1 **Effects of emotional intelligence and supportive text messages on academic outcomes in**

2 **first year undergraduates**

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Abstract

An increase in the number of students entering higher education has intensified the need for targeted strategies to support a wider range of student requirements. Current research suggests that emotional intelligence (EI) may be associated with academic success, progression and retention in university students but the use of EI screening as a prospective measure of success requires further investigation. This study evaluates the utility of prospective EI screening to predict progression rates, mean grades, attendance and online engagement in a sample of first year undergraduate students enrolled on the same degree programme (n=358). A supportive text messaging intervention was employed during potentially stressful periods of the academic year in a subsection of participants (n=60) that demonstrated low total EI scores relative to the cohort. Results showed no effects of EI classification on progression rates, mean grades, attendance and online engagement (all P>0.418). Alternatively, the text messaging intervention was associated with significant improvements compared with a matched control group for progression rates (P=0.027), mean grades (P=0.026) and attendance (P=0.007). The frequency of access to the virtual learning environment also tended to be higher in the intervention group compared with the control group (P=0.059). In conclusion, this study did not identify any benefits of EI screening as a prospective indicator of student success but provides encouraging indications that a text messaging support intervention could help to improve progression rates, mean grades, attendance and online engagement in first year undergraduate students. Further research is warranted to develop these proof-of-concept findings.

Key words: engagement; attendance; grades; progression, support; academic achievement

Introduction

The past two decades have witnessed a significant increase in the number of students entering higher education (HE) in the UK. This is demonstrated by the Higher Education Statistics Agency (HESA) who recorded a rise in the number of students enrolling for their first degree from 313,589 in 1996 to 542,575 in 2015 (HESA 1998, 2017). Such widening participation in HE has been maintained in recent years despite the majority of institutions increasing undergraduate tuition fees to £9000 per year and it appears that numbers will remain high for the foreseeable future. In this regard, the continued recruitment of a large number of undergraduate students has been encouraged by the relaxation of government controls over the number of students recruited by institutions, with the complete removal of government controls on recruitment in 2015 being associated with a further small rise of 3% for the number of first degree enrolments (HESA 2017). The increased diversity of university students that accompanies these increased student numbers is acknowledged to broaden the range of student support needs to maximise engagement, progression and academic success (Crozier et al. 2008; Harper & Quaye 2014).

The positive relationship between student engagement, retention and success during HE is well-established and has stimulated a growing focus for institutions to develop evidence-informed resources to enhance the engagement of university students (Thomas 2012; Trowler 2010). This focus has been particularly aimed at first year students due to the elevated risk of low levels of engagement with the learning environment and increased attrition in this cohort during the transition from school to university (Schneider 2010; Trotter & Roberts 2006). In addition to institutions shaping the HE context to facilitate academic engagement, a growing body of evidence has explored the influence of students' existing emotional and social competencies in aiding them in the transition into, and through, university-level study (Keefer et al. 2012; Richardson et al. 2012).

The definitions of academic achievement and academic success remain debated and these concepts are often used interchangeably within the research literature. Acknowledged definitions of student success are typical broad, as described by Kuh et al. (2006, p.5) as "academic achievement, engagement in educationally purposeful activities, satisfaction, acquisition of desired knowledge, skills and competencies, persistence, attainment of educational outcomes, and post-college performance". The focus of EI research on student outcomes during their first year at university often precludes the assessment of post-college performance but instead focus on the mean grade achieved by students during an academic year and/or the progression rates of students to the subsequent year of study (Parker et al. 2004, 2005, 2006; Qualter et al. 2009). This also aligns with the findings of a recent literature review which identified that academic achievement is the most frequently used assessment of academic performance in previous research and that this was almost entirely measured as the grades achieved by the students (York et al. 2015). In accordance with the definition provided above, measures of progression and engagement were also frequently identified within the literature (York et al. 2015). The use of these most commonly employed assessment methods were prioritised in the present study to facilitate comparisons with previous research within the topic and due to the easily quantifiable and accessible nature of these data.

Emotional intelligence (EI) has generated significant attention as an explanatory variable for important life outcomes, including the extent to which students succeed and progress during their studies at university (Parker et al. 2011). The exact definition of EI and the most appropriate methods for assessing this construct remain highly debated, with some authors considering EI to be an ability-based measure (e.g., Mayer et al. 2008), while others have promoted EI as a trait-based measure (e.g., Petrides, Pita, & Kokkinaki 2007). In accordance with these perspectives, ability-based measures of EI focus on emotion-related cognitive skills, whereas trait-based measures of EI are assessed using self-report questionnaires, similar to

97   other personality variables. Although the broad and varied definitions of EI have attracted

98   criticism from some scholars (e.g., Locke 2005), both the ability and trait aspects of EI have

99   been linked with substantive outcome criteria. The focus of the current investigation will be on

100 trait EI due to the established relationship between trait EI and academic success in North

101 American universities (Parker et al. 2004, 2005). In this regard, high achieving first year

102 university students demonstrated greater self-reported EI scores on enrolment to university

103 compared with lower achieving students (Parker et al. 2004, 2005). These findings are based

104 on assessments using the EQ-i:S (Bar-On 2002) which comprises four broad EI dimensions of

105 intrapersonal, interpersonal, adaptability, and stress management. The subsequent validation

106 of these scales in undergraduate students (Parker et al. 2011) further supports this approach to

107 assessing EI, which may accordingly be defined as: "the interrelated emotional and social

108 competencies, skills and facilitators that determine how effectively we understand and

109 express ourselves, understand others and relate with them, and cope with daily demands"

110 (Bar-On 2006, p.3). The development of such self-report methods also allows for large cohorts

111 to be screened which may help to prospectively identify students with lower levels of EI upon

112 entry to university and enable targeted interventions to provide further support during their

113 studies.

