Alexithymia and illness perceptions in persons with multiple sclerosis and their partners:
a preliminary study

Maria Luca, MD

This thesis is submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy. The candidate has already achieved 180 credits for assessment of taught modules within the blended learning PhD programme

November 2023

Faculty of Health and Medicine
Lancaster University

I declare that this thesis is my own work and has not been submitted for the award of a higher degree elsewhere

Acknowledgments

Thank you to my supervisors Fiona Eccles and Guillermo Perez Algorta. Nothing reported in this thesis would exist without their highly professional advice and cheerful support. I was very lucky to have them by my side and I will cherish their teachings.

My sincere thank you to Francesco Patti and collaborators for opening me the doors of the Multiple Sclerosis Centre of the University Hospital of Catania.

Many many thanks to my work colleagues, for encouraging me pursuing my goals.

Special thanks go to my fellow PhD students, who made me feel part of a big family despite the geographical distances, and to all the amazing Lancaster University staff.

Last but not least, a huge thank you to my family. My dad, one of my biggest supporters, who is now watching me from Heaven. My lovely mum, sister, nephews and brother-in-law, who helped me keep my focus despite the adversities life may throw at us. Their company and unlimited patience (several years of hard studying are no joke!) are highly appreciated.

This PhD has been a difficult, sometimes exhausting, but certainly enriching journey, and I am very grateful to all the people who contributed to making it more enjoyable.

Abstract

Background: Illness perceptions encompass opinions regarding the nature, severity and curability of a disease, that can influence the adjustment to and management of chronic illnesses. Despite their importance, little is known about what may influence the formation of illness appraisals.

Aims: My literature review aimed to synthesise and critically appraise quantitative evidence regarding the relationship between illness perceptions (among persons with multiple sclerosis and their caregivers) and outcome measures. My empirical study tested alexithymic traits as possibly associated with illness perceptions among persons with multiple sclerosis and their partners, as well as within the dyads composed of persons with multiple sclerosis and partners.

Methods: A systematic literature search was conducted on MEDLINE, PsycINFO, and CINAHL. Twenty papers were selected, quality appraised and synthesized using a narrative approach. A cross-sectional study was conducted on persons with multiple sclerosis and their partners, who completed a battery of questionnaires, including the Toronto Alexithymia Scale-20 (to assess alexithymic traits) and the Illness Perception Questionnaire Revised (to investigate the participants' perceptions about multiple sclerosis). A dyadic data analysis (Actor-Partner Interdependence Model) was performed in order to test the effect of alexithymic traits both on a person's own illness perceptions (actor effect) and on the partner's illness perceptions (partner effect).

Findings: The findings of my literature review indicate a link between negative illness perceptions (e.g. more severe consequences) and worse psychophysical outcomes (e.g. fatigue). The results of the empirical study indicate that alexithymic traits may be associated with some illness perceptions both at the individual and dyadic level, whereby higher alexithymic traits relate to more negative illness perceptions.

Conclusion: My literature review highlights the clinical importance of illness perceptions. The findings of the cross-sectional research, reporting a relationship between alexithymia and more negative illness appraisals, may inform therapeutic interventions aimed at reducing alexithymic traits, which in turn may reduce negative, and potentially dysfunctional, illness perceptions.

Contents

Chapter 1

Introduction

1.1 Context to This Thesis

This thesis was written in the context of the Blended Learning Mental Health PhD programme at Lancaster University and results from a collaboration with the Multiple Sclerosis centre of the Neurological Clinic of the University Hospital “Policlinico-San Marco” of Catania (Italy). The Multiple Sclerosis centre of Catania is a regional reference point for the diagnosis and treatment of demyelinating disorders, and is accredited for the prescription and administration of disease modifying therapies. The centre regionally sees an average of 2500 people per year.

While completing the taught phase of the PhD, I had the opportunity to collaborate with Professor Francesco Patti, responsible for the Multiple Sclerosis centre, in the context of a research grant. The experience with persons with multiple sclerosis reinforced the idea, linked to my professional background as a psychiatrist, that what people think about their clinical condition (illness perceptions) may not be simply related to the actual severity of the disorder, but instead are potentially influenced by a variety of factors, including personality traits, such as alexithymia, discussed in detail in the next Chapter. Moreover, the shaping of these perceptions may be influenced by contextual factors, such as the beliefs and personality traits of significant others, including partners. Indeed, chronic conditions, such as multiple sclerosis, affect not only the patients but also their caregivers. A preliminary literature search confirmed that illness perceptions among ill people and their partners are increasingly attracting the attention of researchers, but still represent an uncharted area, particularly concerning what may contribute to the formation of opinions pertaining an illness.

However, the shared formation of illness perceptions within a couple may acquire even more value considering the Italian cultural context, characterized by the so-called “familism”. In fact, family is central to Italian culture, whereby strong bonds within the members, loyalty and mutual aid are normative values (Luciano et al., 2012). Consequently, spouses and family members are more likely to be designated as “confidants” compared to people external to the family network (Isaacs et al., 2015). In case of physical or mental illness, informal (unpaid) caregiving, such as that provided by spouses, is extremely frequent in Italy, where family is expected to be the first and foremost provider of instrumental and emotional support (Petrini et al., 2019). In the last 20 years, society has been evolving, with a more equal role between partners. Such changes are not undermining the importance of family, but rather favouring a transition from a patriarchal to a nuclear family model, whereby the couple acquires a central role (Luciano et al., 2012). This is extremely important, considering that marriage is the most common form of union, particularly in Southern Italy, where the age at first marriage and the divorce rates remain lower compared to the rest of Europe (Ruspini, 2005). These cultural aspects must be embraced by practitioners, who should adopt culture-sensitive communication in order to maximize the responsiveness to the information they provide and the message they want to convey. For example, cultures with strong ties could see the consequences of medication affecting the entire family network (Alden et al., 2018). In such cases, the concepts of patient-centered care and physician-patient relationship are likely to be “enriched” by a third element, namely the patient’s family. Consequently, triadic (physician-patient-family) consultations, characterized by high levels of family involvement in medical decision making, might be the most desirable (and effective) approach within certain cultures (Alden et al., 2018). In light of my local culture, I decided to focus on the variables possibly associated withillness perceptions not only among the persons with multiple sclerosis, but also among their partners, since a dyadic perspective seemed the most natural way to approach the phenomenon.

1.2 Key Concepts

This thesis revolves around three main concepts, introduced and discussed in detail in the next chapter, namely: multiple sclerosis (MS), alexithymia (or alexithymic traits) and illness perceptions (IPs), or appraisals or beliefs. The aim of this research is to investigate alexithymia (a personality trait hindering the understanding of one's own feelings and bodily sensations) as possibly associated with IPs (opinions regarding the nature, severity and curability of an illness) in MS, a chronic neurological condition, in both people living with the condition and their partners. These concepts represent the core aspects of my work and they could fairly be considered as the keywords of this thesis.

1.3 The Thesis

My thesis consists of two main pieces of work: a systematic literature review and a quantitative empirical research study.

The systematic review, focusing on current literature pertaining to the relationship between IPs and psychological, physical and social outcomes in MS, represents an independent piece of work, while providing an appropriate background to the research study, ultimately forming its springboard. Indeed, highlighting the impact of IPs on different outcome measures, the review emphasizes the clinical importance of such appraisals, while identifying gaps in the literature that are addressed in my research study.

The quantitative research adopts a cross-sectional design aimed at testing alexithymic traits as possibly associated with IPs among persons with multiple sclerosis (PwMS) and their partners, as well as within the dyads composed of PwMS and partners. Guided by a pragmatic epistemology, this research study acknowledges that the persons' appraisals of an illness may be influenced by personality and context.

From a theoretical point of view, the study draws on the cognitive-transactional model of couples' adaptation to chronic illness (Badr & Acitelli, 2017), highlighting that IPs are both individually and jointly (within the couple) formed, whereby contextual factors may influence this process. Building upon the cognitive-transactional model of couples' adaptation to chronic illness, and somewhat expanding it, this study proposes that alexithymia, hindering the understanding of one's own body, making it difficult to share feelings and impairing relationships, may represent a variable associated with IPs both at the individual and dyadic level.

From a statistical point of view, the analysis is based upon the Actor-Partner Interdependence Model, considering that the outcomes of the persons involved in a close relationship, such as a romantic one, are strictly intertwined (Kenny et al., 2006). Hence, the PwMS-partner dyads are treated as the unit of analysis, in the attempt to test whether alexithymic traits in the patient may influence IPs in the partner and vice versa.

1.4 Structure of the Thesis

This thesis begins by introducing the previously mentioned key concepts of my work (Chapter 2). It then moves on to present the results of the literature review (Chapter 3). My empirical study is reported in Chapter 4, the latter also focusing on the philosophical stance and theoretical framework guiding my work. The findings of the research study are reported in Chapter 5. The last part of this thesis (Chapter 6) provides a critical discussion about my results, along with considerations regarding the future directions of my research and some final remarks.

Chapter 2

Background

2.1 What Is Multiple Sclerosis?

MS is an autoimmune demyelinating disorder, causing the progressive destruction of the myelin sheath around the nerve fibres of the central nervous system and spinal cord (Goldenberg, 2012). Myelin is a lipid-rich biological membrane that, surrounding the nerve fibres, acts as an electrical insulator, thus speeding up the conduction of electrical signals (Podbielska et al., 2013).

Although the pathogenesis of MS is complex and not fully understood, it is universally believed that T and B cells (two subsets of lymphocytes involved in the immune response) may be responsible for attacking myelin, ultimately compromising the conduction of electrical signals at both central and peripheral levels, responsible for crucial bodily functions, such as movement and sensitivity. The myelin destruction, along with the failure to remyelinate, causes the progressive nerve damage, resulting in the formation of multiple areas of scar tissue (sclerosis) in the brain and spinal cord (Podbielska et al., 2013). Lack of vitamin D, genetic predisposition, infection with Epstein-Barr virus, and an unhealthy lifestyle may represent risk factors for this neurological condition (Wingerchuk, 2011). Major life events and emotional distress might play a role in both the occurrence and exacerbation of MS, via altering the immune response (Jiang et al., 2020; Nisipeanu & Korczyn, 1993; Warren et al., 1982; Warren et al., 1991). MS is the most common cause of neurological disability in young adults worldwide, with a higher prevalence among women [female to male prevalence ratio ranging from 1.1 to 3 depending on the study (Kingwell et al., 2013)]. The peak incidence is among people aged 25-34 years (Nicoletti et al., 2020). In Italy, the prevalence of MS ranges from 122 to 232 cases/100,000 in the mainland and Sicily, with overall similar rates across Europe (Battaglia & Bezzini, 2017; Kingwell et al., 2013).

2.1.1 Clinical Manifestations and Disease Course

From a clinical point of view, three main phenotypes of MS are universally recognized: relapsing-remitting, primary progressive and secondary progressive. Relapsing-remitting MS is the most frequent one and is characterized by relapses followed by periods of complete or partial recovery, while the progressive forms imply a continuous worsening of the symptoms, with accumulated disability (Oh et al., 2018). Although the specific phenotypes may provide a general idea of the disease course, the latter is highly unpredictable and heterogeneous, with highly variable levels of disability even after several years from onset (Lucchinetti et al., 2000).

Since the condition can affect many bodily functions (e.g. movement, vision, speech, etc.), the symptoms may vary across people and MS type. Possible manifestations include, but are not limited to, the following: limb weakness, sexual dysfunction, incontinence, fatigue, cognitive disturbances and spasticity (Crayton et al., 2004; Oh et al., 2018).

2.1.2 Diagnosis and Medical Therapy

Apart from the neurological examination, magnetic resonance imaging (MRI) represents the gold standard for the diagnosis of MS (Ömerhoca et al., 2018).

The typical MS lesions, or “plaques”, are areas of demyelination. At the earlier stages of the plaques, inflammation is predominant, while the later stages are characterized by axonal damage and neuronal loss (Ömerhoca et al., 2018). When particularly inflamed, that is in case of “active” disease, the lesions become more visible on the MRI scans (Chiang et al., 2016).

According to the 2016 MAGNIMS MRI criteria (Filippi et al., 2016), the diagnosis of MS can be formulated when the lesions meet certain criteria of dissemination in space (involvement of brain areas) and time (e.g. a new lesion when compared to a previous scan). Complementing the above approach, despite the lack of specific laboratory markers (Ömerhoca et al., 2018), the diagnosis of MS may be corroborated by the presence of oligoclonal IgG bands in the cerebrospinal fluid, indicative of a B-cell response due to a neuro-inflammatory status (Link & Huang, 2006). Unfortunately, the period from onset to diagnosis is rather frustrating, if not terrifying, for both the PwMS and their families, due to the variety of symptoms that may be difficult to interpret, thus delaying diagnosis (Luca et al., 2021; Topcu et al., 2022). Emotional support and personalized information still remain unmet needs that must be better addressed. More specifically, PwMS frequently feel left alone with their worries and emotional reactions, whereby the lack of information during the diagnostic process may favour the development of negative perceptions about the disease, such as finding it hard to understand and expecting severe consequences in everyday life (Topcu et al., 2022).

Concerning medical therapy, the introduction of interferon (a modulator of the immune system response) for the treatment of MS gave start to the era of the so-called "disease-modifying drugs". From that moment on, a plethora of pharmacological oral or injectable agents, having in common immunomodulatory properties exerted via different mechanisms of action, were tested and released (Vosoughi & Freedman, 2010).

Other treatments might be needed depending on the case, such as: systemic corticosteroids during relapses, botulinum toxin/other agents for spasticity, physical therapy for balance (Arik et al., 2022; Berkovich, 2016; Hughes & Howard, 2013). Finally, antidepressants, psychotherapy or combinatory approaches (Jones et al., 2021; Nathoo & Mackie, 2017) may be used for the treatment of anxious-depressive symptoms, as these are frequent among MS patients (Karimi et al., 2020).

The medical therapy of MS is typically a chronic one, aimed at reducing the relapses and controlling disease progression (Vosoughi & Freedman, 2010). The side effects vary depending on the specific pharmacological agent, and may include fever, injection site reactions, muscle weakness, and increased risk of infections. Despite their overall efficacy, all therapies require a commitment to a chronic and strict administration regimen, along with the management of side effects impacting everyday routine and social functioning (Lynd et al., 2018; Zadeh et al., 2019). Since therapy represents a fundamental aspect of MS management, it is easy to envision how PwMS may develop opinions regarding their medication that could affect their adherence. Indeed, PwMS holding optimistic views regarding the efficacy of pharmacological agents might be less prone to skip medication. Unsurprisingly, family support seems to represent a factor favouring adherence (de Seze et al., 2012). Indeed, medical therapy not only involves PwMS, as caregivers definitely take part to the therapeutic regimen (e.g. dealing with injections and side effects). Furthermore, the general management of MS, including the gathering of medical data, the re-consideration of future family plans and the change of their own identities in terms of housekeeping, parenting and work life are all impacts felt by family members (Heward et al., 2011; Luca et al., 2021). Hence, caregivers might as well form their own beliefs regarding MS, that could potentially influence their partners' view of the condition, its medication and its impact on everyday life.

2.1.3 Living With MS

The life of PwMS is burdened by a constellation of losses pertaining to their body, their future and their social role (Edmonds et al., 2007). Consequently, people affected by this condition frequently suffer from poor quality of life, worrying thoughts and anxious-depressive symptoms (Beiske et al., 2008; Bruce & Arnett, 2009; McCabe & McKern, 2002). Indeed, PwMS and their families deal with uncertainty their entire life, in light of the unpredictability of symptoms (that may come and go), the impossibility to predict relapses and the variable prognosis (Nissen et al., 2021; Luca et al., 2021). Qualitative data consistently indicate fear, shock and sadness as common emotions following diagnosis, not only among PwMS, but also among caregivers (Luca et al., 2021). When dealing with the condition, PwMS may feel that the disease is "taking control" of their body and stripping their identity from them, while the unpredictable and fluctuating symptoms make it difficult to foresee what kind of day lies ahead (Desborough et al., 2020; Nissen et al., 2021). Common symptoms, such as fatigue, along with the side effects of drugs (e.g. bruises at the site of injection, flu-like symptoms) may significantly affect functioning, ultimately impacting work and social life. Furthermore, the uncertain future may prompt PwMS to reconsider their dreams and career expectations, while re-defining, along with their caregivers, the concept of normalcy (Luca et al., 2021). Hence, given the insidious characteristics of MS, some affected people may even feel receiving guidance on how to deal with the condition emotionally as more important than receiving medical information about MS (Pearce & Meyer, 2020).

2.1.4 Psychological Therapy

Literature pertaining to psychological interventions in MS is extensive, with many studies specifically focusing on the treatment of specific psychological difficulties, such as negative mood, anxiety, fatigue or depression (Simpson et al., 2021). Several reports indicate group therapy as effective in reducing anxious-depressive symptoms as well as favouring acceptance and adaptation (Landoni et al., 2000; Robati & Shareh, 2018; Tesar et al., 2003). Furthermore, cognitive-behavioural therapy may help patients dealing with the challenging aspects of the condition, such as functionally-impairing symptoms, relapses and distress (Dennison & Moss-Morris, 2010; Moss-Morris et al., 2013), even though the long-term post-treatment effect might be limited (van den Akker et al., 2016). Mindfulness interventions helping PwMS to face their daily challenges and recognize their feelings may be useful to reduce distress (Bogosian et al., 2016). Interventions focusing on self-management, wellness or positive psychology may also show efficacy in helping PwMS deal with their condition (Simpson et al., 2021). In addition to focusing on anxiety and depression, psychosocial approaches may also be personalized for specific problems. For instance, couples' counselling sessions focusing on intimacy and marital communication may help spouses dealing with MS-related sexual dysfunction (Foley et al., 2001). Shedding light on the personality characteristics impacting on how individuals make sense of and manage their disease might help guiding such interventions. Many personality traits, such as neuroticism and perfectionism, might potentially influence how PwMS appraise and react to their condition (Goetzmann et al., 2005). As for my thesis, I focus on alexithymia (described in detail in the following paragraph), believing that this personality trait, rather common among PwMS (Chalah & Ayache, 2017), deserves special attention. In fact, MS is a challenging disease from a physical, emotional and interpersonal point of view (Luca et al., 2021), thus requiring efforts that alexithymic persons might find it more difficult to make. Indeed, alexithymia alters the understanding of one's own bodily sensations (Pollatos & Herbert, 2018), impairs emotional processing (Luminet et al., 2021b) and favours ineffective and conflictual interpersonal communication (Pérusse et al., 2012). In light of this, alexithymia could impact on *all* the delicate (physical, emotional, interpersonal) aspects of MS, thus representing the perfect candidate for being associated with IPs not only at the individual, but also at the dyadic level, as discussed throughout the thesis.

2.2 What Is Alexithymia?

The term *alexithymia* was coined by Sifneos in 1973. Deriving from Greek, it literally means "lack of words for emotions" ("a"=lack, "lèxis"=word, "thymos"=emotion). Alexithymia consists of a deficit of emotional awareness, resulting in the following core characteristics: 1) difficulty in identifying feelings and describing them to others; 2) difficulty in distinguishing between feelings and the bodily sensations of emotional arousal; 3) difficulty in attending to one's own inner states (externally oriented thinking); 4) impaired fantasy life (Sifneos, 1973).

In other words, people with alexithymia may struggle to elaborate their emotions and stressful events, thus experiencing amplified physiological arousal, a biased reporting of somatic sensations and a tendency to develop physical symptoms in response to emotionally challenging situations (Martínez-Sánchez et al., 2003; Sifneos, 1973).

2.2.1 The Complex History of Alexithymia

The concept of alexithymia has been a "grey area" for decades. Initially, following its theorization in the 70s, alexithymia was considered as a psychopathological condition representing a risk factor for psychosomatic disturbances through a psychodynamic mechanism (Gaggero et al., 2020), whereby a psychological issue manifests itself through physical ("functional", and not organic) symptoms (Heiberg, 1980; Sifneos et al., 1977).

In the late 80s, the development of the renowned Toronto Alexithymia Scale (Taylor et al., 1988) offered the possibility to rapidly test alexithymic traits, thus prompting new research avenues which led to a shift in the conceptualization of alexithymia from a psychopathological condition to a personality trait (Gaggero et al., 2020). More specifically, the fact that alexithymic traits were widespread not only in a variety of mental and physical health conditions (depression, anxiety, substance use disorder, schizophrenia, diabetes, inflammatory bowel syndrome, myocardial infarction, etc.), but also in the general population (Abramson et al., 1991; Fukunishi et al., 1994; Hendryx et al., 1991; Joukamaa et al., 1996; Porcelli et al., 1995; Salminen et al., 1999; Stanghellini & Ricca, 1995; Taylor et al., 1990) suggested that alexithymia could represent a personality trait (Gaggero et al., 2020).

The late 90s were characterized by further debates pertaining to the stability of alexithymia in response to changes in the levels of stress (Gaggero et al., 2020). In this regard, two longitudinal studies reporting alexithymia as a constant trait, remaining unaltered despite changes in terms of stress (Martínez-Sánchez et al., 1998; Martínez-Sánchez et al., 2003), supported the stability of alexithymia over time. Currently, the construct is recognized as a stable personality trait that, being normally distributed in the general population, should be considered on a continuum (Gaggero et al., 2020; Martínez-Sánchez et al., 2003; Salminen et al., 2006; Taylor & Bagby, 2012).

2.2.2 The Classification of Alexithymia

Generally speaking, alexithymia may be classified as primary or secondary (Goerlich, 2018). Primary alexithymia is believed to develop early in life and may relate to psychological trauma. Stressful situations occurring later in life (e.g., receiving a medical diagnosis or sexual assault) are believed to determine secondary alexithymia, representing a dysfunctional defence mechanism protecting the person from experiencing particularly disturbing emotions

(Goerlich, 2018; Messina et al., 2014). Secondary alexithymia may also be due to a focal brain damage affecting areas involved in emotional processing, such as the anterior cingulate cortex and corpus callosum, as in so-called organic alexithymia (Becerra et al., 2002; Messina et al., 2014).

It should be noted that these subtypes do not reflect actual differences in the core characteristics of alexithymia, but a subtle categorization linked to its hypothesized causes. Indeed, in light of the stability of alexithymia over time and the difficulty in identifying a specific cause, it may not be possible to actually ascertain whether alexithymic traits are primary or secondary (Messina et al., 2014). Consequently, my research study considers alexithymia as a general construct without indulging in considerations about its possible causes.

2.2.3 Epidemiology of Alexithymia

The prevalence of alexithymia in the general population is around 10% among both adolescents and adults, with adult males being more alexithymic than adult females (Franz et al., 2008; Joukamaa et al., 2007; Mattila et al., 2006). Alexithymia is strongly related to anxiety and depression. Indeed, in people suffering from anxious-depressive symptoms there is often a higher prevalence (up to 30%) and severity of alexithymia, although it is not clear whether alexithymia may predispose individuals to depression or represent a reaction to experiencing distress (Honkalampi et al., 2000; Marchesi et al., 2000). Nonetheless, alexithymia, anxiety and depression should be considered as distinct constructs that exist independently (Marchesi et al., 2000). In the MS population, the prevalence of alexithymic traits ranges from 10 to 53% (Chalah & Ayache, 2017), probably depending on the study measures (i.e. dichotomous definition of alexithymia). Despite the lack of definite explanations of the link between MS and alexithymia, the latter may derive, in some cases, from the progressive brain damage characterizing the demyelinating disorder. Should the alexithymic traits be of organic nature, the clinicians should take them into account throughout the disease course. On the other hand, alexithymic traits could represent a “protective” response to the stress engendered by receiving the diagnosis of MS. However, the inflexible emotion regulation characterizing alexithymia could account for the typically maladaptive nature of this personality trait (Panayiotou et al., 2021). These data suggest that alexithymic traits may deserve further investigation in the specific population of PwMS, not only for their prevalence and possible underlying causes, but also for their potential negative impact on quality of life and interpersonal communication (Chalah & Ayache, 2017) and their potential role in impacting family functioning (Di Tella et al., 2021).

2.2.4 Alexithymia and the Relationship With the Self

As stated above, alexithymia impairs the understanding of one’s own emotions and bodily sensations (Baiardini et al., 2011). Hence, people with alexithymic traits may perceive the sensations of emotional arousal as signs of physical illness, as well as misinterpret the somatic symptoms of a disease (Larsen et al., 2003; Lumley et al., 1996).

Consistently with this, literature data support the hypothesis that alexithymic traits may negatively impact disease management in several medical conditions, such as respiratory allergy, diabetes, HIV and cardiopathy (Baiardini et al., 2011; Jackson & Emery, 2013; Luca et al., 2015; McIntosh et al., 2016). These considerations apply to the population of interest of this thesis, namely PwMS. Indeed, Bodini et al. (2008), analyzing alexithymia from a dichotomous perspective (presence-absence), reported higher levels of perceived physical fatigue in alexithymic versus non-alexithymic PwMS. The relationship between fatigue and alexithymia, independent from the actual physical impairment, supports the authors’ hypothesis that alexithymic PwMS may present an exaggerated attentional focus on bodily sensations (such as fatigue), thus perceiving them as more severe and overwhelming. As a result, one could anticipate that alexithymic individuals may present inaccurate appraisals of MS, its symptoms and actual severity. However, such findings are not universal as other studies have provided conflicting results pertaining to the link between alexithymia and fatigue, with some authors suggesting no relationship at all (Cecchetto et al., 2014) and others reporting social and cognitive fatigue (respectively, low energy to spend on others or mental activities) as related to alexithymia, and physical fatigue as unrelated to it (Mosson et al., 2014).

2.2.5 Alexithymia and the Relationship With Others

The consequences of the difficulty in identifying and describing feelings are not limited to the person holding alexithymic traits, but also extend to their interpersonal relationships. The lack of emotional awareness translates into an impaired understanding of emotions of others, too. As a result, persons with alexithymia may appear as unempathetic (Vanheule et al., 2007), with limited demonstration of affection and report poor relationship satisfaction (Humphreys et al., 2009; Kafetsios & Hess, 2019). Thus, the partners of alexithymic people may perceive lower levels of support and intimacy, particularly when the couple faces stressful conditions, due to the impaired processing of emotional information (Foran & O'Leary, 2013).

Returning to my topic of interest, namely PwMS and their partners, it is easy to envision how alexithymia may play a significant role in the interpersonal interactions occurring in a couple facing an emotionally and physically challenging disorder. Indeed, alexithymic traits in one or both members of the couple (PwMS and/or partner) may further complicate matters in terms of making sense of the condition and how they deal with it.

2.3 Defining Illness Perceptions

In simple terms, IPs are the result of ill persons “making sense” of their condition. The most renown theoretical framework for IPs is Leventhal’s (1992) self-regulation model (SRM) of health and illness. According to this model, ill people construct personal representations of their disease, which ultimately impact their coping strategies and the emotional response to their condition (Leventhal et al., 1992; Leventhal et al., 2003).

IPs incorporate five core dimensions (Leventhal et al., 1992), namely:

1) *identity*: beliefs about the nature of the illness, including the type of symptoms it may cause;
2) *timeline*: opinions regarding the time-course of the condition, such as cyclical or acute;
3) *causes*: assumptions concerning the possible causes of the condition;
4) *consequences*: representations about the impact of the illness on one’s own life;
5) *cure/control:* beliefs concerning the possibility to cure the condition or control its symptoms.

Extended dimensions, addressed by the questionnaires investigating illness representations (detailed in my literature review) include the understanding of the illness (*coherence*), the emotional reactions it causes (*emotional representations*) and the amount of *concern* regarding the condition (Broadbent et al., 2006; Moss-Morris et al., 2002).

The IP dimensions are not just theoretical concepts, but have an impact on the person’s thoughts and behaviours. For example, regarding identity, while a person may correctly guess which symptoms characterize the flu, this can be much more challenging in a complex condition such as MS. This may lead to a discrepancy between the patient’s and physician’s opinions, along with the misattribution of common disturbances (e.g. sore eyes after long hours at the computer, post-workout tiredness) to the illness (Petrie & Weinman, 2006). The timeline dimension may influence adherence to treatment, since patients believing that their condition is acute may not adhere to chronic medications (Petrie & Weinman, 2006). On the other hand, chronic or cyclic attributions may favour anxious-depressive symptoms and worrying thoughts (Rabin et al., 2004). As for the causes, they can determine positive lifestyle changes (e.g., when attributing heart disease to smoking), but also prompt feelings of guilt, particularly when the causes are unclear and the person may conclude that he/she must be to blame (Naea De Valle & Norman, 1992; Petrie & Weinman, 2006). Concerning the consequences dimension, it entails considerations regarding the impact the disease has on one's own life (work, social life, leisure activities, etc.) and the perceived illness severity, irrespective of the objective clinical evaluation (Petrie & Weinman, 2006). Beliefs about dramatic consequences may lead to dysfunctional coping, thus negatively impacting treatment adherence (Ross et al., 2004). Individuals with stronger beliefs of illness control through treatment are more likely to follow their therapeutic regimen, attributing value to it (Ross et al., 2004). Similarly, people with a better understanding (coherence) of their condition may show higher adherence having a clear idea of what it needs to be done to manage their illness (Ross et al., 2004). On the contrary, persons with higher emotional response and concern in relation to their condition may show lower compliance, since their negative feelings may lead to anxious-depressive symptoms and favour mechanisms of denial, ultimately interfering with illness management (Ross et al., 2004).

2.3.1 The Formation of Illness Perceptions

A new symptom or diagnosis represents a health threat, prompting the formation of appraisals concerning what the specific symptoms/diagnosis might mean. These appraisals arise from and are influenced by various sources, including personal knowledge, previous experience, opinions of significant others, or similar diagnoses in the family (Petrie & Weinman, 2006). IPs are, in fact, complex and may be influenced by multiple factors. Indeed, while individuals personally experience and make sense of their illness, “every component of the self-regulation system will be shaped and re-shaped by the social environment” (Leventhal et al., 2003, p. 55), whereby the input from significant others could even determine the successful or dysfunctional management of the disease (Leventhal et al., 2003). Despite these theoretical considerations, there is a lack of studies specifically focusing on the variables possibly associated with IPs. However, some literature suggests that both intrapersonal and interpersonal factors may influence IPs.

