, while peaceful music played in the background. After the 3-minute relaxation period, the experiment began. During each trial of the experiment two curtains appeared side by side on the screen. Behind one of the curtains there was a picture, the other curtain had a blank wall behind it. Participants were instructed to click the curtain they felt had a picture behind it. Once the participant selected a curtain the curtain would open, allowing the participants to see if they had selected the correct curtain. The pictures behind each curtain were randomly selected out of one of three categories; negative, neutral or erotic. There were 36 trials in total.

Across all the 100 participant sessions, participants correctly identified the future position of the erotic pictures significantly more frequently than the 50% hit rate expected by chance: 53.1%, p <. 01. In contrast, the hit rate on the non-erotic pictures did not differ significantly from chance: 49.8%, p =.56. The hit rate for neutral pictures was 49.6%, and the hit rate for negative pictures was 51.3%. Neither of these differed significantly from chance.

Based on his findings, Bem concluded that humans have the innate ability to anticipate future events; specifically, if the future event to be anticipated contained some form of erotic stimuli.

1.2 Research Breakdown

When critically thinking about a piece of research it often helps to breakdown the research and think about how each individual part of the research process may have affected the conclusion the researcher(s) made. Take some time to think about the research and how it was conducted, discuss it with a partner and then answer the questions below[4].

1. What is the research question/ aim of the research?
2. What data collection method(s) did the researcher(s) use to collect their data?
    a. What is a potential strength of the method(s) they have used?
    b. What is a potential weakness of the method(s) they have used?
3. Based on your answers to the previous question. What other method(s) could they have used to collect their data?
4. What participant sample has the researcher(s) used?
5. Explain your answer. Do you think the researcher(s) would have got the same result if?:-
    a. They used a different participant sample.
    b. They used a different data collection method.
    c. They used different materials, measures, examples or procedure.
6. Can you identify any potential ethical issues with the study?
7. Based on your answers to the previous questions. Are there any problems with the researcher(s) conclusions and explain the problems (If there are any)?

[4] (Questions adapted from Sternberg, R. J., Roediger III, H. L., & Halpern, D. F. (2007) *Critical Thinking in Psychology*. New York NY: Cambridge University Press. Pg. 34)

1.3 Possible answers to the questions

1. Bem's (2011) study aimed to provide a well-controlled replicable experimental demonstration of "Psi".
2. Bem (2011) used a **lab experiment** to collect his research data.
    a. One potential strength of using a lab experiment is that Bem was able to precisely **control extraneous** and **independent variables**. In addition, it also allowed Bem to provide a **replicable experiment of "Psi"**.
    b. In this context, one potential limitation of Bem (2011) using a lab experiment is the **lack of ecological validity**. For example, is judging which curtain a picture is behind an accurate reflection of how precognition and premonition has been described in a real-world context? Which brings into question the **validity** of the experiment.
3. There are several other methods the researcher could have used to examine the phenomena of precognition and premonition. For example, the researcher could have conducted a **quasi-experiment** with participants who identified as having experiences of "Psi" and a control group who didn't. Then, replicate the study described, except have more than two curtains, which would increase the **probability** that the picture identified by the participant was due to the power of "Psi" and not **chance.**
4. The participant sample consisted of **100 Cornell University undergraduate students**, **50 males and 50 females**, that were recruited via Cornell University's Psychology departments automated online sign-up. Participants either received one course credit for their participation or were paid $5.
5.
    a. **No!** The participant sample used within this study is not representative. The sample may have an even gender split; however, the sample consists **entirely of undergraduate students**. The participant sample would be considered

WEIRD (White, Educated, Industrialised, Rich and Democratic). This is a serious threat to the **ecological validity** of the results. Only studying "Psi" in one population, limits the generalisability of the results, as it may manifest differently within a different population. For example, a sample of psychics.

b. **No!** Since the study is a lab experiment a strong argument can be made that the study **lacks ecological validity**. By illustration, is a **forced-choice design task**, where participants are only given **two choices** and are essentially **asked to guess** which curtain a picture is behind comparable to how instances of premonition and precognition have been described in real-life.

c. **No!** Participants only had **two curtains** to choose from. Meaning there was a **50%** chance they would select the right answer, regardless of which curtain the picture is behind. Therefore, either way you would expect the **hit rate to be about 50%,** which is exactly what they found. Bem (2011) found that participants were able to select erotic images **53% of the time**. Statistical analysis revealed that the hit-rate for erotic images was significantly more than the **50% hit rate expected by chance**. However, is a **53% hit rate** for erotic images really a significant enough difference (when participants could only choose from two options) to conclude that humans can anticipate future events. **Probably not.**

6. There are **no real ethical issues** with the study, you could make an argument that exposing participants to explicit erotic images is unethical. However, participants were informed of this before the study began. You could also suggest that the **publication of inaccurate** or **misleading research results** caused by a poorly designed study could be viewed as unethical.

7. **Yes!** The researcher concluded that humans have the ability to anticipate future events. Based on his results. However, the result is most likely due to a poorly designed study, then premonition or precognition. Participants were only able to choose from **two options**. Therefore, you would expect the picture hit rate to be

around 50%, and that is exactly what Bem found. The hit rate for **erotic images was 53%**. Despite participants correctly identifying the future position of erotic images significantly more than chance, a **53% hit rate** is not a large enough difference to conclude that humans have the ability to anticipate future events. Especially, since the participants did not identify the future position of non-erotic pictures **(i.e. neutral and negative) significantly more than chance**.

1.4. References

Bem, D. J. (2011). Feeling the future: experimental evidence for anomalous retroactive influences on cognition and affect. *Journal of personality and social psychology*, *100*(3), 407.

Research Scenario 5: Automaticity of Social Behaviour

Below is a short piece of text (adapted from Bargh, Chen & Burrows (1996) *Automaticity of Social Behavior: Direct Effects of Trait Construct and Stereotype Activation on Action*). Read through the text and answer the questions below. Examples are given for possible answers on the supplementary worksheet.

1.1 Research Summary

For many years, social psychologists have studied the effects of priming (i.e. how exposure to one stimulus influences a response to a subsequent stimulus) on the individual subsequent impression of others. The aim of the present study was to investigate the effect of activation of the elderly stereotype on behaviour.

The participant sample consisted of 30 male and female New York University undergraduates who were enrolled in an Introductory Psychology course. Participants were randomly assigned to either an elderly prime condition or a neutral prime condition. The researcher was blind to each condition, participants were assigned using envelope packets randomly left in the laboratory waiting area.

Participants took part in the study one at a time. They were told that the purpose of the study was to investigate language proficiency and that they were to complete a scrambled-sentence task. The task consisted of 30 sets of five-word combinations. There were two versions of the scrambled-sentence task: one-elderly prime version, which contained words related to the elderly stereotype, and another neutral version. For the elderly prime version, the critical stimuli were worried, Florida, old, lonely, grey, selfish, careful, sentimental, wise, stubborn, courteous, bingo, withdraw, forgetful, retired, wrinkle, rigid, traditional, bitter, obedient, conservative, knits, dependent, ancient, helpless, gullible, cautious and alone.

The participant was instructed to write down a grammatically correct sentence using only four of the five words given. Participants were also told that the task was self-paced, after giving instructions, the researcher left the room to give the participant complete privacy. After the

participant completed the task, they informed the researcher and they re-entered the lab and partially debriefed the participant. They were then informed that the experiment was concerned with how individuals use words, in various, flexible ways. The researcher then waited till the participant had gathered all their belongings and told them that the elevator was down the hall.

Using a hidden stopwatch, a confederate participant, who was sitting in a chair apparently waiting for a professor in a nearby office, recorded the amount of time in seconds that the participant spent walking a length of the corridor starting from the doorway of the experimental room and ending in a broad strip of silver carpet tape placed 9.75m away.

Afterwards, the researcher caught up with the participant near the elevator and gave the complete debriefing, explaining the experimental hypotheses verbally as well as giving the participant an accompanying written version. Participants were also informally asked (prior to the final debriefing) whether they thought the scrambled-sentence task might have affected them in any way, and if they had known that the task contained words relevant to the elderly stereotype. No participant expressed any knowledge of the relevance of the words in the scrambled sentence task to the elderly stereotype. Furthermore, no participant believed that the words had an impact on his or her behaviour.

The researchers conducted a *t*-test in order to ascertain the effect of the priming manipulation on walking speed. Participants in the elderly priming condition (M= 8.28s) had a significantly slower walking speed compared to participants in the neutral priming condition (M = 7.30s). The researchers replicated the study and found the same result.

Based on their results, the researchers concluded that the elderly priming stimuli activated the elderly stereotype in memory, and participants subsequently acted in ways consistent with that activated stereotype.

1.2 Research Breakdown

When critically thinking about a piece of research it often helps to breakdown the research and think about how each individual part of the research process may have affected the conclusion the researcher made. Take some time to think about the research and how it was conducted, discuss it with a partner and then answer the questions below[5].

1. What was the research question/ aim of the research?
2. What data collection method(s) did the researcher(s) use to collect their data?
    a. What is a potential strength of the method(s) they have used?
    b. What is a potential weakness of the method(s) they have used?
3. Based on your answers to the previous question. What other method(s) could they have used to collect their data?
4. What participant sample have the researcher(s) used?
5. Explain your answer. Do you think the researcher(s) would have got the same result if:-
    a. They used a different participant sample.
    b. They used a different data collection method.
    c. They used different materials, measures, examples or procedure.
6. Can you identify any potential ethical issues with the study?
7. Based on your answers to the previous questions. Are there any problems with the researcher(s) conclusions and explain the problems (If there are any)?

[5] (Questions adapted from Sternberg, R. J., Roediger III, H. L., & Halpern, D. F. (2007) *Critical Thinking in Psychology*. New York NY: Cambridge University Press. Pg. 34)

1.3 Possible Answers

1. The aim of Bargh et al. (1996) was to investigate the effect of activation of the elderly stereotype on behaviour.

2. The researchers used a lab experiment/ controlled experiment to collect their data.
    a. The data collection method used within this study has several strengths. Since it's a lab experiment, it can be **replicated** because the researchers generated a standardised procedure for purposes of the experiment. In addition, a lab experiment allows for the **precise control** of **extraneous** and **independent variables**. This further allows for the researcher to precisely measure the exact effect the independent variable (i.e. priming condition) has on the dependent variable (i.e. speed the participant walked).

    b. The data collection method used in this study has several weaknesses. The most notable is that it **lacks ecological validity**. The use of a lab experiment and the dependent variable (i.e. walking speed) in this study are particularly **contrived.** This study is low in **mundane realism**, as both the task and the measurement of the dependent variable do not resemble how stereotypes are primed in real-life.

3. There are several other methods the researcher could have used to collect their data. For example, they could conduct a **field study**. This would be **high in mundane realism** and **ecological validity**, as it would take part in a real-life setting, but also allow the researchers to manipulate the independent variables.

4. The participant sample consisted of **30 male and female New York University Undergraduates** who were enrolled in Introductory Psychology.

5.

a. **No!** The participant sample is **WEIRD** (White, Educated, Industrial, Rich and Democratic). Therefore, the **generalisability** of the results is questionable. Also, since the researcher is trying to prime a stereotype about the elderly, they are restricted on what age participants can be.

b. **No!** As previously mentioned, the study **lacks ecological validity** and is quite contrived. By illustration, is the scrambled-word task comparable to how the priming-effect occurs in real-life in regard to stereotypes.

c. **No!** the researchers used a **manual stopwatch**, rather than an automated electronic system which would have stopped the clock when participants crossed a certain point. Therefore, **researcher/ experimenter bias and confirmation bias** may have played a large part in the study's results. This idea is given further credence when considering how **little difference** there is in the mean walking speed of both participant groups (i.e. less than one second).

6. A potential ethical issue of this study is that the participants were **deceived**. They were told that they were taking part in a study to investigate language proficiency. However, this use of deception would be **considered necessary**, as the researchers wouldn't have been able to adequately manipulate the independent variable and get the result they did if they told participants the truth.
7. **Yes!** Firstly, the study lacks **ecological validity**. Secondly, **researcher/ experimenter bias and confirmation bias** may have played a large part in the result of the study, since the researchers used **manual stopwatches**. Finally, despite there being a significant statistical difference between the walking speed of both conditions. This difference is **less than one second,** which could be explained by **chance**.

1.4. References

Bargh, J. A., Chen, M., & Burrows, L. (1996). Automaticity of social behavior: Direct effects of trait construct and stereotype activation on action. *Journal of Personality and Social Psychology*, *71*(2), 230.

Research Scenario 6: Violence and Video Games

Below is a short piece of text (adapted from Gabbiadini, Riva, Andrigherro, Volpato & Bushman (2013) Interactive *Effect of Moral Disengagement and Violent Video Games on Self-Control, Cheating, and Aggression*). Read through the text and answer the questions below. Examples are given for possible answers on the supplementary worksheet.