114 In addition to maximising academic performance, screening students for EI at the beginning of

115 their university studies could also be beneficial for identifying students with an increased risk

116 of attrition to enable more targeted support interventions. In this regard, preliminary evidence

117 from individual UK and Canadian universities has demonstrated higher total self-reported EI

118 scores in students who progressed from the first to second year of university study compared

119 with students who withdrew from their respective degree programme (Parker et al. 2006;

120 Qualter et al. 2009). Although EI is likely to be only one aspect of a multitude of reasons for

121 differences between students' progression and attrition rates, this represents an easily

122 quantified variable that can be targeted to improve student outcomes. When considering other

123 factors that influence progression and attrition rates, it is widely acknowledged that the

124 motivation and opportunity for students to succeed within education is considerably influenced

125 by the context of an individual's personal and social circumstance (Cartney & Rouse 2006;

126 Haggis 2004). Specifically, the extent to which students feel socially integrated and connected

127 within the university environment is positively associated with student progression (Christo &

128 Oyinlade 2015; Lockhart 2004; Wilcox et al. 2005). The socio-economic circumstances of

129 students have also been shown to be predictive of progression and academic achievement as

130 recently reported by Crawford (2014). This report evaluated English-domiciled students who

131 attended any UK university for the first time at age 18 or 19 between 2004-05 and 2009-10,

132 with each cohort including between 180,000 and 235,000 HE participants. The socio-economic

133 background of students was established by combining individual and neighbourhood level data,

134 with the findings demonstrating that students from the highest socio-economic quintile group

135 were approximately 3.4 percentage points less likely to withdraw from their studies, 5.3

136 percentage points more likely to complete their degree and 3.7 percentage points more likely

137 to graduate with a First or 2:1 degree classification than those from the lowest socio-economic

138 quintile group. Similar degree completion rates and attrition differences between socio-

139 economic groups have been reported in Australian universities which demonstrates the

140 international relevance of this issue (Edwards & McMillan 2015). Although EI is the focus of

141 the present study, further research should aim to develop interventions to support students in

142 relation to these other predictors of progression and academic achievement.

143 Targeted interventions to support students with lower EI scores on entry to university are

144 promising and have primarily focussed on peer-mentoring from older students at the university.

145 In a Canadian university, this approach has been shown to reduce attrition in students who

146 received peer-mentoring either during the summer break at the end of their first year of study

147   or throughout the full academic year (Philippi, Kristensen, and Taylor 2012). These beneficial

148   effects were substantial with an attrition rate approximately 10% lower than a control group of

149   students with similar EI scores that did not receive peer-mentoring. These findings have been

150   further substantiated at a UK university where peer mentoring and the completion of activities

151   to improve EI in students with low baseline scores increased retention rates by approximately

152   25% compared with a cohort that did not receive the intervention (Qualter et al. 2009).

153   The benefits of peer-mentoring for students with low EI scores is encouraging. However, it

154   must be acknowledged that this intervention has resource implications regarding staffing and

155   time commitments which may not be feasible for all institutions. Recent developments within

156   the field of physical activity has demonstrated the utility of targeted text messages to increase

157   participants' feelings of support and improve the continuation of increased physical activity

158   levels in response to an exercise intervention (Kinnafick, Thøgersen-Ntoumani, and Duda

159   2016). These findings demonstrate the potential application of a supportive, yet generic, text

160   messaging intervention to improve persistence with a new behaviour within an unfamiliar

161   environment. This has many similarities with the behavioural changes required for an effective

162   transition and learner success in an unfamiliar HE environment (Briggs et al. 2012) and

163   subsequently it seems feasible that similar interventions could also assist students during their

164   transition to university and through their first year of study. This would also represent a cost-

165   effective method to highlight the support that is available to students and encourage students

166   to seek assistance if required.

167   The purpose of the present study was to further investigate the relationship between the EI

168   scores of students on enrolment to university and measures of academic attainment,

169   engagement and retention during their first year of study. From this sample, we also aimed to

170   establish whether a text messaging intervention can improve student outcomes in those who

171   demonstrated low EI scores on enrolment. This research will add to the limited understanding

172   of the relationship between EI scores and academic outcomes in UK universities, as well as

173   evaluating the effectiveness of a novel low cost intervention to improve academic outcomes in

174   students with low EI scores. In contrast to previous research, this study utilised a cohort of

175   students that were enrolled on the same degree programme in the same year and who were

176   required to complete the same six 20 credit modules for their first year of study. This novel

177   population allowed further investigation into the role of EI on student outcomes without the

178   confounding influence of students having different enrolment dates, studying different modules

179   or studying for different degree programmes. We hypothesised that students with higher EI

180   scores on enrolment would achieve higher grades and have higher levels of engagement and

181   retention than students with lower EI scores. We also hypothesised that the provision of

182   supportive text messages would improve academic attainment, engagement and retention in

183   those students with low EI scores on enrolment.