One group of intrapersonal factors which may be important are personality traits. Indeed, in a sample of persons with lung disease, people tending to experience negative affect (showing high levels of neuroticism) were more likely to perceive a reduced control over their illness, as opposed to people showing higher openness to experiences (Goetzmann et al., 2005). Similarly, myocardial infarction patients holding type D personality traits (which include social inhibition and negative emotions) presented more negative opinions regarding the consequences of their illness and the possibility to control it (both personally and through treatment), along with higher levels of concern when compared to non-type D patients (Williams et al., 2011). Furthermore, alexithymic traits have been found to relate to negative IPs (e.g. higher consequences, concern and emotional representations) in a variety of medical conditions (Barbasio et al., 2015; Larsen et al., 2017; Okanli et al. 2018).

Considering the interpersonal factors, preliminary reports support the need to assess IPs from a relational perspective. More specifically, a study involving patients with mild cognitive impairment and their partners reported an interdependence of IPs across the groups, whereby the patients’ perception of severity influenced that of their partners (Lingler et al., 2016). In other studies, caregivers’ IPs were reported to relate to a variety of patients’ outcomes (adaptation to the disease, quality of life/well-being, self-rated health and/or coping) across different medical conditions, such as rheumatoid arthritis, cancer, cardiopathy and

Huntington's disease (Kaptein et al., 2007; Karademas et al., 2010; Richardson et al., 2016; Sterba et al., 2008). In addition, a study focusing on IPs among caregivers and PwMS reported a relationship between their own negative beliefs and worse well-being in each group (Bassi et al., 2016).

2.3.2 Illness Perceptions and Behaviour

The beliefs about a disease guide the attitudes, behaviours and expectations towards it (Hagger & Orbell, 2003; Leventhal et al., 1992; Leventhal et al., 2003). Hence, negative IPs can lead to worrying thoughts, reduced satisfaction after a consultation and worse psychophysical wellbeing (Petrie et al., 2007). Moreover, people believing that their illness is uncontrollable may not take their medication, find it difficult to adhere to the physician's viewpoint and could ultimately adopt dysfunctional coping strategies, such as denial (Hagger & Orbell, 2003). Some authors reported that strong illness identity (symptoms attributed to the condition) and beliefs about the consequences of the disease are linked to higher rates of service use (Elwy et al., 2011; Frostholm et al., 2005; Pryce et al., 2010), while others have found that the same perceptions (identity and consequences), along with previous unsatisfactory experiences with health services, may represent barriers to help seeking (Gregg et al., 2021). These apparently inconsistent results reflect the complex nature of human behaviour, whereby many factors may dynamically play a role. More specifically, personal and/or others' experience along with the different dimensions of IPs and the specific information about a medical condition may jointly guide the attitude towards an illness and its management (Gregg et al., 2021).

Furthermore, it should be noted that the exact same belief may have positive or negative consequences depending on the person's coping style. For example, the attribution of an illness to psychological causes could either elicit self-blame or prompt the patients to take better care of themselves, depending on the adopted coping strategy, as reported in a study involving PwMS (Bassi et al., 2020). Consequently, the coping strategies adopted by individuals can determine different illness outcomes, particularly when perceptions related to health threats (consequences, timeline, identity) are considered (Hagger & Orbell, 2022).

While acknowledging the complex nature of IPs and their relationship to outcome, IPs are generally referred to as being positive or negative across literature (Barbasio et al., 2015; Brink et al., 2011; Okanli et al., 2018; Petrie & Weinman, 2006). Indeed, one can empirically attach positive (functional) characteristics to personal control, treatment control and coherence, since they basically express a certain level of confidence and optimism towards the illness, and negative (dysfunctional) characteristics to emotional representations and consequences, since they allude to the illness-related suffering and impact in everyday life. This thesis conforms to this custom, which is further validated by the relationship between positive IPs and better outcome, discussed in the following paragraph.

2.3.3 Illness Perceptions and Health Outcomes

Cross-sectional research across many health conditions suggests that illness beliefs show moderate-to-strong relationships with adaptive outcome, namely psychological well-being, vitality, role, social and physical functioning, whereby positive IPs are positively related to better outcome (Hagger & Orbell, 2003). More specifically, positive IPs, such as strong beliefs regarding the controllability of the disease, related to successful coping and self-management in asthma patients, ultimately resulting in a better control of the symptoms (Kaptein et al., 2010). On the contrary, negative IPs (such as poorer sense of personal control) were linked to depression and impaired quality of life among patients with coronary artery disease (Stafford et al., 2009). In a study focusing on psoriasis, the patients attributing more symptoms to their condition had a worse outcome in relation to physical health, social functioning, mental health, health perceptions and depression (Scharloo et al., 2002). Notably, positive perceptions of treatment control were found to predict survival among dialysis patients after controlling for age, biochemical parameters, medical comorbidity and depression (Chilcot et al., 2011). A literature review addressing work participation in persons with somatic conditions has also identified maladaptive IPs as contributors to reduced work participation and unemployment (Hoving et al., 2010).

Longitudinal research from different specialties also supports the relationship between IPs and the outcome measures related to the illness under study. More specifically, negative beliefs regarding the severity and chronicity of symptoms following mild head injury were linked to enduring post-concussional symptoms at three months, regardless of anxiety, depression, post-traumatic stress and severity of injury (Whittaker et al., 2007). Similarly, people suffering from back pain holding negative beliefs regarding the long-lasting, burdening and uncontrollable nature of their condition showed poor clinical outcome at 6 months (Foster et al., 2008).

The relationship between IPs and outcome is the focus of some studies involving PwMS and linking IPs to different outcomes, such as depression, health-related quality of life and adaptation to the disease (Jopson & Moss-Morris, 2003; Spain et al., 2007; Vaughan et al., 2003). These and other studies are analysed in detail in my literature review chapter.

Despite the importance of IPs in clinical practice, there is a lack of studies focusing on what may influence the formation of IPs, particularly among PwMS. However, personality traits, such as alexithymia, may be one fruitful avenue to explore as possibly associated with IPs, as discussed below.

2.4 Alexithymia and Illness Perceptions

There are no studies focusing on the link between alexithymia and illness appraisals in MS. This is surprising, since a crucial theme arising from the PwMS' accounts of their lived experience pertains to making sense of their bodily sensations, which in turn requires a certain level of body awareness and surveillance over their own body (Nissen et al., 2021), typically impaired by alexithymia (Murphy et al., 2018; Pollatos & Herbert, 2018). Indeed, it could be fairly hypothesized that alexithymia, via hindering the correct understanding of somatic sensations, could influence the formation of PwMS's IPs.

Findings from research focusing on other medical conditions, such as cancer, psoriasis and systemic lupus erythematosus, suggest a relationship between alexithymia and negative IPs, particularly concerning the dimensions related to emotional correlates of the disease, its consequences and the ability to understand or control the symptoms (Barbasio et al., 2015; Larsen et al., 2017; Okanli et al., 2018). More research on this topic is needed in the specific population of PwMS. Indeed, MS has some peculiarities (unpredictable nature, extremely heterogeneous symptoms, young age at onset) that further complicate matters for the affected people when it comes to making sense of the condition. Hence, as MS is a complex, multifaceted and unpredictable disease, the formation of functional IPs may represent a crucial and challenging process. As discussed above, it is apparent how PwMS having alexithymic traits may find it even more difficult to make sense of their disease. These considerations motivate my interest in alexithymia as a possible contributor to the formation of IPs both at the individual (understanding one's own body) and dyadic level [due to impaired communication within the couple when one of the members (PwMS or partner) has alexithymic traits]. Many psychological determinants may contribute to IPs, but alexithymia (at least theoretically) seems to perfectly fit the role of a variable possibly associated with IPs, since it may influence their formation at multiple levels: making sense of the illness both physically (understanding symptoms) and emotionally (understanding feelings), as well as sharing opinions with others (engaging in effective spousal communication).

Deepening knowledge on the subject will have not just theoretical value, but may have therapeutic implications for PwMS. Indeed, even though some authors suggest that psychotherapy shows no effect on alexithymia (Yilmaz et al., 2019), others report that psychotherapy, such as group therapy, may be effective in reducing alexithymic traits (Beresnevaite, 2000). A study involving more than 300 people with psychiatric disturbances, while confirming the relative stability of alexithymia (significant correlations between alexithymia levels before and after treatment), nonetheless reported that a psychodynamic approach was effective in reducing alexithymic traits, psychological stress and depression (Stingl et al., 2008). Indeed, despite the widely accepted relative stability of personality traits, it would not be wise to exclude the possibility of a psychological intervention, since intentional personality changes might be possible in adults with dysfunctional traits (Allemand & Flückiger, 2017). In fact, since the clients are frequently aware that some traits impair their everyday functioning, health care professionals may guide them towards a functional change of their behaviour. For example, Allemand and Flückiger (2017) suggest the application of the following strategies: 1) highlight the interpersonal and intrapersonal costs of dysfunctional traits; 2) activate social resources (e.g. family support); 3) target the benefits of certain behaviours; 4) favour active learning (through observation of others and/or feedback received from them). These premises could open encouraging scenarios for the treatment of alexithymia, too. Considering the main focus of my thesis, PwMS and/or their partners with alexithymic traits might need special support during the diagnostic phase and through the complex process of adaptation to MS. It could be hypothesized that providing these couples with strategies of effective communication, clear information on the symptoms that may be wrongly attributed to MS, and practical examples on how opening up with the partner may result in helpful feedback, could empower the dyad, ultimately favouring the formation of positive IPs, the latter being linked to better outcome in MS, as highlighted by my literature review (next Chapter).

Chapter 3

Illness Perceptions and Outcome in Multiple Sclerosis: A Systematic Review of the Literature

3.1 Background

Previous reviews reported a relationship between negative IPs and a variety of negative outcomes (e.g. low quality of life, high levels of depression, anxiety, functional impairment, and pain) in several medical conditions, such as cardiovascular and pulmonary disease, hip/knee arthroplasty, cancer, alopecia and epilepsy (Dempster et al., 2015; Sawyer et al., 2019), but have not included MS.

A review addressing the psychological correlates of adjustment (conceptualized as encompassing depression, quality of life, relationship satisfaction, etc.) in PwMS included IPs as possible predictors (Dennison et al., 2009). However, the paper focused on the relationship between a specific outcome (psychological adjustment) and a variety of possible determinants (e.g., self-efficacy, social support, psychopathology), with only limited information on IPs. In addition, due to its year of publication (2009), the review did not include the bulk of literature on IPs which has been produced after 2009. Since data suggest that illness appraisals show moderate-to-strong relationships with coping and a variety of outcomes (e.g., psychological well-being, distress, role and social functioning, vitality) across all studies addressing this topic (Hagger & Orbell, 2003), I decided to perform an up-to-date review specifically addressing the relationship between IPs and a broad range of outcomes not only among individuals with MS, but also among their caregivers.

Indeed, since "every component of the self-regulation system will be shaped and re-shaped by the social environment" (Leventhal et al., 2003, p. 55), it is plausible that the individuals' perceptions may be somewhat related to the opinions of other relevant people, such as their caregivers, namely family members, friends or partners taking care of them. In addition, caregivers are affected by MS, albeit indirectly, in terms of physical, psychological and financial consequences (McKeown et al., 2003), making their IPs worthy of consideration. Building on this, some studies are starting to focus on the role of IPs of significant others (e.g. partners) on the outcome of persons affected by chronic conditions, including MS, suggesting a possible relationship (Bassi et al., 2016; Sterba et al., 2008; Wu et al., 2013).

To the best of my knowledge, no systematic review has specifically addressed the possible relationship between IPs and outcome in MS. However, one cannot be sure that the findings obtained by previous reviews addressing other chronic conditions may be transferable to MS, considering its peculiar nature (high unpredictability and prevalence among younger people). Consequently, this systematic review addresses this gap in the literature, aiming to synthesise and critically appraise quantitative evidence answering the following question: "Do illness perceptions affect outcome in persons with multiple sclerosis and their caregivers?" This review considered a broad range of outcomes, thus including psychological, physical and social ones.

3.2 Materials and Methods

This review was registered on Prospero (record CRD42021255459) and a version has been published in a peer-reviewed journal (Luca et al., 2022).

The methodology adopted in this review was guided by current literature on the topic, such as Cochrane's guidelines and other references (Aveyard et al., 2016; Higgins & Green, 2011; Munn et al., 2018). My work is the first one addressing the relationship between IPs and different types of outcome in PwMS and their caregivers. Hence, I decided to conduct it in a systematic, rigorous and replicable manner, in order to ensure the trustworthiness of my findings (Aveyard et al., 2016; Higgins & Green, 2011). Moreover, my review represents the springboard for my empirical study. Hence, the choice of performing a systematic one seemed more appropriate to identify areas for future research and conflicting results (Munn et al., 2018).

Review question

The formulation of the review question was informed by the PICOS framework (Centre for Reviews and Dissemination, 2006) even though not all components of the framework were operationalized in the search strategy, so as not to restrict the results (see the section "Database searching" below). More specifically, the **P**opulation of interest consists of *persons* (18+ years) *with MS (any phenotype) and/or their caregivers* and the **I**ndicators are represented by *validated questionnaires addressing illness perceptions (see the inclusion criteria below)*. No specific **C**omparator was chosen for this review. Regarding **O**utcome, no specific terms were used, so as not to restrict the results, not only because "outcome" itself can refer to different aspects, but also because it can potentially differ according to the considered population. For instance, depression may be an outcome applicable to both PwMS and caregivers, while MS-related fatigue is an outcome only applicable to PwMS. The **S**tudy designs included in this review were *quantitative studies* (all types).

Inclusion criteria

Only papers with the following characteristics were included in this review: quantitative studies (all types); written in English or Italian; published from 1992 [date when a complete theorization of IPs was published (Leventhal et al., 1992)]; investigating the relationship between IPs (of the affected persons and/or their caregivers) and any outcome in the PwMS and/or their caregivers (e.g. severity of fatigue, compliance, psychological adjustment, depressive symptoms, quality of life, coping, etc.), even if the main focus of the research was not illness representations; any gender, age, ethnicity; using validated scales (administered by researchers or self-administered) assessing the different dimensions of IPs as theorized by Leventhal et al. (1992) and expanded by the questionnaires investigating them (Broadbent et al., 2006; Moss-Morris et al., 2002): causes, coherence, concern, consequences, control, identity, emotional representations, timeline.

Exclusion criteria

Papers with the following characteristics were excluded by this review: studies with no specific focus on the relationship between IPs and outcome (e.g. studies assessing IPs in persons with worse outcome without investigating the relationship between perceptions and outcome); studies failing to address all the dimensions of IPs (e.g. studies focusing *only* on the perception of uncertainty or the perception of treatment efficacy in MS). The review only included primary research articles and excluded review papers and materials available outside traditional academic publishing (grey literature).

Database searching

The search was finalised with advice from academic librarians of Lancaster University (UK) and performed separately in MEDLINE, PsycINFO, and CINAHL (last access in September 2021). The search was consistent in all databases. Title and abstract searches were performed. Two main concepts were searched for: “MS” and “illness perceptions”. For MS both free terms and subject headings (those considered as being relevant to the review) were used and combined with the Boolean operator “OR”. No subject headings were deemed appropriate for operationalising IPs. The separate searches for “MS” and “illness perceptions” (and related terms), were combined with “AND”. Proximity searches and asterisk operators were also applied. The following search terms were used:

1) "multiple sclerosis"; "MS"; "demyelinating disease"; "relapsing remitting" (and relevant subject headings). For Medline: MH “Multiple Sclerosis+” OR MH “Multiple Sclerosis Chronic Progressive” OR MH “Multiple Sclerosis Relapsing Remitting”. For PsycINFO: DE “Multiple Sclerosis”. For CINAHL: MH “Multiple Sclerosis+”
2) "illness"; "disease"; "sickness"; "condition"; "disability"; "health issue" N3 "perception*"; "representation*"; "belief*"; "opinion*"; "appraisal*"; "attitude*"

The finalised literature search was successfully tested on Medline, in order to ensure that 10 papers, deemed as certainly relevant for the review and previously retrieved from Google Scholar, could be found. In order to maximise the retrieving of papers, three additional search strategies were adopted:

-searching the reference list of the papers included in the review;

-searching for papers by key authors in the field, identified as the most prolific ones in relation to the final number of selected papers;

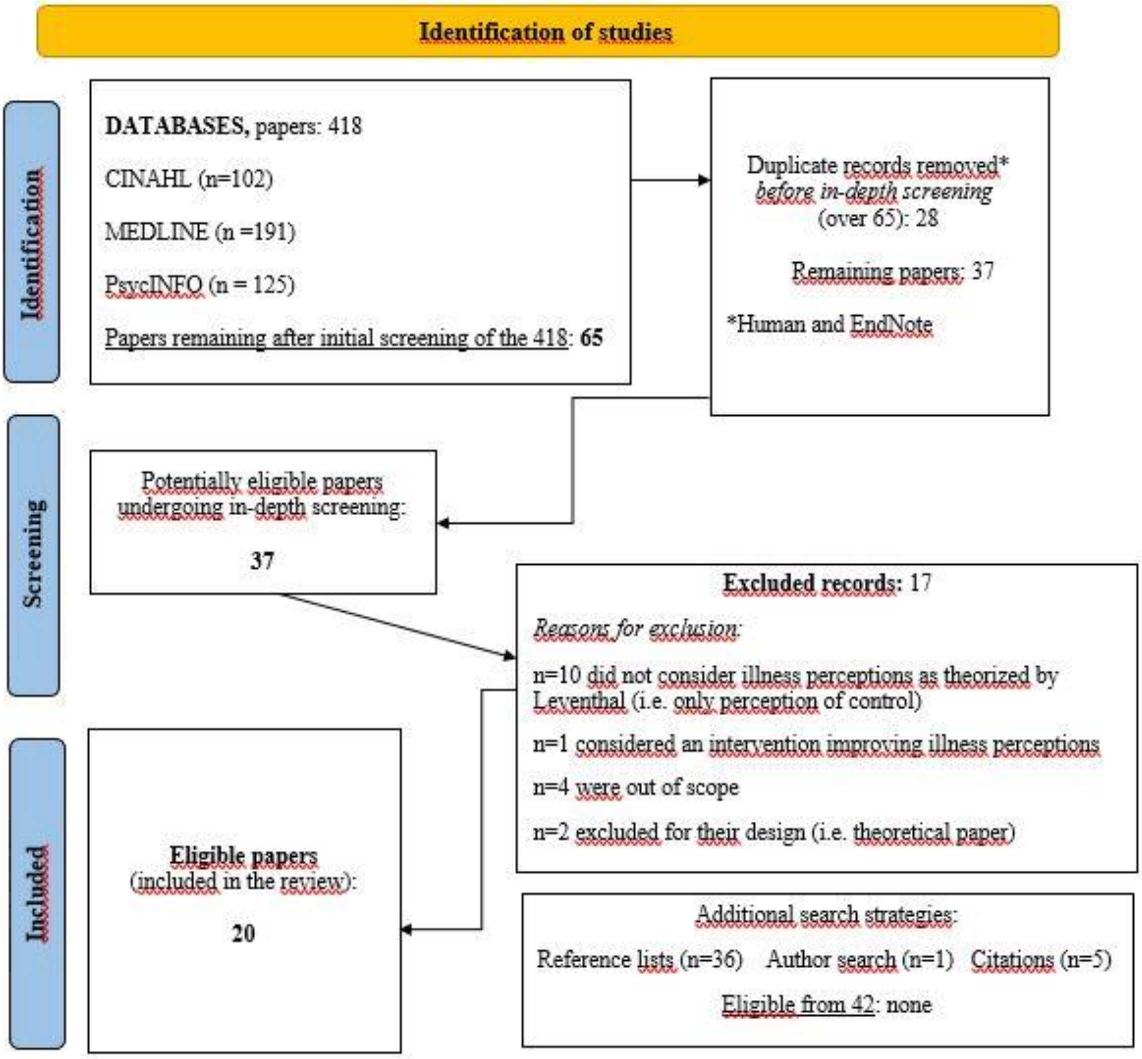
-searching for papers citing those included in the review (on Google scholar).

Selection of the relevant papers

All the papers meeting the inclusion criteria were considered as *relevant* to the review. A first screening of eligibility involved the selection of papers whose titles were broadly or specifically referring to the review topic. Then, the revision of the abstracts and the revision of the full-texts, the latter accessed when the former was not sufficiently exhaustive to allow me to reach a definite decision of inclusion/exclusion. For a visual presentation of the review stages (identification of the papers, screening, eligibility, included articles), based upon the PRISMA 2020 statement and flow diagram (Page et al., 2021), see Figure 1.

Figure 1

PRISMA flowchart



The papers to be screened were managed through the Endnote 8x software. More specifically, after the exclusion of papers deemed as certainly irrelevant from each database, the potentially relevant records (n=65) were saved on Endnote. Then, only after the duplicate references were eliminated (through Endnote and double-checked manually), the remaining papers (n=37) were analysed for exclusion/inclusion.

Data extraction

All the relevant papers were thoroughly assessed in order to extract the information to answer the review question. To serve this purpose, a data extraction form was customized for the specific needs of this review, using the data extraction form of the Joanna Briggs Institute for experimental/observational studies (freely adapted for this review) and the Joanna Briggs Institute guidelines for extracting data as a reference (Aromataris & Munn, 2020; Godfrey & Harrison, 2015). The data extraction tool contains specific information including: study design, sample characteristics, clinical outcome measures, relationship between IPs and outcome and considerations regarding any confounding variables. In order to facilitate the recording of relevant information, outcomes were divided into the following broad categories, informed by the literature: psychological aspects (e.g. adjustment, depression), physical condition (e.g. fatigue, pain), illness management (e.g. adherence, service use), and socio-economic aspects (e.g. work, social isolation). The form offered the possibility to specify the outcomes and add any missing ones.

Critical appraisal

The quality of the selected papers was assessed using the 16-item Quality Assessment Tool for Studies with Diverse Designs-QATSDD (Sirriyeh et al., 2012). The tool, reliable and valid when assessing papers adopting different designs, considers several aspects of studies, such as explicit reference to a theoretical framework, representativeness of the sample, description of the research setting, fit between research question and methods of analysis, etc. Each aspect can be evaluated with a score ranging from 0 (not at all) to 3 (complete), whereby higher numbers indicate higher quality. The maximum total score is 42 and it is possible to calculate, for each paper, the percentage obtained in relation to the maximum total score, in order to produce a quality ranking useful to compare studies (Sirriyeh et al., 2012).

Synthesis and analysis

The findings regarding the relationship between IPs and outcome, derived from the relevant papers, were subjected to a narrative synthesis. Albeit not rigidly following any specific framework on narrative synthesis, I relied on self-study to identify general guidelines for the conduction of narrative synthesis (Campbell et al. 2019; Popay et al., 2006). The latter was performed considering the main results of the studies, similar patterns, disconfirming cases and overall interpretation of the findings. More specifically, I adopted a textual approach to synthesise the findings of the papers included in the review that, guided by my specific study question, aimed at offering an overview of the topic while exploring the relationships within studies (i.e. grouping them according to their design, focus and/or specific analyses, identify the directions and sizes of the reported associations) and assessing the robustedness of the findings. The latter was ensured through the clarification of the weight given to the studies, as a result of the critical appraisal (Popay et al., 2006). Moreover, since one of the criticisms attributed to narrative synthesis of quantitative data is the risk of over-emphasizing selected results (Campbell et al., 2019), I decided to give special attention to the transparent disclosure of the papers disconfirming the hypothesised relationship between IPs and outcome.

The overall (based on the range of values) effect size (ES) of the relationship between IPs and outcome was evaluated for each paper, considering the ES reported by the authors, or the findings referring to the relationship between variables. The latter were interpreted in accordance with the following criteria (Cohen, 1992; Sullivan & Feinn, 2012):

Odds ratio 1.5 (small ES), 2 (medium ES), 3 (large ES);

Pearson's correlation .10 (small ES), .30 (medium ES), and .50 (large ES).

In particular, the size and direction of every correlation were recorded in the data extraction form. Then, the ES was grossly inferred for each paper, considering the range of values as a whole (the most represented ones dictating the final ES). For example, in the case of a paper reporting a total of 8 correlations, 5 of them showing an ES<0.30 and 3 of them showing an ES>0.30, the overall ES was considered as being small. Findings other than correlations, such as the impact of IPs on the percentage of explained variance, as investigated through regression analyses, were also reported.

Quality control of the review process

In order to improve the quality of the review process, the selection, data extraction and critical appraisal phases were independently performed by myself and a senior researcher (Prof. Francesco Patti), using a list of 10 potentially eligible papers selected randomly from the databases. Both evaluators had to identify, from the list, the papers to be included in the review, extract data from them and then critically appraise the selected ones Both the selection and data extraction processes returned the same outcome for each reviewer. Only the critical appraisal highlighted disagreements, that were negligible (difference of no more than 1 point at the QATSDD total score). Therefore, I undertook the rest of the data extraction and critical appraisal alone.

3.3 Results

Retrieved papers

The literature search returned a total of 418 records (125 from PsycINFO, 191 from Medline, 102 from CINAHL). An initial screening was performed on the papers retrieved from each database, in order to eliminate the papers whose titles clearly referred to topics irrelevant to this review. Sixty-five papers remained after this initial screening. After the deletion of 28 duplicate references, a total of 37 potentially eligible papers underwent an in-depth screening (full-text examination), that resulted in the exclusion of seventeen papers (see Figure 1 for the reasons of exclusion). A total of 20 papers remained and were considered as relevant for this review, in accordance with the previously mentioned inclusion criteria (see Table 1 for an overview of the selected papers). The additional search strategies (reference lists, most prolific authors, papers citations) yielded an additional 42 papers for consideration. More specifically, the revision of the reference lists of the papers included in the review allowed the identification of 36 possibly relevant articles (according to the title), however these were all eliminated after abstract/full-text analysis. The search for the most prolific authors in the field returned just 1 paper that was also excluded because it did not consider IPs. The search for papers citations (total 1185) yielded only 5 more possibly relevant records which were all excluded because they did not meet the inclusion criteria (see Figure 1 for a visual presentation of the selection process).

Table 1

Overview of the selected papers

First author	Year	Location and setting	MS type	Sample size	Mean age	Is the relationship between illness perceptions and outcome the main focus of the paper?
Ackroyd	2011	UK, CL	R-R, S-P	72 PwMS	47.5	Yes
				72 caregivers	48.6	
Bassi	2016	Italy, CL	R-R, P-P, S-P	68 PwMS	39.6	Yes
				68 caregivers	46.0	
Bassi	2020	Italy, CL	R-R, P-P, S-P	680 PwMS	40.1	Yes
Bassi	2021	Italy, CL	R-R, P-P, S-P	680 PwMS	40.1	Yes
Dennison	2010	UK, CL	R-R, P-P, S-P	94 PwMS	41.7	No
Glattacker	2018	Germany, CO	R-R, P-P, S-P	590 PwMS	45.6	Yes
Heffer- Rahn	2018	UK, CO	R-R, P-P, S-P, P-R	132 PwMS	43.3	No
Jopson	2003	NZ, CO	R-R, P-P, S-P	168 PwMS	50.6	Yes
Neter	2009	Israel, CL	Not specified	101 PwMS	41.2	No
Neter	2021	Israel, CL	R-R	186 PwMS	40.6	No
Santos	2019	Portugal, CL	R-R, S-P	100 PwMS	39.4	No
				72 caregivers	42.4	
Schiaffino	1998	USA, CL	Not specified	66 PwMS	42.0	Yes
Spain	2007	Australia, CL, CO	R-R, P-P, S-P, ?	580 PwMS	46.7	Yes
Timkova	2021	Slovakia, CL	Not specified	162 PwMS	40.9	Yes
Vaughan	2003	UK, CL	Not specified	99 PwMS	44.8	Yes
Wilski	2016	Poland, CL, CO	R-R, P-P, S-P, P-R,?	185 PwMS (only F)	48.8	No
Wilski	2016a	Poland, CL, CO	R-R, P-P, S-P, P-R,?	257 PwMS	47.9	Yes
Wilski	2016b	Poland, CL	R-R, P-P, S-P, P-R	210 PwMS	47.0	Yes
Wilski	2017	Poland, CL, CO	R-R, P-P, S-P, P-R,?	264 PwMS	49.3	No
Wilski	2019	Poland, CL, CO	R-R, P-P, S-P, P-R,?	278 PwMS	48.0	Yes

Note. The Table provides an overview of the selected papers. CL: clinic; CO: community F: females; MS: multiple sclerosis; R-R: relapsing-remitting MS; P-P: primary progressive; PwMS: persons with MS; P-R: progressive-relapsing; S-P: secondary-progressive; ?: indeterminate/unknown; NZ: New Zealand. In bold the most frequent MS type.

General characteristics of the selected papers

The relevant papers refer to research conducted in different geographical areas (Europe, Australia, New Zealand, USA, Israel). The majority of studies were cross-sectional, with 2 out of 20 adopting a longitudinal design (Neter et al., 2021; Schiaffino et al., 1998). Despite 3 articles enrolling both caregivers (mainly spouses) and PwMS (Ackroyd et al., 2011; Bassi et al., 2016; Santos et al., 2019), only two of them analysed IPs among caregivers, too (Ackroyd et al., 2011; Bassi et al., 2016). Considering the whole body of literature (20 selected papers), the sample size for PwMS ranged from a minimum of 66 (Schiaffino et al., 1998) to a maximum of 680 (Bassi et al., 2020; Bassi et al., 2021), resulting in a total sample size of 4972 participants, of whom 1419 were males and 3542 were females [11 participants had missing data from one study (Glattacker et al., 2018)]. One paper focused only on female PwMS (Wilski et al., 2016), providing data on the relationship between IPs and body esteem. Considering the 20 papers as a whole, the most represented MS phenotype was the relapsing-remitting one, while mean disease duration was higher than 5 years in almost all studies, ranging from a minimum of <3 years (Santos et al., 2019) to a maximum of 13.8 years (Wilski et al., 2016). Disease severity was, overall, mild-moderate. Regarding the two papers where caregivers' IPs were assessed, the sample sizes were 68 (Bassi et al., 2016) and 72 (Ackroyd et al., 2011), resulting in a total sample size of 140.

Critical appraisal

The quality of the papers ranged from 64% to 83% of the possible total QATSDD score. These values are indicative of an overall acceptable quality of the analysed literature, as for previous reviews (Harrison et al., 2021). The main limitations leading to a lower score were the lack of a clear theoretical framework, a poor description of procedure for data collection, the absence of a statistical assessment of reliability and validity of the measurement tools, or no consideration of sample size during study design. Virtually all papers did not clearly state the rationale for the choice of data collection tools (apart from the expected reference to previously conducted validation studies). See Table 2 for the critical appraisal of all papers.

