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Loneliness, Social Factors, and Mental Health Functioning Among Patients with Chronic Illnesses

Gary Treacy

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Head of Department: Prof. Andrew Coogan

Supervised by: Prof. Andrew Coogan, Dr. Philip Hyland & Dr. Joanna McHugh Power

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Abstract

Objective: An extensive body of research supports the relationship between adverse mental health and chronic illness diagnosis. Similarly, previous studies indicate an association between symptoms of Posttraumatic Stress Disorder (PTSD) and a variety of chronic illnesses. The objective of the current study was to investigate how social factors such as social support, loneliness, and social isolation are related to a variety of mental health indicators among adults with at least one chronic illness.

Method: The current study utilised two samples: sample one was drawn from the English Longitudinal Study of Ageing (ELSA) (N = 3,771) and sample two was a primary sample of individuals diagnosed with multiple sclerosis (MS) (N = 28). In study one, standard multiple regression analyses investigated how gender, age, relationship status, self-reported health, social engagement, and loneliness were related to levels of depression, psychological distress, and satisfaction with life. Similarly, standard multiple regression analysis examined how gender, age, number of traumatic experiences, social connectedness, and loneliness were associated with levels of complex posttraumatic stress disorder (CPTSD) in study two.

Results: The results of the multiple regression analyses in study one found that loneliness was most strongly associated with depression, psychological distress, and satisfaction with life. Correspondingly, study two also showed that loneliness was significantly and positively associated with CPTSD.

Conclusion: The present study highlights the adverse impact of loneliness on mental health among individuals diagnosed with a chronic illness. These findings support the need for further investigation into how feelings of loneliness, in particular chronic illness groups, may influence symptoms of CPTSD. The clinical implications of this study highlight the necessity for clinicians to identify and address feelings of loneliness among individuals with chronic illnesses. Additionally, the findings of the current study support the requirement for interventions to be in place for chronically ill patients targeting feelings of loneliness and psychological distress.

Overview

The literature review for the current research will explore the relationship between chronic illnesses and mental health disorders. With an increased likelihood of those diagnosed with a single chronic illness developing additional chronic illnesses, this review will also, investiagte the experiences of individuals who suffer multiple chronic illnesses. Social factors in chronic illness populations are essential; therefore, this review will highlight the role of social support, loneliness, and social isolation in the context of mental health outcomes. Subsequently, discussion regarding gender difference in social factors amongst chronic illness populations will also be addressed. With chronic and life-threatening illnesses considered a significant traumatic life event, this review will explore the link between chronic illness and symptoms of post-traumatic stress disorder (PTSD). Additionally, the role of social support, loneliness, and social isolation in the development of PTSD will also be reviewed. Finally, by examining the current field of traumatology, this review will also explore a new trauma diagnosis concerning complex-posttraumatic stress disorder (CPTSD) and will examine the link between multiple sclerosis (MS) and CPTSD.

Literature Review

Introduction

Chronic Illness and Mental Health

The World Health Organisation (WHO) defines a chronic illness by the inclusion of one or more of the following features: the condition is everlasting, is produced by non-changeable pathological modification, leaves permanent disability, necessitates distinctive training of the individual for recuperation and requires sustained management and care (Zwar et al ., 2017). Empirical research indicates that diagnosis of a chronic illness increases an individual`s probability of suffering from a mental illness (Bisschop et al., 2004; Wilhelm, Mitchell, Slade, Brownhill, & Andrews, 2003). Individuals diagnosed with a chronic illness are three times more likely to develop major depression when compared to similar age and gender-matched primary care individuals (Ali, Stone, Peters, Davies, & Khunti, 2006; Spijkerman et al., 2005). The prevalence of major depression for primary care patients is estimated to be between 5%- 10%, while rates of major depression for chronic illnesses such as diabetes and coronary heart disease (CHD), are estimated to be between 12%- 18%, and 15% - 23%, respectively (Katon, 2011). Furthermore, chronic illness severity has also been shown to be positively related to the severity of one`s mental illness (Wulsin, Vaillant, & Wells, 1999).