184   **Materials and methods**

185   *Participants*

186   All first year BSc Sport & Exercise Science students at the same university in the UK were

187   invited to participate in the study in October 2015. From the cohort of 420 students, 358

188   students provided written informed consent for their data to be used within the study. All

189   participants would be expected to graduate from their three year degree programme in 2018.

190   To ensure that students did not feel coerced into giving consent, they were informed that student

191   IDs would be used to store data and to track student activity and engagement with support and

192   Virtual Learning Environment (VLE) services. Ethical approval for the study was granted by

193   the Faculty Local Research Ethics Committee.

194

Context

195
196 This research was embedded within one of the six compulsory 20 credit first year modules on

197 the BSc Sport & Exercise Science course titled 'Introduction to Research and Study Skills'

198 (IRSS). The module spanned both semesters and focused on developing academic and study

199 skills in semester one, while providing an introduction to research methods and data analysis

200 in semester two. The module structure included biweekly keynote lectures and weekly seminars

201 delivered to each group by their personal tutor. Each tutor group contained approximately 20

202 students and there were 20 tutor groups for the cohort (groups A-T). Staff teaching on the

203 module were briefed about the research study and its use as a stimulus for students' personal

204 reflection and planning during the IRSS module.

205 *Procedures*

206 *Emotional Intelligence Profiling*

207 During the first week of semester one, all participants completed an online version of the EQ-

208 i:S (Bar-On 2002) during their IRSS seminar session. Based on its factor structure and

209 associations with conceptually similar measures (ability-based EI and alexithymia), Parker et

210 al. (2011) have demonstrated the conceptual and theoretical integrity and the discriminant and

211 convergent validity of the EQ-i:S.. For total EI scores and individual subscales, test-retest

212 correlation coefficients, obtained from administrations six months apart, of 0.60 and above

213 supported its temporal reliability, and, Cronbach's alpha values over 0.75 indicated the

214 measure's internal reliability. This measure has been associated with academic success and

215 retention in universities in North America (Parker et al. 2004, 2005, 2006).

216 The EQ-i:S includes 51 items that represent six subscales, four of which were used to determine

217 a total EI score in accordance with previous research (Keefer et al. 2012). These four subscales

218 (comprising 35 items) were used in the current study and are as follows: Interpersonal skills

219 (10 items assessing social awareness and ability to establish and be part of social relationships);

220 Intrapersonal skills (10 items assessing self-awareness and the ability to recognise and

221 effectively manage one's self-expression); Stress management (8 items assessing the ability to

222 manage and regulate emotions); and Adaptability (7 items measuring the ability to adapt to

223 change and solve personal and interpersonal problems).

224 Example items from each subscale are: 'I like helping people' (Interpersonal); 'I'm unable to

225 express my ideas to others' (Intrapersonal; reverse scored item); 'It is a problem controlling

226 my anger' (Stress Management; reverse scored item); 'My approach in overcoming difficulties

227 is to move step by step' (Adaptability). Respondents indicate their responses using a 5-point

228 Likert scale anchored by 1 (*Very seldom true of me*) and 5 (*Very often true of me*).

229 Students confidentially received their individual EQ-i:S results during the fourth IRSS seminar

230 in semester one. This session also provided an explanation of the concept of emotional and

231 social skills, the different elements that the scores on the EQ-i:S represented, and evidence

232 supporting the link between emotional intelligence and outcomes in academia. Students were

233 encouraged to consider the relevance of these skills to help them manage the transition to

234 university and to reflect on their personal profiles to establish areas of strength and areas for

235 improvement. It is important to note that the entire cohort for the degree programme completed

236 the EQ-i:S and attended the feedback session as part of the IRSS module provision but data

237 was only used in the present study for those who provided consent.

238 *Group Allocation*

239 The participants were separated into thirds based on their total EQ-i:S scores (i.e. highest,

240 middle and lowest thirds). Students in the lowest third for EQ-i:S scores were selected for the

241 intervention based on evidence that lower scores increase the risk for attrition and lower

242 academic performance (Parker et al. 2004, 2006), therefore suggesting that these students may

243   benefit most from the intervention. To robustly investigate the effects of the intervention,

244   students in the lowest third were quasi-randomised into either a control or intervention group

245   based on their tutor group. In this regard, those in the lowest third in tutor groups A-J received

246   the intervention, while those in the lowest third in tutor groups K-T acted as control participants

247   without any intervention. The assignment of these students to a non-intervention control group

248   enabled accurate assessment of the text messaging intervention but also provided the

249   opportunity to investigate the relationship between EI scores and student outcomes without

250   there being any contamination of the data from the intervention. In this regard, the 168 students