Table 2

Critical appraisal of the selected papers

Paper	Quality score	Percentage % (of the possible total score)
Ackroyd et al., 2011	28/42	67
Bassi et al., 2016	32/42	76
Bassi et al., 2020	29/42	69
Bassi et al., 2021	30/42	71
Dennison et al., 2010	31/42	74
Glattacker et al., 2018	27/42	64
Heffer-Rahn et al., 2018	31/42	74
Jopson et al., 2003	34/42	81
Neter et al., 2009	32/42	76
Neter et al., 2021	30/42	71
Santos et al., 2019	33/42	78
Schiaffino et al., 1998	31/42	74
Spain et al., 2007	30/42	71
Timkova et al., 2021	32/42	76
Vaughan et al., 2003	32/42	76
Wilski et al., 2016 (body esteem)	29/42	69
Wilski et al., 2016 (self-management)	32/42	76
Wilski et al., 2016 (health-related QoL)	31/42	74
Wilski et al., 2017	33/42	78
Wilski et al., 2019	35/42	83

Note. The Table shows the quality ranking of the papers included in the review. The total score and the percentage in relation to the maximum possible score are reported.

Assessment of illness perceptions among the selected papers

Most of the papers analysed IPs through the Illness Perception Questionnaire, classical or revised version. Nine papers (Dennison et al., 2010; Glattacker et al., 2018; Harrison et al., 2021; Timkova et al., 2021; Wilski et al., 2016; Wilski et al., 2019; Wilski & Tasiemski, 2016a; Wilski & Tasiemski, 2016b; Wilski & Tomczak, 2017) used the brief illness perception questionnaire. One paper (Schiaffino et al., 1998) used the Implicit Models of Illness Questionnaire (IMIQ), but was included since it explicitly referred to Leventhal's theoretical framework. In addition, the IMIQ items have some overlap with Leventhal's dimensions (e.g. variability, cyclic timeline, curability, control). Adopting a longitudinal design, the paper addressed the relationship between IPs, illness severity, and current and future depression.

Correlations between illness perceptions and outcome among PwMS and their caregivers

Regarding the relationship between IPs and outcome, only two papers did not find any significant statistical correlation, as detailed below (Heffer-Rahn & Fisher, 2018; Neter et al., 2021). All the remaining papers reported that IPs related to outcome, even after controlling for potentially confounding variables (see below). For a visual presentation of the relationship between IPs and outcome in the remaining 18 papers, see Tables 3 and 4.

Table 3

Illness perceptions and outcome in the selected papers (part 1)

IPs	**Ackroyd 2011** adversar. Growth	**Bassi 2016** well-being (dimensions)	**Bassi 2020** psych. adjust.	**Bassi 2021** phys.health fatigue	**Dennison 2010** functional impairm. psych. distress	**Glattacker 2018** rehabilit. use (past-future)	**Jopson 2003** adjustment (dimensions)	**Neter 2009** goal diseng. goal re-eng. well-being	**Santos 2019** mental QoL physical QoL
Causes			X	X			X		
Coherence		X	X	X	X		X		X*
Concern (B-IPQ)					X				
Consequences			X	X		X	X	X	X
Control								X	
Personal	X		X	X			X		
Treatment			X	X		X	X		X
Emot. rep.		X	X	X	X				X
Identity	X	X	X	X	X		X	X	X
Timeline									
Acute/chronic				X (chr.)			X (chr.)		
Cyclical	X		X	X			X		X

Note. The Table offers an overview of the illness perceptions (first left column) found to be related with outcome (first top row). Each X indicates that at least one statistically significant correlation has been found. Adversar.: adversarial; chr.: chronic; B-IPQ (brief illness perception questionnaire); emot. rep: emotional representations; IPs: illness perceptions; diseng.: disengagement; impairm.: impairment; re-eng.: re-engagement; phys.: physical; psych.: psychological; QoL: quality of life. The term “dimensions” refer to the use of a variety of tests addressing different aspects of the studied outcome.*in this paper, high coherence related to low mental health.

Table 4

Illness perceptions and outcome in the selected papers (part 2)

IPs	**Schiaffino 1998** psych. adjust.	**Spain 2007** health-related QoL	**Timkova 2021** psychol.distress	**Vaughan 2003** psycho-physical outcome (dimensions)	**Wilski 2016** body esteem	**Wilski 2016a** health-related QoL	**Wilski 2016b** self-manag.	**Wilski 2017** estimated MS impact	**Wilski 2019** perceived MS impact treatment beliefs
Causes		X						IPs (general) are worse in overestimators intermediate in realists low in underestimators	Negative IPs (general) positively relate to perceived MS impact and negatively with treatment beliefs
Coherence					X				
Concern (B-IPQ)			X		X				
Consequences	X	X		X	X	X			
Control	X (curability)	X		X					
Personal					X	X			
Treatment					X	X	X		
Emot. rep.			X		X				
Identity		X		X	X	X			
Timeline									
Acute/chronic		X		X	X		X		
Cyclical	X (variability)								

Note. The Table offers an overview of the illness perceptions (first left column) found to be related with outcome (first top row). Each X indicate that at least one statistically significant correlation has been found. Adjust.: adjustment; B-IPQ (brief illness perception questionnaire); emot. rep: emotional representations; IPs: illness perceptions; manag.: management; MS: multiple sclerosis; psych./psychol.: psychological; QoL: quality of life. The term "dimensions" refer to the use of a variety of tests addressing different aspects of the studied outcome.

The final list of studies included papers addressing the following “outcomes”: psychological (e.g. depression, anxiety, life satisfaction, self-esteem), physical (e.g. physical function, fatigue, pain management), illness management (e.g. adherence, service use) and socio-economic aspects (functional impairment from a work and social perspective). Most of the papers addressed psychological outcomes or a combination of psycho-physical aspects. The IPs dimensions most frequently reported as related to the PwMS’ outcome measures were identity (label attached to the disease and symptoms attributed to it), consequences and control (personal and treatment); see Tables 3 and 4.

Overall, positive IPs, namely beliefs of greater control (either personal or treatment-related), clear understanding of the disease (coherence), attribution of the disease to external causes (e.g. virus) or bad luck were related to better outcomes (Bassi et al., 2016; Wilski et al., 2016; Spain et al., 2007; Vaughan et al., 2003). Conversely, negative IPs, such as higher emotional representations (emotional impact of the disease), illness attribution to psychological causes (thinking that MS might be related to stress), greater identity (number of symptoms attributed to MS) and greater consequences (limitations posed by MS) related to worse outcome (Bassi et al., 2020; Jopson & Moss-Morris, 2003; Timkova et al., 2021; Neter et al., 2009). In contrast to several papers reporting a link between high coherence and better outcome (Bassi et al., 2016; Spain et al., 2007; Vaughan et al., 2003; Wilski et al., 2016), one study (Santos et al., 2019) reported high illness coherence as related to lower mental health. Finally, a paper focusing on both self-reported past use of rehabilitation and intention to use rehabilitation in the future reported that PwMS with stronger beliefs regarding both the consequences of MS and its controllability through treatment were more likely to have used and to use rehabilitation in the future (Glattacker et al., 2018). Regarding timeline, the results were inconsistent. Some papers reported that cyclical and chronic attributions were linked to worse outcome (Bassi et al., 2020; Bassi et al., 2021; Jopson & Moss-Morris, 2003; Schiaffino et al., 1998), while others reported that cyclical (Ackroyd et al., 2011) and chronic (Jopson & Moss-Morris, 2003) timeline perceptions related to better outcome. Inconsistent findings were also observed when using the IPQ and B-IPQ, which analysed timeline as a unique construct, without the "cyclic" specifier (Spain et al., 2007; Vaughan et al., 2003; Wilski et al., 2016; Wilski & Tasiemski, 2016b).

Similarly to the cross-sectional studies above, a longitudinal study (Schiaffino et al., 1998) related greater "consequences" and "curability" (control) to higher and lower concurrent perceived illness severity respectively, while higher "variability" (beliefs regarding the cyclic nature of the disease) was linked to higher depression over time.

The two papers analysing IPs among caregivers (Ackroyd et al., 2011; Bassi et al., 2016) were consistent in reporting that caregivers with higher emotional representations reported worse psychological health. Both papers also reported inter-dyadic influences, such as the link between higher PwMS's identity and consequences with higher partner's adversarial growth (Ackroyd et al., 2011) and the relationship between low coherence in the couple and lower positive affect among the PwMS (Bassi et al., 2016).

Illness perceptions as predictors of outcome variance

In addition to bivariate analyses (correlations), some papers used hierarchical multiple regressions, reporting IPs as potential predictors of outcome. For example, Dennison et al. (2010) observed that the addition of PwMS' cognitive-behavioural responses to their symptoms and IPs to a model including disease severity and phenotype explained 22.6% of the variance in functional impairment ($p<0.01$), with the strongest predictors being unhelpful behavioural responses (such as avoidance) and "identity". Similarly, considering the same model (disease severity and phenotype), unhelpful beliefs about the self (e.g. perfectionism) and IP "coherence" accounted for a 37.1% of variance in distress ($p<0.01$ and $p<0.05$, respectively). In the paper by Jopson and Moss-Morris (2003) the IPs dimensions (identity and consequences in particular) accounted for 29% of the variance in psychosocial dysfunction, 32% of the variance in anxiety ($p<0.01$) and 32% of the variance in physical fatigue ($p<0.01$). In a multi-step model for PwMS applied by Bassi et al. (2016), after controlling for demographic variables, the introduction of each dimension of IPs determined significant contributions to variance in: 1) psychological well-being due to identity (6%, lower well-being), coherence (7%, higher well-being) and emotional representations (14%, lower well-being); 2) life satisfaction due to identity (7%, lower life satisfaction), coherence (10%, higher life satisfaction) and emotional representations (12%, lower life satisfaction); 3) positive affect due to coherence (11%, higher positive affect) and emotional representations (26%, higher positive affect). Spain et al. (2007), after adding the IP dimension “identity” to a model containing other variables (such as illness measures, physical impairment, anxiety and depression), reported a significant contribution of 38% to variance regarding bodily pain and of 71% to variance pertaining physical functioning. Vaughan et al. (2003) recorded a contribution of illness representations to explain 66% of variance in illness intrusiveness. In particular, stronger beliefs regarding the consequences of MS and the attribution of the disease to psychological causes predicted higher intrusiveness, while chronic timeline predicted lower intrusiveness. Identity was reported as a significant predictor of both the psychological and physical components of health-related quality of life in a model including disease severity, age and self-efficacy (Wilski & Tasiemski, 2016a).

Illness perceptions and outcome: mediation models

A small number of papers explored mediating mechanisms in the relationship between illness representations and outcome or alternatively described how the illness representations themselves acted as mediators (i.e. influenced the relationship between other variables and outcome). Bassi et al. (2020, 2021), using multiple mediation models, focused on the possible mediators (coping and social support) of the relationship between IPs and a variety of outcome measures (mental health, depression, satisfaction with life, psychological well-being, perceived physical health). The reported findings suggested that IPs (consequences, identity, psychological causes, illness attribution to bad luck, emotional representations, coherence) may show mixed positive and negative effects, depending on the mediational effect of coping strategies (e.g. avoidance as a detrimental factor, problem-focused strategies as protective factors) and social support (protective factor). For example, stronger MS-related emotional representations related to lower physical health through higher use of avoidance and lower perceived social support (Bassi et al., 2021). Moreover, while stronger identity (number of symptoms attributed to the disease) directly related to worse outcome, it contributed to better outcome whenever coping strategies focusing on meaning were mobilized (Bassi et al., 2020). Timkova et al. (2021) reported that self-esteem partially mediated the relationship between illness appraisals and well-being. More specifically, the adjusted models showed that the direct relationships between both "consequences" and "treatment control" and psychological well-being lost their statistical significance when self-esteem was added to the model as a mediator, while the direct relationships between both "emotional representations" and "concern" and psychological well-being persisted. In addition, positive IPs and self-esteem jointly reduced the impact of other variables (e.g. low income, poor sleep quality, fatigue) on psychological well-being. Regarding the possible mediational role of IPs, Santos et al. (2019) demonstrated that identity and consequences mediated the relationship between PwMS' depression and worse quality of life (mental and physical, respectively). Wilski et al. (2019) reported that negative IPs (overall) mediated the relationship between worse perceptions of MS-related physical condition and distrust towards treatment efficacy.

Effect size of the relationship between illness perceptions and outcome

Twelve out of 20 papers were analysed in terms of ES for the direct relationship between IPs and outcomes (correlations).

Two papers did not report correlations between IPs and outcome (Neter et al., 2021; Heffer-Rahn & Fisher, 2018) and six papers did not report data from correlation analyses (Bassi et al., 2020; Jopson & Moss-Morris, 2003; Schiaffino et al., 1998; Spain et al., 2007; Wilski & Tomczak, 2017; Wilski et al., 2019). One study contained a direct reference to ES (Spain et al., 2007) and all the remaining 11 reported correlation coefficients or odd ratios.

The correlation coefficients suggested a medium ES (evaluated as detailed in the "Materials and Methods" section; most frequent range: 0.30-0.40) for the relationship between IPs and the variety of studied outcomes, with negative IPs relating to worse outcome, regardless of type of outcome (physical, psychological, socio-economic, etc.). Despite the papers reporting some differences in results, the overall ES of the relationship between IPs and outcome was similar across studies, with the most represented values suggesting medium strength.

Disconfirming cases

Two out of the 20 papers included in this review did not support the relationship between IPs and outcome. More specifically, one longitudinal study (Neter et al., 2021), the only one of this review focusing on the possible predictors of PwMS's adherence to and persistence in treatment, reported IPs as uninfluential over these variables. In addition, a cross-sectional study reported a significant correlation between "consequences" (positive correlation: worse outcome), "treatment control", "personal control" (negative correlation: better outcome) and distress ($p<0.01$). However, after controlling for demographic and clinical variables, IPs did not account for additional variance in distress (Heffer-Rahn & Fisher, 2018).

3.4 Discussion

This review aimed to synthesise and critically appraise quantitative evidence regarding the relationship between IPs (among PwMS and their caregivers) and outcome measures, including psychological, physical, illness management and socio-economic aspects.

Only two out of 20 papers did not find correlations between IPs and outcome (Neter et al., 2021; Heffer-Rahn & Fisher, 2018). All the other papers included in this review reported the existence of a moderate ES when analysing the relationship between IPs and outcome, whereby the perceptions entailing stronger beliefs of control, disease understanding, and attribution of the disease to external causes were related to better outcomes, while higher emotional representations and number of symptoms, illness attribution to psychological causes and stronger beliefs about the negative consequences of MS related to worse outcome.

Overall, the direction of the correlations (better or worse outcome) reflect the specific meaning of each perception.

For instance, stronger beliefs regarding MS as causing a great number of symptoms (identity), serious repercussions on one’s own life (consequences) and psychological distress (emotional representations), can be easily interpreted as perceptions that may relate to worse outcome (psychological, physical, social). Similarly, beliefs regarding a psychological cause of the disease (e.g. stress) may elicit feelings of guilt and hopelessness (since the person may feel himself/herself as irreparably “weak”, being sensitive to stress), while the attribution to external causes or even bad luck may free the person from any responsibility, thus resulting in better health-related well-being (Bassi et al., 2020). Considering positive beliefs, building upon Bandura’s theory of self-efficacy (1977), it can be anticipated that the perceptions implying a higher sense of mastery, such as personal and treatment control, as well as the belief of having a clear understanding of the illness (coherence), may prompt a more effective management of

MS and reduce the level of distress. As previously stated, the findings regarding timeline are inconsistent. However, it should be noted that despite cyclicality representing the core feature of MS (thus, cyclical timeline actually represents an accurate depiction of its course), beliefs regarding this rather uncontrollable characteristic of the disease may not prompt specific coping efforts, thus limiting the importance of timeline on adjustment (Bassi et al., 2020).

The few studies addressing mediators highlight how IPs do not exert their role in a vacuum, so that apparently "negative" beliefs may result in positive outcome. For example, the attribution of MS to psychological causes (i.e. life stressors), albeit theoretically negative (burdening the affected person with feelings of guilt and hopelessness, in relation to the perceived vulnerability of one's self), may potentially determine a positive change, prompting the PwMS to take better care of themselves, or modify their lifestyle, in order to reduce everyday stress. The different outcome, in such cases, may depend on both the coping strategies adopted by the PwMS and their perceived social support, as reported by Bassi et al. (2020, 2021). More specifically, the attribution of MS to psychological causes seems to determine worse or better psychological outcome when accompanied by avoidant or meaning/problem-focused coping, respectively (Bassi et al., 2020). Similarly, perceived social support seems to be another important mediator of the relationship between illness representations and outcome. Indeed, more intense emotional representations and negative beliefs about the consequences of MS may relate to lower physical health through lower perceived social support (Bassi et al., 2021).

These findings highlight that IPs are deeply influenced by context and are strictly linked to coping, as acknowledged by Leventhal himself (2003). Indeed, it is easy to envision that both the environment and the specific beliefs held by a person may elicit coping efforts that seem to be congruent with the person's opinions. In this context, even the unexpected, and apparently paradoxical, relationship between increased coherence and lower mental health, reported in one paper, may be explained (Santos et al., 2019). On the one hand, less information may protect the person from the psychological burden related to “knowing too much” (as commented by the authors themselves). On the other hand, this finding might be related to specific coping strategies or contextual factors, that were not considered in the paper.

Building on this influence of other factors, the caregivers’ perceptions may also represent significant contributors to outcome. Unfortunately, the paucity of the papers covering caregivers’ perceptions does not allow us to draw conclusions. However, promising results emerged from the analysed papers: PwMS’ illness representations may influence partners’ adjustment and, vice versa, shared negative perceptions may negatively influence PwMS’ outcome (Ackroyd et al., 2011; Bassi et al., 2016).

Despite the quality of the papers being acceptable overall, some specific limitations arose, that should be addressed in future studies focusing on the relationship between IPs and outcome. In particular, the most common flaws identified across the papers related to theoretical (lack of a clear framework) and methodological aspects, such as failure to address the measurement tools’ validity within the analysed sample, lack of explanation pertaining the rationale for use of specific tools, limited information on how primary data were collected, and absence of considerations regarding sample size when designing the research. These limitations led to the attribution of a lower score at the QATSDD during the critical appraisal phase. For the sake of completeness, it should be noted that some papers included in this review may have been “penalised” (e.g. papers considering aspects, such as service use, that do not require validated questionnaires) over others scoring high on quality but showing a poor presentation of the results (an aspect not considered by the tool).

My findings are consistent with those of other reviews (Pai et al., 2019; Richardson et al., 2017). In particular, Pai et al. (2019), focusing on the link between IPs and psychological adjustment in stroke, reported that identity, consequences and emotional representations were related to higher distress, while coherence was linked to lower distress. Similarly, Richardson et al. (2017) focusing on persons with cancer, reported moderate-to-large ESs between illness representations (in particular, identity, emotional representations, consequences) and psychological distress.

Strengths and limitations of this review

This review has some limitations. Firstly, despite the quality of papers being addressed, all studies were granted the same weight when interpreting the results. Moreover, the reported ES has been grossly inferred from the studies, considering each paper overall, without specifying the ES of every single correlation. However, it should be noted that this is a narrative review of heterogeneous papers, aiming at offering an overview of the topic of interest. Considering the limitations of the included papers themselves, the cross-sectional nature of almost all them does not allow me to infer causation. Nonetheless, the overall sample size and quality of the papers was acceptable, which enabled me to draw conclusions. The inclusion of qualitative studies may have added value to this review, but the specific review question, implying the search for correlations, demanded the selection of quantitative ones.

The main strength of this paper is that of considering outcome from a broad perspective. Indeed, no specific outcomes to be included were considered *a priori*, so that this review not only contributes to answer the main question but also allows identification of the topics that have been investigated when considering outcome among the specific population of PwMS and can highlight what has been overlooked.

Clinical implications and future work

The findings of this review may inform psychological interventions aimed at reducing negative representations, ultimately improving PwMS' and their partners' adaptation to MS.

For example, a paper focusing on the efficacy of an educational intervention (watching a short narrative film) in improving IPs, reported more positive appraisals regarding treatment and understanding of the disease in exposed versus not exposed PwMS (Chiong-Rivero et al., 2021). However, research in this area is limited and future studies with longitudinal design and which address the complex nature of IPs and their development (e.g., quality of PwMS-caregiver relationship, personality characteristics, etc.) may further inform tailored psychological approaches. In particular, my findings highlight the paucity of studies involving caregivers (mostly partners). This gap in the literature prompted me to conduct a study, reported in the next Chapter, specifically focusing on IPs within the PwMS-partner dyads and the variables influencing such perceptions.

Chapter 4

Research Philosophy and Methodology of My Study

4.1 Philosophical Stance of My Research

The question and aims of any study reflect the researcher's worldview (or philosophical paradigm). Indeed, the assumptions regarding what is reality (ontology), how to acquire knowledge about it (epistemology) and how to benefit the community through research guide every step of the research process, from the choice of the problem to address to the adopted methodology, along with the theoretical underpinnings on which a specific study builds (Bryman, 2016).

Historically speaking, the "paradigms war" saw positivism (beliefs of objective reality) as inevitably opposed to interpretivism (subjective reality), with the former advocating quantitative research and the latter qualitative inquiry (Bryman, 2016). Such an absolutist view of reality as either subjective or objective forced scholars to value only a certain type of methodology, while reducing the possible set of research questions to those related to a rigid categorization of "measurable" or "un-measurable" things, that can be investigated only through specific methodologies, *a priori* deemed as better than others (Bryman, 2016; Onwuegbuzie & Leech, 2005; Yvonne Feilzer, 2010). However, despite being a logical consequence of the researcher's worldview, methodology (e.g. research design) and methods (e.g. research tools) should be freed from any constraints, since they simply represent the means used to answer a certain question (Grix, 2002). Indeed, I believe that the orthodox application of one paradigm over the other does not reflect the complexity of reality, whose different facets may be investigated through different "research lenses".

Pragmatism, the philosophical stance of my research, overcomes the paradigms war, ultimately allowing researchers to choose any methodology that fits their specific research question (Creswell, 2014; Yvonne Feilzer, 2010). However, it should be noted that researchers adopting such an open worldview are not exempt from the standards characterizing quality research. More specifically, any research choice must be well-thought through, logically-related to the specific problem one wants to address and deeply grounded in theory, since the research lens cannot be chosen at random (Hussain et al., 2013; Kivunja & Kuyini, 2017; Onwuegbuzie & Leech, 2005).

Despite being recognized as a research paradigm, the pragmatic worldview has suffered many prejudices, being seen as an excuse for "sloppy" and philosophically unjustified research (Hall, 2013; Tashakkori & Teddlie, 2003). However, pragmatism is grounded in clear philosophical assumptions whose roots can be connected to the work of Dewey, Pierce and James (Creswell, 2014). More specifically, following Dewey's concept of experience (Dewey, 1925/2008; Morgan, 2014), pragmatism recognizes both the objective and subjective components of reality, making "truth" possible, but socially and contextually-dependent. In other words, something may be true being located in a specific moment of time and cultural environment (Morgan, 2014). Consequently, pragmatism is characterized by a non-singular reality ontology (addressing the complexity of reality) and a relational epistemology, acknowledging that relationships in research (e.g. problem to address and methodology) rely on the best way to face the specific research question (Kivunja & Kuyini, 2017). Moreover, pragmatic research should benefit the community, being rooted in a value-laden axiology (Kivunja & Kuyini, 2017). These philosophical foundations lead to several advantages for any researcher: a free choice of methods (provided they are logically related to the research question), the possibility to work with researchers with other worldviews, and independence in the use of qualitative and quantitative approaches, alone or in combination (Creswell, 2014).

In terms of methodology, a pragmatic researcher will then value *what* to investigate and *how* to do it (Creswell, 2014). Consistently with this, all my choices pertaining both the literature review and research project, gravitated around the best (more feasible) way to answer my research questions, also considering the theoretical framework, introduced below, guiding my thesis.

4.2 Theoretical Framework of My Research

Stress (change that causes a physical, psychological and/or emotional strain) and the response to it were long considered from an individualistic perspective, whereby the person directly exposed to a threat or loss would assess the situation as stressful or not, while rating the intensity of such a stress. This first assessment is the starting point for reacting to the situation, depending on the individual's personal resources (Lazarus & Folkman, 1984). However, major stressors such as receiving a diagnosis of a chronic medical condition affect both the persons with the condition and their caregivers, here defined as the unpaid persons helping the ill individual both physically and psychologically (Hileman et al., 1992).

Concerning spousal caregiving, "one cannot examine one partner's stress appraisals or coping efforts without considering the effects on the other partner and the marriage" (Bodenmann, 2005, p.36). Indeed, a diagnosis of chronic illness, such as MS, disrupts the daily routine of the couple, the roles of its members and the expectations for the future. Moreover, the uncertainty of the disease course brings uncertainty in the marital relationship as well, with each day presenting a new and unexpected challenge (Boland et al., 2012). The burden of the disease extends to the spouse, whose psycho-physical well-being, social life and financial situation are compromised (Kouzoupis et al., 2010). Data suggest that relationship talk, that is the active discussion about the nature and state of a relationship, strongly influences dyadic adjustment to chronic illness, particularly for women (Badr & Acitelli, 2005). This is particularly important for my research study, since MS is more frequent among women

(Kingwell et al., 2013). Similarly, seeing oneself as part of a couple (couple identity) may help to minimize the negative effects (e.g. relational deprivation) of caregiving while maximizing the positive (e.g. self-esteem) ones (Badr et al., 2007).

In light of these considerations, research is witnessing a shift from an individualistic to a dyadic (couple-oriented) perspective when stress and coping are considered, whereby coping consists of the thoughts and behaviours activated to deal with internal and external stressors (Algorani & Gupta, 2022).

In this regard, Bodenmann's (2005) systemic transactional model of couples coping with stress theorizes that the members of a dyad firstly engage in coping on their own and then, particularly when the stressful condition persists, they try to jointly cope, either supporting each other in the coping efforts or directly engaging in shared problem-solving and emotion-regulation (Bodenmann et al., 2019).

Berg and Upchurch's (2007) developmental-contextual model (DCM) gives special attention to the couple's illness representations and coping as bi-directionally related and affected by sociocultural (e.g. interdependent cultures valuing connectedness with others) and environmental (e.g. quality of the marital relationship) aspects. The model also highlights the relationship between dyadic appraisals [including illness representations within the couple, illness ownership (my or our problem) and/or stressor appraisals (does my partner share the stressful event?)] and dyadic coping (Berg & Upchurch, 2007), namely the active collaboration between ill persons and their partners (Helgeson et al., 2018).

Dyadic appraisals and effective coping are certainly important, but the available theories seem to "jump" to considerations regarding these aspects, while failing to consider what may precede them (Badr & Acitelli, 2017).

In the attempt to fill this gap, Badr and Acitelli (2017) proposed the cognitive-transactional model (CTM) of couples' adaptation of chronic illness, that considers IPs at the individual level as the starting point from which dyadic illness appraisal and coping may begin. More specifically, the model embraces a dynamic-iterative process encompassing: 1) individually making sense of the disease (illness representations, resulting in ideas about illness ownership); 2) jointly making sense of the disease (formation of dyadic illness appraisals); 3) individually and jointly trying to cope with the disease (Badr & Acitelli, 2017). Effective dyadic appraisal and coping depend on effective communication within the couple and may require a revision of individual opinions about illness ownership (Badr & Acitelli, 2017). Moreover, the adaptation to chronic illness also relies on the individual's and couple's efficacy (confidence in the ability to successfully face problems alone and together). Compared to the already existing models, the CTM addresses the complexity of dyadic appraisal and coping by considering a variety of important aspects: illness-related factors (e.g. functional impairment, disease duration), the active negotiation of perceptions and coping within the couple, as well as the effective communication preceding the formation of dyadic appraisals. In other words, the CTM offers a comprehensive view of representations and coping as strictly intertwined, both at the individual and interpersonal level. The model is in its infancy and "more work is needed to clarify the role that contextual factors play in couples' illness representations" (Badr & Acitelli, 2017, p. 47). However, some of the antecedents of communal coping (active collaboration to manage illness as a shared problem) have already been described: interdependent self-construals (orientation to involve others in one's own life), nature of the illness (e.g. when both members of the dyad may benefit from illness management) and relationship quality (Helgeson et al., 2018). Taking a step back, these aspects may be transferred to the CTM as possible contributors to the processing of dyadic IPs, whereby making sense of the illness and effective communication within the couple should be considered as crucially important, along with their possible facilitators/barriers (Badr & Acitelli, 2017).

Keeping in mind what has been previously discussed about alexithymia, this lends itself to be considered as a possible barrier to both making sense of the illness and effective communication within the couple. However, to the best of my knowledge, no studies have focused on the impact of alexithymia on IPs from a dyadic perspective, in any clinical condition. Building upon the CTM and focusing on persons affected by relapsing-remitting MS (the most frequent phenotype) and their partners, my research project hypothesizes that alexithymia, hindering the understanding of one's own body, making it difficult to share feelings and impairing relationships, may influence IPs (presumably facilitating the formation of negative ones and/or preventing the formation of positive ones) both at the individual and dyadic level.

Consequently, my research study posits the following question: "Is alexithymia associated with illness perceptions in PwMS and their partners?" Such a question does not only focus on the individual and dyadic appraisals of MS, but also introduces a possible associated factor influencing the very formation of these appraisals, thus expanding the CTM. In the attempt to answer my research question, I adopted a statistical model specifically designed for dyadic analyses, namely the Actor-Partner Interdependence Model (detailed later), that considers the outcomes of the persons involved in a close relationship, such as a romantic one, as strictly intertwined (Kenny et al., 2006). Hence, when analysing a dyad one could estimate the impact of a variable (in this case, alexithymic traits) characterizing either person A (actor) and/or person B (partner) on an outcome variable (IPs), whereby both members of the dyad act as actors and partners (Kenny et al., 2006). In the following paragraphs, I detail the methodology of my research study.