Extensive research exists supporting the link between chronic illnesses and the subsequent development of mental health disorders. Conversely, studies also highlight that mental health disorders may be a contributing factor in the subsequent diagnosis of a range of chronic illnesses. Anxiety, depression, and post-traumatic stress disorder (PTSD) have been identified as disorders with a variety of pathways, including immune and inflammatory, that adversely affect ones physical wellbeing (Batelaan, Seldenrijk, Bot, Van Balkom, & Penninx, 2016; O'Neil et al., 2015). Furthermore, depression has been shown to escalate the risk of developing chronic illnesses through mechanisms such as poor lifestyle behaviours, a delay in seeking supports and non-compliance to treatment (Prince et al., 2007). Despite these associations, studies examining the causal pathways between chronic illnesses and mental health highlight the multifaceted and bi-directional relationship that exists (Stein et al., 2019). Consequently, investigating the interaction between various mental health disorders and a broad range of chronic illnesses is difficult and complex, as it necessitates obtaining data on both the mental and physical wellbeing of large cohorts observed over several decades (Scott et al., 2016).

A significant body of literature exists regarding the comorbidity of depression and chronic illnesses within the developed world (Cassano & Fava, 2002; Cassileth et al., 1984; Chapman, Perry, & Strine, 2005; Noël et al., 2004). However, from a worldwide perspective, the rate at which depression and chronic illnesses co-occur is largely uncharted. To address this issue, Moussavi et al., (2007) analysed data from the WHO`s World Health Survey (WHS) from a representative sample of 60 countries. Results showed that individuals who reported having a single chronic illness were more likely to display symptoms of depression than those individuals who reported no chronic illnesses. Furthermore, rates of depression ranged from 9.3% for individuals with diabetes, 10.7% for arthritis sufferers, 15.0% for those with angina, and 18.1% for individuals with asthma. Moussavi et al., (2007) also reported that of the 7.1% of respondents who reported having two or more chronic illnesses, almost a quarter (23%) of these people satisfied the criteria for a diagnosis of depression. These results emphasized that the prevalence rates of depression in individuals diagnosed with a chronic illness were significantly higher than individuals without a chronic illness (3.2%), who subsequently reported the highest health status (i.e. the best health).

The vast majority of research focuses on depression in chronically ill populations (Roy-Byrne et al., 2008); however, numerous other mental illnesses have been associated with a diagnosis of a chronic illness. For example, anxiety disorder is associated with children diagnosed with asthma (Ortega, Huertas, Canino, Ramirez, & Rubio-Stipec, 2002), and individuals with chronic physical illnesses (Härter, Conway, & Merikangas, 2003; Sareen et al., 2006). In adolescences, chronic illnesses are linked to emotional difficulties and suicidal ideation (Surís, Parera, & Puig, 1996). A higher lifetime prevalence rate of panic disorder has been observed in individuals with fibromyalgia syndrome (FMS) (Epstein et al., 1999). Both major depression and somatization disorder are associated with chronic fatigue syndrome (Katon, Buchwald, Simon, Russo, & Mease, 1991). Finally, several mental illnesses are common in patients with end-stage renal disease, ranging from anxiety, depression, and substance abuse disorders (Kimmel, Thamer, Richard, & Ray, 1998).

Chronic illnesses may be accompanied by permanent alteration of one`s life and it is this facet of the condition that is suggested to affect an individual's mental capacity to cope with the illness (Goodheart & Lansing, 1997). Various other explanations for the pathway between chronic illnesses and mental illness have been proposed. For example, the potential for disability resulting from a chronic illness can be a risk factor for depression (Prince, Harwood, Blizard, Thomas & Mann, 1997). Individuals with multiple sources of pain, expected in numerous chronic illnesses, are more likely to report symptoms of depression compared to those with a single occurrence of pain (Dworkin, Von Korff, & LeResche, 1990). Additionally, the adverse effect of pain on an individual's sleep patterns can intensify emotional distress (Korff, & Simon, 1996). Chronic illnesses are also associated with alterations to an individuals' physical appearance and can diminish functioning, both of which can increase the likelihood of mental illness (Verhaak, Heijmans, Peters & Rijken, 2005). In contrast to an acute illness, those that are of short duration, chronic illnesses force an individual to continuously adapt to unfamiliar situations and impose greater functional restrictions (Dunlop, Lyons, Manheim, Song & Chang, 2004). As would be expected then, studies have indicated that any significant and unremitting alterations to one`s daily life can ultimately have a negative effect on an individual's mental health (Serido, Almeida, & Wethington, 2004; Holahan, Holahan, & Belk, 1984). In conclusion, the occurrence of a chronic illness, or illnesses, have been found in numerous samples, and across multiple nations, to be associated with an extensive range of negative psychological reactions including insecurity regarding one`s future (Kwakkenbos et al., 2014), avoidance of physical activity (Holla et al., 2014), and the onset of multiple psychiatric disorders (Dekker et al., 2015).