251   from tutor groups K-T provided a large sample of students to accurately assess differences in

252   student success outcomes across the different EI tertiles without any intervention. The control

253   and intervention groups were matched for EQ-i:S scores (mean (SD); Intervention: 103 (4);

254   Non-intervention: 103 (5)) and 60 participants were included in each group.

255   *Intervention*

256   Participants in the intervention group received three text messages from the Faculty Student

257   Liaison Officer (SLO) at pre-identified time points throughout the year. These time points

258   represented potentially stressful periods for the students and were as follows: November 2015

259   (prior to the semester one assessment period); February 2016 (the beginning of semester two

260   and at the time of results feedback from semester one); and April 2016 (prior to the assessment

261   period for semester two). The text message reminded students of the pastoral, academic and

262   personal support that was available within the faculty and the university with a hyperlink to

263   details about these services. The message also invited students to 'drop-in' or make an

264   appointment to see an SLO using the hyperlink provided. Messages were tailored to match the

265   time of year at which they were sent, for instance, referring to preparing for examinations,

266   considering assessment results and preparing for the upcoming semester. Although these

267 services were available to all students within the faculty, the intervention highlighted the

268 availability of the services and made an explicit offer for the students to use this support.

269 *Monitoring of Outcomes*

270 Attendance registers were collected during all seminar sessions for the IRSS module and

271 collated at the end of the academic year. The number of times that the participants accessed the

272 IRSS module content on the VLE was also monitored and collated throughout the year as a

273 marker of student engagement. The mean grade achieved by the participants for their first year

274 modules and the successful completion of first year studies for progression to the second year

275 of the degree programme were obtained from the annual examination board statistics.

276 Progression to the second year of the degree required a mean grade of 40% or higher for the

277 first year modules, with a minimum grade of 40% in five modules and a minimum grade of

278 30% in the remaining one module.

279 *Data Analysis*

280 Data were analysed using IBM SPSS statistics version 22 for Windows and all data are

281 presented as mean (SD). Participants were divided into tertiles based on their ranked total EI

282 score to produce highest, middle and lowest thirds. The threshold values for each third were

283 calculated based on the scores from the entire cohort of the degree programme. Where the

284 threshold value for each third contained multiple participants all participants were retained

285 within the relevant third.

286 One-way ANOVA with post-hoc independent samples t-tests was used to assess differences

287 between tertiles for EI subscales, attendance, VLE access and the mean grade achieved during

288 the year. Differences between the intervention and non-intervention groups for attendance,

289 VLE access and the mean grade achieved during the year were assessed using independent

290 samples t-tests. Progression and withdrawal data were entered in binary form and compared

291 between tertiles and between the intervention and non-intervention groups using the Chi-

292 squared test. Statistical significance for this study was accepted as $P < 0.05$.

293

294 **Results**

295 *Baseline data*

296 Total EI scores for the A-J and K-T tutor groups were comparable at baseline (Highest third:

297 122 (6) vs. 125 (6); Middle third: 112 (2) vs. 113 (2); Lowest third: 103 (4) vs. 103 (5) for the

298 A-J and K-T tutor groups, respectively). The number of students in the A-J and K-T tutor

299 groups was also similar at baseline (Highest third: 53 vs. 50; Middle third: 77 vs. 58; Lowest

300 third: 60 vs. 60 for the A-J and K-T tutor groups, respectively). The scores for each subscale

301 of the EQ-i:S were significantly different between tertiles in accordance with the total EI scores

302 (all $P < 0.0005$; Table 1).

303 *Progression rates*

304 Chi-squared test revealed a trend towards a difference in progression rates to the second year

305 of the degree programme between tertiles when assessed as an entire cohort. This indicated

306 higher progression rates in the lowest third than the highest and middle thirds ($P = 0.077$;

307 Highest third: 67%; Middle third: 67%; Lowest third: 78%; Figure 1a). This trend was

308 consistent within tutor groups A-J ($P = 0.092$; Highest third: 72%; Middle third: 73%; Lowest

309 third: 87%; Figure 1c) but not tutor groups K-T ($P = 0.419$; Highest third: 62%; Middle third:

310 59%; Lowest third: 70%; Figure 1d). This difference appears to be the result of higher

311 progression rates in the intervention group (i.e., the lowest third of tutor groups A-J) compared

312 with the non-intervention group (i.e., the lowest third of tutor groups K-T) ($P = 0.027$;

313 Intervention: 87%; Non-intervention: 70%; Figure 1b).

314 The number of students that withdrew from the degree programme before the end of the

315 academic year was not different between tertiles (P = 0.490; Highest third: 7 students; Middle

316 third: 13 students; Lowest third: 7 students). There was also no difference between tertiles in

317 the number of withdrawals for tutor groups A-J (P = 0.610) or K-T (P = 0.381), or between

318 intervention and non-intervention groups (P = 0.697).