4.3 Alexithymia and Illness Perceptions in Persons With Multiple Sclerosis and Their Partners: A Preliminary Study

4.3.1 Methodology

My cross-sectional study primarily sought to test whether alexithymic traits are associated with IPs among PwMS and their partners (actor effects). Secondly, it aimed to test whether alexithymic traits are associated with IPs within the couples (dyads) composed by PwMS and their partners (partner effects), while investigating the effect size (ES) of the partner effect of alexithymic traits in accordance with the Actor-Partner Interdependence Model (APIM).

In anticipation of the possible results, I formulated two hypotheses, that arose from the literature data discussed so far:

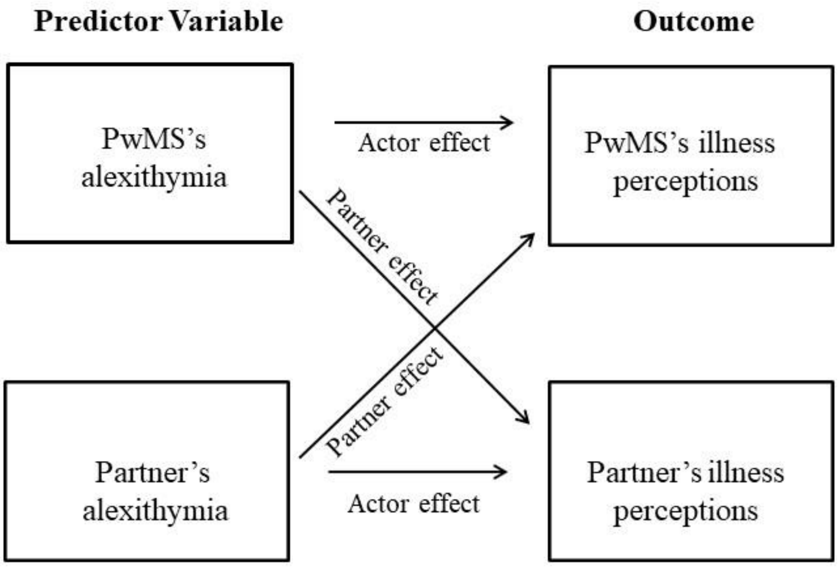
1) Alexithymia among PwMS and their partners will be associated with their own IPs (actor effect), whereby higher alexithymic traits will relate to lower positive IPs (e.g. coherence, control) and higher negative IPs (e.g. consequences, emotional representations). The hypothesised direction is related to the scoring system of the questionnaire used to assess IPs (see later, Materials and Methods).

2) Alexithymic traits in a member of the dyad (PwMS or partner) will be associated with the IPs of the other member (partner effect), with effects showing the same direction as hypothesis 1.

In other words, I expected an interdependence of both members of the dyad in terms of outcome (IPs), as summarized in the visual presentation below (Figure 1), adapted from Kenny et al. (2006).

Figure 1

Research hypotheses



Sample size

As already stated, the primary aim of my research was to investigate the actor effects. Previous studies investigating the impact of alexithymia on IPs from an individual perspective suggest medium-to-large effect sizes (d=0.6-0.7) (Barbasio et al., 2015; Larsen et al., 2017; Okanli et al., 2018) and these values were used to adequately power the study to find these effects, should they exist. Since there are no studies addressing this topic from a dyadic perspective, my study is configured as a preliminary one, with the secondary aim to estimate the ES of the partner effect exerted by alexithymia. Building on the available data, an online calculator (retrieved from https://robert-a-ackerman.shinyapps.io/apimpower/) for power analysis for the APIM was used. In order to detect an actor effect with 80% power (α=0.05) expecting a medium ES (d=0.6), I needed to enrol 90-100 dyads. The recruitment phase was guided by specific inclusion criteria (enlisted in the following paragraph) that were formulated for the sake of homogeneity of the sample, considering that the generation of cognitive appraisals as well as their optimistic (or pessimistic) nature could be potentially influenced by illness severity, altered cognitive function, recent relapse, neurological conditions other than MS and whether the person was taking part in psychological therapies.

Study population

PwMS

Inclusion criteria for recruitment were: diagnosis of relapsing-remitting MS, all genders, aged ≥18, being a cohabitant partner, willingness to participate in the study of both members of the couple.

Inclusion criteria for remaining in the study were: Expanded Disability Status Scale (Kurtzke, 1983) between 2-5.5 (patients are disabled, but still able to walk without support), normal cognitive function (screened as detailed in the “Materials and Methods” section).

Exclusion criteria were: current MS flare up, history of recent attack (<3 months); concomitant neurological diagnosis of any type, current psychiatric and/or psychological treatments.

Partners

Inclusion criteria for recruitment were: being a cohabitant partner of a person with relapsing-remitting MS, any gender, aged 18 or over, willingness to participate in the study of both members of the couple.

Inclusion criteria for remaining in the study were: normal cognitive function (screened as detailed in the "Materials and Methods" section).

Exclusion criteria were: current psychiatric and/or psychological treatments.

4.3.2 Study Procedures

Recruitment and enrolment

Recruitment proceeded on a first-come-first-served basis, until reaching the required sample size. After checking the list of the routinely scheduled patient visits, I contacted the PwMS who potentially met the inclusion criteria (having checked their demographic and clinical records) in advance of their visit, by telephone. They were briefly informed about the study and invited to consider participation along with their partners. Participation was re-discussed in detail at the scheduled visit, during which the inclusion criteria were double-checked [Expanded Disability Status Scale (Kurtzke, 1983) assessed; absence of exclusion criteria verified]. Apart from the Expanded Disability Status Scale, routinely assessed at each visit in the clinic, all other evaluations (including the cognitive function screening) were performed in the context of the study. Hence, *before proceeding* with any other action, all the potential participants willing to participate were shown the participant information sheet and consent form (PIS and CF) [patient or partner version as appropriate], to be signed.

As already stated (inclusion criteria above), only participants with a normal cognitive function could remain in the study. Hence, once the PIS and CF had been signed, both PwMS and their partners separately underwent a screening evaluation to exclude the presence of cognitive impairment, through the Montreal Cognitive Assessment (MoCA) test (Nasreddine et al., 2005), detailed in the following section. The couples successfully completing the screening underwent a psychological assessment through self-administered questionnaires (described below), that myself or another member of the research team located in Italy handed to them. The couple's members filled in their questionnaires in separate rooms. The participants expressing difficulties with face-to-face visits were granted the possibility to undergo the screening (MoCA test) via teleconference and return all the questionnaires via email or fax within one week from enrolment.

Ethical considerations regarding consent

The participants could provide their consent, be enrolled and immediately take part to the study (so as to avoid extra travel) or schedule another meeting dedicated to the study procedures if they preferred. Whenever needed, they were granted up to a week to reach a decision regarding their participation. Partners that were not present at the visit could provide their consent within one week. Only the individuals signing the PIS and CF were enrolled and assigned an identification number. As required by the Ethics Committee of the University Hospital of Catania, all participants were given a letter to deliver to their general practitioner, containing a brief description of the study. The participant documentation included useful contacts to be used in case of distress derived from the participation to this research.

Data protection

In order to keep the participants' identity confidential, a list matching persons and identification numbers was created on paper and stored in a locked cabinet accessible only to the research team. All the paperwork (e.g. questionnaires) generated in the study was stored in another locked cabinet (different from that containing the list of the participants) accessible only to the research team.

4.3.3 Assessment Instruments

All the assessment instruments used in the study were chosen due to their widespread use as validated instruments, brevity and/or availability in the MS centre where my research was conducted. Below, their detailed description.

- MoCA test (Nasreddine et al., 2005): It is a brief 30-item instrument assessing different types of cognitive abilities, such as orientation, visuospatial ability, abstraction, attention, etc. Validated on Italian samples (Pirrotta et al., 2015), the test can be administered via teleconference, adopting very slight adjustments to the classical version (both versions requiring training). Higher scores indicate better cognitive function, whereby a cut-off ≥26 indicates normal cognition (Nasreddine et al., 2005). Previous validation studies reported satisfactory internal reliability (Cronbach's alpha >.70) while indicating the MoCA as a good screening tool for cognitive deficits both in the general population and PwMS (Dagenais et al., 2013; Daniel et al., 2022). Considering my research procedures, individuals with a score <26 were excluded from the study. It should be noted that *both* members of the couple (PwMS and their partners) had to pass the screening test in order for the dyad to proceed in the study.
- Illness Perception Questionnaire Revised, IPQ-R (Moss-Morris et al., 2002): The tool is composed of three sections, namely the identity scale (section I, a list of symptoms

that the respondent may attribute to the illness), the beliefs scale (section II, covering a variety of IPs dimensions) and the causal attribution scale (section III, a list of possible factors that may have caused the illness). The IPQ-R is scored considering each section separately (Moss-Morris et al., 2002; Oudin Doglioni et al., 2022). Considering my research, all participants were administered only the IPQ-R section II, already comprehensive of several IP dimensions, in order not to cognitively burden the patients. Section II, validated in Italian language (Giardini et al., 2007) and already considered alone in previous studies (de Heer et al., 2017; Okanli et al., 2018), consists of 38 statements (including reverse-scored ones) requiring an answer ranging from 1 (“strongly disagree”) to 5 (“strongly agree’’). These statements address seven different IPs dimensions, namely acute/chronic timeline, cyclical timeline, coherence, consequences, emotional representations, personal control and treatment control. Higher scores indicate stronger beliefs in relation to the specific dimension (Nicholls et al., 2013). More specifically, higher scores at acute/chronic timeline and cyclical timeline indicate that the person believes that the condition is chronic and cyclical, respectively. Higher scores on the coherence, personal control and treatment control scales respectively indicate better understanding of the illness, beliefs that one can actually do something to control the illness, and confidence that medication can manage the condition. Finally, higher scores on the consequences and emotional representations scales respectively indicate that the illness seriously impacts everyday life and emotionally burdens the individual (Moss-Morris et al., 2002; Nicholls et al., 2013). The questionnaire was originally intended for patients, but the items can be slightly modified in order to create a version for partners, whereby the dimensions timeline, personal and treatment control contain statements related to the condition and the person affected by it, while the dimensions coherence, consequences and emotional representations require the partner to think about his/her own experience (Bassi et al., 2016). Hence, the participants to my study were administered the appropriate version. All IP dimensions addressed in section II were considered in the descriptive statistics, so as to comprehensively characterize the sample. However, timeline acute/chronic and cyclical were excluded from further analyses. Indeed, exerting a minimal impact on psychological adjustment and not mobilizing any particular coping strategy, timeline may have a limited clinical value compared to the other IP dimensions (Bassi et al., 2020). Cronbach's alpha values ≥.50 have been reported for the personal and treatment control dimensions, >.60 for all the other dimensions of the IPQ-R section II (Giardini et al., 2007).

- Toronto Alexithymia Scale-20, TAS-20 (Bagby et al., 1994; Taylor, et al., 1992): Composed of 20 items, this is the most used self-administered questionnaire for alexithymia, in different clinical contexts (Moriguchi et al., 2007). Validated on Italian samples (Bressi et al., 1996), it consists of three subscales: difficulty in identifying feelings (DIF), difficulty in describing feelings (DDF) and externally-oriented thinking (EOT), the latter indicating a tendency to focus on the details of external events rather than on their emotional correlates, thus distracting attention from the internal thoughts that should be elicited by experiences with high emotional content (Davydov et al., 2013). Every item can be answered through a Likert scale, according to the level of agreement with the statements (ranging from 1: "completely disagree" to 5: "completely agree"). In terms of scoring, both a total score (ranging from 20 to 100) and one for each subscale can be obtained. Depending on the total score (Taylor et al., 1992), it is possible to discriminate between conditions of alexithymia (≥61), possible alexithymia (50-60) and non-alexithymia <50). The three-factor structure resulting in the TAS-20 total score has been replicated in different samples and geographical areas

(Bagby et al., 1994; Parker et al., 2003; Taylor et al., 2003). A previous validity study reported Cronbach's alpha coefficients >.60 when considering both the TAS-20 and its subscales, except for EOT (Zhu et al., 2007), the latter consistently showing lower reliability (Zhu et al., 2007; Zimmermann et al., 2007), probably due to a response bias to the imbalance of reversed scored items (Zhu et al., 2007). However, it should be noted that the subscale EOT still captures an important facet of alexithymia, as confirmed by high convergent validity with measures of similar constructs (Waller & Scheidt, 2004). Moreover, some discriminating characteristics of the facets of alexithymia confirm the complex nature of alexithymia without questioning its cohesiveness. For example, only EOT seems to moderate emotional reactivity by decoupling the physiological domain of an emotional response from its subjective-experience domain (Davydov et al., 2013) and reduce social sharing after exposure to an emotional stimulus (Luminet et al., 2004). As for my research, I considered alexithymia on a continuum (TAS-20 total score), without categorizing the participants as alexithymic and non-alexithymic, in line with the interpretation of alexithymia as a personality trait (Gaggero et al., 2020; Martínez-Sánchez et al., 2003; Salminen et al., 2006; Taylor & Bagby, 2012). However, I decided to consider the TAS-20 subscales (including EOT) as well (both in the descriptive statistics and the APIM model), so as to capture the complex nature of alexithymia and investigate the differential weight specific traits could have in influencing IPs.

- Patient Health Questionnaire 4, PHQ-4 (Kroenke et al., 2009): It is an ultra-brief 4-items questionnaire previously used to assess anxious-depressive symptoms among persons with MS and their partners (Herbert et al., 2019). The PHQ-4 is composed of the first two items of the Generalized Anxiety Disorder–7 scale (GAD–7) and the Patient Health Questionnaire-8 (PHQ-8), respectively addressing anxious and depressive symptoms (Kroenke et al., 2009). The GAD-2 and PHQ-2 versions, validated on Italian samples (Giuliani et al., 2021), can be answered on a range going from 0 ("not at all") to 3 ("nearly every day"). Subscale scores (for anxiety and depression) can be obtained, whereby values ≥3 at both scales indicate the presence of clinically significant symptoms (Kroenke et al., 2009; Stanhope, 2016), even though a total score (from 0 to 12) can be calculated, too. Cronbach's alpha coefficients >.70 were reported for both the questionnaire as a whole and its subscales (Löwe et al., 2010). In my research, I considered both total score and subscales to characterize the sample.

- Dyadic Adjustment Scale, DAS (Spanier, 1976): This is a self-report questionnaire validated on Italian samples (Garbarini et al., 2014). Composed of 32 items (the majority of them answered on Likert-type scales), it investigates different aspects of marital quality through the following subscales (Santona et al., 2023; Spanier, 1976): dyadic satisfaction (happiness for the relationship; score: 0-50), dyadic consensus (level of agreement on different topics; score: 0-65), dyadic cohesion (participating together in activities; score: 0-24) and dyadic affectional expression (agreement regarding the expression of feelings and sexuality; score: 0-12). In addition to the scores relating to the subscales, a DAS total score (from 0 to 151) can be obtained, whereby higher values indicate higher quality of the relationship for both subscales and total score (Santona et al., 2023; Spanier, 1976). Values between 92 and 107 can be used as a cut-off to differentiate between distressed and non-distressed dyads (Santona et al., 2023). Cronbach's alpha coefficients >.60 have been reported for both total score and subscales (Spanier, 1976). In my research, I considered both total score and subscales to characterize the sample.

Only the PwMS were asked to answer to the following questionnaire:

Multiple Sclerosis Impact Scale-29 version 2, MSIS-29v2 (Hobart et al., 2001; Hobart & Cano, 2009): MSIS-29 is a self-report 29-item measure of the psycho-physical impact of MS (Hobart et al., 2001). The scale (original and/or revised version) is widely used as a patient-reported disability measure in different countries including the UK (Bacci et al., 2016; Hawton et al., 2012), USA (Raffel et al., 2017), Iran (Ayatollahi et al., 2007) and Italy (Capra et al., 2021; Patti et al., 2007). In my research, I used MSIS-29v2 (Hobart & Cano, 2009). In terms of scoring, a value for two subscales (physical and psychological) can be obtained by summing items and transforming them into a score out of 100 (Hobart et al., 2001; Hobart & Cano, 2009). Although a total score can also be derived, researchers are advised to use subscale scores only (as I did in my study), whereby higher values indicate worse health (Ramp et al., 2009). Cronbach's alpha coefficients >.70 for each subscale were consistently reported across validation studies (Ramp et al., 2009). In my study, I used the MSIS-29v2 to characterize the sample.

Demographic data (sex, age, education, ethnicity) were recorded on paper (data collection sheet) for both PwMS and their partners, using participant identification numbers. The data collection sheet also had a section to report disease duration and Expanded Disability Status Scale-EDSS score (Kurtzke, 1983) for PwMS only, the latter approving the extraction of these data from their medical notes when signing the consent form. Being routinely performed in the MS centre where my research was conducted, the EDSS score was calculated for every PwMS during the scheduled visit. Resulting from a neurological examination performed by certified raters who have attended training, it ranges from 0 (normal) to 10 (death due to MS) and indicates increasing levels of disability. Values of 2 upwards refer to a condition of disability. From values of 6, walking assistance is needed (Kurtzke, 1983).

As already stated when discussing my inclusion criteria, only persons with EDSS scores between 2-5.5 (disabled, but still able to walk without support) were enrolled.

This study protocol was approved by both the Faculty of Health and Medicine Research Ethics Committee of Lancaster University and the Ethics Committee of the University Hospital “Policlinico-San Marco” of Catania (study site). The study was conducted only after the approval letters had been released.

4.3.4 Statistical Analysis

Data were uploaded to an anonymized database and analysed with version 28 of the Statistical Package for the Social Sciences (SPSS), provided by Lancaster University. Data cleaning was performed prior to data analysis by considering range and consistency checks. Descriptive statistics were performed to summarize the demographic and clinical characteristics of the sample. Continuous data (e.g. age, education, disease duration…) were expressed as mean and standard deviation (SD), categorical variables (e.g. sex, work, ethnicity…) as number and percentage. For both PwMS and partners, the Cronbach’s alpha coefficients were calculated in order to evaluate the internal consistency of all the questionnaires (subscales and/or total score whenever considered, as specified when describing the instruments). A t-test was performed to compare the scores obtained by PwMS and partners at the TAS-20 (total score and subscales) and the IPQ-R (all the seven dimensions) questionnaires. Moreover, Pearson’s correlations assessed possible relationships between TAS-20 and IPQ-R scores in both PwMS and partners.

A dyadic data analysis was then performed in accordance to the APIM (Kenny et al., 2006), implying the nonindependence of couple data, whereby a variable (predictor) of one member of the dyad can affect the outcome of the other member and vice versa. The analytic method adopted to conduct the dyadic analysis was that of multilevel linear modelling, MLM

(Kenny et al., 2006), advancing the idea of data structure as having multiple levels (level I is the person, level II is the dyad within which the person is nested). The MLM requires a dataset with a pairwise structure (two rows per couple, each row recording the scores of both PwMS and respective partner), that I created through an online software (retrievable from https://davidakenny.shinyapps.io/ItoP/).

In relation to my research question ("Is alexithymia associated with illness perceptions in PwMS and their partners?") both the effect of the person's own alexithymic traits [actor effect] and the effect of their partner's alexithymic traits [partner effect] on IPs were estimated. As the dyads are distinguishable due to their role (PwMS vs caregiver), both actor effects and partner effects were obtained for each member of the couple. More specifically, I ran different statistical models separately including each alexithymic feature (DDF, DIF, EOT or TAS-20 total score) as predictor and each IP dimension (coherence, consequences, emotional representations, personal control or treatment control) as outcome. Simple APIM models (not considering possible confounders) were tested. Finally, models showing statistically significant effects between predictor and outcome were re-run adjusting for possible confounders, as a sensitivity analysis. All APIM models (unadjusted and adjusted) were performed through an online software (retrievable from https://davidakenny.shinyapps.io/APIM_MM/). The statistical significance level was set at a *p* value <0.05 for all the statistical analyses performed in my research. No adjustments were applied to the *p* value to take account of multiple analyses, due to the exploratory nature of my study.

Chapter 5

Results

5.1 Characteristics of the Sample

One hundred and sixty potentially eligible PwMS were invited to participate from 11th August 2021 to 7th January 2022. Twenty-eight were not elegible [20 PwMS were single, 6 PwMS had recently changed their marital status (widowed/divorced), 2 PwMS were under psychiatric treatment]. Of the 132 persons meeting the inclusion criteria, 22 declined participation and 10 did not return the questionnaires.

In terms of assessment method (online versus in person), 91 couples completed the screening and questionnaires at the hospital. In 8 cases, the PwMS completed the screening and questionnaire at the hospital and the partners at home. One couple underwent the online screening and completed the questionnaires at home.

The final sample consisted of 100 PwMS (71 women and 29 men, mean age 47.6±10.4 years) and 100 partners (29 women and 71 men, mean age 49.1±10.8 years) with a mean partnership duration of 20.1±11.7 years. PwMS had a disease duration of 10.5±8.5 years and a severity score, measured via the EDSS, of 2.8±1.1, indicating mild disability. The demographics of PwMS and their partners are shown in Table 1. Overall, the sample of PwMS was mainly composed of females (71%) and had lower rates of employment when compared to the partners (44% versus 73%).

Table 1

Socio-demographic characteristics of the sample

	Whole sample (n=200)	**PwMS (n=100)**	**Partners (n=100)**
Age. Years	48.4±10.6	47.6±10.4	49.2±10.8
Education. Years	11.3±3.7	11.4±3.7	11.1±3.8
Sex. Women	50 (50.0%)	71 (71.0%)	29 (29.0%)
Ethnicity.White	199 (99.5%)	100 (100.0%)	99 (99.0%)
Work. Employed	117 (58.5%)	44 (44.0%)	73 (73.0%)

Note. PwMS: persons with multiple sclerosis.

5.2 Psychometric Properties of the Questionnaires

The internal consistency (Cronbach's alpha) of all questionnaires was tested for both PwMS (n=100) and their partners (n=100), returning results (Tables 2-5) that are in line with previous studies (Löwe et al., 2010; Montesino et al., 2013; Rosti-Otajärvi et al., 2017; Su Ann et al., 2019). More specifically, the Cronbach's alpha values for all measures indicate moderate (≥0.50) to excellent (≥0.90) reliability (Hinton et al., 2004). Considering the TAS-20, my results from both PwMS and their partners indicate a satisfactory reliability for the total score and subscales, with the exception of EOT (Cronbach's alpha <0.50). This finding aligns with previous studies indicating low reliability for this subscale, already discussed above when describing the scale (Zhu et al., 2007; Zimmermann et al., 2007). The Cronbach's alpha coefficients of the MSIS-29v2 were 0.949 for the physical subscale and 0.916 for the psychological one. For detailed results concerning the internal consistency of the other questionnaires, for both PwMS and their partners, see the following Tables: 2 (DAS), 3 (PHQ-4), 4 (TAS-20), 5 (IPQ-R).

Table 2

Psychometric properties of the Dyadic Adjustment Scale

	Reliability Cronbach's alpha PwMS	Reliability Cronbach's alpha Partners
Affectional Expression	0.738	0.540
Cohesion	0.699	0.754
Consensus	0.898	0.856
Satisfaction	0.805	0.841
DAS tot	0.824	0.772

Note. DAS: Dyadic Adjustment Scale; PwMS: persons with multiple sclerosis; tot: total score.

Table 3

Psychometric properties of the Patient Health Questionnaire 4

	Reliability Cronbach's alpha PwMS	**Reliability Cronbach's alpha Partners**
PHQ-4 anxiety	0.847	0.748
PHQ-4 depression	0.807	0.637
PHQ-4 tot	0.863	0.801

Note. PHQ-4: Patient Health Questionnaire 4; PwMS: persons with multiple sclerosis; tot: total score.

Table 4

Psychometric properties of the Toronto Alexithymia Scale-20

	Reliability Cronbach's alpha PwMS	**Reliability Cronbach's alpha Partners**
DDF	0.587	0.651
DIF	0.888	0.840
EOT	0.401	0.412
TAS tot	0.825	0.808

Note. DDF: Difficulty Describing Feelings; DIF: Difficulty Identifying Feelings; EOT: Externally-Oriented Thinking; PwMS: persons with multiple sclerosis; TAS-20: Toronto Alexithymia Scale; tot: total score.

Table 5

Psychometric properties of the Illness Perception Questionnaire-Revised

	Reliability Cronbach's alpha PwMS	**Reliability Cronbach's alpha Partners**
Coherence	0.774	0.715
Consequences	0.707	0.702
Emotional representations	0.855	0.815
Personal control	0.535	0.586
Treatment control	0.504	0.606

Note. PwMS: persons with multiple sclerosis.

5.3 Descriptive Statistics

The DAS total score in the whole sample was 107.3±17.2 (see Table 6), indicating a good dyadic adjustment (Hunter, 1998; Santona et al., 2023). Both PwMS and their partners showed a higher mean PHQ-4 total score than that reported in the general population (Wicke et al., 2022), which indicates a greater level of distress (See Table 7). Considering the perceived impact of MS among PwMS, the physical subscale was 32.3±22 and the psychological one was 41.5±25.4. These values align with the mild level of physical disability of the sample, while highlighting a higher psychological burden (Garrett et al., 2013). Considering alexithymic traits, my sample of PwMS presented scores similar to those already reported in literature (Gleichgerrcht et al., 2015). When compared to their partners, they presented a significantly higher TAS-20 total score, mainly relating to a higher difficulty in identifying feelings (Table 8). As for IPs, PwMS presented significantly higher perception of illness-related consequences and lower illness coherence (Table 9). The PwMS' IPQ-R scores obtained from my sample are in line with literature data (Barbasio et al., 2015). The IPQ-R scores from partners of PwMS are also similar to those reported by scholars studying the relationship between IPs and outcome from a dyadic perspective (Ackroyd et al., 2011).

Table 6

Dyadic adjustment scale

DAS QUESTIONNAIRE	Whole sample (n=200)	PwMS (n=100)	Partners (n=100)
Affectional expression	8.6±1.9	8.5±2.0	8.7±1.7
Dyadic cohesion	13.7±4.1	13.5±4.1	13.8±4.2
Dyadic consensus	45.4±7.0	45.5±7.3	45.3±6.6
Dyadic satisfaction	39.7±7.0	39.2±6.8	40.1±7.3
DAS Total score	107.3±17.2	106.7±17.8	107.9±16.7

Note. DAS: Dyadic Adjustment Scale; PwMS: persons with multiple sclerosis.

Table 7

Patient health questionnaire 4

PHQ-4	Whole sample (n=200)	PwMS (n=100)	Partners (n=100)
PHQ-4 Anxiety	2.6±1.8	3.0±1.9	2.3±1.7
PHQ-4 Depression	1.7±1.7	2.0±1.8	1.4±1.5
PHQ-4 Total score	4.4±3.2	5.0±3.5	3.7±2.8

Note. PHQ-4: Patient Health Questionnaire 4; PwMS: persons with multiple sclerosis.

Table 8

Alexithymia in PwMS and partners

TAS-20	**Whole sample (n=200)**	**PwMS (n=100)**	**Partners (n=100)**	**p-value**	**T value**
DDF	12.6±4.5	13.1±4.4	12.1±4.5	0.134	1.506
DIF	16.6±7.6	18.2±8.1	15.0±6.8	**0.003**	**3.029**
EOT	20.0±4.8	20.2±4.8	19.8±4.7	0.507	0.665
TAS tot	49.2±13.4	51.5±13.8	46.9±12.6	**0.015**	**2.466**

Note. DDF: Difficulty Describing Feelings; DIF: Difficulty Identifying Feelings; EOT: Externally-Oriented Thinking; PwMS: persons with multiple sclerosis; TAS-20: Toronto Alexithymia Scale-20; tot: total score. The results of the comparison between PwMS and partners are reported. In bold, the statistically significant results (*p*<0.05).

Table 9

Illness Perception Questionnaire-Revised

IPQ-R	Whole sample (n=200)	PwMS (n=100)	Partners (n=100)	p-value	T value
Acute/chronic timeline	23.6±4.9	23.8±4.9	23.4±4.9	0.496	0.681
Coherence	17.4±4.0	16.8±4.0	18.1±3.9	**0.021**	**-2.331**
Consequences	19.0±4.6	20.2±4.2	17.8±4.6	**<0.001**	**3.807**
Cyclical timeline	14.2±3.1	14.2±3.3	14.3±2.9	0.910	-0.114
Emotional representations	19.4±5.5	19.5±5.8	19.4±5.2	0.929	0.090
Personal control	18.4±3.8	18.8±3.5	18.0±4.0	0.149	1.450
Treatment control	18.4±2.7	18.2±2.6	18.6±2.9	0.313	-1.012

Note. IPQ-R: Illness Perception Questionnaire Revised; PwMS: persons with multiple sclerosis. The results of the comparison between PwMS and partners are reported. In bold, the statistically significant results (p<0.05).

5.4 Relationships Between Alexithymia and Illness Perceptions

In order to investigate the relationship between alexithymia and IPs, I performed Pearson's correlations considering TAS-20 (total score and subscales) and IPs (coherence, consequences, emotional representations, personal control, treatment control). To aid with the interpretation of my results, I remind the reader that for TAS-20, higher values of the subscales (DDF, DIF, EOT) and the total score indicate higher alexithymic traits. In terms of IPs, higher scores on the scales consequences and emotional representations indicate stronger beliefs of serious impact of MS on life and emotional status, respectively. Higher scores on coherence show more confidence in the understanding of the characteristics of the disease, while higher scores on treatment and personal control indicate beliefs that, respectively, treatment and the person affected by MS can somewhat impact on the disease course. Correlations between alexithymia (TAS-20 subscales and total score) and IPs (IPQ-R subscales) returned some statistically significant results in both PwMS and their partners, as detailed below.

Difficulty describing feelings (DDF)

DDF showed statistically significant correlations with coherence, consequences and emotional representations, as reported in Table 10.

Coherence

A statistically significant correlation was found between DDF and coherence for both PwMS and their partners, whereby higher DDF was correlated with lower coherence (PwMS $r = -.290$, $p = .003$; partners $r = -.391$, $p <.001$).

Consequences

DDF positively correlated with consequences (higher DDF, higher consequences) among partners only ($r = .263$, $p = .008$).

Emotional representations

DDF positively correlated with emotional representations (higher DDF, higher emotional representations) in both groups (PwMS $r = .323$, $p = .001$; partners $r = .312$, $p = .002$).

Difficulty identifying feelings (DIF)

DIF showed statistically significant correlations with coherence, consequences, emotional representations and treatment control, as shown in Table 10.