1.1. Research Summary

The aim of Gabbiadini et al. (2014) was to examine the effect of violent video games on three moral behaviors; lack of self-control, cheating and aggression. The researchers predicted that exposure to violent video games would increase immoral behaviors (i.e. lack of self-control, cheating and aggression), especially in people high in moral disengagement.

The participant sample consisted of 172 Italian High School students. The mean age of participants was 15.7 years and 58% were male. The parental consent rate was 100%, and 100% of the participants agreed to take part in the study of their own free will.

All participants were tested individually, the testing took place on their High school campus. Participants were informed that the study was to investigate the effects of video games on cognitive ability. Participants were randomly assigned to play either a violent (Grand theft auto III or Grand theft Auto San Andreas) or a non-violent (Pinball 3D or Mini golf 3D) video game for 35 minutes, after 10 minutes of practice. Despite there being a number of ways to measure self-control, the researchers chose unhealthy food consumption, due to its perceived relevance to the sample.

During the experiment, a bowl containing 100g of M&M chocolates were placed next to the computer. Participants were told that they could freely eat them, but they were also advised that a high consumption of sweets in a short amount of time is unhealthy. The researchers believed that this would encourage participants to control their impulses, the number of sweets left in the bowl was used to measure self-control. After the gameplay session was over, moral

standards were measured using a 16-item Moral Disengagement Scale. Some items on the scale were as follows “Compared to the illegal things people do, taking some things from a store without paying for them is not very serious” and “It is okay to insult a classmate because beating him/her is worse” (1= completely disagree to 7= completely agree).

To measure cheating, participants were told they could earn one raffle ticket for each problem they solved on a 10-item logic test. The raffle tickets for each problem could be used to win an attractive prize (e.g. iPad). After 4 minutes, the participants were asked to score their own responses and take a lottery ticket for each item they answered correctly. Therefore, participants could cheat by taking more tickets than they earned from an envelope containing many tickets. Because researchers knew how many tickets were in the envelope, they could determine the number of unearned tickets they took (i.e. how many they cheated to gain an advantage in the raffle).

The researchers found that violent video game players exercised less self-control (i.e. ate more M & M than non-violent players). Results also showed that there was a significant negative correlation between moral disengagement and self-control for violent game players, and that males ate more M&M’s then females did. The researchers also found that violent video game players cheated more than non-violent video game players. Participants who played violent video games took significantly more unearned raffle tickets than those who played a non-violent video game. There was a significant positive relationship between moral disengagement and cheating for participants who played violent video games.

Finally, participants were fully debriefed. The researchers explained the use of deception and why it was necessary, disclosed the true purpose of the study, and then discussed the potentially harmful effects of violent video games. During the raffle, about 2 weeks later, prizes were given to randomly selected students. Based on the results of the study, the researchers concluded that violent video games decreased self-control and increased cheating, especially in people who were high in moral engagement.

1.2 Research Breakdown

When critically thinking about a piece of research it often helps to breakdown the research and think about how each individual part of the research process may have affected the conclusion the researcher made. Take some time to think about the research and how it was conducted, discuss it with a partner and then answer the questions below[1].

1. What was the research question/ aim of the research?
2. What data collection method(s) did the researcher(s) use to collect their data?
    a. What is a potential strength of the method(s) they have used?
    b. What is a potential weakness of the method(s) they have used?
3. Based on your answers to the previous question. What other method(s) could they have used to collect their data?
4. What participant sample have the researcher(s) used?
5. Explain your answer. Do you think the researcher(s) would have got the same result if:
    a. They used a different participant sample.
    b. They used a different data collection method.
    c. They used different materials, measures, examples or procedure.
6. Can you identify any potential ethical issues with the study?
7. Based on your answers to the previous questions. Are there any problems with the researcher(s) conclusions and explain the problems (If there are any)?

1.3 Possible Answers to the questions

1. The aim of Gabbiadini et al. (2014) was to examine the effect of violent video games on three moral behaviours; lack of self-control, cheating and aggression. The researchers predicted that exposure to violent video games would increase immoral behaviours, especially in people high in moral disengagement.
2. The researchers used a lab experiment/ controlled experiment to collect their data.
    a. The data collection method used in this study has several strengths. Since it's a lab experiment, it's easily **replicated** because the researchers generated a standardised procedure for the purposes of the experiment. A lab experiment also allows for the **precise control** of extraneous and independent variables. This further allows the researcher to precisely measure the exact effect the independent variable (i.e. game type) has on the dependent variables (i.e. self-control, cheating, and aggression).
    b. The data collection method used in this study has several weaknesses. The most notable is that it **lacks ecological validity**. The use of a lab experiment created an **artificial environment** which is far removed from real-life. Especially, in the case of this study where the environment is particularly contrived.
3. There are several other methods the researchers could have used to collect their data. For example; they could have used a **series of questionnaires**, which asked how many hours the participants played video games for and what kind of video games they played, and measured their moral behaviours (i.e. self-control, cheating and aggression). This would have allowed them to get a much larger and more generalizable sample.
4. The sample in this study consisted of **172 Italian High School students, 58% of the sample was male, while the other 42% were female. The mean age of participants was 15.7 years.**
5.

a. **No!** The sample can be considered **WEIRD** (White, educated, Industrial, Rich and Democratic), the **sample size is also small**, which effects **generalisability**. In addition, since the participants moral behaviours (self-control, cheating and aggression) were **not measured prior to the study**, the sample may be **biased** and contain a group of highly immoral individuals.

b. **Possibly!** The study was only a snapshot of the participants' behaviour, it was also very contrived. Since, the researchers n**ever followed up or conducted a longitudinal study** it is unknown if the effect they described (i.e. that violent video games decrease self-control and increase cheating and aggression behaviours) was **long-lasting or transient**. In other words, a real-effect or a product of the study design.

c. **No!** The researchers never asked participants if they **regularly played violent video games**, which would have an effect on the results. In addition, it could be argued that the researcher's choice to use amount of chocolate eaten as a measure of self-control **brings the reliability and validity of the results into question**. For example, since participants were tested individually, this would have been done over a long period of time. What if the participant was just hungry at the time of the experiment? And, that is why they ate the M & M's.

6. There are several ethical issues with this study, one of which is that the participants were **deceived**. They were told that they were taking part in a study to investigate the effects of video games and cognitive ability. However, this use of deception would be **considered necessary**, as the researchers wouldn't have been able to adequately manipulate the independent variable and get the result they did if they told participants the truth.

7. **Yes!** The researchers concluded that violent video games decreased self-control and increased cheating, especially in people with high moral disengagement. However, the way the researchers **measured self-control is suspect**. The **reliability** and **validity** of sweets consumed in a given time period is a **questionable measure of self-**

control. Additionally, participants moral behaviours (self-control, cheating and aggression) were **not measured prior to the study**, the sample may have been **biased** and contained a group of highly immoral individuals.

1.4 References

Gabbiadini, A., Riva, P., Andrighetto, L., Volpato, C., & Bushman, B. J. (2014). Interactive effect of moral disengagement and violent video games on self-control, cheating, and aggression. *Social Psychological and Personality Science*, *5*(4), 451-458.

Research Scenario 7: Chocolate Consumption, Cognitive Function and Nobel Laureates

Below is a short piece of text (adapted from Messerli (2012) *Chocolate Consumption, Cognitive Function and Nobel Laureates*). Read through the text and answer the questions below. Examples are given for possible answers on the supplementary worksheet.

1.1 Research Summary

Dietary flavonoids are abundant in plant-based foods, they have been shown to improve cognitive function. A subclass of flavonoids called “Flavanols” are found in a wide array of food including; cocoa, green tea, red wine, and some fruits. Since cocoa is the main ingredient in chocolate the researcher wished to examine if there is a correlation between chocolate consumption and cognitive ability. Not just for individuals, but for an entire population.

The researcher could not find any overall data for individual countries cognitive performance, so they decided that the total number of Nobel Prize winners per capita would be a suitable surrogate. The idea being that the number of Nobel Prize winners per capita is a valid indicator of countries with superior intelligence.

The researcher ranked countries by the number of Nobel Prize winners per capita from a list downloaded off Wikipedia. Since the population of a country is substantially higher than its number of Nobel Prize winners, the number of Nobel Prize winners had to be multiplied by 10 million. Therefore, the numbers must be read as the number of Nobel Prize winners for every 10 million people in each country. Data on chocolate consumption was obtained for 22 countries from two websites about chocolate. Data were available from 2011 for one country (Switzerland), from 2010 for 15 countries, from 2004 for 5 countries, and from 2002 for one country (China).

Results from the study showed a strong significant positive correlation (r = 0.79, p <.01) between chocolate consumption per capita and number of Nobel Prize winners per 10 million persons in a total of 23 countries. When Sweden was excluded, the correlation coefficient rose to 0.86. Sweden was excluded as the results suggested it should have produced a total of about 14 Nobel Prize winners per capita, yet they were observed to have a total of 32 Nobel prize winners per 10 million people. Switzerland was the top performing country for both chocolate consumption and number of Nobel Prize winners per 10 million people per capita. Results also showed that it would take about 0.4kg of chocolate consumption per capita per year to increase the total number of Nobel Prize winners by one. For countries like the United States this would amount to 125 million kg of chocolate consumption per year.

The researchers concluded that chocolate consumption enhances cognitive function, and it closely correlates with the total number of Nobel Prize winners in each country. However, it is yet to be determined if it is the flavonoids in the chocolate that are the underlying mechanism for the observed association with improved cognitive function.

1.2 Research Breakdown

When critically thinking about a piece of research it often helps to breakdown the research and think about how each individual part of the research process may have affected the conclusion the researcher(s) made. Take some time to think about the research and how it was conducted, discuss it with a partner and then answer the questions below[6].

1. What is the research question/ aim of the research?
2. What data collection method(s) did the researcher(s) use to collect their data?
    a. What is a potential strength of the method(s) they have used?
    b. What is a potential weakness of the method(s) they have used?
3. Based on your answers to the previous question. What other method(s) could they have used to collect their data?
4. What participant sample have the researcher(s) used?
5. Explain your answer. Do you think the researcher(s) would have got the same result if:-
    a. They used a different participant sample.
    b. They used a different data collection method.
    c. They used different materials, measures, examples or procedure.
6. Can you identify any potential ethical issues with the study?
7. Based on your answers to the previous questions. Are there any problems with the researcher(s) conclusions and explain the problems (If there are any)?

[6] (Questions adapted from Sternberg, R. J., Roediger III, H. L., & Halpern, D. F. (2007) *Critical Thinking in Psychology*. New York NY: Cambridge University Press. Pg. 34)

1.3 Possible Answers to the questions:

1. The aim of the study was to investigate if there was a **correlation** between **chocolate consumption** and a **countries cognitive function**.
2. The researcher used a **correlation study** to examine the statistical relationship between **chocolate consumption** and **cognitive function.**
    a. A potential strength of using a **correlational study design** in this context is that it allowed the researcher to investigate the **naturally occurring variables** (i.e. chocolate consumption and cognitive function) that would have been **impractical** in any other context. A correlation study would also allow the researcher to **easily see** if there is a relationship between the two variables.
    b. A potential weakness of using a **correlational study design** in this context is that the researcher cannot imply that chocolate consumption is the cause of the difference in amount of Nobel prize winners per country. **Correlation does not equal causation.** Even if there is a **very strong** association between two variables. Additionally, correlation does not allow the researcher to go beyond the data. By illustration, it would not be legitimate to imply that consuming more chocolate would increase cognitive function or increase a person's chance of winning a Nobel Prize.
3. The researcher could have conducted a **lab experiment.** The researcher could utilise a pre-test post-test **between subjects design** where participants cognitive function is tested, then they are allocated to either a **control group,** where they have participants just eat normally or a second group where they are instructed to increase their chocolate consumption. Then the researcher would measure to see if there is a difference in cognitive function between the groups.
4. This study does not have a participant sample in the traditional sense. However, the **countries** and **Nobel prize winners** can be thought of as participants in this study.

5.

a. **No**! You have to decide if the number of Nobel Prize winners per country is an **accurate** and **valid** measure of a countries overall cognitive function. It is **highly assumptive.** Additionally, it is based on the idea that Nobel prize winners have **superior cognitive function**, however the researcher does not present any evidence to support this. Additionally, there are also a myriad of other factors that contribute to someone being given a Nobel Prize that the researcher does not consider.

b. **No!** Since the researcher used a **correlation study** and only looked at **two variables**. They have not considered what **other variables** could have explained the results. This is apparent when the researcher discusses how they excluded Sweden from the study as it did not fit with their results. By illustration, there could be a **third variable** that could be driving both chocolate consumption and a countries number of Nobel prize winners. If the researcher used something like a **questionnaire**, they could explore other factors such as, **differences in socioeconomic status, geography and climate factors** which may play some role.

c. **No**! As previously mentioned, the number of Nobel prize winners is not a **valid measure** of a countries cognitive function nor an indicator of a **country's superior intelligence**. Therefore, if they used a more **valid and reliable measure of cognitive function** the results would no doubt be different. But even if you thought it was chocolate consumption and the number of Nobel prize winners that led to the result these are **time-dependent variables** and change from year to year.