319 *Mean grade*

320 One-way ANOVA revealed no significant difference in mean grade between tertiles when

321 assessed as an entire cohort (P = 0.129; Figure 2a). Alternatively, mean grade was significantly

322 different between tertiles for tutor groups A-J (P = 0.032), with post-hoc analysis demonstrating

323 significantly higher grades in the lowest third compared with the highest third (P = 0.010) and

324 a trend for higher grades in the lowest third compared with the middle third (P = 0.087) (Figure

325 2c). There was no difference between tertiles for tutor groups K-T (P = 0.678; Figure 2d). These

326 contrasting findings appear to be the result of higher mean grades in the intervention group

327 compared with the non-intervention group (P = 0.026; Figure 2b).

328 *Attendance*

329 One-way ANOVA revealed no significant difference in attendance between tertiles when

330 assessed as an entire cohort (P = 0.375; Figure 3a), tutor groups A-J (P = 0.490; Figure 3c) or

331 tutor groups K-T (P = 0.885; Figure 3d). Attendance was significantly higher in the intervention

332 group than the non-intervention group (P = 0.007; Figure 3b).

333 *VLE access*

334 One-way ANOVA revealed no significant difference in the frequency of VLE access between

335 tertiles when assessed as an entire cohort (P = 0.652; Figure 4a), tutor groups A-J (P = 0.935;

336 Figure 4c) or tutor groups K-T (P = 0.500; Figure 4d). There was a trend towards a higher

337 frequency of VLE access in the intervention group compared with the non-intervention group

338 (P = 0.059; Figure 4b).

339

340 **Discussion**

341 Higher education institutions typically rely on personal tutoring programmes to provide both

342 academic and pastoral support to students. However, there is a need to adopt additional

343 strategies to support students during their transition to a university learning environment and

344 to retain students in accordance with the UK performance indicators of HE (HESA 2016;

345 Pollard et al. 2013). Although recent research has used EI screening as a tool to identify

346 students that may require additional support during the transition to university (Philippi,

347 Kristensen, and Taylor 2012; Qualter et al. 2009), the present study did not observe any

348 association between EI scores and academic performance or progression rates in a cohort of

349 first year undergraduate students. However, this study did demonstrate improved outcomes for

350 a subsection of the participants that received a targeted text messaging support intervention.

351 In addition to investigating the effects of a supportive text messaging intervention, the present

352 study design enabled further exploration of the relationship between EI and progression rates,

353 achieved mean grade, attendance and VLE access in first year undergraduate students. This

354 was achieved through the use of a control group for students within the lowest third of total EI

355 scores who were in tutor groups K-T. Subsequently, the lack of any intervention for the 168

356 students in tutor groups K-T across all EI tertiles provided the opportunity to investigate these

357 relationships without any contamination from experimental interventions. Our findings

358 demonstrated that progression rates, achieved mean grade, attendance and VLE access did not

359 significantly differ across the three tertiles of EI. These results do not appear to support the

360 notion suggested by others that higher emotional intelligence is associated with greater

361 likelihood to progress (Parker et al. 2006; Qualter et al. 2009), higher academic attainment

362 (Parker et al. 2004, 2005; Pope, Roper, and Qualter 2012) and greater engagement with

363 learning (Arguedas, Daradoumis, and Xhafa 2016). One potential explanation for such

364 conflicting results is the method of data analysis performed within the studies. In this regard,

365 positive associations between EI and academic outcomes have typically been observed via

366 retrospective analysis of EI scores after the participants have been separated into categories of

367 academic achievement or progression at the end of the monitoring period (Parker et al. 2004,

368 2005, 2006; Pope, Roper, and Qualter 2012; Qualter et al. 2009). In contrast, the purpose of

369 the present study was to evaluate the effectiveness of EI screening as a *prospective* measure to

370 identify students that might benefit from additional support during their first year at university.

371 The categorisation of participants into tertiles based on total EI scores follows a similar

372 approach to Qualter et al. (2009) who also failed to observe a relationship between EI and

373 progression rates when participants were prospectively categorised.

374 A particularly novel aspect of the present study was the targeted provision of a text messaging

375 intervention to raise students' awareness of university support services at key time points

376 during the academic year. Although the present study may be regarded as a pilot intervention,

377 the initial results are encouraging. In this regard, compared with a matched control group, the

378 students receiving the intervention demonstrated significantly higher progression rates, higher

379 mean grades, higher attendance, and a trend towards greater VLE access. These seemingly

380 beneficial effects occurred despite the absence of any responses from the intervention group to

381 seek appointments with the Student Liaison Officer after receiving the text messages. The

382 reasons for students not responding to the offered support are unknown but their reluctance to

383 engage with support services corresponds with previous literature. In this regard, university

384 students have shown significant heterogeneity in their support seeking behaviours, with

385 students commonly not seeking help for academic (Ryan et al. 1998), counselling (Morgan et

386   al. 2003) career guidance (Graef et al. 2010), and mental health support (Eisenberg et al. 2007)

387   even when the help is available and required. Findings specifically from UK universities

388   highlight that many students do not seek support even when experiencing a problem (Christie

389   et al. 2004), which is particularly concerning based on data from more than 450 campus-based

390   and open university students that all students within this sample reported some difficulty when

391   entering HE (Gutteridge 2001). In the present study we attempted to reduce the barriers to

392   support seeking by directly reminding students of the support available within the university.