Coherence

The subscale DIF negatively correlated with coherence (higher DIF, lower coherence) in both groups (PwMS $r = -.312$, $p = .002$; partners $r = -.390$, $p < .001$).

Consequences

Higher DIF correlated with higher consequences in both groups (PwMS $r = .240$, $p = .016$; partners $r = .255$, $p = .010$).

Emotional representations

DIF positively correlated with emotional representations (higher DIF, higher emotional representations) in both groups (PwMS $r = .479$, $p < .001$; partners $r = .377$, $p < .001$).

Treatment control

DIF showed a statistically significant negative correlation with treatment control (higher DIF, lower treatment control) among partners only ($r = -.372$, $p < .001$).

Externally-oriented thinking (EOT)

EOT showed statistically significant correlations with personal control and treatment control, as detailed in Table 10.

Personal control

Higher EOT scores were significantly correlated with lower personal control among PwMS only (*r* = -.224, *p* = .025)

Treatment control

EOT negatively correlated with treatment control (higher EOT, lower treatment control) among partners only (*r* = -.278, *p*= .005).

TAS-20 total score

TAS-20 total score showed statistically significant correlations with coherence, consequences, emotional representations and treatment control, as shown in Table 10.

Coherence

Higher TAS-20 total score correlated with lower coherence in both groups (PwMS *r* = -.300, *p* = .002; partners *r* = -.412, *p*<.001).

Consequences

Higher TAS-20 total score correlated with higher consequences among partners only (*r* = .244, *p* = .014).

Emotional representations

TAS-20 total score positively correlated with emotional representations (higher TAS-20 total score, higher emotional representations) in both groups (PwMS *r* = .400, *p*<.001; partners *r* = .312, *p* = .002).

Treatment control

TAS-20 total score showed a negative correlation with treatment control (higher TAS-20 total score, lower treatment control) among partners only (*r* = -.363, *p*<.001).

Table 10

Correlations between alexithymia and illness perceptions

		PwMS **TAS-20 and IPQ-R: Pearson's correlations**					**Partners** **TAS-20 and IPQ-R: Pearson's correlations**				
		Coher.	**Cons.**	**Emotional repres**	**P. control**	**T. control**	**Coher.**	**Cons.**	**Emotional repres.**	**P. control**	**T. control**
DDF	r	-.290	.144	.323	-.103	-.136	-.391	.263	.312	.137	-.163
	p-value	**.003**	.154	**.001**	.309	.178	**<.001**	**.008**	**.002**	.173	.105
DIF	r	-.312	.240	.479	-.129	-.162	-.390	.255	.377	.072	-.372
	p-value	**.002**	**.016**	**<.001**	.201	.106	**<.001**	**.010**	**<.001**	.477	**<.001**
EOT	r	-.065	-.062	.041	-.224	-.039	-.164	.034	-.006	-.131	-.278
	p-value	.520	.540	.686	**.025**	.700	.102	.738	.956	.194	**.005**
TAS-20 tot	r	-.300	.166	.400	-.187	-.153	-.412	.244	.312	.038	-.363
	p-value	**.002**	.099	**<.001**	.062	.129	**<.001**	**.014**	**.002**	.705	**<.001**

Note. Correlations between Toronto Alexithymia Scale (TAS-20), subscales and total score, and Illness Perception Questionnaire Revised (IPQ-R, subscales: coherence, consequences, emotional representations, personal control, treatment control) among persons with multiple sclerosis (PwMS) and their partners. In bold, the statistically significant results ($p<0.05$). DDF: Difficulty Describing Feelings; DIF: Difficulty Identifying Feelings; EOT: Externally-Oriented Thinking; TAS tot: TAS-20 total score.

5.5 APIM Model Results

To answer my research question (“Is alexithymia associated with illness perceptions in PwMS and their partners?“), I ran statistical models with TAS-20 subscales and total score separately considered as possible predictors of IPs. Below, the results of such analyses.

Difficulty describing feelings (DDF)

In a model with DDF as a predictor of IPs, this alexithymic feature showed statistically significant correlations with coherence, consequences and emotional representations. Full details (including the magnitude of the effects) are shown in Table 11.

Coherence (actor effect)

A statistically significant actor effect was observed in both groups (PwMS r = -.290, p = .003; partners r = -.390, p <.001) for coherence, whereby an increase in DDF correlated with a reduction of coherence.

Consequences (actor effect)

A statistically significant actor effect was observed (among partners only) for consequences, whereby an increase in DDF related to an increase in consequences (r = .265, p = .007).

Emotional representations (actor effect + partner effect)

A statistically significant actor effect was observed in both groups (PwMS r = .325, p <.001; partners r = .319, p = .001) for emotional representations, whereby an increase in DDF correlated with an increase of emotional representations.

Moreover, a statistically significant partner effect was observed, whereby an increase of DDF in the partners correlated with higher emotional representations in PwMS (*r* = .265, *p* = .007).

How to interpret the APIM results

The visual presentation below (Figure 2), summarizing the effects found between DDF and emotional representations provides an example of how to read the results keeping in mind the APIM model. For more details, see Table 11.

Figure 2

Correlations between difficulty describing feelings and emotional representations

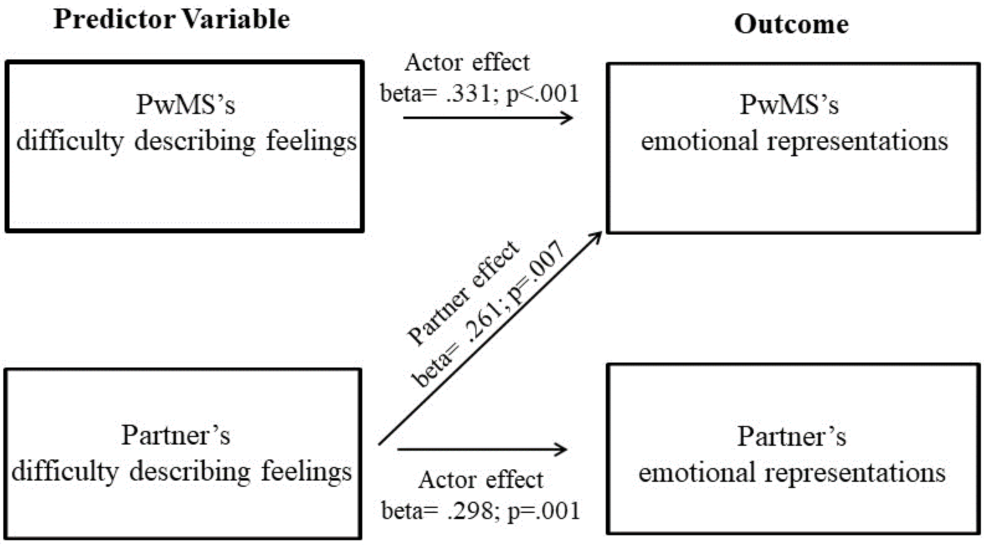


Table 11

APIM model, predictor: Difficulty Describing Feeling

	ROLE	EFFECT ESTIMATE	95%CI	p-value	Beta-value	r	ES
IPs' dimensions							
Coherence							
PwMS	Actor	-.263	-.436 to -.091	**.003**	-.298	-.290	Small
	Partner	.012	-.158 to .182	.894	.013	.014	/
Partners	Actor	-.336	-.494 to -.178	<**.001**	-.380	-.390	Medium
	Partner	-.032	-.192 to .129	.698	-.036	-.039	/
Consequences							
PwMS	Actor	.133	-.054 to .320	.165	.134	.140	/
	Partner	.125	-.059 to .309	.185	.126	.134	/
Partners	Actor	.270	.074 to .466	**.007**	.273	.265	Small
	Partner	-.037	-.236 to .162	.715	-.038	-.037	/
Emotional representations							
PwMS	Actor	.409	.172 to .647	<**.001**	.331	.325	Medium
	Partner	.323	.089 to .556	**.007**	.261	.265	Small
Partners	Actor	.369	.150 to .587	**.001**	.298	.319	Medium
	Partner	-.149	-.371 to .072	.188	-.121	-.133	/
Personal control							
PwMS	Actor	-.083	-.239 to .074	.302	-.098	-.104	/
	Partner	.036	-.118 to .190	.650	.042	.046	/
Partners	Actor	.119	-.055 to .294	.182	.142	.135	/
	Partner	.074	-.103 to .252	.411	.089	.083	/
Treatment control							
PwMS	Actor	-.080	-.194 to .034	.173	-.130	-.137	/
	Partner	.027	-.085 to .139	.637	.044	.048	/
Partners	Actor	-.102	-.227 to .023	.112	-.167	-.160	/
	Partner	-.068	-.195 to .059	.297	-.111	-.106	/

Note. Correlations found between the alexithymic trait "Difficulty Describing Feelings" (predictor) and the Illness perceptions' (IPs) dimensions (outcome), using the Actor-Partner Interdependence Model (APIM), without confounders. The findings refer to both persons with multiple sclerosis (PwMS) and their partners, taking into account the actor and partner roles for each group. The 95% confidence interval (CI) is also reported, as well as the effect size (ES) of the statistically significant effects (*p* values in bold).

Difficulty identifying feelings (DIF)

In a model with DIF as a predictor of IPs, this alexithymic feature showed statistically significant correlations with coherence, consequences, emotional representations and treatment control. Full details (including the magnitude of the effects) are shown in Table 12.

Coherence (actor effect)

A statistically significant actor effect was observed in both groups (PwMS $r = -.295$, $p = .003$; partners $r = -.356$, $p < .001$) for coherence, whereby an increase of DIF related to a decrease of coherence.

Consequences (actor effect)

A statistically significant actor effect was recorded in both groups (PwMS $r = .224$, $p = .025$; partners $r = .245$, $p = .014$) for consequences, whereby an increase of DIF correlated with an increase of consequences in PwMS and their partners.

Emotional representations (actor effect)

A statistically significant actor effect was detected in both groups (PwMS $r = .453$, $p < .001$; partners $r = .347$, $p < .001$) for emotional representations, whereby an increase of DIF correlated with an increase of emotional representations.

Treatment control (actor effect)

A significant actor effect, for partners only, was observed for treatment control, whereby an increase of DIF determined a reduction of treatment control ($r = -.328$, $p < .001$).

Table 12

APIM model, predictor: Difficulty Identifying Feelings

	ROLE	EFFECT ESTIMATE	95%CI	p-value	Beta-value	r	ES
IPs' dimensions							
Coherence							
PwMS	Actor	-.150	-.246 to -.053	**.003**	-.284	-.295	Small
	Partner	-.019	-.135 to .096	.746	-.036	-.033	/
Partners	Actor	-.206	-.313 to -.098	**<.001**	-.391	-.356	Medium
	Partner	-.054	-.144 to .035	.235	-.104	-.120	/
Consequences							
PwMS	Actor	.120	.016 to .224	**.025**	.204	.224	Small
	Partner	.023	-.102 to .148	.719	.039	.037	/
Partners	Actor	.171	.036 to .305	**.014**	.289	.245	Small
	Partner	.006	-.106 to .119	.912	.011	.011	/
Emotional representations							
PwMS	Actor	.327	.199 to .455	**<.001**	.444	.453	Medium
	Partner	.062	-.091 to .216	.426	.085	.081	/
Partners	Actor	.273	.126 to .419	**<.001**	.371	.347	Medium
	Partner	.059	-.063 to .181	.346	.080	.095	/
Personal control							
PwMS	Actor	-.056	-.144 to .032	.213	-.112	-.126	/
	Partner	.003	-.103 to .108	.959	.006	.005	/
Partners	Actor	.033	-.088 to .154	.592	.066	.054	/
	Partner	.030	-.071 to .131	.560	.060	.059	/
Treatment control							
PwMS	Actor	-.049	-.113 to .015	.134	-.135	-.151	/
	Partner	-.009	-.086 to .067	.809	-.026	-.025	/
Partners	Actor	-.139	-.219 to -.060	**<.001**	-.383	-.328	Medium
	Partner	-.059	-.126 to .007	.082	-.163	-.175	/

Note. Correlations found between the alexithymic trait "Difficulty Identifying Feelings" (predictor) and the Illness perceptions' (IPs) dimensions (outcome), using the Actor-Partner Interdependence Model (APIM), without confounders. The findings refer to both persons with multiple sclerosis (PwMS) and their partners, taking into account the actor and partner roles for each group. The 95% confidence interval (CI) is also reported, as well as the effect size (ES) of the statistically significant effects (*p* values in bold).

Externally-oriented thinking (EOT)

In a model with EOT as a predictor of IPs, this alexithymic feature showed statistically significant correlations with coherence, personal control and treatment control. Full details (including the magnitude of the effects) are shown in Table 13.

Coherence (partner effect)

A statistically significant partner effect was observed, whereby an increase of EOT in PwMS correlated with a reduction of coherence in their partners (r = -.217, p = .030).

Personal control (actor effect)

A statistically significant actor effect was recorded, among PwMS only, for personal control, whereby an increase of EOT related to a decrease of personal control (r = -.230, p = .021).

Treatment control (actor effect)

A significant actor effect, among partners only, was observed for treatment control, since an increase of EOT was linked to a decrease of treatment control (r = -.234, p = .019).

Table 13

APIM model, predictor: Externally-Oriented Thinking

	ROLE	EFFECT ESTIMATE	95%CI	p-value	Beta-value	r	ES
IPs' dimensions							
Coherence							
PwMS	Actor	-.040	-.211 to .130	.644	-.049	-.047	/
	Partner	-.055	-.228 to .118	.535	-.067	-.063	/
Partners	Actor	-.088	-.249 to .074	.290	-.106	-.107	/
	Partner	-.178	-.337 to -.019	**.030**	-.216	-.217	Small
Consequences							
PwMS	Actor	-.051	-.231 to .130	.584	-.055	-.056	/
	Partner	-.016	-.199 to .168	.868	-.017	-.017	/
Partners	Actor	.041	-.158 to .240	.688	.044	.041	/
	Partner	-.031	-.227 to .165	.755	-.034	-.032	/
Emotional representations							
PwMS	Actor	.022	-.223 to .268	.859	.019	.018	/
	Partner	.105	-.144 to .355	.410	.091	.084	/
Partners	Actor	-.008	-.235 to .220	.984	-.007	-.007	/
	Partner	.006	-.218 to .229	.961	.005	.005	/
Personal control							
PwMS	Actor	-.173	-.319 to -.028	**.021**	-.221	-.230	Small
	Partner	.042	-.106 to .190	.580	.053	.056	/
Partners	Actor	-.118	-.290 to .053	.178	-.151	-.136	/
	Partner	.031	-.138 to .200	.717	.040	.037	/
Treatment control							
PwMS	Actor	-.021	-.130 to .088	.709	-.037	-.038	/
	Partner	.000	-.111 to .111	.995	.001	.001	/
Partners	Actor	-.143	-.262 to -.025	**.019**	-.252	-.234	Small
	Partner	-.096	-.212 to .021	.110	-.168	-.161	/

Note. Correlations found between the alexithymic trait "Externally-Oriented Thinking" (predictor) and the Illness perceptions' (IPs) dimensions (outcome), using the Actor-Partner Interdependence Model (APIM), without confounders. The findings refer to both persons with multiple sclerosis (PwMS) and their partners, taking into account the actor and partner roles for each group. The 95% confidence interval (CI) is also reported, as well as the effect size (ES) of the statistically significant effects (*p* values in bold).

TAS-20 total score

In a model with TAS-20 total score (total level of alexithymia) as a predictor of IPs, the scale showed statistically significant correlations with coherence, consequences, emotional representations and treatment control. Full details (including the magnitude of the effects) are shown in Table 14.

Coherence (actor effect)

A statistically significant actor effect was observed in both groups (PwMS *r* = -.289, *p* = .003; partners *r* = -.384, *p* <.001) for coherence, whereby an increase of TAS-20 total score correlated with a decrease of coherence.

Consequences (actor effect)

A statistically significant actor effect was observed among partners only, whereby an increase of TAS-20 total score related to an increase of consequences (*r* = .243, *p* = .014).

Emotional representations (actor effect)

A significant actor effect was recorded when considering emotional representations in both groups (PwMS *r* = .371, *p* <.001; partners *r* = .305, *p* = .002), whereby an increase of TAS-20 total score was linked to an increase of emotional representations.

Treatment control (actor effect + partner effect)

An actor effect was detected, among partners only, for treatment control, whereby an increase of TAS-20 total score related to a decrease of treatment control (*r* = -.329, *p* <.001). Moreover, a statistically significant partner effect was observed, whereby an increase of TAS-20 total score in PwMS related to a decrease of treatment control in the partners (*r* = -.207, *p* = .038).

Table 14

APIM model, predictor: TAS-20 total score

	ROLE	EFFECT ESTIMATE	95%CI	p-value	Beta-value	r	ES
IPs' dimensions							
Coherence							
PwMS	Actor	-.085	-.142 to -.029	**.003**	-.286	-.289	Small
	Partner	-.009	-.071 to .052	.767	-.031	-.030	/
Partners	Actor	-.117	-.173 to -.061	**<.001**	-.393	-.384	Medium
	Partner	-.042	-.093 to .009	.110	-.141	-.161	/
Consequences							
PwMS	Actor	.047	-.014 to .109	.132	.142	.152	/
	Partner	.020	-.048 to .087	.570	.058	.058	/
Partners	Actor	.090	.019 to .162	**.014**	.270	.243	Small
	Partner	-.007	-.072 to .059	.838	-.020	-.021	/
Emotional representations							
PwMS	Actor	.154	.078 to .231	**<.001**	.370	.371	Medium
	Partner	.072	-.012 to .156	.093	.174	.169	/
Partners	Actor	.129	.049 to .209	**.002**	.309	.305	Medium
	Partner	.004	-.069 to .077	.917	.009	.011	/
Personal control							
PwMS	Actor	-.049	-.100 to .001	.057	-.174	-.191	/
	Partner	.010	.045 to .066	.718	.036	.037	/
Partners	Actor	.008	-.056 to .072	.811	.028	.024	/
	Partner	.020	-.039 to .078	.510	.069	.067	/
Treatment control							
PwMS	Actor	-.029	-.066 to .009	.133	-.139	-.151	
	Partner	.001	-.039 to .042	.944	.007	.007	
Partners	Actor	-.074	-.116 to -.032	**<.001**	-.358	-.329	Medium
	Partner	-.041	-.080 to -.002	**.038**	-.199	-.207	Small

Note. Correlations found between alexithymia [Toronto Alexitymia Scale 20 (TAS-20) total score (predictor)] and the Illness perceptions' (IPs) dimensions (outcome), using the Actor-Partner Interdependence Model (APIM), without confounders. The findings refer to both persons with multiple sclerosis (PwMS) and their partners, taking into account the actor and partner roles for each group. The 95% confidence interval (CI) is also reported, as well as the effect size (ES) of the statistically significant effects (*p* values in bold).

5.6 Sensitivity Analysis

Sensitivity analyses serve to identify potential underlying factors that may disconfirm the primary findings of a research, thus questioning their robustedness (Thabane et al., 2013).

As for my research, I decided to take into consideration potential confounders that may have impacted IPs, apart from alexithymic traits. More specifically, I re-ran the models previously showing statistically significant correlations between alexithymia and IPs in the simple APIM (see Tables 11-14), simultaneously adding sex, disease severity (EDSS score) and quality of marital relationship (DAS total score) as covariates. Given my sample of PwMS is mainly composed of females, I decided to consider the possible impact of gender on my findings. Then, I hypothesized that a more severe clinical condition (indicated by a higher score on the EDSS) could potentially favour the formation of negative IPs, while a poor marital quality might well worsen the perceived impact of an illness, due to feelings of solitude and lack of effective communication. After adjusting for the covariates, the actor effects previously observed between alexithymic traits and consequences disappeared in both groups, with EDSS and DAS total score instead representing major contributors to the variance (higher marital quality, lower consequences; higher severity, higher consequences). For all the other IPs (coherence, emotional representations, personal control and treatment control), the majority of the actor effects observed in the simple models remained, as shown in Tables 15-18.. While the other previously detected partner effects disappered, the partner effect from PwMS to partners (whereby an increase of EOT in the PwMS determined a reduction of coherence in their partners) remained unaltered after adjusting for the covariates. See Tables 15-18.

Table 15

APIM with covariates, predictor: Difficulty Describing Feelings

	ROLE	EFFECT ESTIMATE	95%CI	p-value	Beta-value	r	ES
IPs' dimensions							
Coherence							
PwMS	Actor	-.237	-.413 to -.062	**.009**	-.268	-.271	Small
	Partner	.077	-.111 to .264	.424	.087	.066	/
Partners	Actor	-.282	-.455 to -.109	**.002**	-.319	-.296	Small
	Partner	-.011	-.174 to .152	.895	-.012	-.004	/
COVARIATES							
Sex	PwMS	.380	-1.344 to 2.104	.666	.044	.039	/
	Partners	-.815	-2.463 to .834	.334	-.094	-.113	/
EDSS	PwMS	-.671	-1.385 to .043	.067	-.188	-.187	/
DAS-tot	PwMS	.030	-.017 to .076	.210	.131	.085	/
	Partners	.030	-.016 to .077	.203	.132	.179	/
Consequences							
PwMS	Actor	.087	-.097 to .271	.356	.088	.096	/
	Partner	.006	-.190 to .203	.949	.006	.009	/
Partners	Actor	.173	-.041 to .387	.115	.174	.165	/
	Partner	-.075	-.276 to .126	.468	-.075	-.073	/
COVARIATES							
Sex	PwMS	-1.113	-2.922 to .696	.229	-.115	-.123	/
	Partners	1.259	-.779 to 3.296	.227	.130	.121	/
EDSS	PwMS	.968	.219 to 1.717	.012*	.241	.254	Small
DAS-tot	PwMS	-.053	-.102 to -.004	.035*	-.207	-.206	Small
	Partners	-.054	-.112 to .003	.065	-.212	-.175	/
Emotional representations							
PwMS	Actor	.375	.133 to .616	**.003**	.303	.296	Small
	Partner	.231	-.027 to .489	.081	.187	.170	/
Partners	Actor	.279	.043 to .515	**.022**	.226	.227	Small
	Partner	-.194	-.416 to .028	.089	-.157	-.176	/
COVARIATES							

Sex	PwMS	-1.610	-3.982 to .763	.185	-.133	-.139	/
	Partners	.038	-2.216 to 2.291	.974	.003	.007	/
EDSS	PwMS	.071	-.912 to 1.053	.888	.014	.021	/
DAS-tot	PwMS	-.042	-.106 to .022	.199	-.132	-.147	/
	Partners	-.072	-.135 to -.008	.028*	-.225	-.232	Small

Note. Correlations found between the alexithymic trait “Difficulty Describing Feelings” (predictor) and the Illness perceptions’ (IPs) dimensions (outcome), using the Actor-Partner Interdependence Model (APIM), considering possible confounders. The analysis only considers the dimensions showing significant correlations throughout the simple APIM model. The findings refer to both persons with multiple sclerosis (PwMS) and their partners, taking into account the actor and partner roles for each group. The 95% confidence interval (CI) is also reported, as well as the effect size (ES) of the statistically significant effects (p values regarding the correlation between alexithymic traits and IPs in bold; p values regarding the correlation between covariates and IPs highlighted with an asterisk). DAS-tot: Dyadic Adjustment Scale total score; EDSS: Expanded Disability Status Scale.

Table 16

APIM with covariates, predictor: Difficulty Identifying Feelings

	ROLE	**EFFECT ESTIMATE**	**95%CI**	**p-value**	**Beta-value**	**r**	**ES**
IPs' dimensions							
Coherence							
PwMS	Actor	-.140	-.238 to -.042	.005	-.266	-.281	Small
	Partner	.004	-.117 to .125	.948	.008	.001	/
Partners	Actor	-.178	-.297 to -.059	**.004**	-.338	-.278	Small
	Partner	-.045	-.136 to .045	.331	-.086	-.096	/
COVARIATES							
Sex	PwMS	.141	-1.538 to 1.820	.869	.016	.016	/
	Partners	-1.186	-2.780 to .408	.146	-.137	-.156	/
EDSS	PwMS	-.571	-1.285 to .142	.118	-.160	-.160	/
DAS-tot	PwMS	.019	-.026 to .064	.419	.082	.060	/
	Partners	.025	-.024 to .073	.318	.107	.134	/
Consequences							
PwMS	Actor	.097	-.005 to .198	.063	.164	.190	/
	Partner	-.032	-.157 to .094	.621	-.054	-.051	/
Partners	Actor	.114	-.034 to .262	.132	.193	.158	/
	Partner	-.011	-.124 to .101	.843	-.019	-.019	/
COVARIATES							
Sex	PwMS	-1.064	-2.805 to .678	.233	-.110	-.123	/
	Partners	1.482	-.506 to 3.470	.146	.153	.147	/
EDSS	PwMS	.940	.200 to 1.679	**.014***	.234	.250	Small
DAS-tot	PwMS	-.052	-.099 to -.006	**.028***	-.205	-.218	Small
	Partners	-.048	-.107 to .012	.117	-.186	-.147	/
Emotional representations							
PwMS	Actor	.308	.180 to .435	**<.001**	.418	.438	Medium
	Partner	.020	-.138 to .179	.800	.028	.023	/
Partners	Actor	.225	.062 to .388	**.007**	.306	.266	Small
	Partner	.048	-.076 to .172	.451	.065	.077	/
COVARIATES							
Sex	PwMS	-1.851	-4.042 to .339	.099	-.153	-.169	/
	Partners	.177	-2.011 to 2.365	.874	.015	.018	/
EDSS	PwMS	.013	-.918 to .943	.979	.003	.006	/
DAS-tot	PwMS	-.055	-.114 to .004	.069	-.172	-.194	/
	Partners	-.045	-.111 to .021	.187	-.140	-.141	/

Treatment control							
PwMS	Actor	-.045	-.109 to .020	.177	-.122	-.139	/
	Partner	.008	-.071 to .088	.835	.023	.021	/
Partners	Actor	-.114	-.203 to -.025	**.013**	-.314	-.251	Small
	Partner	-.052	-.120 to .016	.134	-.143	-.153	/
COVARIATES							
Sex	PwMS	-.656	-1.762 to .451	.247	-.110	-.119	/
	Partners	-.543	-1.734 to .649	.373	-.091	-.092	/
EDSS	PwMS	-.039	-.509 to .431	.871	-.016	-.017	/
DAS-tot	PwMS	.024	-.006 to .054	.118	.151	.158	/
	Partners	.022	-.014 to .058	.242	.137	.120	/

Note. Correlations found between the alexithymic trait "Difficulty Identifying Feelings" (predictor) and the Illness perceptions' (IPs) dimensions (outcome), using the Actor-Partner Interdependence Model (APIM), considering possible confounders. The analysis only considers the dimensions showing significant correlations throughout the simple APIM model. The findings refer to both persons with multiple sclerosis (PwMS) and their partners, taking into account the actor and partner roles for each group. The 95% confidence interval (CI) is also reported, as well as the effect size (ES) of the statistically significant effects (p values regarding the correlation between alexithymic traits and IPs in bold; p values regarding the correlation between covariates and IPs highlighted with an asterisk). DAS-tot: Dyadic Adjustment Scale total score; EDSS: Expanded Disability Status Scale.