6. There are **no** obvious ethical issues with this study.
7. **Yes!** The researcher concluded that "**chocolate consumption enhances cognitive function, and it closely correlated with the total number of Nobel Prize winners in each country"**. However, correlation is not causation, so they cannot imply that one causes the other. By illustration, **countries that have higher cognitive function could**

consume more chocolate. Also, number of Nobel prize winners per country is not a **valid measurement** of a countries overall **cognitive function**.

1.4. References

Messerli, F. (2012). Chocolate Consumption, Cognitive Function, and Nobel Laureates. *New England Journal Of Medicine*, *367*(16), 1562-1564. doi: 10.1056/nejmon1211064

Research Scenario 8: When Names Sabotage Success

Below is a short piece of text (adapted from Nelson & Simmons (2007) *Moniker Maladies When Names Sabotage Success*). Read through the text and answer the questions below. Examples are given for possible answers on the supplementary worksheet.

1.1 Research Summary

Nelson and Simmons (2007) conducted five studies examining if people like their names enough to consciously avoid negative outcomes that resemble their names. For example, they found that students whose names began with letters associated with poorer academic performance (i.e. C and D) performed worse than those associated with better academic performance (i.e. A and B). The first four studies suggested that people whose initials match objectively undesirable performance outcomes perform worse than people with other initials. Additionally, these studies demonstrate this effect in real-world situations that have important consequences: Baseball strikeouts, grades, and graduate school performance can affect salaries, status and career.

However, the aforementioned studies were heavily criticised for using archival data. In order to definitively demonstrate that initials affect performance, the researchers conducted an experiment in which participants (*N*= 284) were randomly assigned into two groups. These were called initial-matching and initial-irrelevant. Participants were recruited for an online experiment. They were told they would be entered into a $50 lottery for taking part and could win an additional prize of $100. The participants all lived in the United States were predominately female (83%) and ranged in age from 18 to 67 years (*M* = 33).

Participants were asked a series of unrelated demographic questions, including asking their first and last initials. After this, participants were told that they would be taking part in an anagram task, which involved unscrambling a set of letters in order to form English Words. Participants were asked to solve four relatively easy practice anagrams, they then had to complete as many anagrams as possible before proceeding to the next screen.

On the next screen participants were asked to solve 10 different anagrams, including two that were unsolvable, and were told to take as much time as they wanted to complete the task. Participants were told that for all those who completed all 10 anagrams, they would be entered into a lottery where they could win more than $100, and if they gave up or could not solve all the anagrams they would be entered into a lottery where they would win less than $100. The critical manipulation involved the labels for the two buttons. In the initial-irrelevant condition the buttons displayed randomly assigned, initial-irrelevant prize labels (e.g. Prize X and Prize Y). In the initial-matching positive condition, the “more than $100 button” displayed the word prize plus participants first initial (e.g. Prize A), and then “less than $100 button” displayed a random letter. In the initial-matching negative condition the “more than $100” displayed a random letter, and the “less than $100” displayed the participants first initial (e.g. Prize A).

The researchers hypothesised that participants whose initials matched the label for the consolation (e.g. less than $100) prize would solve the fewest anagram. They also expected participants whose initials matched the prize for solving all the anagrams to perform no better than participants whose initials matched neither of the prizes. Before analysing the data, the researchers eliminated two types of participant. They eliminated participants who did not answer any of the anagrams correctly (approximately 6% of the sample) and therefore seemed to have abandoned the task. They also eliminated participants who claimed to have answered all the anagrams correctly (approximately 13% of the sample) because that was impossible. This left 225 participants within the study.

The researchers found that prize labels significantly influenced performance on the anagram task. The results showed that those whose initials matched the “less than $100” button performed worse than people whose initials matched the “more than $100 button”, or those whose initials did not match any of the buttons. However, those whose initials matched the “more than $100 button” did not do better than those whose initials did not match any buttons.

The researchers concluded that name liking guides the pursuit of initial-resembling performance outcomes, even when those outcomes are explicitly negative. Therefore, people

solved fewer anagrams when the consolation prize for poor performance was labelled with their first initial.

1.2 Research Breakdown

When critically thinking about a piece of research it often helps to breakdown the research and think about how each individual part of the research process may have affected the conclusion the researcher(s) made. Take some time to think about the research and how it was conducted, discuss it with a partner and then answer the questions below[7].

1. What is the research question/ aim of the research?
2. What data collection method(s) did the researcher(s) use to collect their data?
    a. What is a potential strength of the method(s) they have used?
    b. What is a potential weakness of the method(s) they have used?
3. Based on your answers to the previous question. What other method(s) could they have used to collect their data?
4. What participant sample have the researcher(s) used?
5. Explain your answer. Do you think the researcher(s) would have got the same result if:-
    a. They used a different participant sample.
    b. They used a different data collection method.
    c. They used different materials, measures, examples or procedure.
6. Can you identify any potential ethical issues with the study?
7. Based on your answers to the previous questions. Are there any problems with the researcher(s) conclusions and explain the problems (If there are any)?

[7] (Questions adapted from Sternberg, R. J., Roediger III, H. L., & Halpern, D. F. (2007) *Critical Thinking in Psychology*. New York NY: Cambridge University Press. Pg. 34)

1.3 Possible Answers to the questions:

1. The overall aim of Nelson and Simmons (2007) research was to **investigate** if people like their names enough to **consciously avoid negative outcomes** that **resemble their names**. The researchers used a **lab experiment** in order to collect their data.

    a. A potential strength of using a lab experiment is that they are **easy to replicate** because the researcher has taken the time to produce a **standardized procedure**. Additionally, they also allow for precise control of **extraneous variables** and **independent variables** (i.e. initial matching or initial irrelevant condition). This allows for a **cause and effect relationship** to be established.
    b. A potential weakness of using lab experiments is the **artificiality of the setting**. By illustration solving an anagram is not a reflection of real-life, the study is **low in ecological validity**. Particularly when compared to the other four studies, which looked at baseball strikeout rates, grades and graduate school performance. In addition, lab experiments are also **highly susceptible to demand characteristics and experiments effects** which may affect the results.

2. Based on the aforementioned weaknesses of the study i.e. **low ecological validity** due to its artificial nature and susceptibility to experimenter effects, the researchers could have conducted a **field experiment**. This would have still allowed the researcher to manipulate the **independent variable** (initial matching or initial irrelevant), but in a real-life setting. For example, they could run the experiment in a classroom over a term and see if children whose name begins with a C or a D, perform worse than children's whose name beings with A or a B.

3. The sample consists of **284** participants, **83%** of the sample were **female** and range in age from **16 to 67 years (*M* = 33).** All the participants lived in the United States. Participants were randomly allocated to either condition.
4.
    a. **Possibly**! Since the sample is predominately female, which mean its **gender bias** and it's entirely comprised of people living in the United States, which means its **culturally bias**. It would be interesting to investigate how the study would replicate in other countries with a different participant sample make up.
    b. **No!** these results would probably **not replicate** outside the lab because they are so easy to **falsify**. For example, it takes one person whose name begins with C or D to outperform someone on a test whose name begins with A and B to disprove the conclusion. There are countless examples of people whose name begins with undesirable letters that do **extremely well in the real world**.
    c. **No!** Firstly, the task is **very artificial**, the researcher would probably find a different result if the task was more **high stakes**. Secondly, if the results of the study are correct participants should do better if their names matched the "more than $100" prize button but they did not. Finally, the study is based on the idea that participants are pairing the concept of **failure** with their **own name**, however, the researchers do not really explain why this is
5. There are **no** obvious ethical issues with this study.
6. **Yes!** The conclusion itself is **reductionist** and **deterministic**. It suggests that people's failures can be attributed to if their name has an undesirable initial. The study itself appears to be well-controlled and some may consider it **"scientific".** But actually, the results have no basis in scientific fact, there is a lack of **real-world** evidence to support their claim. The study could be considered **pseudoscientific** due to its **exaggerated claims** and reliance on **confirmation bias**.

1.4 References

Nelson, L., & Simmons, J. (2007). Moniker Maladies: When Names Sabotage Success. *SSRN Electronic Journal*. doi: 10.2139/ssrn.946249

Research Scenario 9: Gender Behaviour and Facial Expression

Below is a short piece of text (adapted from Landis (1924) *General Behavior and Facial Expression*). Read through the text and answer the questions below. Examples are given for possible answers on the supplementary worksheet.

Research Summary

The purpose of this study was to describe, analyse, and classify the general behaviour of "normal individuals" with special reference to facial movements, head reactions, verbal reactions, and to also explore sex differences, during a controlled series of situations designed to arouse emotional responses.

The study sample consisted of 25 participants, 12 of the participants were male and 12 of the participants were female; the other participant was a 13-year-old boy, who had been admitted to the university hospital suffering from high blood pressure, which was thought to be caused by emotional instability. Of the female participants, eight were assistants or graduates within the Psychology department. One of the female participants was a stenographer, one was a music student, one was a school-teacher and one was a psychology clinician. Only two of the female participants were married. All of the male participants were connected to the Psychology department in some way. One was an undergraduate majoring in Sociology. Five of the men were married. The participants ages ranged from 13 to 41 years of age. All the participants apart from the boy had known about the experiment for some time.

The researchers required participants to take part in a series of 25 situations which were designed to elicit an emotional response. During each of the situations, researchers would measure changes in participants blood pressure and take a photograph of every change in the participants' facial expression. It was hoped that the researcher could use the photographs to identify which muscle was responsible for the facial expression, however, the nature of the movement involved meant the photos were blurry.

The 25 situations varied significantly, they included various activities, for example; listening to popular music, reading a passage from the bible, reacting to skin diseases, and mental multiplication. In one of the situations, the experimenter lit a fire cracker behind the participants chair in order to see how they would react to a gun shot. In another situation, participants were asked to close their eyes and place their hand in a bucket that contained three live frogs. In addition to the frogs, there was also a conduit in the bottom of the bucket, which would deliver a powerful electric shock if the participant touched it. In situation 15, participants were presented with a live rat and a butcher's knife by the researcher and asked to cut off the rat's head. If the participants declined the researcher cut off the rat's head instead, in front of the participant.

The researcher suggested that the attitude the participants had before the experiment began varied greatly, and most likely had an effect on the results. For example, some participants entered the room "in fear and trembling", while others walked in passively like a "goat being offered for sacrifice". The results of the study showed that smiling was the most common facial expression with 34% of the photographs depicting the participants smiling. The males in the experiment were more expressive than the women. Men tended to react with anger and profanity, whereas, women tended to cry and plead with the researcher to stop the experiment.

The researcher concluded that the more disturbing situations were the cause of differences in facial expressions and participants responses, rather than any specific individual difference or subjective reaction.

Research Breakdown

When critically thinking about a piece of research it often helps to breakdown the research and think about how each individual part of the research process may have affected the

conclusion the researcher made. Take some time to think about the research and how it was conducted, discuss it with a partner and then answer the questions below[8].

1. What was the research question/ aim of the research?
2. What data collection method(s) did the researcher(s) use to collect their data?
    a. What is a potential strength of the method(s) they have used?
    b. What is a potential weakness of the method(s) they have used?
3. Based on your answers to the previous question. What other method(s) could they have used to collect their data?
4. What participant sample have the researcher(s) used?
5. Explain your answer. Do you think the researcher(s) would have got the same result if:-
    a. They used a different participant sample.
    b. They used a different data collection method.
    c. They used different materials, measures, examples or procedure.
6. Can you identify any potential ethical issues with the study?
7. Based on your answers to the previous questions. Are there any problems with the researcher(s) conclusions and explain the problems (If there are any)?

[8] (Questions adapted from Sternberg, R. J., Roediger III, H. L., & Halpern, D. F. (2007) *Critical Thinking in Psychology*. New York NY: Cambridge University Press. Pg. 34)

Possible Answers to the questions

1. The aim of the research was to **describe**, **analyse,** and **classify** the general behaviour of "normal individuals" with special reference to **facial movements, head reactions, verbal reactions, and to also explore sex differences**, during a controlled series of situations designed to arouse emotional responses.