393   Further investigation of the reasons underlying the lack of help seeking behaviours was beyond

394   the scope of this study but represents an important avenue for future research to establish how

395   to develop future support mechanisms that are most appropriate for the student population.

396   Although the text messaging intervention did not promote help seeking behaviours from the

397   students, it seems feasible that the receipt of the text messages alone may have benefitted the

398   students. This effect is supported by previous evidence that a text messaging intervention

399   increased participant perceptions of support and persistence with new behaviours in a physical

400   activity setting (Kinnafick, Thøgersen-Ntoumani, and Duda 2016). Furthermore, in a sports

401   performance context the mere perception of support has been shown to evoke an increased

402   sense of confidence and reassurance coupled with a reduction in stress and anxiety (Freeman

403   and Rees 2010). These findings suggest that an increased perception of support may have been

404   gained from the text messaging intervention to help students cope and persist with the demands

405   of an unfamiliar HE environment. The observed improvements in progression rates may be

406   particularly relevant for HE institutions in the UK considering the increased focus on student

407   retention as a key marker of success for universities and the need for high retention rates to

408   fulfil financial aims via the income generated from tuition fees (Bennett, Kottasz, and

409   Nocciolino 2007; Owen 2002; Simpson 2005). Retention is also important to maximise the

410   prospects of enrolled students based on evidence that compared with non-graduates, university

411   graduates lead healthier lifestyles (Baum, Ma, and Payea 2013) and experience better outcomes

412   in both lifetime earnings and employability (Day and Newburger 2002; Universities UK 2014).

413   However, further research is required to substantiate the findings of the present study and to

414   assess student perceptions of support in response to this form of intervention.

415   The findings from the present study provide a number of implications and future directions for

416   both research and practice that require consideration. First, considering the novelty of the text

417   messaging intervention within this context, it is crucial that further research is performed to

418   investigate similar time- and cost-effective interventions to improve student outcomes in a

419   larger sample of students and across a range of institutions. It must also be acknowledged that

420   EI is considered to be a dynamic construct with the potential to fluctuate over the course of a

421   student's experiences within HE (Parker et al. 2004). Subsequently, the findings of the present

422   study may be limited by the assessment of EI at a single baseline time point and future research

423   may benefit from the longitudinal assessment of EI and its association with relevant outcomes

424   throughout university degree programmes. Second, future research should also consider the

425   most appropriate outcomes to assess as a measure of student engagement. Although the present

426   study used the most appropriate proxy measurements for student engagement (attendance and

427   VLE access), a more targeted and comprehensive investigation is required in future research

428   to examine the qualitative aspects of this concept (Kuh 2009). Third, EI was assessed in the

429   present study using a validated and reliable EI questionnaire (Parker et al. 2011) in order to

430   screen a large cohort of students with limited resources. This method successfully differentiated

431   the EI of students and provided further insights into the relationship between EI and student

432   success outcomes, as well as enabling our investigation into the effects of a text messaging

433   intervention for those students with the lowest EI scores on entry to university. The quantitative

434   findings gained from the present study provide important insights into the potential utility of

435   prospective EI screening as a predictor of student success. These findings have also

436   demonstrated the potential benefits of supportive text messaging to improve student outcomes.

437   It would be beneficial for future research to develop these findings through the addition of

438   qualitative data to better understand optimal support interventions and for the development of

439   other novel or adapted approaches to support the diverse needs of university students.

440   An additional fundamental consideration in relation to the present study is that the definition

441   of academic success and achievement remains a debated topic and we did not assess all aspects

442   of this concept. In this regard, a recent review has suggested that additional aspects beyond

443   those assessed in the present study should be considered when measuring academic

444   achievement (York et al. 2015). This includes distinctly assessing the attainment of learning

445   objectives and the acquisition of desired skills and competencies of students during their degree

446   programme as a marker of learning rather than focussing solely on performance ability. Student

447   satisfaction has also been considered as an outcome for student success based on the

448   acknowledged relationship between student wellbeing and academic performance (Beghetto

449   2004; York et al. 2015), and ultimately the post-college performance of students should be

450   integrated within measures of academic success (York et al. 2015). Subsequently, although the

451   present study measured the most commonly used markers of academic success, it must be

452   acknowledged that this provided relatively narrow criteria for academic success and it would

453   be beneficial for future research to evaluate the effectiveness of support interventions on

454   student success when measured more holistically.

455   Despite these limitations, we can state with confidence that the participants did not respond

456   adversely to the intervention performed in the present study and the observed positive effects

457   associated with such a low-cost initiative suggests that staff within HE environments may be

458   in a position to harness novel time- and cost-effective support mechanisms to benefit student

459   outcomes. It must also be considered that this approach could be used in conjunction with,

460   rather than as a replacement for, peer-mentoring schemes if these are already established within

461   institutions. Such use of multiple student support initiatives may be beneficial considering that

462   peer-support networks have been advocated as a useful intervention for students in HE but that

463   an optimal approach has not yet been established (Crisp and Cruz 2009).