Table 17

APIM with covariates, predictor: Externally-Oriented Thinking

	ROLE	**EFFECT ESTIMATE**	**95%CI**	**p-value**	**Beta-value**	**r**	**ES**
IPs' dimensions							
Coherence							
PwMS	Actor	-.049	-.223 to .125	.583	-.059	-.056	/
	Partner	-.026	-.214 to .162	.788	-.031	-.034	/
Partners	Actor	.005	-.161 to .170	.955	.006	.013	/
	Partner	-.222	-.378 to -.065	**.006**	-.269	-.277	Small
COVARIATES							
Sex	PwMS	.333	-1.508 to 2.174	.724	.038	.035	/
	Partners	-1.965	-3.655 to -.275	.024*	-.227	-.235	Small
EDSS	PwMS	-.676	-1.411 to .060	.073	-.189	-.185	/
DAS-tot	PwMS	.027	-.020 to .073	.259	.118	.097	/
	Partners	.062	.017 to .106	.007*	.271	.295	Small
Personal control							
PwMS	Actor	-.159	-.310 to -.008	**.041**	-.203	-.207	Small
	Partner	.020	-.143 to .183	.809	.026	.016	/
Partners	Actor	-.151	-.336 to .033	.110	-.193	-.166	/
	Partner	.044	-.131 to .219	.622	.056	.052	/
COVARIATES							
Sex	PwMS	-.633	-2.229 to .964	.438	-.077	-.083	/
	Partners	.505	-1.384 to 2.394	.601	.061	.056	/
EDSS	PwMS	-.161	-.799 to .477	.621	-.047	-.052	/
DAS-tot	PwMS	-.003	-.043 to .037	.899	-.012	-.042	/
	Partners	-.027	-.077 to .022	.275	-.126	-.122	/
Treatment control							
PwMS	Actor	-.010	-.121 to .102	.862	-.017	-.018	/
	Partner	.017	-.103 to .137	.779	.030	.027	/
Partners	Actor	-.097	-.220 to .027	.128	-.170	-.156	/
	Partner	-.112	-.229 to .005	.063	-.196	-.189	/
COVARIATES							

Sex	PwMS	-.551	-1.728 to .626	.360	-.092	-.095	/
	Partners	-.766	-2.031 to .498	.237	-.128	-.122	/
EDSS	PwMS	-.061	-.531 to .409	.800	-.025	-.027	/
DAS-tot	PwMS	.028	-.001 to .058	.064	.180	.184	/
	Partners	.041	.008 to .074	.017*	.260	.242	Small

Note. Correlations found between the alexithymic trait “Externally-Oriented Thinking” (predictor) and the Illness perceptions’ (IPs) dimensions (outcome), using the Actor-Partner Interdependence Model (APIM), considering possible confounders. The analysis only considers the dimensions showing significant correlations throughout the simple APIM model. The findings refer to both persons with multiple sclerosis (PwMS) and their partners, taking into account the actor and partner roles for each group. The 95% confidence interval (CI) is also reported, as well as the effect size (ES) of the statistically significant effects (p values regarding the correlation between alexithymic traits and IPs in bold; p values regarding the correlation between covariates and IPs highlighted with an asterisk). DAS-tot: Dyadic Adjustment Scale total score; EDSS: Expanded Disability Status Scale

Table 18

APIM with covariates, predictor: TAS-20, total score

	ROLE	**EFFECT ESTIMATE**	**95%CI**	**p-value**	**Beta-value**	**r**	**ES**
IPs' dimensions							
Coherence							
PwMS	Actor	-.081	-.137 to -.024	**.006**	-.271	-.280	Small
	Partner	.008	-.060 to .077	.809	.028	.013	/
Partners	Actor	-.100	-.164 to -.036	**.002**	-.337	-.288	Small
	Partner	-.040	-.092 to .012	.132	-.134	-.150	/
COVARIATES							
Sex	PwMS	.364	-1.349 to 2.077	.678	.042	.040	/
	Partners	-.847	-2.469 to .775	.307	-.098	-.115	/
EDSS	PwMS	-.617	-1.329 to .094	.091	-.173	-.174	/
DAS-tot	PwMS	.022	-.025 to .069	.361	.097	.062	/
	Partners	.020	-.028 to .068	.410	.088	.119	/
Consequences							
PwMS	Actor	.037	-.022 to .097	.217	.112	.127	/
	Partner	-.027	-.098 to .045	.465	-.080	-.073	/
Partners	Actor	.052	-.029 to .133	.206	.156	.133	/
	Partner	-.013	-.079 to .052	.691	-.040	-.040	/
COVARIATES							
Sex	PwMS	-1.299	-3.086 to .489	.156	-.134	-.145	/
	Partners	1.299	-.749 to 3.348	.215	.134	.125	/
EDSS	PwMS	.985	.242 to 1.727	.010*	.246	.260	Small
DAS-tot	PwMS	-.060	-.108 to -.011	.017*	-.233	-.232	Small
	Partners	-.051	-.110 to .009	.100	-.198	-.157	/
Emotional representations							
PwMS	Actor	.150	.073 to .226	**<.001**	.359	.366	Medium
	Partner	.031	-.061 to .123	.514	.074	.062	/
Partners	Actor	.097	.006 to .188	**.037**	.233	.207	Small
	Partner	-.005	-.078 to .069	.898	-.012	-.015	/

COVARIATES							
Sex	PwMS	-2.104	-4.412 to .205	.076	-.174	-.183	/
	Partners	-.028	-2.325 to 2.269	.981	-.002	.001	/
EDSS	PwMS	.102	-.857 to 1.062	.835	.020	.026	/
DAS-tot	PwMS	-.052	-.115 to .012	.111	-.163	-.174	/
	Partners	-.057	-.124 to .011	.103	-.178	-.176	/
Treatment control							
PwMS	Actor	-.023	-.061 to .014	.223	-.113	-.126	/
	Partner	.014	-.031 to .059	.550	.067	.060	/
Partners	Actor	-.059	-.107 to -.010	**.018**	-.284	-.238	Small
	Partner	-.038	-.077 to .001	.058	-.185	-.193	/
COVARIATES							
Sex	PwMS	-.535	-1.662 to .593	.354	-.089	-.096	/
	Partners	-.399	-1.620 to .823	.523	-.067	-.066	/
EDSS	PwMS	-.062	-.531 to .406	.794	-.025	-.027	/
DAS-tot	PwMS	.028	-.004 to .059	.085	.175	.171	/
	Partners	.021	-.015 to .058	.247	.136	.120	/

Note. Correlations found between the Toronto Alexithymia Scale (TAS-20) total score (predictor) and the Illness perceptions' (IPs) dimensions (outcome), using the Actor-Partner Interdependence Model (APIM), considering possible confounders. The analysis only considers the dimensions showing significant correlations throughout the simple APIM model. The findings refer to both persons with multiple sclerosis (PwMS) and their partners, taking into account the actor and partner roles for each group. The 95% confidence interval (CI) is also reported, as well as the effect size (ES) of the statistically significant effects (p values regarding the correlation between alexithymic traits and IPs in bold; p values regarding the correlation between covariates and IPs highlighted with an asterisk). DAS-tot: Dyadic Adjustment Scale total score; EDSS: Expanded Disability Status Scale.

In light of the findings reported in this chapter, it can be fairly concluded that alexithymia is confirmed as a variable possibly associated with IPs. The sensitivity analysis showed several findings were robust in the presence of other variables but also pointed out possible confounders that may impact the relationship between alexithymic traits and illness appraisals. These data could inform further studies on the topic, as discussed in the next chapter.

Chapter 6

Discussion

My thesis focuses on persons with MS (PwMS) and their partners' illness perceptions (IPs).

The research topic was addressed from two perspectives. In the literature review (Chapter 3), I investigated the relationship between IPs and outcomes in PwMS and their caregivers. In the empirical work (Chapters 4 and 5), I tested alexithymia as possibly associated with IPs, from an individual and dyadic perspective, with the secondary aim of obtaining the magnitude of the partner effects exerted by alexithymic traits. Overall, my dissertation contributes to advance the knowledge on IPs and the factors possibly associated with themin the specific population of PwMS and their partners, while raising interesting points for future research.

The findings of my literature review (Luca et al., 2022) indicate that positive IPs (e.g. control, coherence) relate to better psychophysical outcome (e.g. well-being and physical health), the latter being worse among PwMS holding negative beliefs about their condition. The magnitude of the relationship between IPs and outcome was medium across the analyzed studies. The few articles focusing on dyads suggest a possible interdependence, within the couples, between IPs and outcome, such as the correlation between low coherence in the couple and lower positive affect among the PwMS (Luca et al., 2022).

Despite the importance of IPs, however, there was a remarkable gap in the knowledge pertaining to what might influence their formation at the individual and dyadic level. Therefore, it would be wise to investigate upstream, in other words before that potentially dysfunctional IPs take shape and hinder the person's adaptation to MS. These considerations prompted me to conduct my empirical study with a particular focus on alexithymia, this being a personality trait potentially impacting on the individuals' physical (Pollatos & Herbert, 2018), emotional (Luminet et al., 2021b) and interpersonal (Pérusse et al., 2012) aspects.

Taking into account the findings of my study, there are various points to discuss. In particular, the results from my Actor-Partner Interdependence Model (APIM) analysis (Chapter 5) support the hypothesis of a person's own alexithymia [Toronto Alexithymia Scale (TAS-20) total score and/or subscales] as associated with their own IPs, whereby higher alexithymic traits enhance negative IPs (e.g. consequences) and reduce positive ones (e.g. coherence), with small-to-medium effect sizes, in both PwMS and their partners. These findings are in line with those reported by other researchers, whereby higher alexithymic traits related to increased negative (e.g. consequences) IPs and reduced positive (e.g. coherence) ones (Barbasio et al., 2015).

In my study, the TAS-20 total score related to almost all IPs. However, a closer look at the alexithymic facets (difficulty describing feeling, DDF; difficulty identifying feelings, DIF; externally-oriented thinking, EOT) shows peculiar trends. In particular, EOT had no impact on consequences and emotional representations, while being the only facet influencing personal control, whereby higher EOT correlated with lower personal control in PwMS. On the other hand, higher DDF and DIF both related to higher emotional representations in PwMS and their partners. Moreover, higher DIF and DDF related to higher consequences in both groups and among partners only, respectively.

The differential impact of alexithymic traits on IPs may reflect the very nature of the diverse alexithymia facets. Indeed, since DDF and DIF are usually accountable for over-responding (almost always maladaptive) to negative and emotionally challenging situations (Luminet et al., 2021a), their relationship with higher consequences and emotional representations may indicate an exaggeratedly negative appraisal of MS. On the contrary, EOT is typically related to emotion deficits, being characterized by concrete thinking, which overlooks inner states (Maroti et al., 2018) and reduces the sense of mastery over situations (Brett & Dubash, 2023), the latter potentially explaining the negative correlation between EOT and personal control in my sample. In other words, EOT may predominantly contribute to cognitive processing, as opposed to DDF and DIF, more involved in the emotional response to MS. From a therapeutic perspective, one could anticipate that persons with a predominance of EOT might take advantage of cognition-oriented psychotherapeutic tecniques, for example aimed at improving the sense of mastery. On the contrary, people showing higher DDF and/or DIF may take advantage of emotion-focused therapies, aimed at reducing the emotional burden of MS. It should be noted that cognitive-emotional processing is a complex phenomenon, to be considered in an integrated manner, whereby the analysis of the differential weight of the alexithymia facets just provides a better understanding (Luminet et al., 2021b). The results discussed above confirm that alexithymia is associated with IPs at the individual level.

However, the findings from my APIM analysis also validate a couple-oriented perspective, whereby alexithymic traits in a member of the couple favour negative IPs in the other member. More specifically, the following partner effects, reflecting small effect sizes, were detected:

1) higher DDF in the partners related to higher emotional representations in the PwMS;
2) higher TAS-20 total score in PwMS related to lower treatment control in the partners; and
3) higher EOT in PwMS related to lower coherence in the partners.

These findings make sense in light of the interpersonal repercussions of alexithymia. As previously stated, individuals with greater alexithymia may appear detached or even hostile in the context of emotionally charged situations (Pérusse et al., 2012). Showing difficulties in understanding, sharing and regulating their emotions, their interpersonal life might be more stressful compared to other individuals, particularly in the presence of high alexithymic traits (Chen et al., 2011). In a marital context, persons with alexithymic traits may show (at various levels) lack of empathy and support, ultimately failing to conduct serene and fruitful conversations with their spouse (whose feelings are hardly recognized) and to engage in emotional resonance (Bird & Viding, 2014; Goerlich, 2018; Pérusse, et al., 2012). Consequently, stress communication, implying the understanding and disclosure of one's own and one spouse's stress when facing challenging situations (in my study, MS), is compromised (Gabriel et al., 2016). Unsurprisingly, the conflictual communication generates distress and negative emotions within the couple (Pérusse et al., 2012). Generally speaking, the spouse of an alexithymic individual might feel restrained in showing vulnerability and perceive the partner as cold, thus finding the marital relationship unsatisfying (Eid & Boucher, 2012). These considerations may help in interpreting the partner effects arising from my APIM analysis.

Indeed, it is easy to envision how a PwMS with a partner presenting high DDF might experience higher MS-related emotional burden, since there is little room for sharing emotions and receive sympathy within the couple. Interestingly, in a study investigating the relationship between alexithymia and dyadic adjustment through the APIM in a community sample, a negative correlation was reported between DDF and the partner's dyadic adjustment, with females being more affected by their partner's emotional repression (Eid & Boucher, 2012). This is particularly relevant for my study, considering that the group of PwMS is mainly composed of females.

Considering the other partner effect, it seems that higher alexithymic traits (TAS-20 total score) in PwMS relate to lower perception of treatment as effective in controlling MS in their partners. Alexithymic persons (here, alexithymic PwMS) facing stressors tend to avoid uncomfortable topics of discussion (here, MS), keep their opinions to themselves, and are likely to exhibit helplessness, behavioural disengagement and denial (Velasco et al., 2006). In this context, their partners, left alone to deal with medical information, unshared emotions and reduced spousal support may develop a more pessimistic view of MS as a completely uncontrollable condition.

Finally, let us examine the finding linking higher EOT in the PwMS to lower understanding of MS (coherence) in their partners. The externally-oriented cognitive style relates to specific deficits: impaired ability to extract useful over inaccurate information due to lack of internal awareness, reduced perspective-taking (Luminet et al., 2021b) and poor reflective functioning, including the understanding of one's own and others' behaviour in relation to emotions (Calaresi & Barberis, 2019). Hence, it is apparent how high EOT may decrease the person's ability to partake in an effective exchange of meaningful information. In particular, the reduced understanding of the emotions prompted by negative situations (Luminet et al., 2021b) may significantly impact the couple's confrontation ofstressful topics, ultimately hindering the formation of a clear idea of what MS actually is. These findings support my initial hypothesis of alexithymia being associated with negative IPs in PwMS and their partners, both at the individual and dyadic level.

What may seem mere speculations, acquire more value in light of the theoretical framework guiding my research, namely the already introduced cognitive-transactional model (CTM) of couples' adaptation to chronic illness, considering the personal and shared formation of IPs as a crucial step towards the dyadic adaptation to a chronic illness, whereby the effective couple's communication plays a crucial role (Badr & Acitelli, 2017). Indeed, alexithymia may actually represent a barrier to making sense of MS both individually and dyadically. From a couple-oriented perspective, the quality of the relationship and the communication within the couple seem to be crucially important. Interestingly, in a study conducting an APIM analysis, loneliness and intimate communication mediated the relationship between alexithymia and marital quality (Frye-Cox & Hesse, 2013).

The interpretation of my negative findings offers some points for reflection. In particular, considering the relationship between higher DIF and lower treatment control, this effect was not detected among PwMS, but only among partners. This is an unexpected finding, since one might think that such an alexithymic facet would affect the PwMS' beliefs, too. However, this result might relate to the fact that partners, not having a direct experience of the illness, may rely more on external sources of control (treatment) of MS compared to PwMS. This interpretation is supported by the fact that another alexithymic facet, namely EOT, affected personal control among PwMS only and treatment control among partners only. Regarding the lack of correlations between TAS-20 total score and personal control in both partners and PwMS, this negative finding might reflect the specific impact of EOT on personal control, impact that was masked when considering alexithymia as a whole.

To the best of my knowledge, this is the first study investigating the link between alexithymia and IPs from a dyadic perspective. My findings also allowed me to obtain preliminary data on the effects size of the partner effects exterted by alexithymic traits. Moreover, identifying alexithymia as possibly associated with IPs might enrich the already existing theoretical frameworks highlighting the importance of a couple's communication.

Practical implications of my research

The preliminary nature of my study demands caution when interpreting the findings. However, deepening the knowledge on the link between alexithymia and IPs may have practical implications. In fact, one could hypothesise that tailored psychotherapeutic interventions aimed at reducing alexithymic traits in PwMS and/or their partners could enhance positive, and potentially more functional, functional IPs. Indeed, scholars are already claiming the need to finally convert decades of basic research on alexithymia into clinical interventions (Samur et al., 2013). In this regard, literature data suggest that, despite the relative stability of alexithymia and the extra challenges it poses in terms of therapeutic alliance and emotional awareness, it would be an error to a priori consider alexithymic persons as untreatable or unwilling to engage in a psychotherapeutic program (Nunes da Silva, 2021). Indeed, interventions aimed at improving insight, verbalization of emotions (Grabe et al., 2008), decoding others' feelings (Levant et al., 2009), linking emotions to specific events (da Silva et al., 2017, 2020) may be effective at reducing alexithymic traits. Emotionally-focused interventions dedicated to couples may be useful to promote functional communication patterns, ultimately improving marital adjustment (Izadi & Mokhtari, 2021).

Limitations of my research

My research has some limitations. First of all, its cross-sectional design provides information on the correlations between alexithymia and IPs, not allowing us to draw conclusions regarding causation. Moreover, including other components of IPs (identity, causes) could have offered a broader view of the phenomenon under study. Since no adjustments were applied for multiple comparisons (see paragraph 4.3.4, statistical analysis) my findings must be interpreted with caution due to risks of type I errors (false positives). So, readers are invited to consider other aspects, such as the magnitude of effect sizes (Ranganathan et al., 2016), to inform future similar studies, also taking into account the preliminary nature of my research.

Being a preliminary study, my research is far from being conclusive. Moreover, my sensitivity analysis, albeit overall confirming the relationship between alexithymia and IPs, suggests that other aspects, such as relationship quality, may be important in this relationship. In fact, relationship quality may somewhat mediate the link between alexithymia and IPs, particularly in terms of partner effects. Indeed, it would be naive to reduce the complex mechanisms underlying the formation of IPs to a linear and monocausal process.

Hence, many questions remain unanswered and further studies are recommended to disentangle the involved factors and their contribution.

Future research

My results stimulate future research on my topic of interest. Studies with larger sample sizes (e.g. multi-site) might provide more details on the partner effects exerted by alexithymia, since in my study their magnitude was small. Moreover, studies specifically focusing on the role of confounders (marital/partnership quality in particular) might shed light on the specific pathways through which alexithymia could influence illness appraisals. Moreover, longitudinal studies could investigate the relationship between alexithymia and IPs in newly diagnosed individuals, while focusing on their psychophysical outcome.

Concluding remarks

My literature review highlights the clinical importance of IPs. The findings of the cross-sectional research, reporting a relationship between alexithymia and more negative illness appraisals, may inform therapeutic interventions aimed at reducing alexithymic traits, which in turn may reduce negative, and potentially dysfunctional, IPs. Many questions remain unanswered and further studies are needed to shed light on this interesting topic.

References

Abramson, L., McClelland, D. C., Brown, D., & Kelner, S. (1991). Alexithymic characteristics and metabolic control in diabetic and healthy adults. *The Journal of Nervous and Mental Disease*, *179*(8), 490-494. https://doi.org/10.1097/00005053-199108000-00007

Ackroyd, K., Fortune, D. G., Price, S., Howell, S., Sharrack, B., & Isaac, C. L. (2011). Adversarial growth in patients with multiple sclerosis and their partners: Relationships with illness perceptions, disability and distress. *Journal of Clinical Psychology in Medical Settings, 18*(4), 372-379. https://doi.org/10.1007/s10880-011-9265-0

Alden, D. L., Friend, J., Lee, P. Y., Lee, Y. K., Trevena, L., Ng, C. J., Kiatpongsan, S., Abdullah, K.L., Tanaka, M., & Limpongsanurak, S. (2018). Who decides: Me or we? Family involvement in medical decision making in eastern and western countries. *Medical Decision Making*, *38*(1), 14-25. https://doi.org/10.1177/0272989X17715628

Algorani, E. B., & Gupta, V. (2022). *Coping mechanisms.* StatPearls [Internet]. https://www.ncbi.nlm.nih.gov/books/NBK559031/

Allemand, M., & Flückiger, C. (2017). Changing personality traits: Some considerations from psychotherapy process-outcome research for intervention efforts on intentional personality change. *Journal of Psychotherapy Integration*, *27*(4), 476–494. https://doi.org/10.1037/int0000094

Arik, M. I., Kiloatar, H., & Saracoglu, I. (2022). Do pilates exercises improve balance in patients with multiple sclerosis? A systematic review and meta-analysis. *Multiple Sclerosis and Related Disorders*, *57*, Article 103410. https://doi.org/10.1016/j.msard.2021.103410

Aromataris, E., & Munn, Z. (Eds.). (2020). JBI Manual for Evidence Synthesis. Joanna Briggs Institute. https://synthesismanual.jbi.global

Aveyard, H., Payne, S., & Preston, N. (2016). *A Postgraduate's Guide to Doing a Literature Review in Health and Social Care*. Open University Press.

Ayatollahi, P., Nafissi, S., Eshraghian, M. R., Kaviani, H., & Tarazi, A. (2007). Impact of depression and disability on quality of life in Iranian patients with multiple sclerosis. *Multiple Sclerosis Journal*, *13*(2), 275-277. https://doi.org/10.1177/1352458506070960

Bacci, E. D., Wyrwich, K. W., Phillips, G. A., Vollmer, T., & Guo, S. (2016). Analysis of the psychometric properties of the multiple sclerosis impact scale-29 (MSIS-29) in relapsing–remitting multiple sclerosis using classical and modern test theory. *Multiple Sclerosis Journal–Experimental, Translational and Clinical*, *2*, Article 2055217316673235. https://doi.org/ 10.1177/2055217316673235

Badr, H., & Acitelli, L. K. (2005). Dyadic adjustment in chronic illness: Does relationship talk matter? *Journal of Family Psychology*, *19*(3), 465-469. https://doi.org/10.1037/0893-3200.19.3.465

Badr, H., & Acitelli, L. K. (2017). Re-thinking dyadic coping in the context of chronic illness. *Current Opinion in Psychology, 13,* 44-48. https://doi.org/10.1016/j.copsyc.2016.03.001

Badr, H., Acitelli, L. K., & Carmack Taylor, C. L. (2007). Does couple identity mediate the stress experienced by caregiving spouses? *Psychology and Health*, *22*(2), 211-229. https://doi.org/10.1080/14768320600843077

Bagby, R. M., Parker, J. D., & Taylor, G. J. (1994). The twenty-item Toronto alexithymia scale—I. Item selection and cross-validation of the factor structure. *Journal of Psychosomatic Research*, *38*(1), 23-32. https://doi.org/10.1016/0022-3999(94)90005-1

Baiardini, I., Abbà, S., Ballauri, M., Vuillermoz, G., & Braido, F. (2011). Alexithymia and chronic diseases: The state of the art. *Giornale Italiano di Medicina del Lavoro ed Ergonomia*, *33*(1), 47-52. https://pubmed.ncbi.nlm.nih.gov/21488483/

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191–215. https://doi.org/10.1037/0033-295X.84.2.191

Barbasio, C., Vagelli, R., Marengo, D., Querci, F., Settanni, M., Tani, C., Mosca, M., & Granieri, A. (2015). Illness perception in systemic lupus erythematosus patients: The roles of alexithymia and depression. *Comprehensive psychiatry*, *63*, 88-95. https://doi.org/10.1016/j.comppsych.2015.09.004

Bassi, M., Cilia, S., Falautano, M., Grobberio, M., Niccolai, C., Pattini, M., Pietrolongo, E., Quartuccio, M. E., Viterbo, R. G., Allegri, B., Amato, M. P., Benin, M., De Luca, G., Gasperini, C., Minacapelli, E., Patti, F. Trojano, M., & Delle Fave, A. (2020). Illness perceptions and psychological adjustment among persons with multiple sclerosis: The mediating role of coping strategies and social support. *Disability and Rehabilitation, 42*(26), 3780-3792. https://doi.org/ 10.1080/09638288.2019.1610511

Bassi, M., Falautano, M., Cilia, S., Goretti, B., Grobberio, M., Pattini, M., Pietrolongo, E., Viterbo, R. G., Amato, M. P., Benin, M., Lugaresi, A., Minacapelli, E., Montanari, E., Patti, F., Trojano, M., & Delle Fave, A. (2016). Illness perception and well-being among persons with multiple sclerosis and their caregivers. *Journal of Clinical Psychology in Medical Settings, 23*(1), 33-52. https://doi.org/ 10.1007/s10880-015-9425-8

Bassi, M., Grobberio, M., Negri, L., Cilia, S., Minacapelli, E., Niccolai, C., Pattini, M., Pietrolongo, E., Quartuccio, M. E., Viterbo, R. G., Allegri, B., Amato, M. P., Benin, M., De Luca, G., Falautano, M., Gasperini, C., Patti, F., Trojano, M., & Delle Fave, A. (2021). The contribution of illness beliefs, coping strategies, and social support to perceived physical health and fatigue in multiple sclerosis. *Journal of Clinical Psychology in Medical Settings, 28*(1), 149-160. https://doi.org/10.1007/s10880-019-09692-6

Battaglia, M. A., & Bezzini, D. (2017). Estimated prevalence of multiple sclerosis in Italy in 2015. *Neurological Sciences*, *38*(3), 473-479. https://doi.org/10.1007/s10072-016-2801-9

Becerra, R., Amos, A., & Jongenelis, S. (2002). Organic alexithymia: A study of acquired emotional blindness. *Brain injury*, *16*(7), 633-645. https://doi.org/10.1080/02699050110119817

Beiske, A. G., Svensson, E., Sandanger, I., Czujko, B., Pedersen, E. D., Aarseth, J. H., & Myhr, K. M. (2008). Depression and anxiety amongst multiple sclerosis patients. *European Journal of Neurology*, *15*(3), 239-245. https://doi.org/10.1111/j.1468-1331.2007.02041.x

Beresnevaite, M. (2000). Exploring the benefits of group psychotherapy in reducing alexithymia in coronary heart disease patients: A preliminary study. *Psychotherapy and Psychosomatics*, *69*(3), 117-122. https://doi.org/10.1159/000012378

Berg, C. A., & Upchurch, R. (2007). A developmental-contextual model of couples coping with chronic illness across the adult life span. *Psychological Bulletin*, *133*(6), 920-954. https://doi.org/ 10.1037/0033-2909.133.6.920

Berkovich, R. (2016). Treatment of acute relapses in multiple sclerosis. In R. Arnon & A. Miller (Eds.), *Translational Neuroimmunology in Multiple Sclerosis*, (pp. 307-326). Academic Press. https://doi.org/10.1016/B978-0-12-801914-6.00024-6

Bird, G., & Viding, E. (2014). The self to other model of empathy: Providing a new framework for understanding empathy impairments in psychopathy, autism, and alexithymia. *Neuroscience & Biobehavioral Reviews*, *47*, 520-532. https://doi.org/10.1016/j.neubiorev.2014.09.021

Bodenmann, G. (2005). Dyadic coping and its significance for marital functioning. In T. A. Revenson, K. Kayser, & G. Bodenmann (Eds.), *Couples coping with stress: Emerging perspectives on dyadic coping* (pp. 33–49). American Psychological Association. https://doi.org/10.1037/11031-002

Bodenmann, G., Falconier, M. K., & Randall, A. K. (2019). Dyadic coping. *Frontiers in Psychology*, *10*, Article 1498. https://doi.org/10.3389/fpsyg.2019.01498

Bodini, B., Mandarelli, G., Tomassini, V., Tarsitani, L., Pestalozza, I., Gasperini, C., Lenzi, G. L., Pancheri, P., & Pozzilli, C. (2008). Alexithymia in multiple sclerosis: Relationship with fatigue and depression. *Acta Neurologica Scandinavica*, *118*(1), 18-23. https://doi.org/10.1111/j.1600-0404.2007.00969.x

Bogosian, A., Hughes, A., Norton, S., Silber, E., & Moss-Morris, R. (2016). Potential treatment mechanisms in a mindfulness-based intervention for people with progressive multiple sclerosis. *British Journal of Health Psychology*, *21*(4), 859-880. https://doi.org/10.1111/bjhp.12201

Boland, P., Levack, W. M., Hudson, S., & Bell, E. M. (2012). Coping with multiple sclerosis as a couple: ‘Peaks and troughs’–an interpretative phenomenological exploration. *Disability and Rehabilitation*, *34*(16), 1367-1375. https://doi.org/10.3109/09638288.2011.645115

Bressi, C., Taylor, G., Parker, J., Bressi, S., Brambilla, V., Aguglia, E., Allegranti, I., Bongiorno, A., Giberti, F., Bucca, M., Todarello, O., Callegari, C., Vender, S., Gala, C., & Invernizzi, G. (1996). Cross validation of the factor structure of the 20-item

Toronto alexithymia scale: An Italian multicenter study. *Journal of Psychosomatic Research, 41*(6), 551-559. https://doi.org/ 10.1016/S0022-3999(96)00228-0

Brett, G., & Dubash, S. (2023). The sociocognitive origins of personal mastery. *Journal of Health and Social Behavior, 64*(3), 452-468. https://doi.org/10.1177/00221465231167558

Brink, E. V. A., Alsén, P., & Cliffordson, C. (2011). Validation of the revised illness perception questionnaire (IPQ-R) in a sample of persons recovering from myocardial infarction–the Swedish version. *Scandinavian Journal of Psychology*, *52*(6), 573-579. https://doi.org/10.1111/j.1467-9450.2011.00901.x

Broadbent, E., Petrie, K. J., Main, J., & Weinman, J. (2006). The brief illness perception questionnaire. *Journal of Psychosomatic Research*, *60*(6), 631-637. https://doi.org/ 10.1016/j.jpsychores.2005.10.020

Bruce, J. M., & Arnett, P. (2009). Clinical correlates of generalized worry in multiple sclerosis. *Journal of Clinical and Experimental Neuropsychology*, *31*(6), 698-705. https://doi.org/ 10.1080/13803390802484789

Bryman, A. (2016). *Social research methods* (5th ed.). Oxford University Press.

Calaresi, D., & Barberis, N. (2019). The relationship between reflective functioning and alexithymia. *Journal of Clinical & Developmental Psychology*, *1*(2). https://doi.org/10.6092/2612-4033/0110-2107

Campbell, M., Katikireddi, S. V., Sowden, A., & Thomson, H. (2019). Lack of transparency in reporting narrative synthesis of quantitative data: A methodological assessment of systematic reviews. *Journal of Clinical Epidemiology, 105,* 1-9. https://doi.org/10.1016/j.jclinepi.2018.08.019

Capra, R., Morra, V. B., Mirabella, M., Gasperini, C., Scandellari, C., Totaro, R., De Rossi, N., Masera, S., Zipoli, V., & Patti, F. (2021). Natalizumab is associated with early improvement of working ability in relapsing-remitting multiple sclerosis patients: WANT observational study results. *Neurological Sciences, 42,* 2837-2845. doi: 10.1007/s10072-020-04838-z

Cecchetto, C., Aiello, M., D'Amico, D., Cutuli, D., Cargnelutti, D., Eleopra, R., & Rumiati, R. I. (2014). Facial and bodily emotion recognition in multiple sclerosis: The role of alexithymia and other characteristics of the disease. *Journal of the International Neuropsychological Society*, *20*(10), 1004-1014. https://doi.org/10.1017/S1355617714000939

Centre for Reviews and Dissemination. (2006). *CRD's guidance for undertaking reviews in healthcare*. York Publishing Services.