2. They used a **lab experiment** to collect their data.

    a. A potential strength of the study is that it is **easy to replicate**, since it's a lab experiment a **standardized procedure** will have been generated for researchers to follow. Another strength of using a lab experiment is that it allows for **precise control** of **extraneous** and **independent variables**. This allows for **cause and effect relationships** to be established.

    b. A potential weakness of the study is that the setting is **artificial**, and it may produce unnatural behaviour that does not reflect real life i.e. **low in ecological validity**. For example, the most common facial expression was smiling, which could either indicate nervous laughter or that the participant was not taking the experiment seriously. Another weakness could be **demand characteristic/ experimenter effects,** which may bias results. By illustration, the judging of facial expressions requires a subjective element as it is open to interpretation.

3. The researcher could have conducted a **controlled observation**. Where the researcher **covertly films participants** completing a series of natural tasks designed to elicit emotional responses. For example, the researcher could film the participants watching a series of film clips designed to elicit some type of response, and then observe and record changes in the participants facial expressions. In addition, the researcher should have more than one person recording when they notice a change in participants facial expression to ensure **inter-rater reliability**

4. The participant sample consisted of **25 participants**, **12 females** and **12 males** and a **13-year-old boy**. Participants ages ranged from **13 to 41 years old**.

5.

   a. **No!** The sample is **WEIRD** (White, Educated, Industrialised, Rich and Democratic), they were also either psychology students or associated with the **psychology department**, which means they may have had **prior knowledge of the study or experiment design**. Therefore, **demand characteristics** may have had an effect on the results. Finally, the underage boy used in the experiment, was admitted to the university hospital because of **high blood pressure** and **emotional instability**, this would have no doubt affected how he reacted to each situation. Additionally, 25 participants is too small of a sample to compare gender differences. The external/ ecological validity and generalisability of the findings is questionable.

   b. **No!** You have to question the reliability of the data. Even the researcher admits that the camera produced blurred pictures and the camera couldn't take pictures while the participant was moving. Meaning they could have missed a significant proportion of facial expression changes. Also, the **experiment is contrived** and **artificial**, the researcher found that 34% of the pictures contained people smiling, suggesting that the participants were **either laughing through nervousness** or **not taking it seriously**. Something like a covert observation would have minimised this.

   c. **No!** The **situations** that the researcher used were **horrifying,** which probably led to some **extreme reactions**. A study of this type would not be allowed to be conducted under current British Psychological Society ethical procedures. Secondly, the camera they used was not good enough to pick up **subtle facial expression differences**, as the researcher had to wait till the participant was not

moving to take the picture. They would be able to pick up greater facial expression differences if they filmed the participants with modern cameras, which obviously were not available at the time. This would also minimise **experimenter bias**, as the researcher took a picture every time, they perceived that the participants facial expression changed, which is highly subjective and open to **confirmation bias.**

6. There are a number of ethical issues with this study. Firstly, one of the participants is **below 16 years of age**. The researcher does not mention if they **sought parental consent** for him to take part in the study. Secondly, the boy had been admitted to hospital with **high blood pressure**, which was thought to be caused by **emotional instability**, the nature of the experiment may have exacerbated this. Thirdly, some of the "situations" the researcher used to elicit an emotional response are **akin to torture** e.g. electric shocks, faking a gun shot and decapitating a rat. Finally, the researcher acknowledges that participants were **visibly upset before, during and after the study**, yet did nothing to prevent this. The researcher actually found that some of the participants **pleaded with them to stop the experiment**, yet they continued. Finally, the researcher never discusses whether they **debriefed participants** or not.

7. **No!** Despite all the unethical things the researcher did during this study. The researcher's conclusion is probably accurate.

References

Landis, C. (1924). Studies of Emotional Reactions. II. General Behavior and Facial Expression. *Journal of Comparative Psychology*, 4(5), 447.

Research Scenario 10: "Beauty is in the eye of the beer holder"

Below is a short piece of text (adapted from Bègue, Bushman, Zerhouni, Subra & Ourabah, 2012). Read through the text and answer the questions below. Examples are given for possible answers on the supplementary worksheet.

1.1 Research Summary

Bègue et al. (2012) reported on two experiments which aimed to investigate the role of alcohol consumption in perceived attractiveness. In study one researchers wished to test the hypothesis that intoxicated people think that they are more attractive than sober people do. In study two researchers wanted to experimentally test the expectancy and pharmacological effects of alcohol consumption on self-evaluated attractiveness.

The sample in study one consisted of 19 customers (63% males, *M*age = 22.5, *SD* = 5.0, range = 19-40) in a barroom in Grenoble, France. Participants in study one received a lottery ticket for their participation in the study. Participants were asked to rate themselves on how *attractive, bright, original,* and *funny* they felt at the moment (1= *not at all* to 7 = *extremely*). Additionally, participants in the first study were breathalysed in order to estimate their blood alcohol level (BAL). Participants were debriefed following the study.

The researchers found that the higher a participants BAL, the more attractive they thought they were (r = .56, p <.05). The researchers concluded that the results were consistent with the hypothesis that intoxicated people think they are more attractive than sober people do. Due to the correlational nature of this first study, researchers carried out another study to investigate the possible origins of the alcohol-self-perceived attractiveness relationship.

The sample in study two consisted of 94 French men. Three men did not follow instructions, and a further five (two in the placebo condition and three in the anti-placebo condition) suspected a discrepancy between what they were told they were drinking and what they were actually given. The aforementioned participants were excluded from the study. Therefore, the final sample included 86 men (*M*age= 27, *SD* = 7) Participants were recruited via newspaper

advertisements for a taste-test study and were paid 14€. Men were interviewed over the phone about if they were allergic to any food, including alcohol. Potential at risk drinkers were excluded from the study.

In study two participants drank a beverage that did or did not contain alcohol. Within each group, half were told that the beverage contained alcohol and half were told it did not. Participants were then asked to deliver a speech for a filmed message, which supposedly would be used in future advertisements for the beverage. Participants were then asked to watch the filmed message, and rate how attractive, bright, original and funny they thought they were. Researchers thought that alcohol would increase a participant's self-perceived attractiveness, as it did in study one, but were unsure if this would be due to the pharmacological effects of alcohol or the expectancy effect, or both. In order to obtain an "objective" measure of how attractive participants were, 22 independent judges who were university students (36% males; M*age* =20, *SD* = 3), blind to beverage condition, also rated participants on the same aforementioned categories. All the judges were sober, researchers predicted that alcohol consumption would be unrelated to the objective measure of attractiveness.

Results of the study showed that participants who thought that they had consumed alcohol gave themselves more positive self-evaluations than those who thought they had not consumed alcohol. Results also showed that the boost in self-perceived attractiveness experienced by people who thought they were drunk was unrelated to the way they were perceived by independent judges. The independent judges gave similar attractiveness ratings to people who thought that they were drunk and to people who thought they were sober.

The researchers concluded that when people drink alcohol, they rate themselves as more attractive, but this self-perceived boost in attractiveness is an illusion, since the boost in attractiveness is only perceived by the individual who is drunk and not shared by anyone else.

1.2 Research Breakdown

When critically thinking about a piece of research it often helps to breakdown the research and think about how each individual part of the research process may have affected the conclusion the researcher(s) made. Take some time to think about the research and how it was conducted, discuss it with a partner and then answer the questions below[9].

8. What is the research question/ aim of the research?
9. What data collection method(s) did the researcher(s) use to collect their data?
    a. What is a potential strength of the method(s) they have used?
    b. What is a potential weakness of the method(s) they have used?
10. Based on your answers to the previous question. What other method(s) could they have used to collect their data?
11. What participant sample have the researcher(s) used?
12. Explain your answer. Do you think the researcher(s) would have got the same result if:-
    a. They used a different participant sample.
    b. They used a different data collection method.
    c. They used different materials, measures, examples or procedure.
13. Can you identify any potential ethical issues with the study?
14. Based on your answers to the previous questions. Are there any problems with the researcher(s) conclusions and explain the problems (If there are any)?

1.3 Possible Answers to the questions:

[9] (Questions adapted from Sternberg, R. J., Roediger III, H. L., & Halpern, D. F. (2007) *Critical Thinking in Psychology*. New York NY: Cambridge University Press. Pg. 34)

1. The aim of the research was to investigate the **role of alcohol consumption on perceived attractiveness**. The aim of study one was to test the hypothesis that **intoxicated individuals think they are more attractive than sober people do**. The aim of study two was to experimentally **test the expectancy and pharmacological effects of alcohol consumption on self-evaluated attractiveness**.
2. Study one is a **naturalistic experiment** that took place in a **bar in France.** Study two is a **lab experiment**
    a. **Study one: -** One potential strength of a naturalistic experiment is that it is more likely to **reflect real-life**. By illustration, the naturalistic experiment in this study took place in a **bar**, therefore the researchers would be able to study **"normal drinking behaviours"**. Also, since they take place in natural environments, the results are less susceptible to **demand characteristics** and **experimental effects**. **Study two: -** One potential strength of a lab experiment is that it is **easy to replicate**, since the researchers would have had to produce a **standardised procedure**. In addition, lab experiments allow for the **precise control of extraneous and independent variables**, therefore **cause and effect relationships** can be established.
    b. **Study one: -** One potential weakness of a naturalistic experiment is that the researchers have **no control over extraneous variables**, therefore the results may be **biased**. Naturalistic experiments are also **expensive, time consuming and difficult to replicate**. **Study two: -** One potential weakness of a lab experiment is that they are low in **ecological validity**, since the environment the researcher creates by controlling for extraneous variables is **artificial.**
3. The researchers could have conducted a more **robust naturalistic experiment**. They could have recruited participants from the campus pub or parties over a **three-month period** and asked them to rate an unfamiliar series of faces on attractiveness from the gender they are attracted to. They could breathalyse participants, those who were

drunk would be the **experiment group,** while those who were sober would be the **control group.**

4. The sample in study one consisted of **19 customers (63% male, *M*age = 22.5, *SD* = 5.0, Range = 19-40)** in a **bar in Grenoble France**. In study two, **86 French Men** were recruited via a newspaper article.

5.

   a. **No,** the sample in the first study is **very small with only 19 participants**. The sample is also **gender bias, with more than half of the participants being male**. In addition, the sample may also be culturally bias, since the naturalistic experiment took place in a bar in France. For example, it is well known that the French have a different drinking culture then the British. However, the researcher did not take sufficient demographic information in order to make this assessment. The sample in study two is also **gender bias, all of the 86 participants** that took part in the study were French men. This is an example of **androcentrism** and **beta bias.**

   b. **Possibly!** It is unknown if the effect the researcher observed was due to the research methods the researchers used. More research would need to be conducted in order to determine otherwise.

   c. **No!** In study one researchers wished to test the hypothesis that **intoxicated people think that they are more attractive than sober people do**, and they chose to use a correlation design. This only told the researchers that there was an **association between alcohol consumption and self-perceived attractiveness**. They should have really got a group of sober people to rate themselves and then a group of drunk people and compare the scores. They didn't do this hence, why they had to conduct study two. In study two, the researchers claimed that getting 22 independent judges to rate participants was an **"objective measure" of attractiveness**. However, this is a **subjective measure of attractiveness** as each individual judge will have preferences.

The researchers do not take this or sexuality into consideration. They should have used a **more objective measure of attractiveness**, such as **facial symmetry**.

6. There are **no significant ethical issues** with this study. It could be considered that **deceiving** the participants by not telling them whether they were drinking alcohol or not is an ethical issue. However, **this deception was important in order to test the relationship between alcohol expectancy and self-perceived attractiveness.**
7. **No!** Based on the results they found, using the sample they had, the conclusion appears accurate and is consistent with what the researchers found.
8.

1.4. References

Bègue, L., Bushman, B. J., Zerhouni, O., Subra, B., & Ourabah, M. (2013). 'Beauty is in the eye of the beer holder': People who think they are drunk also think they are attractive. British Journal of Psychology, 104(2), 225-234.