Multiple Chronic Illnesses

For those living with a single chronic illness, there is the increased likelihood of being diagnosed with multiple chronic illnesses (Markle, Attell, & Treiber, 2015). Previous studies have also highlighted an increased risk of major depression among individuals diagnosed with more than one chronic illnesses (Harpole et al., 2005; Katon & Schulberg, 1992; Noël et al., 2004). In the Republic of Ireland, 11% of those aged 50 and over are living with two or more chronic illnesses, and this figure increases to 18% for comparable adults in Northern Ireland

(Savva & McDaid, 2011). An extensive volume of research exists highlighting the adverse psychological impact of experiencing a single chronic illness (Bodenheimer, Wagner, & Grumbach, 2002; Newacheck, McManus, & Fox, 1991; Townsend, Wyke, & Hunt, 2006; Wagner, Austin, & Von Korff, 1996). However, limited studies focus on the experiences of those living with multiple chronic illnesses or the likelihood that older adults with a single chronic illness will be diagnosed with multiple chronic illnesses as they age (Clarke, & Bennett, 2013; Markle, Attell, & Treiber, 2015). Several factors have been highlighted in the literature for those most at risk of multimorbidity (i.e. two or more chronic illnesses). These range from low socio-economic status, poor health behaviours and lack of physical activity (Balanda, Barron, Fahy, & McLaughlin, 2010). Additionally, it is suggested that a lack of social connectedness may influence multimorbidity as research shows that individuals living alone have a greater number of chronic illnesses compared to those living with a significant other (Savva & McDaid, 2011).

Currently, the impact of multimorbidity on one`s functional status and mental health is not well understood (Clarke & Bennett, 2013; McDaid, Hanly, Richardson, Kee, Kenny, & Savva, 2013). It is suggested that multimorbidity may increase the likelihood of disability (Marengoni et al., 2011; Rijken, van Kerkhof, Dekker, & Schellevis, 2005), worsen one`s quality of life (Alonso et al., 2004; Djärv, Wikman, & Lagergren, 2012; Walker, 2007) and negatively affect self-reported health status (Galenkamp, Braam, Huisman, & Deeg, 2011). Moreover, disruption to one`s self-concept and capacity to engage in social activities, caused by MCI, is highlighted as significantly distressing to an individual (Belgrave, 1990; Roberto & McCann, 2011). Previous studies suggest that each additional chronic illness acquired by an individual negatively influences their functional dependency (Wolff, Boult, Boyd, & Anderson, 2005) and particular combinations of multiple chronic illnesses increase the likelihood of disability (Vogeli et al., 2007). Despite this support for the negative consequences of multimorbidity, literature concerning multiple chronic illnesses in older cohorts is unclear. A study found that those with 4 or more chronic illnesses, displayed higher levels of depressive symptoms when compared to individuals with 2 to 3 chronic illnesses and, those with a single chronic illness (Seo, Choi, Kim, Lee, & Oh, 2017). However, the authors concluded that the risk for experiencing symptoms of depression with each additional illness was only observed in middle-aged adults and not in older adults. Younger adults are more likely to have adverse perceptions and psychological adjustments to each additional illnesses, while older adults are less likely to report poorer mental health consequences like anxiety despite the occurrence of multiple chronic illness (Seo et al., 2017). These findings are disputed in a study investigating the effect that number of chronic illnesses in older adults (Buttorff, Ruder, & Bauman, 2017). The results of this study suggested that diagnosis of additional chronic illnesses did adversely impact older individuals. Findings concluded that those individuals diagnosed with five or more chronic illnesses had greater functional, cognitive, and social limitations than individuals with three or four chronic illnesses (Buttorff et al., 2017).

Chronic Illness and Social Support

The definition of social support refers to a social network`s assistance towards psychological well-being, intended to benefit an individual`s capacity to manage periods of stress (Cohen, 2004). Traditionally, support is categorised into three types of resources: instrumental, functional, and emotional (House, Kahn, McLeod & Williams, 1985). Instrumental support is defined as facilitation of material aid such as assisting with everyday tasks or financial assistance. Informational support is concerned with providing important information that is expected to benefit the individual and is commonly related to offering direction and guidance in coping with one`s issue. Finally, emotional support, relates to the communication of compassion, comfort, empathy and offering the opportunity for emotional expression (Helgeson, & Zajdel, 2017). Social support that encompasses all three types of resources has been related to enhanced chronic illness adjustment; however, the majority of research in this area has only focused on the emotional component of social support (Uchino, 2004).