Chalah, M. A., & Ayache, S. S. (2017). Alexithymia in multiple sclerosis: A systematic review of literature. *Neuropsychologia*, *104*, 31-47. https://doi.org/10.1016/j.neuropsychologia.2017.07.034

Chen, J., Xu, T., Jing, J., & Chan, R. C. (2011). Alexithymia and emotional regulation: A cluster analytical approach. *BMC Psychiatry*, *11*(1), 1-6. https://doi.org/10.1186/1471-244X-11-33

Chiang, G. C., Pinto, S., Comunale, J. P., & Gauthier, S. A. (2016). Gadolinium-enhancing lesions lead to decreases in white matter tract fractional anisotropy in multiple sclerosis. *Journal of Neuroimaging*, *26*(3), 289-295. https://doi.org/10.1111/jon.12309

Chilcot, J., Wellsted, D., & Farrington, K. (2011). Illness perceptions predict survival in haemodialysis patients. *American Journal of Nephrology*, *33*(4), 358-363. https://doi.org/ 10.1159/000326752

Chiong-Rivero, H., Robers, M., Martinez, A., Manrique, C. P., Diaz, A., Polito, K., Vajdi, B., Chan, C., Burnett, M., Delgado, S. R., Chinea, A., McCauley, J. L., & Amezcua, L. (2021). Effectiveness of film as a health communication tool to improve perceptions and attitudes in multiple sclerosis. *Multiple Sclerosis Journal–Experimental, Translational and Clinical, 7*(1), Article 2055217321995947. https://doi.org/10.1177/2055217321995947

Cohen, J. (1992). Statistical power analysis. *Current Directions in Psychological Science, 1*(3), 98-101. https://doi.org/10.1111/1467-8721.ep10768783

Crayton, H., Heyman, R. A., & Rossman, H. S. (2004). A multimodal approach to managing the symptoms of multiple sclerosis. *Neurology*, *63*(11), 12-18. https://doi.org/ 10.1212/WNL.63.11_suppl_5.S12

Creswell, J.W. (2014) The selection of a research approach. In J. W. Creswell (Ed.), *Research design: qualitative, quantitative, and mixed methods approaches* (4th ed., pp. 3-23). Sage.

da Silva, A. N., Vasco, A. B., & Watson, J. C. (2020). Alexithymia and change process: Contributions of a phase model. *Counselling and Psychotherapy Research*, *20*(4), 703-714. https://doi.org/10.1002/capr.12303

da Silva, A. N., Vasco, A. B., & Watson, J. C. (2017). Alexithymia and emotional processing: A mediation model. *Journal of Clinical Psychology*, *73*(9), 1196-1205. doi: 10.1002/jclp.22422

Dagenais, E., Rouleau, I., Demers, M., Jobin, C., Roger, É., Chamelian, L., & Duquette, P. (2013). Value of the MoCA test as a screening instrument in multiple sclerosis. *Canadian Journal of Neurological Sciences*, *40*(3), 410-415. https://doi.org/10.1017/S0317167100014384

Daniel, B., Agenagnew, L., Workicho, A., & Abera, M. (2022). Psychometric properties of the Montreal cognitive assessment (MoCA) to detect major neurocognitive disorder among older people in Ethiopia: A validation study. *Neuropsychiatric Disease and Treatment*, *18*, 1789-1798. https://doi.org/10.2147/NDT.S377430

Davydov, D. M., Luminet, O., & Zech, E. (2013). An externally oriented style of thinking as a moderator of responses to affective films in women. *International Journal of Psychophysiology*, *87*(2), 152-164. https://doi.org/10.1016/j.ijpsycho.2012.12.003

de Heer, E. W., Vriezekolk, J. E., & van der Feltz-Cornelis, C. M. (2017). Poor illness perceptions are a risk factor for depressive and anxious symptomatology in fibromyalgia syndrome: A longitudinal cohort study. *Frontiers in Psychiatry*, *8*, Article 217. https://doi.org/10.3389/fpsyt.2017.00217 de Seze, J., Borgel, F., & Brudon, F. (2012). Patient perceptions of multiple sclerosis and its treatment. *Patient Preference and Adherence*, *6*, 263-273. https://doi.org/10.2147/PPA.S27038

Dempster, M., Howell, D., & McCorry, N. K. (2015). Illness perceptions and coping in physical health conditions: A meta-analysis. *Journal of Psychosomatic Research*, *79*(6), 506-513. https://doi.org/10.1016/j.jpsychores.2015.10.006

Dennison, L., & Moss-Morris, R. (2010). Cognitive–behavioral therapy: What benefits can it offer people with multiple sclerosis?. *Expert Review of Neurotherapeutics*, *10*(9), 1383-1390. https://doi.org/10.1586/ern.10.111

Dennison, L., Moss-Morris, R., & Chalder, T. (2009). A review of psychological correlates of adjustment in patients with multiple sclerosis. *Clinical Psychology Review*, *29*(2), 141-153. https://doi.org/10.1016/j.cpr.2008.12.001

Dennison, L., Moss-Morris, R., Silber, E., Galea, I., & Chalder, T. (2010). Cognitive and behavioural correlates of different domains of psychological adjustment in early-stage multiple sclerosis. *Journal of Psychosomatic Research*, *69*(4), 353-361. https://doi.org/10.1016/j.jpsychores.2010.04.009

Desborough, J., Brunoro, C., Parkinson, A., Chisholm, K., Elisha, M., Drew, J., Fanning, V., Lueck, C., Bruestle, A., Cook, M., Suominen, H., Tricoli, A., Henschke, A., & Phillips, C. (2020). 'It struck at the heart of who I thought I was': A meta-synthesis of the qualitative literature examining the experiences of people with multiple sclerosis. *Health Expectations*, *23*(5), 1007-1027. https://doi.org/ 10.1111/hex.13093

Dewey, J. (2008). Experience and nature. In J. Boydston & S. Hook (Eds.), *The later works of John Dewey, 1925-1953* (Vol. 1, pp. 1-437). Southern Illinois University Press.

Di Tella, M., Perutelli, V., Miele, G., Lavorgna, L., Bonavita, S., De Mercanti, S. F., Streito, L. M., Clerico, M., & Castelli, L. (2021). Family functioning and multiple sclerosis: Study protocol of a multicentric Italian project. *Frontiers in Psychology*, *12,* Article 668010. https://doi.org/10.3389/fpsyg.2021.668010

Edmonds, P., Vivat, B., Burman, R., Silber, E., & Higginson, I. J. (2007). Loss and change: Experiences of people severely affected by multiple sclerosis. *Palliative Medicine, 21*(2), 101-107. https://doi.org/10.1177/0269216307076333

Eid, P., & Boucher, S. (2012). Alexithymia and dyadic adjustment in intimate relationships: Analyses using the actor partner interdependence model. *Journal of Social and Clinical Psychology, 31*(10), 1095-1111. https://doi.org/10.1521/jscp.2012.31.10.1095

Elwy, A. R., Yeh, J., Worcester, J., & Eisen, S. V. (2011). An illness perception model of primary care patients' help seeking for depression. *Qualitative Health Research*, *21*(11), 1495-1507. https://doi.org/10.1177/1049732311413781

Filippi, M., Rocca, M. A., Ciccarelli, O., De Stefano, N., Evangelou, N., Kappos, L., Rovira, A., Sastre-Garriga, J., Tintorè, M., Frederiksen, J. L., Gasperini, C., Palace, J., Reich, D. S., Banwell, B., Montalban, X., Barkhof, F. (2016). MRI criteria for the diagnosis of multiple sclerosis: MAGNIMS consensus guidelines. *The Lancet Neurology*, *15*(3), 292-303. https://doi.org/10.1016/S1474-4422(15)00393-2

Foley, F. W., LaRocca, N. G., Sorgen Sanders, A., & Zemon, V. (2001). Rehabilitation of intimacy and sexual dysfunction in couples with multiple sclerosis. *Multiple Sclerosis Journal*, *7*(6), 417-421. https://doi.org/10.1177/135245850100700612

Foran, H. M., & O'Leary, K. D. (2013). The role of relationships in understanding the alexithymia–depression link. *European Journal of Personality*, *27*(5), 470-480. https://doi.org/10.1002/per.1887

Foster, N. E., Bishop, A., Thomas, E., Main, C., Horne, R., Weinman, J., & Hay, E. (2008). Illness perceptions of low back pain patients in primary care: What are they, do they change and are they associated with outcome?. *Pain*, *136*(1-2), 177-187. https://doi.org/10.1016/j.pain.2007.12.007

Franz, M., Popp, K., Schaefer, R., Sitte, W., Schneider, C., Hardt, J., Decker, O., & Braehler, E. (2008). Alexithymia in the German general population. *Social Psychiatry and Psychiatric Epidemiology*, *43*(1), 54-62. https://doi.org/10.1007/s00127-007-0265-1

Frostholm, L., Fink, P., Christensen, K. S., Toft, T., Oernboel, E., Olesen, F., & Weinman, J. (2005). The patients’ illness perceptions and the use of primary health care. *Psychosomatic Medicine*, *67*(6), 997-1005. https://doi.org/10.1097/01.psy.0000189164.85653.bc

Frye-Cox, N. E., & Hesse, C. R. (2013). Alexithymia and marital quality: The mediating roles of loneliness and intimate communication. *Journal of Family Psychology*, *27*(2), 203-211. https://doi.org/10.1037/a0031961

Fukunishi, I., Numata, Y., & Hattori, M. (1994). Alexithymia and defense mechanisms in myocardial infarction. *Psychological Reports*, *75*(1), 219-223. https://doi.org/10.2466/pr0.1994.75.1.219

Gabriel, B., Untas, A., Lavner, J. A., Koleck, M., & Luminet, O. (2016). Gender typical patterns and the link between alexithymia, dyadic coping and psychological symptoms. *Personality and Individual Differences*, *96*, 266-271. https://doi.org/10.1016/j.paid.2016.02.029

Gaggero, G., Bonassi, A., Dellantonio, S., Pastore, L., Aryadoust, V., & Esposito, G. (2020). A scientometric review of alexithymia: Mapping thematic and disciplinary shifts in half a century of research. *Frontiers in Psychiatry*, *11*, Article 1405. https://doi.org/10.3389/fpsyt.2020.611489

Garbarini, C., Gerino, E., Marino, E., Rollè, L., & Brustia, P. (2014). Psychometrical properties of the dyadic adjustment scale for measurement of marital quality with Italian couples. *Procedia-Social and Behavioral Sciences*, *127*, 499-503. https://doi.org/10.1016/j.sbspro.2014.03.298

Garrett, M., Hogan, N., Larkin, A., Saunders, J., Jakeman, P., & Coote, S. (2013). Exercise in the community for people with multiple sclerosis—a follow-up of people with minimal gait impairment. *Multiple Sclerosis Journal*, *19*(6), 790-798. https://doi.org/10.1177/1352458512461390

Giardini, A., Majani, G., Pierobon, A., Gremigni, P., & Catapano, I. (2007). Contributo alla validazione italiana dell'IPQ-R. [Contribution to the Italian validation of the IPQ-R]. *Giornale Italiano di Medicina del Lavoro ed Ergonomia*, *29*(1), 64-74. https://www.academia.edu/7112656/Contributo_alla_validazione_italiana_dellIPQ_R

Giuliani, M., Gorini, A., Barbieri, S., Veglia, F., & Tremoli, E. (2021). Examination of the best cut-off points of PHQ-2 and GAD-2 for detecting depression and anxiety in Italian cardiovascular inpatients. *Psychology & Health*, *36*(9), 1088-1101. https://doi.org/10.1080/08870446.2020.1830093

Glattacker, M., Giesler, J. M., Klindtworth, K., & Nebe, A. (2018). Rehabilitation use in multiple sclerosis: Do illness representations matter? *Brain and Behavior*, *8*(6), Article e00953. https://doi.org/10.1002/brb3.953

Gleichgerrcht, E., Tomashitis, B., & Sinay, V. (2015). The relationship between alexithymia, empathy and moral judgment in patients with multiple sclerosis. *European Journal of Neurology*, *22*(9), 1295-1303. https://doi.org/10.1111/ene.12745

Godfrey, C., & Harrison, M. (2015). *CAN-SYNTHESIZE is a quick reference resource to guide the use of the Joanna Briggs Institute methodology of synthesis*. Joanna Briggs Institute. https://studylib.net/doc/7067436/can-synthesise-appendices

Goerlich, K. S. (2018). The multifaceted nature of alexithymia–a neuroscientific perspective. *Frontiers in Psychology, 9*, Article 1614. https://doi.org/10.3389/fpsyg.2018.01614

Goetzmann, L., Scheuer, E., Naef, R., Klaghofer, R., Russi, E. W., Buddeberg, C., & Boehler, A (2005). Personality, illness perceptions, and lung function (FEV_1) in 50 patients after lung transplantation. *GMS Psycho-Social-Medicine,2*(2005), Article 06. http://www.egms.de/de/journals/psm/2005-2/psm000015.shtml

Goldenberg, M. M. (2012). Multiple sclerosis review. *Pharmacy and Therapeutics, 37*(3), 175-184. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3351877/pdf/ptj3703175.pdf

Grabe, H. J., Frommer, J., Ankerhold, A., Ulrich, C., Gröger, R., Franke, G. H., Barnow, S., Freyberger, H. J., & Spitzer, C. (2008). Alexithymia and outcome in psychotherapy. *Psychotherapy and Psychosomatics, 77*(3), 189-194. https://doi.org/10.1159/000119739

Gregg, J. E., Simpson, J., Nilforooshan, R., & Perez-Algorta, G. (2021). What is the relationship between people with dementia and their caregiver's illness perceptions post-diagnosis and the impact on help-seeking behaviour? A systematic review. *Dementia, 20*(7), 2597-2617. https://doi.org/10.1177/1471301221997291

Gregory, S. (2005). Living with chronic illness in the family setting. *Sociology of Health & Illness*, *27*(3), 372-392. https://doi.org/10.1111/j.1467-9566.2005.00447.x

Grix, J. (2002). Introducing students to the generic terminology of social research. *Politics*, *22*(3), 175-186. https://doi.org/10.1111/1467-9256.00173

Hagger, M. S., & Orbell, S. (2003). A meta-analytic review of the common-sense model of illness representations. *Psychology and Health*, *18*(2), 141-184. https://doi.org/10.1080/088704403100081321

Hagger, M. S., & Orbell, S. (2022). The common sense model of illness self-regulation: A conceptual review and proposed extended model. *Health Psychology Review*, *16*(3), 347-377. https://doi.org/10.1080/17437199.2021.1878050

Hall, J. N. (2013). Pragmatism, evidence, and mixed methods evaluation. *New Directions for Evaluation*, *2013*(138), 15-26. https://doi.org/10.1002/ev.20054

Harrison, R. A., Bradshaw, J., Forrester-Jones, R., McCarthy, M., & Smith, S (2021). Social networks and people with intellectual disabilities: A systematic review. *Journal of Applied Research in Intellectual Disabilities*, *34*(4), 973-992. https://doi.org/10.1111/jar.12878

Hawton, A., Green, C., Telford, C., Zajicek, J., & Wright, D. (2012). Using the multiple sclerosis impact scale to estimate health state utility values: Mapping from the MSIS-29, version 2, to the EQ-5D and the SF-6D. *Value in Health*, *15*(8), 1084-1091. https://doi.org/10.1016/j.jval.2012.07.007

Heffer-Rahn, P., & Fisher, P. L. (2018). The clinical utility of metacognitive beliefs and processes in emotional distress in people with multiple sclerosis. *Journal of Psychosomatic Research*, *104*, 88-94. https://doi.org/10.1016/j.jpsychores.2017.11.014

Heiberg, A. N. (1980). Alexithymic characteristics and somatic illness. *Psychotherapy and Psychosomatics*, *34*(4), 261-266. https://doi.org/10.1159/000287467

Helgeson, V. S., Jakubiak, B., Van Vleet, M., & Zajdel, M. (2018). Communal coping and adjustment to chronic illness: Theory update and evidence. *Personality and Social Psychology Review, 22*, 170-195. https://doi.org/10.1177/1088868317735767

Hendryx, M. S., Haviland, M. G., & Shaw, D. G. (1991). Dimensions of alexithymia and their relationships to anxiety and depression. *Journal of Personality Assessment, 56*(2), 227-237. https://doi.org/10.1207/s15327752jpa5602_4

Herbert, L. B., Zerkowski, K., O'Brien, S., Leonard, K. V., & Bhowmick, A. (2019). Impact on interpersonal relationships among patients with multiple sclerosis and their partners. *Neurodegenerative Disease Management*, *9*(3), 173-187. https://doi.org/10.2217/nmt-2018-0045

Heward, K., Gough, B., & Molineux, M. (2011). Change of identity: The psychological and emotional impact of caring for someone with multiple sclerosis. *Social care and neurodisability, 2*(1), 21-32. https://doi.org/10.5042/scn.2011.0081

Higgins, J., & Green, S. (Eds). Cochrane handbook for systematic reviews of interventions. Version 5.1.0 [updated March 2011]. https://handbook-5-1.cochrane.org/

Hileman, J. W., Lackey, N. R., & Hassanein, R. S. (1992). Identifying the needs of home caregivers of patients with cancer. *Oncology Nursing Forum, 19*(5):771-777. Retrieved from https://europepmc.org/article/med/1608841

Hinton, P. R., Brownlow, C., McMurray, I., & Cozens, B. (2004). *SPSS explained*. Routledge. https://doi.org/10.4324/9780203642597

Hobart, J., & Cano, S. (2009). Improving the evaluation of therapeutic interventions in multiple sclerosis: The role of new psychometric methods. *Health Technology Assessment, 13*(12), 1-200. doi: https://doi.org/10.3310/hta13120

Hobart, J., Lamping, D., Fitzpatrick, R., Riazi, A., & Thompson, A. (2001). The multiple sclerosis impact scale (MSIS-29): A new patient-based outcome measure. *Brain*, *124*(5), 962-973. https://doi.org/10.1093/brain/124.5.962

Honkalampi, K., Hintikka, J., Tanskanen, A., Lehtonen, J., & Viinamäki, H. (2000). Depression is strongly associated with alexithymia in the general population. *Journal of Psychosomatic Research*, *48*(1), 99-104. https://doi.org/10.1016/S0022-3999(99)00083-5

Hoving, J. L., Van der Meer, M., Volkova, A. Y., & Frings-Dresen, M. H. W. (2010). Illness perceptions and work participation: A systematic review. *International Archives of Occupational and Environmental Health*, *83*(6), 595-605. https://doi.org/10.1007/s00420-010-0506-6

Hughes, C., & Howard, I. M. (2013). Spasticity management in multiple sclerosis. *Physical Medicine and Rehabilitation Clinics of North America*, *24*(4), 593-604. https://doi.org/10.1016/j.pmr.2013.07.003

Humphreys, T. P., Wood, L. M., & Parker, J. D. (2009). Alexithymia and satisfaction in intimate relationships. *Personality and Individual Differences, 46*(1), 43-47. https://doi.org/10.1016/j.paid.2008.09.002

Hunter, A. G. (1998). Some psychosocial aspects of nonlethal chondrodysplasias: IV. Dyadic scale of marital adjustment. *American Journal of Medical Genetics*, *78*(1), 17-21. https://doi.org/10.1002/(SICI)1096-8628(19980616)78:1<17::AID-AJMG4>3.0.CO;2-I

Hussain, M. A., Elyas, T., & Nasseef, O. A. (2013). Research paradigms: A slippery slope for fresh researchers. *Life Science Journal*, *10*(4), 2374-2381. https://doi.org/10.7537/marslsj100413.317

Isaacs, J., Soglian, F., & Hoffman, E. (2015). Confidant relations in Italy. *Europe's Journal of Psychology*, *11*(1), 50-62. https://doi.org/10.5964/ejop.v11i1.741

Izadi, F., & Mokhtari, E. (2021). The effectiveness of emotional-focused couple therapy on reducing the negative emotion schemas and alexithymia as well as increasing marital compatibility. *International Journal of Psychology (IPA)*, *15*(1), 225-254. https://ijpb.ir/article-1-353-en.pdf

Jackson, J. L., & Emery, C. F. (2013). Emotional distress, alexithymia, and coping as predictors of cardiac rehabilitation outcomes and attendance. *Journal of Cardiopulmonary Rehabilitation and Prevention*, *33*(1), 26-32. https://doi.org/10.1097/HCR.0b013e318276864c

Jiang, X., Olsson, T., Hillert, J., Kockum, I., & Alfredsson, L. (2020). Stressful life events are associated with the risk of multiple sclerosis. *European Journal of Neurology*, *27*(12), 2539-2548. https://doi.org/10.1111/ene.14458

Jones, C. D., Motl, R., & Sandroff, B. M. (2021). Depression in multiple sclerosis: Is one approach for its management enough? *Multiple Sclerosis and Related Disorders*, *51*, Article 102904. https://doi.org/10.1016/j.msard.2021.102904

Jopson, N. M., & Moss-Morris, R. (2003). The role of illness severity and illness representations in adjusting to multiple sclerosis. *Journal of Psychosomatic Research*, *54*(6), 503-511. https://doi.org/10.1016/S0022-3999(02)00455-5

Joukamaa, M., Saarijärvi, S., Muuriaisniemi, M. L., & Salokangas, R. K. (1996). Alexithymia in a normal elderly population. *Comprehensive Psychiatry*, *37*(2), 144-147. https://doi.org/10.1016/S0010-440X(96)90576-3

Joukamaa, M., Taanila, A., Miettunen, J., Karvonen, J. T., Koskinen, M., & Veijola, J. (2007). Epidemiology of alexithymia among adolescents. *Journal of Psychosomatic Research*, *63*(4), 373-376. https://doi.org/10.1016/j.jpsychores.2007.01.018

Kafetsios, K., & Hess, U. (2019). Seeing mixed emotions: Alexithymia, emotion perception bias, and quality in dyadic interactions. *Personality and Individual Differences*, *137*, 80-85. https://doi.org/10.1016/j.paid.2018.08.014

Kaptein, A. A., Klok, T., Moss-Morris, R., & Brand, P. L. (2010). Illness perceptions: Impact on self-management and control in asthma. *Current Opinion in Allergy and Clinical Immunology*, *10*(3), 194-199. https://doi.org/10.1097/ACI.0b013e32833950c1

Kaptein, A. A., Scharloo, M., Helder, D. I., Snoei, L., Van Kempen, G. M. J., Weinman, J., van Houwelingen, J. C., & Roos, R. A. C. (2007). Quality of life in couples living with

Huntington's disease: the role of patients' and partners' illness perceptions. *Quality of Life Research*, *16*(5), 793-801. doi: 10.1007/s11136-007-9194-4

Karademas, E. C., Zarogiannos, A., & Karamvakalis, N. (2010). Cardiac patient–spouse dissimilarities in illness perception: Associations with patient self-rated health and coping strategies. *Psychology and Health*, *25*(4), 451-463. https://doi.org/10.1080/08870440802652089

Karimi, S., Andayeshgar, B., & Khatony, A. (2020). Prevalence of anxiety, depression, and stress in patients with multiple sclerosis in Kermanshah-Iran: A cross-sectional study. *BMC Psychiatry*, *20*(1), 1-8. https://doi.org/10.1186/s12888-020-02579-z

Kenny, D. A., Kashy, D. A., & Cook, W. L. (2006). *Dyadic data analysis*. Guilford Press.

Kingwell, E., Marriott, J. J., Jetté, N., Pringsheim, T., Makhani, N., Morrow, S. A., Fisk, J. D., Evans, C., Béland, S. G., Kulaga, S., Dykeman, J., Wolfson, C., Koch, M. W., & Ruth, A. M. (2013). Incidence and prevalence of multiple sclerosis in Europe: A systematic review. *BMC Neurology*, *13*(1), 1-13. https://doi.org/10.1186/1471-2377-13-128

Kivunja, C., & Kuyini, A. B. (2017). Understanding and applying research paradigms in educational contexts. *International Journal of Higher Education*, *6*(5), 26-41. https://doi.org/10.5430/ijhe.v6n5p26

Kouzoupis, A. B., Paparrigopoulos, T., Soldatos, M., & Papadimitriou, G. N. (2010). The family of the multiple sclerosis patient: A psychosocial perspective. *International Review of Psychiatry*, *22*(1), 83-89. https://doi.org/10.3109/09540261003589588

Kroenke, K., Spitzer, R. L., Williams, J. B., & Löwe, B. (2009). An ultra-brief screening scale for anxiety and depression: The PHQ–4. *Psychosomatics*, *50*(6), 613-621. https://doi.org/10.1016/S0033-3182(09)70864-3

Kurtzke, J. F. (1983). Rating neurologic impairment in multiple sclerosis: An expanded disability status scale (EDSS). *Neurology*, *33*(11), 1444-1452. https://doi.org/10.1212/WNL.33.11.1444

Landoni, M. G., Giordano, M. T., & Guidetti, G. P. (2000). Group psychotherapy experiences for people with multiple sclerosis and psychological support for families. *Journal of Neurovirology*, *6*(2), 168-171. https://www.jneurovirol.com/pdf/6(s2)/s168-s171.pdf

Larsen, J. K., Brand, N., Bermond, B., & Hijman, R. (2003). Cognitive and emotional characteristics of alexithymia: a review of neurobiological studies. *Journal of Psychosomatic Research*, *54*(6), 533-541. https://doi.org/10.1016/S0022-3999(02)00466-X

Larsen, M. H., Krogstad, A. L., & Wahl, A. K. (2017). Alexithymia, illness perception and self-management competency in psoriasis. *Acta Dermato-venereologica*, *97*(8), 934-940. https://doi.org/10.2340/00015555-2707

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer publishing company.

Levant, R. F., Hayden, E. W., Halter, M. J., & Williams, C. M. (2009). The efficacy of alexithymia reduction treatment: A pilot study. *The Journal of Men's Studies*, *17*(1), 75-84. https://doi.org/10.3149/jms.1701.75

Leventhal, H., Brissette, I., & Leventhal, E.A. (2003). The common sense model of self-regulation of health and illness. In L.C. Cameron & H. Leventhal (Eds.), *The self-regulation of health and illness behaviour* (pp. 42–65). Taylor & Francis Group.

Leventhal H., Diefenbach, M., & Leventhal, E.A. (1992). Illness cognition: Using common sense to understand treatment adherence and affect cognition interactions. *Cognitive Therapy and Research*, *16*(2), 143–163. https://doi.org/10.1007/BF01173486

Lingler, J. H., Terhorst, L., Schulz, R., Gentry, A., & Lopez, O. (2016). Dyadic analysis of illness perceptions among persons with mild cognitive impairment and their family members. *The Gerontologist*, *56*(5), 886-895. https://doi.org/10.1093/geront/gnv029

Link, H., & Huang, Y. M. (2006). Oligoclonal bands in multiple sclerosis cerebrospinal fluid: An update on methodology and clinical usefulness. *Journal of Neuroimmunology*, *180*(1-2), 17-28. https://doi.org/10.1016/j.jneuroim.2006.07.006

Löwe, B., Wahl, I., Rose, M., Spitzer, C., Glaesmer, H., Wingenfeld, K., Schneider, A., & Brähler, E. (2010). A 4-item measure of depression and anxiety: Validation and standardization of the Patient Health Questionnaire-4 (PHQ-4) in the general population. *Journal of Affective Disorders*, *122*(1-2), 86-95. https://doi.org/10.1016/j.jad.2009.06.019

Luca, M., Eccles, F., Algorta, G. P., & Patti, F. (2022). Illness perceptions and outcome in multiple sclerosis: A systematic review of the literature. *Multiple sclerosis and related disorders*, *67,* Article 104180. https://doi.org/10.1016/j.msard.2022.104180

Luca, A., Luca, M., Di Mauro, M., Palermo, F., Rampulla, F., & Calandra, C. (2015). Alexithymia, more than depression, influences glycaemic control of type 2 diabetic patients. *Journal of Endocrinological Investigation*, *38*(6), 653-660. https://doi.org/10.1007/s40618-015-0238-2

Luca, M., Ortega-Castro, N., & Patti, F. (2021). Paediatric multiple sclerosis: A scoping review of patients' and parents' perspectives. *Children*, *9*(1), Article 11. https://doi.org/10.3390/children9010011

Lucchinetti, C., Brück, W., Parisi, J., Scheithauer, B., Rodriguez, M., & Lassmann, H. (2000). Heterogeneity of multiple sclerosis lesions: Implications for the pathogenesis of demyelination. *Annals of Neurology*, *47*(6), 707-717. https://doi.org/10.1002/1531-8249(200006)47:6<707::AID-ANA3>3.0.CO;2-Q

Luciano, M., Sampogna, G., del Vecchio, V., Giacco, D., Mulè, A., de Rosa, C., Fiorillo, A., & Maj, M. (2012). The family in Italy: Cultural changes and implications for treatment. *International Review of Psychiatry, 24(2),* 149-156. https://doi.org/10.3109/09540261.2012.656306

Luminet, O., Nielson, K. A., & Ridout, N. (2021a). Cognitive-emotional processing in alexithymia: An integrative review. *Cognition and Emotion*, *35*(3), 449-487. https://doi.org/10.1080/02699931.2021.1908231

Luminet, O., Nielson, K. A., & Ridout, N. (2021b). Having no words for feelings: Alexithymia as a fundamental personality dimension at the interface of cognition and emotion. *Cognition and Emotion*, *35*(3), 435-448. https://doi.org/10.1080/02699931.2021.1916442

Luminet, O., Rimé, B., Bagby, R. M., & Taylor, G. (2004). A multimodal investigation of emotional responding in alexithymia. *Cognition and Emotion, 18*(6), 741-766. https://doi.org/10.1080/02699930341000275

Lumley, M. A., Stettner, L., & Wehmer, F. (1996). How are alexithymia and physical illness linked? A review and critique of pathways. *Journal of Psychosomatic Research, 41*(6), 505-518. https://doi.org/10.1016/S0022-3999(96)00222-X

Lynd, L. D., Henrich, N. J., Hategeka, C., Marra, C. A., Mittmann, N., Evans, C., & Traboulsee, A. L. (2018). Perspectives of patients with multiple sclerosis on drug treatment: A qualitative study. *International Journal of MS care*, *20*(6), 269-277. https://doi.org/10.7224/1537-2073.2017-109

Marchesi, C., Brusamonti, E., & Maggini, C. (2000). Are alexithymia, depression, and anxiety distinct constructs in affective disorders? *Journal of Psychosomatic Research, 49*(1), 43-49. https://doi.org/10.1016/S0022-3999(00)00084-2

Maroti, D., Lilliengren, P., & Bileviciute-Ljungar, I. (2018). The relationship between alexithymia and emotional awareness: a meta-analytic review of the correlation between TAS-20 and LEAS. *Frontiers in psychology, 9,* Article 453. https://doi.org/10.3389/fpsyg.2018.00453/full

Martínez-Sánchez, F., Ato-Garcia, M., Adam, E. C., Medina, T. B. H., & España, J. J. S. (1998). Stability in alexithymia levels: A longitudinal analysis on various emotional answers. *Personality and Individual Differences, 24*(6), 767-772. https://doi.org/10.1016/S0191-8869(97)00239-0

Martínez-Sánchez, F., Ato-García, M., & Ortiz-Soria, B. (2003). Alexithymia—state or trait? *The Spanish Journal of Psychology, 6*(1), 51-59. https://doi.org/10.1017/S1138741600005205

Mattila, A. K., Salminen, J. K., Nummi, T., & Joukamaa, M. (2006). Age is strongly associated with alexithymia in the general population. *Journal of Psychosomatic Research, 61*(5), 629-635. https://doi.org/10.1016/j.jpsychores.2006.04.013

McCabe, M. P., & McKern, S. (2002). Quality of life and multiple sclerosis: Comparison between people with multiple sclerosis and people from the general population. *Journal of Clinical Psychology in Medical Settings, 9*(4), 287-295. https://doi.org/10.1023/A:1020734901150