Appendix X: Phase 3 – SPSS Output

Reliability

Scale: Pre-test R-PCTE (Lawson et al., 2015)

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.607	14

```
RELIABILITY
  /VARIABLES=Post_CTSkill1 Post_CTSkill2 Post_CTSkill3 Post_CTSkill4 Post_CTSkill5
Post_CTSKill6
    Post_CTSkill7 Post_CTSkill8 Post_CTSkill9 Post_CTSkill10 Post_CTSkill11
Post_CTSkill12
```

```
  Post_CTSkill13 Post_CTSkill14

 /SCALE('Post-test R-PCTE (Lawson et al., 2015)') ALL

 /MODEL=ALPHA.
```

Reliability

Scale: Post-test R-PCTE (Lawson et al., 2015)

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.574	14

```
RELIABILITY
  /VARIABLES=Pre_Perception1 Pre_Perception2 Pre_Perception3 Pre_Perception4
Pre_Perception5
    Pre_Perception6 Pre_Perception7 Pre_Perception8 Pre_Perception9 Pre_Perception10
Pre_Perception11
    Pre_Perception12 Pre_Perception13 Pre_Perception14 Pre_Perception15
Pre_Perception16
    Pre_Perception17 Pre_Perception18 Pre_Perception19 Pre_Perception20
  /SCALE('Pre-test Course Evaluation Form (Foundation for Critical Thinking in Instruction,
2007)')
    ALL
  /MODEL=ALPHA.
```

Reliability

Scale: Pre-test Course Evaluation Form (Foundation for Critical Thinking in Instruction, 2007)

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all

variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.926	20

```
RELIABILITY
  /VARIABLES=Post_Perception1 Post_Perception2 Post_Perception3 Post_Perception4
Post_Perception5
    Post_Perception6 Post_Perception7 Post_Perception8 Post_Perception9
Post_Perception10
    Post_Perception11 Post_Perception12 Post_Perception13 Post_Perception14
Post_Perception15
    Post_Perception16 Post_Perception17 Post_Perception18 Post_Perception19
Post_Perception20
  /SCALE('Post-test Course Evaluation Form (Foundation for Critical Thinking in Instruction,
'+
    '2007)') ALL
  /MODEL=ALPHA.
```

Reliability

Scale: Post-test Course Evaluation Form (Foundation for Critical Thinking in Instruction, 2007)

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.952	20

RELIABILITY

/VARIABLES=Pre_CTMS1 Pre_CTMS2 Pre_CTMS3 Pre_CTMS4

```
/SCALE('Pre-test CTMS Expectancy') ALL

/MODEL=ALPHA.
```

Reliability

Scale: Pre-test CTMS Expectancy

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.753	4

```
RELIABILITY

/VARIABLES=Post_CTMS1 Post_CTMS2 Post_CTMS3 Post_CTMS4
```

/SCALE('Post-test CTMS Expectancy') ALL

/MODEL=ALPHA.

Reliability

Scale: Post-test CTMS Expectancy

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.803	4

```
RELIABILITY
  /VARIABLES=Pre_CTMS5 Pre_CTMS6 Pre_CTMS7 Pre_CTMS8
  /SCALE('Pre-test CTMS Attainment') ALL
  /MODEL=ALPHA.
```

Reliability

Scale: Pre-test CTMS Attainment

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.792	4

```
RELIABILITY
  /VARIABLES=Post_CTMS5 Post_CTMS6 Post_CTMS7 Post_CTMS8
  /SCALE('Post-test CTMS Attainment') ALL
  /MODEL=ALPHA.
```

Reliability

Scale: Post-test CTMS Attainment

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items

.809	4

RELIABILITY

/VARIABLES=Pre_CTMS9 Pre_CTMS10 Pre_CTMS11 Pre_CTMS12

/SCALE('Pre-test CTMS Utility Value') ALL

/MODEL=ALPHA.

Reliability

Scale: Pre-test CTMS Utility Value

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.828	4

```
RELIABILITY
  /VARIABLES=Post_CTMS9 Post_CTMS10 Post_CTMS11 Post_CTMS12
  /SCALE('Post-test CTMS Utility Value') ALL
  /MODEL=ALPHA.
```

Reliability

Scale: Post-test CTMS Utility Value

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.003	4

```
RELIABILITY
  /VARIABLES=Pre_CTMS13 Pre_CTMS14 Pre_CTMS15 Pre_CTMS16
  /SCALE('Pre-test CTMS Intrinsic/interest value') ALL
  /MODEL=ALPHA.
```

Reliability

Scale: Pre-test CTMS Intrinsic/interest value

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items

.760	4

RELIABILITY

/VARIABLES=Post_CTMS13 Post_CTMS14 Post_CTMS15 Post_CTMS16

/SCALE('Post-test CTMS Intrinsic/interest value') ALL

/MODEL=ALPHA.

Reliability

Scale: Post-test CTMS Intrinsic/interest value

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items

.834	4

RELIABILITY

/VARIABLES=Pre_CTMS17 Pre_CTMS18 Pre_CTMS19

/SCALE('Pre-test CTMS Cost') ALL

/MODEL=ALPHA.

Reliability

Scale: Pre-test CTMS Cost

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.712	3

```
RELIABILITY
  /VARIABLES=Post_CTMS17 Post_CTMS18 Post_CTMS19
  /SCALE('Post-test CTMS Cost') ALL
  /MODEL=ALPHA.
```

Reliability

Scale: Post-test CTMS Cost

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items

.790	3

RELIABILITY

/VARIABLES=Pre_CTMS5 Pre_CTMS6 Pre_CTMS7 Pre_CTMS8 Pre_CTMS9 Pre_CTMS10 Pre_CTMS11 Pre_CTMS12

Pre_CTMS13 Pre_CTMS14 Pre_CTMS15 Pre_CTMS16 Pre_CTMS17 Pre_CTMS18 Pre_CTMS19

/SCALE('Pre-test CTMS Task Value') ALL

/MODEL=ALPHA.

Reliability

Scale: Pre-test CTMS Task Value

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.876	15

```
RELIABILITY
  /VARIABLES=Post_CTMS5 Post_CTMS6 Post_CTMS7 Post_CTMS8 Post_CTMS9
Post_CTMS10 Post_CTMS11
    Post_CTMS12 Post_CTMS13 Post_CTMS14 Post_CTMS15 Post_CTMS16
Post_CTMS17 Post_CTMS18 Post_CTMS19
  /SCALE('Post-test CTMS Task Value') ALL
  /MODEL=ALPHA.
```

Reliability

Scale: Post-test CTMS Task Value

Case Processing Summary

		N	%
Cases	Valid	73	100.0
	Excluded[a]	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.279	15

```
GLM Pre_CTSkill Post_CTSkill Pre_CTPerception Post_CTPerception Pre_TaskValue
Post_TaskValue
   Pre_Expectancy Post_Expectancy BY Condition
 /WSFACTOR=PrePost 2 Polynomial
 /MEASURE=CT_Skill CT_Perceptions CT_Task_Value CT_Expectancy
 /METHOD=SSTYPE(3)
 /PLOT=PROFILE(PrePost*Condition)
 /EMMEANS=TABLES(Condition)
 /EMMEANS=TABLES(PrePost)
 /EMMEANS=TABLES(Condition*PrePost)
 /PRINT=DESCRIPTIVE ETASQ HOMOGENEITY
 /CRITERIA=ALPHA(.05)
 /WSDESIGN=PrePost
```

/DESIGN=Condition.

General Linear Model

Within-Subjects Factors

Measure	PrePost	Dependent Variable
CT_Skill	1	Pre_CTSkill
	2	Post_CTSkill
CT_Perceptions	1	Pre_CTPerception
	2	Post_CTPerception
CT_Task_Value	1	Pre_TaskValue
	2	Post_TaskValue
CT_Expectancy	1	Pre_Expectancy
	2	Post_Expectancy

Between-Subjects Factors

		Value Label	N
Condition	1.00	Control	29
	2.00	Experimental	44

Descriptive Statistics

	Condition	Mean	Std. Deviation	N
Pre_CTSkill	Control	17.3793	4.41923	29
	Experimental	16.2727	5.47452	44
	Total	16.7123	5.07849	73
Post_CTSkill	Control	20.0345	5.50638	29
	Experimental	20.1136	4.34670	44
	Total	20.0822	4.80380	73
Pre_CTPerception	Control	69.4694	12.22067	29
	Experimental	76.0906	11.69902	44

	Total	73.4602	12.26629	73
Post_CTPerceptio n	Control	68.9090	13.04324	29
	Experimenta l	78.3636	13.02608	44
	Total	74.6077	13.75489	73
Pre_TaskValue	Control	68.3290	7.05462	29
	Experimenta l	71.7253	8.81676	44
	Total	70.3761	8.28129	73
Post_TaskValue	Control	66.9526	8.03248	29
	Experimenta l	68.2727	17.29950	44
	Total	67.7483	14.29149	73
Pre_Expectancy	Control	14.2069	3.80206	29
	Experimenta l	14.3182	3.24770	44
	Total	14.2740	3.45310	73
Post_Expectancy	Control	13.7586	3.65137	29
	Experimenta l	15.0227	3.18783	44
	Total	14.5205	3.41203	73

Box's Test of Equality of Covariance Matrices[a]

Box's M	91.636
F	2.218
df1	36
df2	12168.972
Sig.	.000

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.[a]

a. Design: Intercept + Condition

Within Subjects Design: PrePost

Multivariate Tests[a]

Effect			Value	F
Between Subjects	Intercept	Pillai's Trace	.987	1315.601[b]
		Wilks' Lambda	.013	1315.601[b]
		Hotelling's Trace	77.388	1315.601[b]
		Roy's Largest Root	77.388	1315.601[b]
	Condition	Pillai's Trace	.121	2.347[b]
		Wilks' Lambda	.879	2.347[b]
		Hotelling's Trace	.138	2.347[b]
		Roy's Largest Root	.138	2.347[b]
Within Subjects	PrePost	Pillai's Trace	.296	7.135[b]
		Wilks' Lambda	.704	7.135[b]
		Hotelling's Trace	.420	7.135[b]
		Roy's Largest Root	.420	7.135[b]
	PrePost * Condition	Pillai's Trace	.054	.978[b]
		Wilks' Lambda	.946	.978[b]
		Hotelling's Trace	.058	.978[b]

		Roy's Largest Root	.058	.978[b]

Multivariate Tests[a]

Effect			Hypothesis df	Error df	Sig.
Between Subjects	Intercept	Pillai's Trace	4.000	68.000	.000
		Wilks' Lambda	4.000	68.000	.000
		Hotelling's Trace	4.000	68.000	.000
		Roy's Largest Root	4.000	68.000	.000
	Condition	Pillai's Trace	4.000	68.000	.063
		Wilks' Lambda	4.000	68.000	.063
		Hotelling's Trace	4.000	68.000	.063
		Roy's Largest Root	4.000	68.000	.063
Within Subjects	PrePost	Pillai's Trace	4.000	68.000	.000
		Wilks' Lambda	4.000	68.000	.000
		Hotelling's Trace	4.000	68.000	.000
		Roy's Largest Root	4.000	68.000	.000

	PrePost * Condition	Pillai's Trace	4.000	68.000	.425
		Wilks' Lambda	4.000	68.000	.425
		Hotelling's Trace	4.000	68.000	.425
		Roy's Largest Root	4.000	68.000	.425

Multivariate Tests[a]

Effect			Partial Eta Squared
Between Subjects	Intercept	Pillai's Trace	.987
		Wilks' Lambda	.987
		Hotelling's Trace	.987
		Roy's Largest Root	.987
	Condition	Pillai's Trace	.121
		Wilks' Lambda	.121
		Hotelling's Trace	.121
		Roy's Largest Root	.121
Within Subjects	PrePost	Pillai's Trace	.296
		Wilks' Lambda	.296
		Hotelling's Trace	.296

		Roy's Largest Root	.296
	PrePost * Condition	Pillai's Trace	.054
		Wilks' Lambda	.054
		Hotelling's Trace	.054
		Roy's Largest Root	.054

a. Design: Intercept + Condition

Within Subjects Design: PrePost

b. Exact statistic

Mauchly's Test of Sphericity[a]

Within Subjects Effect	Measure	Mauchly's W	Approx. Chi-Square	df	Sig.
PrePost	CT_Skill	1.000	.000	0	.
	CT_Perceptions	1.000	.000	0	.
	CT_Task_Value	1.000	.000	0	.
	CT_Expectancy	1.000	.000	0	.