Individuals who are diagnosed with a chronic illness and exposed to the physical threat of declining health and reduced physical functioning, also experience the increased psychological risk associated with diminished social and work-related contacts (Janicki et al., 2011). The association between social ties and an individual's behaviour, cognition, and emotions is claimed to influence both physical and mental health (Cohen, 1988, 2004). In relation to mental health, it is theorized that social networks regulate and prevent unhealthy responses during periods of disruption to one`s normal lifestyle (Janicki-Deverts & Cohen, 2011). This regulation is achieved through the communication of social expectations, of appropriate norms and through the facilitation of appropriate support. Regarding physical health, social networks are responsible for preventing negative behaviours relating to physical activity, nutrition, alcohol consumption, smoking, sleep management, and one`s compliance to medical routines (Janicki-Deverts & Cohen, 2011).

A number of studies highlight the ‘Support-Buffering Hypothesis’ (Cohen & Wills, 1985) which advocates the beneficial effects of social support during periods of extreme stress. For example, a study of long-term gynecologic cancer survivors found that, regardless of physical symptomatology, individuals benefited from supportive social networks and displayed less intrusive thoughts regarding their illness when compared to less supported individuals (Carpenter, Fowler, Maxwell, & Andersen, 2010). For diabetes sufferers, previous studies (Albright, Parchman, & Burge, 2001; van Dam et al., 2005) claim that social support was only associated with self-care tasks (i.e. nutrition, physical activity). However, in a nationally representative sample of adults with diabetes suffering cognitive impairment, Okura, Heisler, and Langa (2009), found greater social support was associated with prevention of deteriorating glycemic control.

Social support has been shown to influence several important areas of life functioning following chronic illness diagnosis including, superior illness adjustment (White, Richter & Fry, 1992), greater self-management of the illness (Gallant, 2003), and protection against negative psychological reactions to the illness (Carpenter, Fowler, Maxwell & Andersen, 2010). Numerous studies have highlighted the role social support plays in a variety of chronic illnesses ranging from cancer (Creagan, 1997) to coronary heart disease (Eriksen, 1994). For example, for males diagnosed with prostate cancer, social support protected against unpleasant beliefs and helped individuals in their understanding of the illness (Roberts, Lepore, & Helgeson, 2006). Social support has also been found to be responsible for improving levels of self-esteem and offering chronically ill individuals a sense of identity and control of their environment (Cohen, 1998). Furthermore, for end-stage renal disease (ESRD), social support linked to self-esteem was found to reduce levels of depression and increase positivity (Symister, & Friend, 2003) and even predicted survival among individuals diagnosed with ESRD who reported having a higher perception of social support (Kimmel et al., 1998).

Chronic Illness and Loneliness

Loneliness is a subjective construct and defined as the feeling or perception of being alone, disconnected or distant from social interaction (Tomaka, Thompson, & Palacios, 2006). It is also characterised by a discrepancy between an individual's coveted social interactions compared to their actual social contacts (Ernst, & Cacioppo, 1999). The term loneliness was typically reserved for older adults who live a solitary life, however, the reality is that loneliness occurs in individuals of all ages and is not exclusive to older adults who exist in a self-contained existence (Luhmann, & Hawkley, 2016). Support for this assertion, highlighted in meta-analyses and reviews of loneliness, concluded that feelings of loneliness have a tendency to peak in young adulthood, reduce throughout middle adulthood (30-65 years) and old age (65-80 years), before increasing again in the oldest stage of old age (> 80 years) (Perlman, 1990; Pinquart, & Sörensen, 2003; Qualter et al., 2015).

Loneliness has been shown to be a key predictor in psychological disorders such as anxiety (Bekhet, & Zauszniewski, 2012) and depression (Cacioppo, Hawkley, & Thisted, 2010), and has also been found to predict morbidity and mortality in adult populations (Luo, Hawkley, Waite, & Cacioppo, 2012; Perissinotto, Cenzer, & Covinsky, 2012). The pioneering work of James J. Lynch's (1977) "The Broken Heart: The Medical Consequences of Loneliness" was one of the first indications within the field of psychology that linked health consequences to the human experience of loneliness. Lynch (1977) theorised that the impact of loneliness correlated directly with an individual's health behaviours, morbidity, and mortality. Subsequently, research suggests that loneliness is associated with numerous chronic illnesses like heart disease, hypertension, stroke, metabolic syndrome, and diabetes (Petitte et al., 2015).