464   In conclusion, this study did not identify any benefits of EI screening as a prospective indicator

465   of student success but provides encouraging indications that a text messaging support

466   intervention could help to improve attendance, mean grades and progression rates in first year

467   undergraduate students. Considering the novel nature of the intervention within this context,

468   these conclusions should be viewed as tentative, with further research warranted before they

469   are used as the basis for interventions being developed and implemented with student cohorts

470   on a wider scale. The authors of the present study recommend that colleagues at other

471   institutions consider opportunities for conducting additional studies that employ more

472   prolonged and intensive investigations to further investigate these proof-of-concept findings.

473

479   **Conflict of interest**

480   The authors declare that there are no conflicts of interest.

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626   **Table 1.** Scores for each subscale of the EQ-i:S in each tertile.

	Highest third	Middle third	Lowest third	P
Interpersonal skills	41 (3)	40 (3)	38 (4)	<0.0005
Intrapersonal skills	27 (5)	23 (4)	19 (4)	<0.0005
Stress management	28 (5)	24 (4)	22 (3)	<0.0005
Adaptability	27 (4)	26 (3)	24 (4)	<0.0005

627
628   Values are mean (SD). P-values were determined using one-way ANOVA.

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633 **Figure 1.** Progression rates from the first to second year of study for the entire cohort (a), the

634 intervention and non-intervention groups (b), tutor groups A-J (c) and tutor groups K-T (d).

635 Black bars represent the number of progressing students and the white bars represent the

636 number of non-progressing students. *Significantly different between intervention and non-

637 intervention groups.

638 **Figure 2.** Mean grade achieved during the first year of study for the entire cohort (a), the

639 intervention and non-intervention groups (b), tutor groups A-J (c) and tutor groups K-T (d).

640 *Significantly different between intervention and non-intervention groups. [#]Significantly

641 higher in the lowest third than the highest third. Values are mean (SD).

642 **Figure 3.** Seminar attendance within the IRSS module for the entire cohort (a), the intervention

643 and non-intervention groups (b), tutor groups A-J (c) and tutor groups K-T (d). *Significantly

644 different between intervention and non-intervention groups. Values are mean (SD).

645 **Figure 4.** VLE access within the IRSS module for the entire cohort (a), the intervention and

646 non-intervention groups (b), tutor groups A-J (c) and tutor groups K-T (d). Values are mean
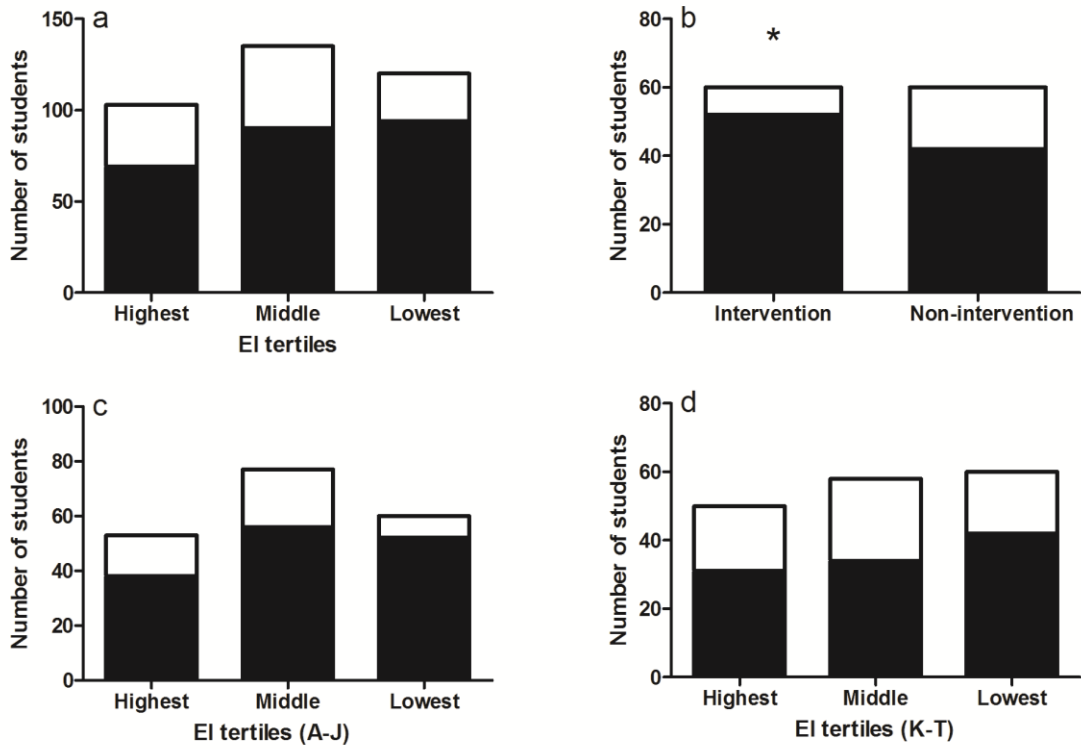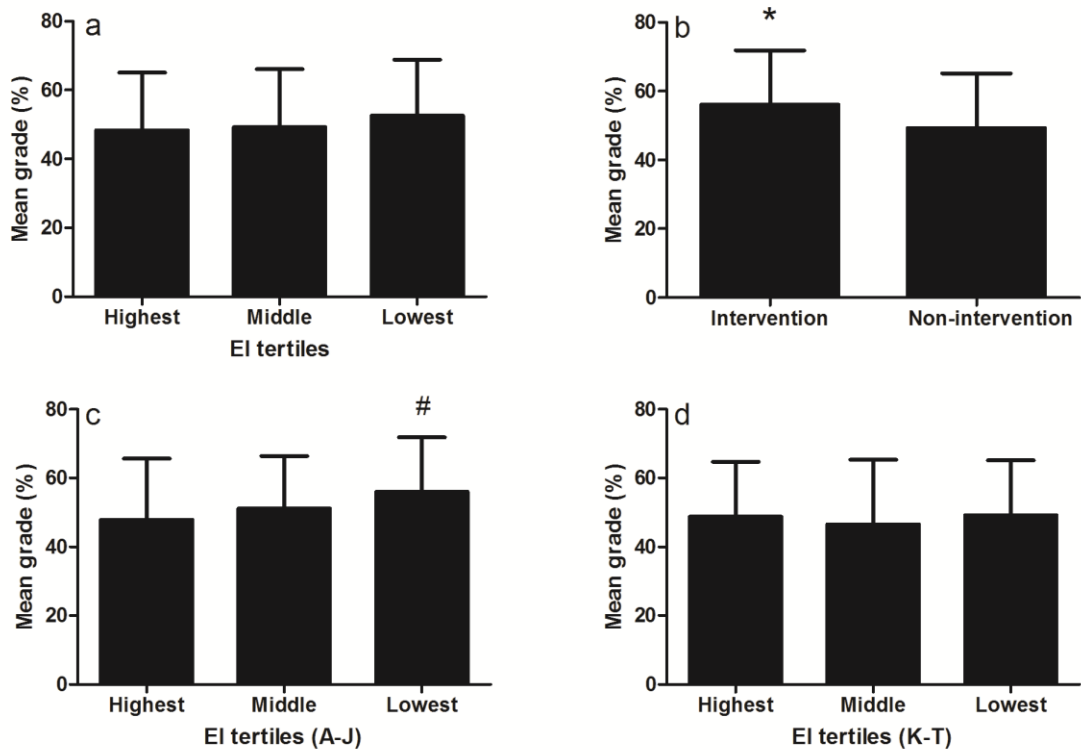
647 (SD).