Mauchly's Test of Sphericity[a]

Within Subjects Effect	Measure	Epsilon[b] Greenhouse-Geisser	Huynh-Feldt	Lower-bound
PrePost	CT_Skill	1.000	1.000	1.000
	CT_Perceptions	1.000	1.000	1.000
	CT_Task_Value	1.000	1.000	1.000
	CT_Expectancy	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.[a]

a. Design: Intercept + Condition

Within Subjects Design: PrePost

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Multivariate[a,b]

Within Subjects Effect		Value	F	Hypothesis df	Error df
PrePost	Pillai's Trace	.296	7.135[c]	4.000	68.000
	Wilks' Lambda	.704	7.135[c]	4.000	68.000
	Hotelling's Trace	.420	7.135[c]	4.000	68.000
	Roy's Largest Root	.420	7.135[c]	4.000	68.000
PrePost * Condition	Pillai's Trace	.054	.978[c]	4.000	68.000
	Wilks' Lambda	.946	.978[c]	4.000	68.000
	Hotelling's Trace	.058	.978[c]	4.000	68.000
	Roy's Largest Root	.058	.978[c]	4.000	68.000

Multivariate[a,b]

Within Subjects Effect		Sig.	Partial Eta Squared
PrePost	Pillai's Trace	.000	.296
	Wilks' Lambda	.000	.296
	Hotelling's Trace	.000	.296
	Roy's Largest Root	.000	.296
PrePost * Condition	Pillai's Trace	.425	.054
	Wilks' Lambda	.425	.054

	Hotelling's Trace	.425	.054
	Roy's Largest Root	.425	.054

a. Design: Intercept + Condition

Within Subjects Design: PrePost

b. Tests are based on averaged variables.

c. Exact statistic

Univariate Tests

Source	Measure		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
PrePost	CT_Skill	Sphericity Assumed	368.808	1	368.808	24.792	.000	.259
		Greenhouse-Geisser	368.808	1.000	368.808	24.792	.000	.259
		Huynh-Feldt	368.808	1.000	368.808	24.792	.000	.259
		Lower-bound	368.808	1.000	368.808	24.792	.000	.259
	CT_Perceptions	Sphericity Assumed	25.637	1	25.637	.445	.507	.006

		Greenhouse-Geisser	25.637	1.000	25.637	.445	.507	.006
		Huynh-Feldt	25.637	1.000	25.637	.445	.507	.006
		Lower-bound	25.637	1.000	25.637	.445	.507	.006
	CT_Task_Value	Sphericity Assumed	203.798	1	203.798	2.385	.127	.032
		Greenhouse-Geisser	203.798	1.000	203.798	2.385	.127	.032
		Huynh-Feldt	203.798	1.000	203.798	2.385	.127	.032
		Lower-bound	203.798	1.000	203.798	2.385	.127	.032
	CT_Expectancy	Sphericity Assumed	.574	1	.574	.097	.756	.001
		Greenhouse-Geisser	.574	1.000	.574	.097	.756	.001
		Huynh-Feldt	.574	1.000	.574	.097	.756	.001
		Lower-bound	.574	1.000	.574	.097	.756	.001
PrePost * Condition	CT_Skill	Sphericity Assumed	12.288	1	12.288	.826	.367	.011
		Greenhouse-Geisser	12.288	1.000	12.288	.826	.367	.011
		Huynh-Feldt	12.288	1.000	12.288	.826	.367	.011
		Lower-bound	12.288	1.000	12.288	.826	.367	.011

	CT_Perceptions	Sphericity Assumed	70.161	1	70.161	1.218	.273	.017
		Greenhouse-Geisser	70.161	1.000	70.161	1.218	.273	.017
		Huynh-Feldt	70.161	1.000	70.161	1.218	.273	.017
		Lower-bound	70.161	1.000	70.161	1.218	.273	.017
	CT_Task_Value	Sphericity Assumed	37.675	1	37.675	.441	.509	.006
		Greenhouse-Geisser	37.675	1.000	37.675	.441	.509	.006
		Huynh-Feldt	37.675	1.000	37.675	.441	.509	.006
		Lower-bound	37.675	1.000	37.675	.441	.509	.006
	CT_Expectancy	Sphericity Assumed	11.615	1	11.615	1.963	.166	.027
		Greenhouse-Geisser	11.615	1.000	11.615	1.963	.166	.027
		Huynh-Feldt	11.615	1.000	11.615	1.963	.166	.027
		Lower-bound	11.615	1.000	11.615	1.963	.166	.027
Error(PrePost)	CT_Skill	Sphericity Assumed	1056.219	71	14.876			
		Greenhouse-Geisser	1056.219	71.000	14.876			

		Huynh-Feldt	1056.219	71.000	14.876			
		Lower-bound	1056.219	71.000	14.876			
	CT_Perceptions	Sphericity Assumed	4090.185	71	57.608			
		Greenhouse-Geisser	4090.185	71.000	57.608			
		Huynh-Feldt	4090.185	71.000	57.608			
		Lower-bound	4090.185	71.000	57.608			
	CT_Task_Value	Sphericity Assumed	6068.205	71	85.468			
		Greenhouse-Geisser	6068.205	71.000	85.468			
		Huynh-Feldt	6068.205	71.000	85.468			
		Lower-bound	6068.205	71.000	85.468			
	CT_Expectancy	Sphericity Assumed	420.166	71	5.918			

	Greenhouse-Geisser	420.166	71.000	5.918			
	Huynh-Feldt	420.166	71.000	5.918			
	Lower-bound	420.166	71.000	5.918			

Tests of Within-Subjects Contrasts

Source	Measure	PrePost	Type III Sum of Squares	df	Mean Square
PrePost	CT_Skill	Linear	368.808	1	368.808
	CT_Perceptions	Linear	25.637	1	25.637
	CT_Task_Value	Linear	203.798	1	203.798
	CT_Expectancy	Linear	.574	1	.574
PrePost * Condition	CT_Skill	Linear	12.288	1	12.288
	CT_Perceptions	Linear	70.161	1	70.161

	CT_Task_Value	Linear	37.675	1	37.675
	CT_Expectancy	Linear	11.615	1	11.615
Error(PrePost)	CT_Skill	Linear	1056.219	71	14.876
	CT_Perceptions	Linear	4090.185	71	57.608
	CT_Task_Value	Linear	6068.205	71	85.468
	CT_Expectancy	Linear	420.166	71	5.918

Tests of Within-Subjects Contrasts

Source	Measure	PrePost	F	Sig.	Partial Eta Squared
PrePost	CT_Skill	Linear	24.792	.000	.259
	CT_Perceptions	Linear	.445	.507	.006
	CT_Task_Value	Linear	2.385	.127	.032
	CT_Expectancy	Linear	.097	.756	.001
PrePost * Condition	CT_Skill	Linear	.826	.367	.011
	CT_Perceptions	Linear	1.218	.273	.017

	CT_Task_Value	Linear	.441	.509	.006
	CT_Expectancy	Linear	1.963	.166	.027
Error(PrePost)	CT_Skill	Linear			
	CT_Perceptions	Linear			
	CT_Task_Value	Linear			
	CT_Expectancy	Linear			

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
Pre_CTSkill	1.493	1	71	.226
Post_CTSkill	.282	1	71	.597
Pre_CTPerception	.000	1	71	.982
Post_CTPerception	.358	1	71	.552
Pre_TaskValue	.641	1	71	.426
Post_TaskValue	.558	1	71	.458
Pre_Expectancy	.079	1	71	.779
Post_Expectancy	.208	1	71	.649

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.[a]

a. Design: Intercept + Condition

Within Subjects Design: PrePost

Tests of Between-Subjects Effects

Transformed Variable: Average

Source	Measure	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	CT_Skill	47600.596	1	47600.596	1384.683	.000
	CT_Perceptions	749439.821	1	749439.821	2950.148	.000
	CT_Task_Value	662286.383	1	662286.383	3524.065	.000
	CT_Expectancy	28701.492	1	28701.492	1632.300	.000
Condition	CT_Skill	9.226	1	9.226	.268	.606
	CT_Perceptions	2258.631	1	2258.631	8.891	.004
	CT_Task_Value	194.418	1	194.418	1.035	.313

	CT_Expectancy	16.533	1	16.533	.940	.336
Error	CT_Skill	2440.733	71	34.377		
	CT_Perceptions	18036.463	71	254.035		
	CT_Task_Value	13343.208	71	187.933		
	CT_Expectancy	1248.426	71	17.583		

Tests of Between-Subjects Effects

Transformed Variable: Average

Source	Measure	Partial Eta Squared
Intercept	CT_Skill	.951
	CT_Perceptions	.976
	CT_Task_Value	.980
	CT_Expectancy	.958
Condition	CT_Skill	.004
	CT_Perceptions	.111
	CT_Task_Value	.014
	CT_Expectancy	.013

Error	CT_Skill	
	CT_Perceptions	
	CT_Task_Value	
	CT_Expectancy	

Estimated Marginal Means

1. Condition

Measure	Condition	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
CT_Skill	Control	18.707	.770	17.172	20.242
	Experimental	18.193	.625	16.947	19.439
CT_Perceptions	Control	69.189	2.093	65.016	73.362
	Experimental	77.227	1.699	73.839	80.615
CT_Task_Value	Control	67.641	1.800	64.052	71.230
	Experimental	69.999	1.461	67.085	72.913
	Control	13.983	.551	12.885	15.081

CT_Expectancy	Experimental	14.670	.447	13.779	15.562

2. PrePost

Measure	PrePost	Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
CT_Skill	1	16.826	.608	15.614	18.038
	2	20.074	.579	18.921	21.228
CT_Perceptions	1	72.780	1.424	69.941	75.619
	2	73.636	1.559	70.529	76.744
CT_Task_Value	1	70.027	.977	68.080	71.975
	2	67.613	1.719	64.184	71.041
CT_Expectancy	1	14.263	.416	13.433	15.092
	2	14.391	.404	13.585	15.196

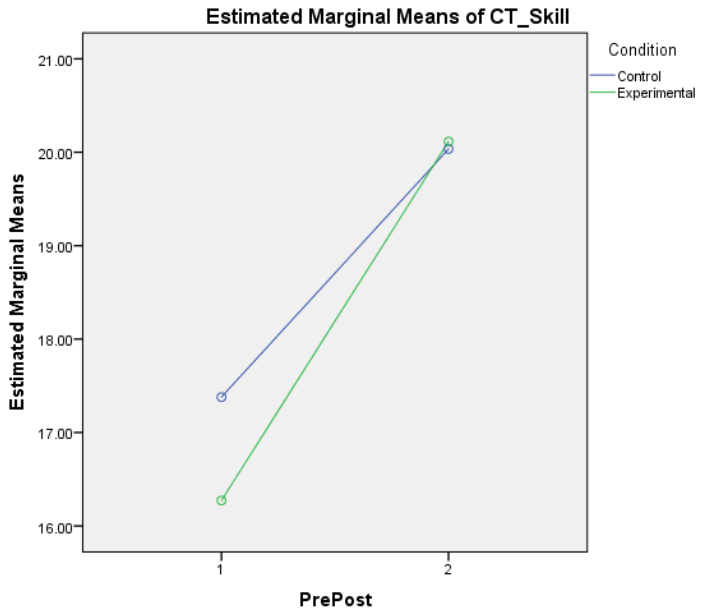
3. Condition * PrePost

Measure	Condition	PrePost	Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound

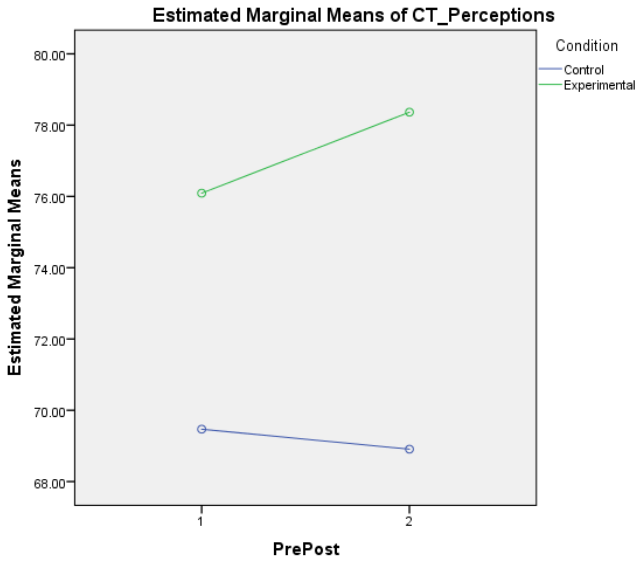
CT_Skill	Control	1	17.379	.944	15.497	19.262
		2	20.034	.898	18.243	21.826
	Experimental	1	16.273	.767	14.744	17.801
		2	20.114	.729	18.660	21.568
CT_Perceptions	Control	1	69.469	2.211	65.060	73.878
		2	68.909	2.420	64.083	73.735
	Experimental	1	76.091	1.795	72.511	79.670
		2	78.364	1.965	74.446	82.281
CT_Task_Value	Control	1	68.329	1.517	65.305	71.353
		2	66.953	2.670	61.629	72.276
	Experimental	1	71.725	1.231	69.270	74.180
		2	68.273	2.167	63.951	72.594
CT_Expectancy	Control	1	14.207	.646	12.920	15.494
		2	13.759	.627	12.508	15.009
	Experimental	1	14.318	.524	13.273	15.363
		2	15.023	.509	14.007	16.038