Utilizing the National Health and Nutrition Survey (NHANS), a U.S. nationally representative sample, Thurston and Kubzansky (2009) examined the relationship between loneliness and coronary heart disease (CHD). Findings from 2616 participants (*n* = 1150 males, 1466 females) concluded that women with high levels of loneliness were at an increased risk of CHD. Furthermore, amongst the most significant emotional characteristics identified in CHD patients, loneliness was one of 10 predominant characteristics found in a sample of men and women diagnosed with CHD (Tobo-Medina & Canaval-Erazo, 2010). Loneliness has also been investigated in populations concerning heart failure (Löfvenmark, Mattiasson, Billing, & Edner, 2009). In a sample of heart failure patients, those who reported feelings of loneliness spent a longer duration in hospital and had more hospital readmissions than those who did not report feelings of loneliness.

A relationship between loneliness and increased prevalence rates of stroke has been highlighted in the literature (Boden-Albala, Litwak, Elkind, Rundek, & Sacco, 2005). For individuals who suffered a stroke, loneliness has been found to worsen recovery and increase disability and mortality (Cox, McKevitt, Rudd, & Wolfe, 2006). Furthermore, individuals who report higher levels of loneliness were at greater risk for post-stroke depression (PSD). Numerous factors are said to influence a stroke survivor's experience of loneliness and depression (Petitte et al., 2015). The most notable being reported loneliness or depression preceding the stroke, followed by the severity of the stroke and, whether the individuals were discharged to a treatment facility or their own residence. Moreover, stroke survivors who lived at home but were not feeling lonely reported greater morale than comparable older adults who didn`t suffer a stroke but reported high feelings of loneliness (von Heideken Wågert et al., 2005).

In relation to cardiovascular reactivity and hypertension, numerous studies indicate that for both young and older adults, loneliness is positively associated with these illnesses. For example, in a study of female adults aged 18-39; results found that for those reporting feelings of loneliness, exposure to stressful experiences correlated with diastolic blood pressure reactivity (Nausheen et al., 2007). Another study investigated the role of loneliness in moderating the effects of oxytocin, a hormone released during social interaction, and cardiac autonomic control. For both males and females, loneliness predicted alterations in cardiovascular and respiratory function even when controlling for depression and anxiety (Norman et al., 2011). The authors concluded that loneliness might change normal autonomic response in reaction to diminishing health. Finally, in a sample of older adults, Momtaz et al., (2012) found that loneliness significantly increased an individual's risk for hypertension in later life even when controlling for sociodemographic factors and additional chronic illnesses. The authors concluded that this relationship might be related to lonely individuals having a diminished autonomic response to stress.

Numerous studies conclude that the subjective experience of loneliness is the greatest predictor of negative health outcomes (Cacioppo et al., 2000; Doane & Adam, 2010; Hackett, Hamer, Endrighi, Brydon & Steptoe, 2012; Hawkley, Thisted, Masi & Cacioppo, 2010; Perissinotto, Cenzer & Covinsky, 2012). These findings are in direct conflict with studies that focus on the impact of social isolation in relation to health. Various findings have highlighted that individuals who are socially isolated or socially disconnected may be more susceptible to negative health outcomes than those who report or perceive feelings of loneliness (Bassuk, Glass, & Berkman, 1999; Cohen, Doyle, Skoner, Rabin & Gwaltney, 1997; Eng, Rimm, Fitzmaurice & Kawachi, 2002; Heffner, Waring, Roberts, Eaton, & Gramling, 2011; Holt-Lunstad, Smith & Layton, 2010).

Social isolation and loneliness have become terms that interchange continuously and are often times construed as comparable throughout the literature. However, early research had already begun to clearly define these constructs as separate entities (Peplau & Perlman, 1982). Literature concerning loneliness and social isolation makes a clear distinction between the two concepts. Social isolation is discernible by the objective features of one's current state and is denoted by a dearth of social contact or relations with other individuals (Cornwell & Waite, 2009). Examining social isolation necessitates ascertaining objective characteristics relating to the size and composition of an individual's social network and their function within their community (van Tilburg, 1998). Obtaining these measurable characteristics creates a continuum whereby social isolation is positioned at one end and social participation at the other. Conversely, loneliness is a cognitive representation of an individual's subjective assessment of his or her participation, or lack of participation, within social networks (Gierveld & Van Tilburg, 2010). This assessment is measured against the individual's expectations for what they consider optimal embeddedness within a social network. Therefore, loneliness is thought to be a manifestation of undesirable emotions that can occur across the lifespan (Gierveld & van Tilburg, 2010).