McIntosh, R. C., Ironson, G., Antoni, M., Fletcher, M. A., & Schneiderman, N. (2016). Alexithymia, assertiveness and psychosocial functioning in HIV: Implications for medication adherence and disease severity. *AIDS and Behavior, 20*(2), 325-338. https://doi.org/10.1007/s10461-015-1126-7

McKeown, L. P., Porter-Armstrong, A. P., & Baxter, G. D. (2003). The needs and experiences of caregivers of individuals with multiple sclerosis: A systematic review. *Clinical Rehabilitation, 17*(3), 234-248. https://doi.org/10.1191/0269215503cr618oa

Messina, A., Beadle, J. N., & Paradiso, S. (2014). Towards a classification of alexithymia: primary, secondary and organic. *Journal of psychopathology, 20*, 38-49. https://www.jpsychopathol.it/article/towards-a-classification-of-alexithymia-primary-secondary-and-organic/

Montesino, M. L. C., Gómez, J. L. G., Fernández, M. E. P., & Rodríguez, J. M. A. (2013). Psychometric properties of the dyadic adjustment scale (DAS) in a community sample of couples. *Psicothema*, *25*(4), 536-541. https://doi.org/10.7334/psicothema2013.85

Morgan, D. L. (2014). Pragmatism as a paradigm for social research. *Qualitative Inquiry, 20*(8), 1045-1053. doi: 10.1177/1077800413513733

Moriguchi, Y., Maeda, M., Igarashi, T., Ishikawa, T., Shoji, M., Kubo, C., & Komaki, G. (2007). Age and gender effect on alexithymia in large, Japanese community and clinical samples: A cross-validation study of the Toronto alexithymia scale (TAS-20). *BioPsychoSocial Medicine, 1*(1), Article 7. https://doi.org/10.1186/1751-0759-1-7

Moss-Morris, R., Dennison, L., Landau, S., Yardley, L., Silber, E., & Chalder, T. (2013). A randomized controlled trial of cognitive behavioral therapy (CBT) for adjusting to multiple sclerosis (the saMS trial): Does CBT work and for whom does it work? *Journal of Consulting and Clinical Psychology*, *81*(2), 251-262. https://doi.org/10.1037/a0029132

Moss-Morris, R., Weinman, J., Petrie, K., Horne, R., Cameron, L., & Buick, D. (2002). The revised illness perception questionnaire (IPQ-R). *Psychology and Health, 17*(1), 1-16. https://doi.org/ 10.1080/08870440290001494

Mosson, M., Peter, L., & Montel, S. (2014). Impact du niveau d’activité physique sur l’alexithymie et le coping dans une population de plus de 40 ans atteinte de sclérose en plaques: une étude pilote. [Impact of physical activity level on alexithymia and coping strategies in an over-40 multiple sclerosis population: A pilot study]. *Revue Neurologique*, *170*(1), 19-25. https://www.em-consulte.com/article/866165/alertePM

Munn, Z., Peters, M. D., Stern, C., Tufanaru, C., McArthur, A., & Aromataris, E. (2018). Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Medical Research Methodology*, *18*(143), 1-7. https://doi.org/10.1186/s12874-018-0611-x

Murphy, J., Catmur, C., & Bird, G. (2018). Alexithymia is associated with a multidomain, multidimensional failure of interoception: Evidence from novel tests. *Journal of Experimental Psychology: General*, *147*(3), 398-408. https://doi.org/10.1037/xge0000366

Naea De Valle, M., & Norman, P. (1992). Causal attributions, health locus of control beliefs and lifestyle changes among pre-operative coronary patients. *Psychology and Health*, *7*(3), 201-211. https://doi.org/10.1080/08870449208520021

Nasreddine, Z. S., Phillips, N. A., Bédirian, V., Charbonneau, S., Whitehead, V., Collin, I., Cummings, J. L., & Chertkow, H. (2005). The Montreal cognitive assessment, MoCA: A brief screening tool for mild cognitive impairment. *Journal of the American Geriatrics Society*, *53*(4), 695-699. https://doi.org/10.1111/j.1532-5415.2005.53221.x

Nathoo, N., & Mackie, A. (2017). Treating depression in multiple sclerosis with antidepressants: A brief review of clinical trials and exploration of clinical symptoms to guide treatment decisions. *Multiple Sclerosis and Related Disorders*, *18*, 177-180. https://doi.org/10.1016/j.msard.2017.10.004

Neter, E., Glass-Marmor, L., Wolkowitz, A., Lavi, I., & Miller, A. (2021). Beliefs about medication as predictors of medication adherence in a prospective cohort study among persons with multiple sclerosis. *BMC Neurology*, *21*(1), 1-9. https://doi.org/10.1186/s12883-021-02149-0

Nicholls, E. E., Hill, S., & Foster, N. E. (2013). Musculoskeletal pain illness perceptions: Factor structure of the illness perceptions questionnaire-revised. *Psychology & Health*, *28*(1), 84-102. https://doi.org/10.1080/08870446.2012.714782

Nicoletti, A., Rascunà, C., Boumediene, F., Vasta, R., Cicero, C. E., Lo Fermo, S., Ferrante, M., Marziolo, R., Maimone, D., Grimaldi, L. M., Preux, P., Patti, F., & Zappia, M. (2020). Incidence of multiple sclerosis in the province of Catania. A geo-epidemiological study. *Environmental Research*, *182*, Article 109022. https://doi.org/10.1016/j.envres.2019.109022

Nisipeanu, P., & Korczyn, A. D. (1993). Psychological stress as risk factor for exacerbations in multiple sclerosis. *Neurology*, *43*(7), 1311-1311. https://doi.org/10.1212/WNL.43.7.1311

Nissen, N., Lemche, J., Reestorff, C. M., Schmidt, M., Skjerbæk, A. G., Skovgaard, L., Stenager, E., Søgaard, I. G., & la Cour, K. (2021). The lived experience of uncertainty in everyday life with MS. *Disability and Rehabilitation*, *44*(20), 5957-5963. https://doi.org/10.1080/09638288.2021.1955302

Nunes da Silva, A. (2021). Developing emotional skills and the therapeutic alliance in clients with alexithymia: intervention guidelines. *Psychopathology*, *54*(6), 282-290. https://doi.org/10.1159/000519786

Oh, J., Vidal-Jordana, A., & Montalban, X. (2018). Multiple sclerosis: Clinical aspects. *Current Opinion in Neurology, 31*(6), 752-759. https://doi.org/10.1097/WCO.0000000000000622

Okanli, A. Y. Ş. E., Karabulutlu, E. Y., Asi Karakaş, S., Şahin Altun, Ö., & Yildirim, N. A. C. İ. (2018). Alexithymia and perception of illness in patients with cancer. *European Journal of Cancer Care, 27*(3), Article e12839. https://doi.org/10.1111/ecc.12839

Ömerhoca, S., Akkaş, S. Y., & İçen, N. K. (2018). Multiple sclerosis: Diagnosis and differential diagnosis. *Archives of Neuropsychiatry, 55*(1), 1-9. https://doi.org/10.29399/npa.23418

Onwuegbuzie, A. J., & Leech, N. L. (2005). On becoming a pragmatic researcher: The importance of combining quantitative and qualitative research methodologies. *International Journal of Social Research Methodology, 8*(5), 375-387. https://doi.org/10.1080/13645570500402447

Oudin Doglioni, D., Pham-Hung D'Alexandry D'Orengiani, A. L., Galactéros, F., & Gay, M. C. (2022). Psychometric characteristics of the revised illness perception questionnaire (IPQ-R) in adults with sickle cell disease. *Health Psychology and Behavioral Medicine, 10*(1), 60-80. https://doi.org/10.1080/21642850.2021.2016411

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J., Akl, E., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E., Mayo-Wilson, E., McDonald, S.,…& Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *The BMJ, 372*(71). https://doi.org/10.1136/bmj.n71

Pai, H. C., Li, C. C., Tsai, S. M., & Pai, Y. C. (2019). Association between illness representation and psychological distress in stroke patients: A systematic review and meta-analysis. *International Journal of Nursing Studies*, *94*, 42-50. https://doi.org/10.1016/j.ijnurstu.2019.01.015

Panayiotou, G., Panteli, M., & Vlemincx, E. (2021). Adaptive and maladaptive emotion processing and regulation, and the case of alexithymia. *Cognition and Emotion*, *35*, 488-499. https://doi.org/10.1080/02699931.2019.1671322

Parker, J. D., Taylor, G. J., & Bagby, R. M. (2003). The 20-Item Toronto alexithymia scale: III. Reliability and factorial validity in a community population. *Journal of Psychosomatic Research*, *55*(3), 269-275. https://doi.org/10.1016/S0022-3999(02)00578-0

Patti, F., Russo, P., Pappalardo, A., Macchia, F., Civalleri, L., Paolillo, A., & FAMS Study Group. (2007). Predictors of quality of life among patients with multiple sclerosis: An Italian cross-sectional study. *Journal of the Neurological Sciences*, *252*(2), 121-129. https://doi.org/ 10.1016/j.jns.2006.10.017

Pearce, A. R., & Meyer, S. B. (2020). Patient perspectives on managing uncertainty living with multiple sclerosis. *Journal of Communication in Healthcare*, *13*(2), 111-118. https://doi.org/ 10.1080/17538068.2020.1772579

Pérusse, F., Boucher, S., & Fernet, M. (2012). Observation of couple interactions: Alexithymia and communication behaviors. *Personality and Individual Differences*, *53*(8), 1017-1022. https://doi.org/10.1016/j.paid.2012.07.022

Petrie, K. J., Jago, L. A., & Devcich, D. A. (2007). The role of illness perceptions in patients with medical conditions. *Current Opinion in Psychiatry*, *20*(2), 163-167. https://doi.org/10.1097/YCO.0b013e328014a871

Petrie, K., & Weinman, J. (2006). Why illness perceptions matter. *Clinical Medicine*, *6*(6), 536-539. https://doi.org/10.7861/clinmedicine.6-6-536

Petrini, M., Cirulli, F., D'Amore, A., Masella, R., Venerosi, A., & Venerosi, A. (2019). Health issues and informal caregiving in Europe and Italy. *Annali dell'Istituto Superiore di Sanitą', 55*(1), 41-50. https://doi.org/10.4415/ANN_19_01_08

Pirrotta, F., Timpano, F., Bonanno, L., Nunnari, D., Marino, S., Bramanti, P., & Lanzafame, P. (2015). Italian validation of Montreal cognitive assessment. *European Journal of Psychological Assessment*,*31*(2), 131-137. https://doi.org/10.1027/1015-5759/a000217

Podbielska, M., Banik, N. L., Kurowska, E., & Hogan, E. L. (2013). Myelin recovery in multiple sclerosis: The challenge of remyelination. *Brain Sciences*, *3*(3), 1282-1324. https://doi.org/10.3390/brainsci3031282

Pollatos, O., & Herbert, B. M. (2018). Alexithymia and body awareness. In O. Luminet, R. M. Bagby, & G. J. Taylor, *Alexithymia: Advances in research, theory, and clinical practice* (pp. 321-333). Cambridge Univeristy Press.

Popay, J., Roberts, H., Sowden, A., Petticrew, M., Arai, L., Rodgers, M., Britten, N., Roen, K., & Duffy, S. (2006). Guidance on the conduct of narrative synthesis in systematic reviews. *A product from the ESRC methods programme, Version 1,* 1-92.

https://www.lancaster.ac.uk/media/lancaster-university/content-assets/documents/fhm/dhr/chir/NSsynthesisguidanceVersion1-April2006.pdf

Porcelli, P., Zaka, S., Leoci, C., Centonze, S., & Taylor, G. J. (1995). Alexithymia in inflammatory bowel disease. *Psychotherapy and Psychosomatics, 64*(1), 49-53. https://doi.org/10.1159/000288990

Pryce, H., Metcalfe, C., Hall, A., & Claire, L. S. (2010). Illness perceptions and hearing difficulties in King-Kopetzky syndrome: What determines help seeking? *International Journal of Audiology*, *49*(7), 473-481. https://doi.org/10.3109/14992021003627892

Rabin, C., Leventhal, H., & Goodin, S. (2004). Conceptualization of disease timeline predicts posttreatment distress in breast cancer patients. *Health Psychology*, *23*(4), 407-412. https://doi.org/10.1037/0278-6133.23.4.407

Raffel, J., Wallace, A., Gveric, D., Reynolds, R., Friede, T., & Nicholas, R. (2017). Patient-reported outcomes and survival in multiple sclerosis: A 10-year retrospective cohort study using the Multiple Sclerosis Impact Scale–29. *PLoS Medicine*, *14*(7), Article e1002346. https://doi.org/10.1371/journal.pmed.1002346

Ramp, M., Khan, F., Misajon, R. A., & Pallant, J. F. (2009). Rasch analysis of the multiple sclerosis impact scale (MSIS-29). *Health and Quality of Life Outcomes*, *7*(1), 1-10. https://doi.org/10.1186/1477-7525-7-58

Ranganathan, P., Pramesh, C. S., & Buyse, M. (2016). Common pitfalls in statistical analysis: The perils of multiple testing. *Perspectives in Clinical Research, 7*(2), 106-107. https://doi.org/10.4103/2229-3485.179436

Richardson, A. E., Morton, R. P., & Broadbent, E. A. (2016). Changes over time in head and neck cancer patients' and caregivers' illness perceptions and relationships with quality of life. *Psychology & Health, 31*(10), 1203-1219. https://doi.org/10.1080/08870446.2016.1203686

Richardson, E. M., Schüz, N., Sanderson, K., Scott, J. L., & Schüz, B. (2017). Illness representations, coping, and illness outcomes in people with cancer: A systematic review and meta-analysis. *Psycho-oncology*, *26*(6), 724-737. https://doi.org/10.1002/pon.4213

Robati, Z., & Shareh, H. (2018). The effectiveness of cognitive-behavioral group therapy in anxiety and self-esteem in patients with multiple sclerosis. *Journal of Fundamentals of Mental Health, 20*(6), 349-357. https://jfmh.mums.ac.ir/article_11760_4f5c0f7fc77e47b6d73804266a2a5e54.pdf

Ross, S., Walker, A., & MacLeod, M. J. (2004). Patient compliance in hypertension: Role of illness perceptions and treatment beliefs. *Journal of Human Hypertension*, *18*(9), 607-613. https://doi.org/10.1038/sj.jhh.1001721

Rosti-Otajärvi, E., Hämäläinen, P., Wiksten, A., Hakkarainen, T., & Ruutiainen, J. (2017). Validity and reliability of the Finnish version of the multiple sclerosis impact scale-29. *Brain and Behavior*, *7*(7), Article e00725. https://doi.org/10.1002/brb3.725

Ruspini, E. (2005). Between past and present: A sociological analysis of marriage in Italy. *Marriage, Families & Spirituality*, *11*(1), 39-53. https://doi.org/10.2143/INT.11.1.2014358

Salminen, J. K., Saarijärvi, S., Äärelä, E., Toikka, T., & Kauhanen, J. (1999). Prevalence of alexithymia and its association with sociodemographic variables in the general population of Finland. *Journal of Psychosomatic Research, 46*(1), 75-82. https://doi.org/10.1016/S0022-3999(98)00053-1

Salminen, J. K., Saarijärvi, S., Toikka, T., Kauhanen, J., & Äärelä, E. (2006). Alexithymia behaves as a personality trait over a 5-year period in Finnish general population. *Journal of Psychosomatic Research, 61*(2), 275-278. https://doi.org/10.1016/j.jpsychores.2006.01.014

Samur, D., Tops, M., Schlinkert, C., Quirin, M., Cuijpers, P., & Koole, S. L. (2013). Four decades of research on alexithymia: moving toward clinical applications. *Frontiers in psychology, 4*, Article 861. https://doi.org/10.3389/fpsyg.2013.00861

Santona, A., Vismara, L., Gorla, L., Tognasso, G., Ambrosini, C., Luli, A., & Rollè, L. (2023). The relationship between attachment, dyadic adjustment, and sexuality: A comparison between infertile men and women. *International Journal of Environmental Research and Public Health*, *20*(4), Article 3020. https://doi.org/10.3390/ijerph20043020

Santos, M., Sousa, C., Pereira, M., & Pereira, M. G. (2019). Quality of life in patients with multiple sclerosis: A study with patients and caregivers. *Disability and Health Journal*, *12*(4), 628-634. https://doi.org/10.1016/j.dhjo.2019.03.007

Sawyer, A. T., Harris, S. L., & Koenig, H. G. (2019). Illness perception and high readmission health outcomes. *Health Psychology Open, 6*(1), Article 2055102919844504. https://doi.org/10.1177/2055102919844504

Scharloo, M., Kaptein, A. A., Weinman, J., Bergman, W., Vermeer, B. J., & Rooijmans, H. G. M. (2002). Patients' illness perceptions and coping as predictors of functional status in psoriasis: A 1-year follow-up. *British Journal of Dermatology*, *142*(5), 899-907. https://doi.org/10.1046/j.1365-2133.2000.03469.x

Schiaffino, K. M., Shawaryn, M. A., & Blum, D. (1998). Examining the impact of illness representations on psychological adjustment to chronic illnesses. *Health Psychology*, *17*(3), 262-268. https://doi.org/10.1037/0278-6133.17.3.262

Sifneos, P. E. (1973). The prevalence of 'alexithymic' characteristics in psychosomatic patients. *Psychotherapy and Psychosomatics*, *22*(2-6), 255-262. https://doi.org/10.1159/000286529

Sifneos, P. E., Apfel-Savitz, R., & Frankel, F. H. (1977). The phenomenon of 'alexithymia': Observations in neurotic and psychosomatic patients. *Psychotherapy and Psychosomatics*, *28*(1/4), 47-57. https://www.jstor.org/stable/45114843

Simpson, J., Eccles, F., & Zarotti, N. (2021). *Extended evidence-based guidance on psychological interventions for psychological difficulties in individuals with Huntington's disease, Parkinson's disease, motor neurone disease, and multiple sclerosis*. British Psychological Society. https://doi.org/10.5281/zenodo.4593882

Sirriyeh, R., Lawton, R., Gardner, P., & Armitage, G. (2012). Reviewing studies with diverse designs: The development and evaluation of a new tool. *Journal of Evaluation in Clinical Practice*, *18*(4), 746-752. https://doi.org/10.1111/j.1365-2753.2011.01662.x

Spain, L. A., Tubridy, N., Kilpatrick, T. J., Adams, S. J., & Holmes, A. C. N. (2007). Illness perception and health-related quality of life in multiple sclerosis. *Acta Neurologica Scandinavica*, *116*(5), 293-299. https://doi.org/10.1111/j.1600-0404.2007.00895.x

Spanier, G. (1976). Measuring dyadic adjustment: New scales of assessing the quality of marriage and similar dyads. *Journal of Marriage and the Family*, *38*(1), 15-28. https://doi.org/10.2307/350547

Stafford, L., Berk, M., & Jackson, H. J. (2009). Are illness perceptions about coronary artery disease predictive of depression and quality of life outcomes? *Journal of Psychosomatic Research*, *66*(3), 211-220. https://doi.org/10.1016/j.jpsychores.2008.09.005

Stanghellini, G., & Ricca, V. (1995). Alexithymia and schizophrenias. *Psychopathology*, *28*(5), 263-272. https://doi.org/10.1159/000284937

Stanhope, J. (2016). Patient Health Questionnaire-4. *Occupational Medicine*, *66*(9), 760-761. https://doi.org/10.1093/occmed/kqw165

Sterba, K. R., DeVellis, R. F., Lewis, M. A., DeVellis, B. M., Jordan, J. M., & Baucom, D. H. (2008). Effect of couple illness perception congruence on psychological adjustment in women with rheumatoid arthritis. *Health Psychology*, *27*(2), 221-229. https://doi.org/10.1037/0278-6133.27.2.221

Stingl, M., Bausch, S., Walter, B., Kagerer, S., Leichsenring, F., & Leweke, F. (2008). Effects of inpatient psychotherapy on the stability of alexithymia characteristics. *Journal of Psychosomatic Research*, *65*(2), 173-180. https://doi.org/10.1016/j.jpsychores.2008.01.010

Su Ann, S. T., Balakrishnan, S., Sok Cin, T., & Tangiisuran, B. (2019). Translation and validation of revised illness perception questionnaire (IPQ-R): The Malay version in Malaysia. *Health Education and Care, 4*(1), 1-6. https://doi.org/10.15761/HEC.1000147

Sullivan, G. M., & Feinn, R. (2012). Using effect size—or why the p value is not enough. *Journal of Graduate Medical Education, 4*(3), 279-282. https://doi.org/10.4300/JGME-D-12-00156.1

Tashakkori, A., & Teddlie, C. (2003). Major issues and controversies in the use of mixed methods in the socialand behavioral sciences. In A. Tashakorri & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (pp. 3-50). Sage.

Taylor, G. J., & Bagby, R. M. (2012). The alexithymia personality dimension. In T. A. Widiger (Ed.), *The Oxford handbook of personality disorders* (pp. 648–673). Oxford University Press.

Taylor, G. J., Bagby, M., & Parker, J. D. (1992). The revised Toronto alexithymia scale: Some reliability, validity, and normative data. *Psychotherapy and Psychosomatics, 57*(1-2), 34-41. https://doi.org/10.1159/000288571

Taylor, G. J., Bagby, R. M., & Parker, J. D. (2003). The 20-item Toronto alexithymia scale: IV. Reliability and factorial validity in different languages and cultures. *Journal of Psychosomatic Research, 55*(3), 277-283. https://doi.org/10.1016/S0022-3999(02)00601-3

Taylor, G. J., Bagby, R. M., Ryan, D. P., Parker, J. D., Doody, K. F., & Keefe, P. (1988). Criterion validity of the Toronto alexithymia scale. *Psychosomatic Medicine*, *50*(5), 500-509. 10.1097/00006842-198809000-00006

Taylor, G. J., Parker, J. D., Bagby, R. M. (1990). A preliminary investigation of alexithymia in men with psychoactive substance dependence. *American Journal of Psychiatry*, *147*(9), 1228-1230. https://doi.org/10.1176/ajp.147.9.1228

Tesar, N., Baumhackl, U., Kopp, M., & Günther, V. (2003). Effects of psychological group therapy in patients with multiple sclerosis. *Acta Neurologica Scandinavica*, *107*(6), 394-399. https://doi.org/10.1034/j.1600-0404.2003.00077.x

Thabane, L., Mbuagbaw, L., Zhang, S., Samaan, Z., Marcucci, M., Ye, C., Thabane, M., Giangregorio, L., Dennis, B., Kosa, D., Debono, V. B., Dillenburg, R., Fruci, V., Bawor, M., Lee, J., Wells, G., & Goldsmith, C. H. (2013). A tutorial on sensitivity analyses in clinical trials: The what, why, when and how. *BMC Medical Research Methodology*, *13*(1), 1-12. doi: 10.1186/1471-2288-13-92

Timkova, V., Mikula, P., Fedicova, M., Szilasiova, J., & Nagyova, I. (2021). Psychological well-being in people with multiple sclerosis and its association with illness perception and self-esteem. *Multiple Sclerosis and Related Disorders, 54,* Article 103114. https://doi.org/10.1016/j.msard.2021.103114

Topcu, G., Mhizha-Murira, J. R., Griffiths, H., Bale, C., Drummond, A., Fitzsimmons, D., Potter, K., Evangelou, N., & das Nair, R. (2022). Experiences of receiving a diagnosis of multiple sclerosis: A meta-synthesis of qualitative studies. *Disability and Rehabilitation*, *45*(5), 772-783. https://doi.org/10.1080/09638288.2022.2046187 van den Akker, L. E., Beckerman, H., Collette, E. H., Eijssen, I. C. J. M., Dekker, J., & de Groot, V. (2016). Effectiveness of cognitive behavioral therapy for the treatment of fatigue in patients with multiple sclerosis: A systematic review and meta-analysis. *Journal of Psychosomatic Research, 90*, 33-42. https://doi.org/10.1016/j.jpsychores.2016.09.002

Vanheule, S., Desmet, M., Meganck, R., & Bogaerts, S. (2007). Alexithymia and interpersonal problems. *Journal of Clinical Psychology, 63*(1), 109-117. https://doi.org/10.1002/jclp.20324

Vaughan, R., Morrison, L., & Miller, E. (2003). The illness representations of multiple sclerosis and their relations to outcome. *British Journal of Health Psychology, 8*(3), 287-301. https://doi.org/10.1348/135910703322370860

Velasco, C., Fernández, I., Páez, D., & Campos, M. (2006). Perceived emotional intelligence, alexithymia, coping and emotional regulation. *Psicothema, 18*, 89-94. https://reunido.uniovi.es/index.php/PST/article/view/8425

Vosoughi, R., & Freedman, M. S. (2010). Therapy of MS. *Clinical Neurology and Neurosurgery*, *112*(5), 365-385. https://doi.org/10.1016/j.clineuro.2010.03.010

Waller, E., & Scheidt, C. E. (2004). Somatoform disorders as disorders of affect regulation: A study comparing the TAS-20 with non-self-report measures of alexithymia. *Journal of Psychosomatic Research, 57*(3), 239-247. https://doi.org/10.1016/S0022-3999(03)00613-5

Warren, S., Greenhill, S., & Warren, K. G. (1982). Emotional stress and the development of multiple sclerosis: Case-control evidence of a relationship. *Journal of Chronic Diseases*, *35*(11), 821-831. https://doi.org/10.1016/0021-9681(82)90047-9

Warren, S., Warren, K. G., & Cockerill, R. (1991). Emotional stress and coping in multiple sclerosis (MS) exacerbations. *Journal of Psychosomatic Research, 35*(1), 37-47. https://doi.org/10.1016/0022-3999(91)90005-9

Whittaker, R., Kemp, S., & House, A. (2007). Illness perceptions and outcome in mild head injury: A longitudinal study. *Journal of Neurology, Neurosurgery & Psychiatry*, *78*(6), 644-646. https://doi.org/10.1136/jnnp.2006.101105

Wicke, F. S., Krakau, L., Löwe, B., Beutel, M. E., & Brähler, E. (2022). Update of the standardization of the patient health questionnaire-4 (PHQ-4) in the general population. *Journal of Affective Disorders, 312*, 310-314. https://doi.org/10.1016/j.jad.2022.06.054

Williams, L., O'Connor, R. C., Grubb, N. R., & O'Carroll, R. E. (2011). Type D personality and illness perceptions in myocardial infarction patients. *Journal of Psychosomatic Research*, *70*(2), 141-144. https://doi.org/10.1016/j.jpsychores.2010.07.015

Wilski, M., Kocur, P., Górny, M., Koper, M., Nadolska, A., Chmielewski, B., & Tomczak, M. (2019). Perception of multiple sclerosis impact and treatment efficacy beliefs: Mediating effect of patient's illness and self-Appraisals. *Journal of Pain and Symptom Management, 58*(3), 437-444. https://doi.org/10.1016/j.jpainsymman.2019.06.013

Wilski, M., Tasiemski, T., & Dąbrowski, A. (2016). Body esteem among women with multiple sclerosis and its relationship with demographic, clinical and socio-psychological factors. *International Journal of Behavioral Medicine, 23*(3), 340-347. https://doi.org/10.1007/s12529-015-9527-6

Wilski, M., & Tasiemski, T. (2016a). Health-related quality of life in multiple sclerosis: Role of cognitive appraisals of self, illness and treatment. *Quality of Life Research*, *25*(7), 1761-1770. https://doi.org/10.1007/s11136-015-1204-3

Wilski, M., & Tasiemski, T. (2016b). Illness perception, treatment beliefs, self-esteem, and self-efficacy as correlates of self-management in multiple sclerosis. *Acta Neurologica Scandinavica*, *133*(5), 338-345. https://doi.org/10.1111/ane.12465

Wilski, M., & Tomczak, M. (2017). Comparison of personal resources in patients who differently estimate the impact of multiple sclerosis. *Annals of Behavioral Medicine*, *51*(2), 179-188. https://doi.org/10.1007/s12160-016-9841-5

Wingerchuk, D. M. (2011). Environmental factors in multiple sclerosis: Epstein-Barr virus, vitamin D, and cigarette smoking. *Mount Sinai Journal of Medicine*, *78*(2), 221-230. https://doi.org/10.1002/msj.20240

Wu, L. M., Mohamed, N. E., Winkel, G., & Diefenbach, M. A. (2013). Patient and spouse illness beliefs and quality of life in prostate cancer patients. *Psychology & Health*, *28*(4), 355-368. https://doi.org/10.1080/08870446.2012.722219

Yilmaz, O., Mircik, A. B., Kunduz, M., Çombaş, M., Öztürk, A., Deveci, E., & Kirpinar, I. (2019). Does psychotherapy improve alexithymia? A comparison study among patients with mild or moderate depression. *Archives of Clinical Psychiatry (São Paulo)*, *46*(6), 156-164. https://doi.org/10.1590/0101-60830000000217

Yvonne Feilzer, M. (2010). Doing mixed methods research pragmatically: Implications for the rediscovery of pragmatism as a research paradigm. *Journal of Mixed Methods Research*, *4*(1), 6-16. https://doi.org/10.1177/1558689809349691

Zadeh, A. R., Ghadimi, K., Ataei, A., Askari, M., Sheikhinia, N., Tavoosi, N., & Falahatian, M. (2019). Mechanism and adverse effects of multiple sclerosis drugs: A review article. Part 2. *International Journal of Physiology, Pathophysiology and Pharmacology*, *11*(4), 105-114. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6737425/

Zhu, X., Yi, J., Yao, S., Ryder, A. G., Taylor, G. J., & Bagby, R. M. (2007). Cross-cultural validation of a Chinese translation of the 20-item Toronto alexithymia scale. *Comprehensive Psychiatry*, *48*(5), 489-496. https://doi.org/10.1016/j.comppsych.2007.04.007

Zimmermann, G., Quartier, V., Bernard, M., Salamin, V., & Maggiori, C. (2007). Qualités psychométriques de la version française de la TAS-20 et prévalence de l'alexithymie chez 264 adolescents tout-venant. [The 20-item Toronto alexithymia scale: Structural validity, internal consistency and prevalence of alexithymia in a Swiss adolescent sample]. *L'encéphale*, *33*(6), 941-946. https://doi.org/10.1016/j.encep.2006.12.006