Profile Plots

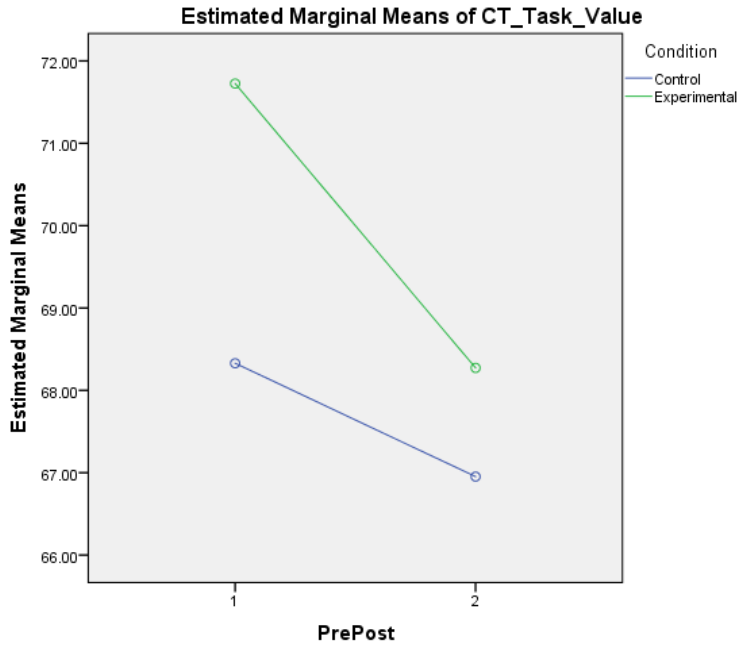
CT_Skill



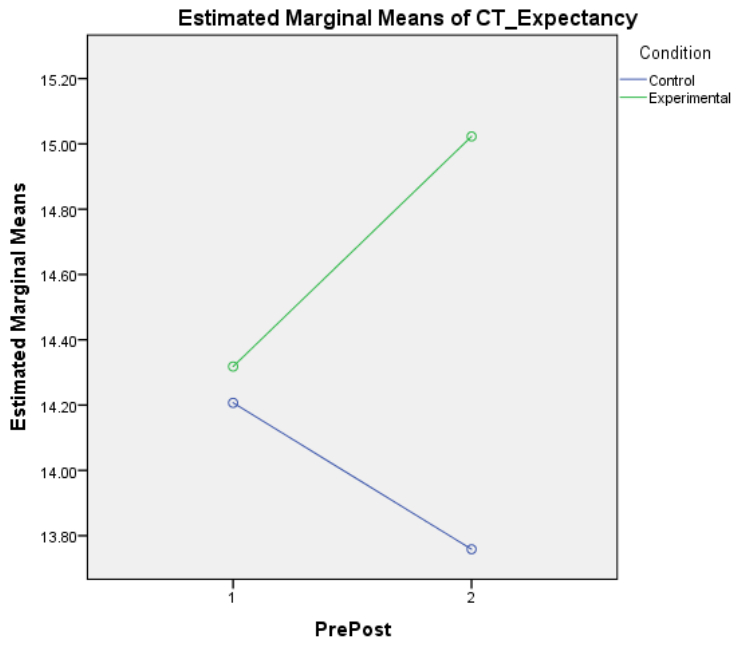
CT_Perceptions



CT_Task_Value



CT_Expectancy

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Appendix Y: Phase 3 – Letter of Ethical Approval

University of Cumbria

University of Cumbria
Research Office
Lancaster Campus
Lancaster, LA1 3JD

Tel: 01524 590804
Fax: 01524 384385
Email: research.office@cumbria.ac.uk

27 September 2018

Our Ref: DC/SB

Joseph McCann
HPSS
Fusehill Street

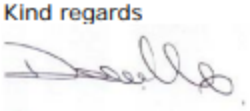
Dear Joseph

Request for Ethical Clearance – Our Ref: 18/04
Project: Critical Thinking Intervention

Thank you for your revised application regarding the issues that required a response.

Approval is granted with no further changes or amendments required

Kind regards



Professor Diane Cox
Chair
Research Ethics Panel

Appendix Z: Phase 4 – Participant Information Sheet (A-level Teachers)

Title of study: An evaluation of the effectiveness of an intervention aimed at improving the critical thinking ability of pre-tertiary psychology students

About the study

The aim of this study is to qualitatively evaluate the effectiveness of the intervention you previously participated in. Which aimed to improve the critical thinking ability of pre-tertiary psychology students.

Why have you asked me to take part and what will I be required to do?

The research involves taking part in an approximately 45-minute semi-structured interview. You have been asked to participate as you are a A-level Psychology teacher (or equivalent), who previously participated in a school-based intervention, which aimed to improve the critical thinking ability of A-level psychology students, therefore better preparing them for their transition to higher education. You will be asked various questions about the intervention you participated in, questions will centre around delivery of the intervention, the interventions effectiveness, how to improve the intervention, critical thinking instruction and the academic preparedness of your students. You will also be asked some demographic questions, about your gender, age, years of experience as a teacher and qualifications.

Are there any risks associated with participation?

It is important to acknowledge that it can be difficult to determine all the potential risks on the onset of a piece of research. However, some potential risks are that the research may have an adverse impact on employment or social standing as it involves discussion of an employer (i.e. your school) and discussion of what could be considered commercially sensitive information (i.e. your teaching). The researcher has mitigated the impact of this by redacting all identifiable information from the interview transcript that will be produced as part of the research. The research may also induce psychological stress or anxiety, as it involves discussing your teaching and professional practice. If this does occur, you are reminded that

you can stop the interview at any time and can withdraw from the study at any point without consequence. You can also withdraw from the study up to two weeks after the date of the interview, by contacting the researcher with your memorable word.

Are there any benefits associated with participation?

There are no direct benefits associated with the research, however, you have the opportunity to help contribute to the evaluation of an intervention which aims to improve the critical thinking ability of A-level Psychology students, with the hope of better preparing them for the transition to university.

What if I do not wish to take part or change my mind during the study?

You have the right to withdraw from the study at any point without consequence, you can do this by notifying the principal researcher (Joseph McCann; Joseph.mccann@uni.cumbria.ac.uk) during the course of the interview. If you choose to do this, you will be immediately debriefed, and all data provided for the purposes of the research will be destroyed. In addition to this, you may also withdraw up to two weeks after the study has taken place. You will be asked for a memorable word/number during the interview, this will be used as a unique identifier that will allow you to withdraw post-participation. You do this by emailing the principal researcher (Joseph McCann; joseph.mccann@cumbria.ac.uk) with your memorable word or number. This is not possible after this two-week withdrawal period, as the data will be anonymised and aggregated with research data provided by other participants, therefore, even the researcher would be unable to tell who the data belongs to.

What if I do not wish to offer a piece of information requested by the researcher?

You have the right to decline any piece of specific information requested by the researcher, a right provided to you by the Data Protection Act (2018). If you choose to decline a piece of information, the researcher will move on to the next question.

Are there any incentives/ payments to take part in the study?

There are no incentives/ payments for taking part in the study. You will not be financially reimbursed for your time. Your involvement in the research is entirely voluntary.

What happens to the research data?

All anonymised research data will be stored in encrypted files. Audio files will be deleted once they have been transcribed and anonymised by the principal researcher Joseph McCann. Research data will be stored on an encrypted USB device, which requires a password to decrypt the data, as well as Joseph McCann's (Joseph.mccann@uni.cumbria.ac.uk) OneDrive for Business account, which encrypts files both in transit (upload) and at rest (storage). Research data will be stored for a period of five years in line with the University of Cumbria data retention policy, after which they will be destroyed. Paper consent forms will be stored separately from the research data, they will be treated like research data. The consent forms will be stored in a locked filing cabinet for a period of five years in line with the University of Cumbria Data Retention policy. All data will be stored in accordance with the Data Protection Act (2018) and General Data Protection Regulation (2018), as well as the University of Cumbria Ethical Guidelines. Only the research team will have access to the research data, the research teams consists of the Principal Researcher Joseph McCann (Joseph.mccann@uni.cumbria.ac.uk), the Primary research supervisor Dr Elizabeth Bates (Elizabeth.bates@cumbria.ac.uk) and the secondary research supervisor Professor Pete Boyd (Pete.boyd@cumbria.ac.uk).

Are there any confidentiality and anonymity conditions associated with the data?

All data shared with the research team will be kept confidential. Unless, the participant discloses information which the researcher perceives will lead to safeguarding or health and well-being issues that may lead to immediate harm to either the participant or someone else. If this occurs the researcher may not be able to keep the information confidential.

What happens after I have participated in the study?

Once you have participated in the study, you will be appropriately debriefed and signposted to appropriately relevant organisations. The debrief will thank you for participation and restate the aim of the study. You will also be reminded that you can retrospectively withdraw from the study up to 2 weeks after participation.

How will the research be reported?

The research will be reported as part of Joseph McCann's (Principal Researcher) PhD. The research will also be submitted to a peer-reviewed journal for publication, as well as presented at future conferences. A summary of the research findings can be made available by contacting the principal researcher Joseph McCann via email (joseph.mccann@uni.cumbria.ac.uk)

How can I find out more information?

If you would like more information about the study, you can contact the principal researcher Joseph McCann (joseph.mccann@uni.cumbria.ac.uk). If your enquires are not satisfactorily resolved by the principal researcher, you can contact the primary research supervisor Dr Elizabeth Bates (Elizabeth.bates@cumbria.ac.uk) or the secondary research supervisor Professor Pete Boyd (pete.boyd@cumbria.ac.uk).

What if I want to complain about the research?

Initially you should contact the principal researcher Joseph McCann (Joseph.mccann@uni.cumbria.ac.uk) directly. However, if you are not satisfied or wish to make a more formal complaint you should contact Diane Cox, Director of Research Office, University of Cumbria, Bowerham Road, Lancaster, LA1 3JD. diane.cox@cumbria.ac.uk

Appendix AA: Phase 4 – Participant Information Sheet (Students)

Title of study: An evaluation of the effectiveness of an intervention aimed at improving the critical thinking ability of pre-tertiary psychology students

About the study

The aim of this study is to qualitatively evaluate the effectiveness of the intervention you previously participated in that aimed to improve the critical thinking ability of pre-tertiary psychology students.

Why have you asked me to take part and what will I be required to do?

The research involves taking part in an approximately 45-minute semi-structured interview. You have been asked to participate as you are an undergraduate psychology student, who previously participated in a school-based intervention, which aimed to improve the critical thinking ability of A-level psychology students, therefore better preparing them for their transition to higher education. You will be asked various questions about the intervention you participated in, questions will centre around your academic preparedness for university, the difference between A-level Psychology and university level psychology, critical thinking and the effectiveness of the intervention you previously participated in. You will also be asked some demographic questions, about your gender, age, your current course and your student status.

Are there any risks associated with participation?

It is important to acknowledge that it can be difficult to determine all the potential risks at the outset of a piece of research. However, some potential risks of participation in this research are the research may induce mild psychological stress or anxiety, as it involves discussing your academic performance. This may lead to you labelling yourself (e.g. I am stupid). If this does occur or you experience any distress during the interview, you are reminded that you can stop the interview at any time and can withdraw from the study at any point without

consequence. You can also with from the study up to two weeks after the date of the interview, by contacting the researcher with your memorable word, if distress occurs post study.

Are there any benefits associated with participation?

There are no direct benefits associated with the research, however, you have the opportunity to help contribute to the evaluation of an intervention which aims to improve the critical thinking ability of A-level Psychology students, with the hope of better preparing them for the transition to university.

What if I do not wish to take part or change my mind during the study?

You have the right to withdraw from the study at any point without consequence, you can do this by notifying the principal researcher (Joseph McCann; Joseph.mccann@uni.cumbria.ac.uk) during the course of the interview. If you choose to do this, you will be immediately debriefed, and all data provided for the purposes of the research will be destroyed. In addition to this, you may also withdraw up to two weeks after the study has taken place. You will be asked for a memorable word/number during the interview, this will be used as a unique identifier that will allow you to withdraw post-participation. You do this by emailing the principal researcher (Joseph McCann; joseph.mccann@cumbria.ac.uk) with your memorable word or number. This is not possible after this two-week withdrawal period, as the data will be anonymised and aggregated with research data provided by other participants, therefore, even the researcher would be unable to tell who the data belongs to.

What if I do not wish to offer a piece of information requested by the researcher?

You have the right to decline any piece of specific information requested by the researcher, a right provided to you by the Data Protection Act (2018). If you choose to decline a piece of information, the researcher will move on to the next question.

Are there any incentives/ payments to take part in the study?

There are no incentives/ payments for taking part in the study. You will not be financially reimbursed for your time. Your involvement in the research is entirely voluntary.

What happens to the research data?