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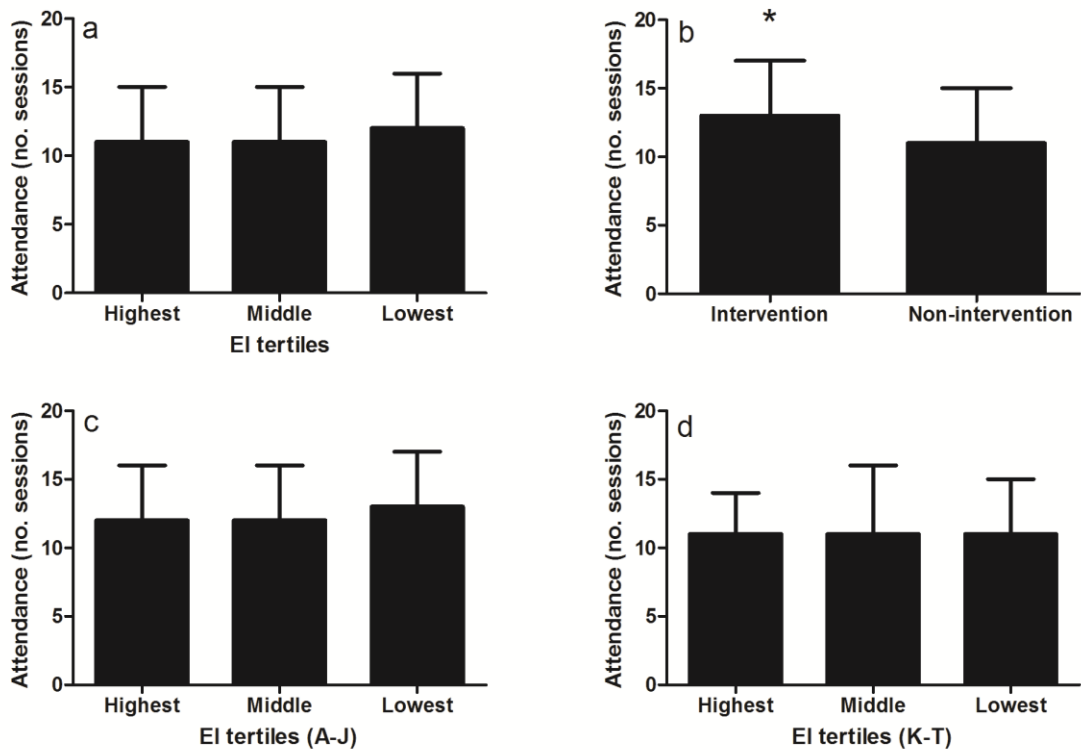651

652   **Figure 1**

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661   **Figure 4**

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