All anonymised research data will be stored in encrypted files. Audio files will be deleted once they have been transcribed and anonymised by the principal researcher Joseph McCann. Research data will be stored on an encrypted USB device, which requires a password to decrypt the data, as well as Joseph McCann's (Joseph.mccann@uni.cumbria.ac.uk) OneDrive for Business account, which encrypts files both in transit (upload) and at rest (storage). Research data will be stored for a period of five years in line with the University of Cumbria data retention policy, after which they will be destroyed. Paper consent forms will be stored separately from the research data, they will be treated like research data. The consent forms will be stored in a locked filing cabinet for a period of five years in line with the University of Cumbria Data Retention policy. All data will be stored in accordance with the Data Protection Act (2018) and General Data Protection Regulation (2018), as well as the University of Cumbria Ethical Guidelines. Only the research team will have access to the research data, the research teams consists of the Principal Researcher Joseph McCann (Joseph.mccann@uni.cumbria.ac.uk), the Primary research supervisor Dr Elizabeth Bates (Elizabeth.bates@cumbria.ac.uk) and the secondary research supervisor Professor Pete Boyd (Pete.boyd@cumbria.ac.uk).

Are there any confidentiality and anonymity conditions associated with the data?

All data shared with the research team will be kept confidential. Unless, the participant discloses information which the researcher perceives will lead to safeguarding or health and well-being issues that may lead to immediate harm to either the participant or someone else. If this occurs the researcher may not be able to keep the information confidential.

What happens after I have participated in the study?

Once you have participated in the study, you will be appropriately debriefed and signposted to appropriately relevant organisations. The debrief will thank you for participation and restate the aim of the study. You will also be reminded that you can retrospectively withdraw from the study up to 2 weeks after participation.

How will the research be reported?

The research will be reported as part of Joseph McCann's (Principal Researcher) PhD. The research will also be submitted to a peer-reviewed journal for publication, as well as presented at future conferences. A summary of the research findings can be made available by contacting the principal researcher Joseph McCann via email (joseph.mccann@uni.cumbria.ac.uk)

How can I find out more information?

If you would like more information about the study, you can contact the principal researcher Joseph McCann (joseph.mccann@uni.cumbria.ac.uk). If your enquires are not satisfactorily resolved by the principal researcher, you can contact the primary research supervisor Dr Elizabeth Bates (Elizabeth.bates@cumbria.ac.uk) or the secondary research supervisor Professor Pete Boyd (pete.boyd@cumbria.ac.uk).

What if I want to complain about the research?

Initially you should contact the principal researcher Joseph McCann (Joseph.mccann@uni.cumbria.ac.uk) directly. However, if you are not satisfied or wish to make a more formal complaint you should contact Diane Cox, Director of Research Office, University of Cumbria, Bowerham Road, Lancaster, LA1 3JD. diane.cox@cumbria.ac.uk

Appendix AB: Phase 4 – Participant Consent Form (A-level Teachers)

Title of study: An evaluation of the effectiveness of an intervention aimed at improving the critical thinking ability of pre-tertiary psychology students

Please answer the following questions by circling your responses:

Have you read and understood the information sheet about this study?

YES NO

Have you been able to ask questions and had enough information about this study?

YES NO

Do you understand that you are free to withdraw at any time during the study, without having to give a reason for doing so?

YES NO

Do you understand that you are free to withdraw from this study up 2 weeks after participation by providing a member of the research team with your memorable word/number?

YES NO

Your responses will be anonymised. Do you give permission for members of the research team to analyse and quote your anonymous responses?

YES NO

Do you agree to your interview or focus group to be audio recorded?

YES NO

Do you give consent to take part in this study? YES NO

Your signature will certify that you have voluntarily decided to consent to take part in this research study having read and understood the information in the information sheet. It will also certify that you have had adequate opportunity to discuss the study with an investigator and that all questions have been answered to your satisfaction.

Signature of participant:..... Date:.....

Name (block letters):.....

Signature of investigator:..... Date:.....

Name (block letters):.....

Appendix AC: Phase 4 – Participant Consent Form (Students)

Title of study: An evaluation of the effectiveness of an intervention aimed at improving the critical thinking ability of pre-tertiary psychology students

Please answer the following questions by circling your responses:

Have you read and understood the information sheet about this study?

YES NO

Have you been able to ask questions and had enough information about this study?

YES NO

Do you understand that you are free to withdraw at any time during the study, without having to give a reason for doing so?

YES NO

Do you understand that you are free to withdraw from this study up 2 weeks after participation by providing a member of the research team with your memorable word/number?

YES NO

Your responses will be anonymised. Do you give permission for members of the research team to analyse and quote your anonymous responses? YES NO

Do you agree to your interview or focus group to be audio recorded? YES NO

Do you give consent to take part in this study? YES NO

Your signature will certify that you have voluntarily decided to consent to take part in this research study having read and understood the information in the information sheet. It will also certify that you have had adequate opportunity to discuss the study with an investigator and that all questions have been answered to your satisfaction.

Signature of participant:..... Date:.....

Name (block letters):.....

Signature of investigator:..... Date:.....

Name (block letters):.....

Appendix AD: Phase 4 – Participant Debrief (A-level Teachers)

Title of study: An evaluation of the effectiveness of an intervention aimed at improving the critical thinking ability of pre-tertiary psychology students

Thank you for taking the time to take part in this research project.

The research project aimed to qualitatively evaluate the effectiveness of the intervention you previously participated in that aimed to improve the critical thinking ability of pre-tertiary psychology students.

If you would like any further information about this research project, then please feel free to email "Joseph McCann", (Principal researcher) on joseph.mccann@uni.cumbria.ac.uk.

You can also email Dr Elizabeth Bates (Primary Research Supervisor) on Elizabeth.bates@cumbria.ac.uk or Professor Pete Boyd pete.boyd@cumbria.ac.uk to talk about the research project.

Should you wish to withdraw in the next 2 weeks, email your memorable word or number to the principal researcher and they will remove your data from the study.

If any of the issues in this study were distressing and you feel you need additional support, please contact your line manager/ supervisor to discuss an appropriate course of action. However, if you need further support please contact one of the organisations below for help:

Education Support partnership- This is a free helpline specifically designed for educators 24/7, 365 days a year, that will listen to you without judgement and will help you think through the problems you are facing, whether personal or professional, to find a way forward and feel better.

Website: https://www.educationsupportpartnership.org.uk/

UK-wide**: 08000 562 561**

Txt: **07909 341229**

National Education Union- This is the largest education union in Europe and represents the vast majority of teachers and trainee teachers working in England and Wales. The can offer you advice on a whole host of teaching related matters.

Website: https://www.teachers.org.uk/

NUT Adviceline: **0203 006 6266**

Email:**nutadviceline@nut.org.uk**

Thank you again for your participation!

Appendix AE: Phase 4 - Participant Debrief (Students)

Title of study: An evaluation of the effectiveness of an intervention aimed at improving the critical thinking ability of pre-tertiary psychology students

Thank you for taking the time to take part in this research project.

The research project aimed to qualitatively evaluate the effectiveness of the intervention you previously participated in that aimed to improve the critical thinking ability of pre-tertiary psychology students.

If you would like any further information about this research project, then please feel free to email "Joseph McCann", (Principal researcher) on joseph.mccann@uni.cumbria.ac.uk.

You can also email Dr Elizabeth Bates (Primary Research Supervisor) on Elizabeth.bates@cumbria.ac.uk or Professor Pete Boyd pete.boyd@cumbria.ac.uk to talk about the research project.

Should wish to withdraw in the next 2 weeks, email your memorable word or number to the principal researcher and they will remove the data from the study.

If any of the issues in this study were distressing and you feel you need additional support, initially you should contact your personal tutor/ lecturer and discuss an appropriate course of action. However, if you receive an unsatisfactory response you may contact either of the organisation below.

National Union of Students (NUS) – The NUS champions students and helps students shape the future of education. Each institution should have a student union, which can advise and help you with various parts of university life. The weblink below show all of the NUS members and enables you to get closer to your student union.

Weblink: https://www.nus.org.uk/en/students-unions/

Student Minds- Student Minds works with students, service users, professionals and academics to develop new and innovative ways to improve the mental health of students. They offer various forms of support and links to other services.

Weblink: https://www.studentminds.org.uk/findsupport.html#

Thank you again for your participation!

Appendix AF: Phase 4 – Interview Schedule (A-level Teachers)

An evaluation of the effectiveness of an intervention aimed at improving the critical thinking ability of Pre-tertiary Psychology students (Teacher Edition).

Thank you for agreeing to take part in this study. The aim of the study is to evaluate a school-based intervention (which you were previously part of) which aimed to improve the critical thinking ability of A-level Psychology students. After being fully informed on the nature of the study are you happy to proceed with the interview? And are you happy for the interview to be recorded?

Initial biographical: -

- What gender do you identify as?
- Do you mind telling me your age?
- How many years' experience do you have as a teacher?
- How many years' experience do you have as a psychology teacher?
- What is the subject discipline of your first degree?
- Do you have any other qualifications?
    - If so, what are they?

Delivering the intervention: -

- How did you find delivering the intervention?
- What do you think worked well about the intervention?
- What would you change about the intervention?
- How receptive were your students towards the intervention?

Critical thinking intervention effectiveness: -

- How would you describe your students' critical thinking ability before the delivery of the intervention?
- During the course of the intervention, did you notice any changes in your students' critical thinking ability?
    - If so, what were these changes?
- How effective do you think the intervention was in improving your students' critical thinking skills?
- How effective do you think the intervention was in improving your students' motivation to think critically?
- How effective do you think the intervention was in improving your students' ability to recognise critical thinking instruction?
- How well do you think the intervention complimented the A-level curriculum?

Improvements to the intervention

- What changes would you make to the intervention to make it more effective?
    - Critical Thinking Skills?
    - Critical Thinking Motivations?
    - Recognising critical thinking instruction?
- Are there any resources that formed part of the intervention that you would change?
    - If so, why/how?

Critical thinking instruction

- How would you define critical thinking?
- Has your definition of critical thinking changed since you have taken part in this research?
- Has this intervention encouraged you to incorporate more critical thinking instruction into your teaching?
    - If so, why?
    - If so, how?
- Would you incorporate the resources that formed the intervention into your teaching again?

Academic preparedness

- Before the intervention, how prepared did you feel your students were to transition to higher education?
- After the intervention, how prepared do you feel students' were to transition to higher education?
- Is there anything you would like to add?

Appendix AG: Phase 4 – Interview Schedule (Students)

An evaluation of the effectiveness of an intervention aimed at improving the critical thinking of pre-tertiary psychology students? (Student Edition)

Thank you for agreeing to take part in this study. The aim of this study is to evaluate a school-based intervention (which you were previously part of) which aimed to improve the critical thinking ability of A-level Psychology students. After being fully informed on the nature of the study, are you happy to proceed with the interview? And, are you happy for the interview to be recorded?

Initial biographical: -

- What gender do you identify as?
- What course are you currently studying?
- Are you currently studying full-time or part-time?

Academic preparedness: -

- What did you do to prepare for university?
- How prepared did you feel to make the transition to university? Why?
- What did you do to prepare academically for the transition to university?
- What were your expectations of university work?
- How well do you think you have transition to university?
    - Work-load?
    - Academically?
- What did your sixth form/ college do to prepare you academically for the transition to university?

Difference between A-level and university: -

- What differences have you noticed in terms of teaching between university and A-level?

- What expectations did you think the teachers had of you at A-level?
- What expectations do you think are placed on you at university?
- How has your approach to learning changed since you transitioned to university?
- What is the biggest difference in terms of work between A-level and university?
- How well do you think you have coped with these differences?

Critical Thinking

- Have your lecturers mentioned “critical thinking”?
- How would you define critical thinking?
- Is it different to the way it was discussed at A-level? If so, how?
- Has your definition of critical thinking changed since you have attended university?
- How important do you think critical thinking is?

Critical thinking intervention effectiveness: -

- How effective do you think the critical thinking intervention you took part in was to introduce you to university level critical thinking skills?
- How effective do you think the critical thinking intervention you took part in was for motivating you to think critically?
- How effective do you think the critical thinking intervention you took part in was at preparing you academically for university level critical thinking skills?
- Did the critical thinking intervention you took part in make it easier for you to identify when you were receiving critical thinking instruction?

- Is there anything you would like to add?

Appendix AH: Phase 4 – Letter of Ethical Approval

University of Cumbria

Joseph McCann
HPSS
Fusehill Street

University of Cumbria, Research Office,
Lancaster Campus, Bowerham Road,
Lancaster, LA1 3JD

01524 590804
Research.office@cumbria.ac.uk
www.cumbria.ac.uk

28 March 2019

Request for Ethical Clearance – Our Ref: 18/42
Project: An evaluation of the effectiveness of an intervention aimed at improving the critical thinking ability of pre-tertiary psychology students

Dear Joseph

Thank you for your recent application for ethical review.

Approval has been granted with no changes or amendments required.

Kind regards

Professor Diane Cox
Chair
Research Ethics Panel

PEOPLE.
PLACES.
PARTNERSHIPS.
BEING. ENRICHED.