Chronic Illness and Social Isolation

Social isolation is defined by Nicholson (2009, p. 1346) as "a state in which the individual lacks a sense of belonging socially, lacks engagement with others, has a minimal number of social contacts and they are deficient in fulfilling and quality relationships". Social isolation has been equated to the risks of smoking and obesity for an individual's health (House, 2001). Furthermore, a deficiency in social contacts has been linked to cognitive decline (Barnes, De Leon, Wilson, Bienias, & Evans, 2004; Wilson et al., 2007), depression (Heikkinen, & Kauppinen, 2004), risk for infection (Cohen, Doyle, Skoner, Rabin, & Gwaltney, 1997) and higher rates of morbidity and mortality (Brummett et al., 2001; Seeman, 2000). While social isolation is experienced and affects the health of all age groups (House et al., 1987), it is particularly perilous in older adults as they are more susceptible to disabilities, health issues (Brummett et al., 2001) and chronic illnesses (Lam & Perales, 2017; Ward, Schiller, & Goodman, 2014).

The stress process model (Pearlin, Menaghan, Lieberman, & Mullan, 1981) is continuously highlighted as a means for explaining how social relationships affect both mental and physical illnesses (Yang, McClintock, Kozloski, & Li, 2013). Within this model, the experience of prolonged stress combined with aspects of social isolation (e.g., minimal coping resources) may prompt negative alteration in ones neuroendocrine, immune, and cardiovascular systems (Kaplan, Seeman, Cohen, Knudsen, & Guralnik, 1987). Extensive research has acknowledged that through stimulation of the hypothalamic-pituitary-adrenal (HPA) axis and sympathetic nervous system (SNS), stress can directly affect several regulatory structures associated with immune function and inflammatory responses (Seeman, McEwen, Rowe, & Singer, 2001; Selye, 1956).

Social isolation is also a known stressor that can cause a cascade of negative health consequences, from impacting metabolic pathways linked to cancer (Williams et al., 2009) to innate inflammatory responses associated with numerous illnesses (Hermes, Rosenthal, Montag, & McClintock, 2006). Conversely, increased social connectedness has been linked to a decrease in mortality rates for cardiovascular disease and incidence of stroke (Kawachi et al., 1996). Furthermore, it has been suggested that social and civic participation in the form of attendance in religious groups (Hummer, Rogers, Nam, & Ellison, 1999; Strawbridge, Cohen, Shema, & Kaplan, 1997) and community volunteering (Musick, Herzog, & House, 1999) may diminish stress and lower threat of mortality.

It has been proposed that the relationship between chronic illness and social isolation exists through functional limitations, emotional problems or cognitive inabilities associated with chronic illnesses (Holley, 2007). Functional limitations in individuals diagnosed with a chronic illness can be brought about by restricted mobility, decreased energy levels and pain (Sullivan, Weinert, & Cudney, 2003). The subsequent impact on daily activities and one`s independence can further diminish social contacts. Mukherjee, Reis and Heller (2003) claim that cognitive incapacities and emotional difficulties following a chronic illness like a traumatic brain injury can affect social interactions and subsequently marginalise an individual within their community. Similarly, for individuals diagnosed with neurological disorders, alterations to one's personality following the illness can challenge their capability to interact in normal social situations (Biordi & Nicholson, 2013).

Gender Differences in Social Factors among Chronic Illnesses

Currently, studies on gender differences in relation to chronic illness adjustment are extensive and findings are varied. In general, women report worse health than men, however, rates of mortality are lower for women despite having higher levels of depression, other psychiatric conditions, and distress across a range of chronic illnesses (Denton, Prus, & Walters, 2004). For example, in a large sample of patients (N = 35,722) with chronic obstructive pulmonary disorder (COPD), after excluding individuals with a history of mental disorders, women were twice as likely as men to develop depression in a follow up analysis (Schneider, Jick, Bothner & Meier, 2010). Women were also more likely to report an increased risk for depression as the duration of the disorder increased. This increased risk for depression did not concur with disorder duration in men. However, the risk for individuals dying within one year of being diagnosed with depression was higher in men than women (Schneider et al., 2010). Similar studies found that women diagnosed with diabetes reported more functional restrictions, more symptoms of depression and worse psychosocial adjustments, when compared to men (Iida, Parris Stephens, Rook, Franks, & Salem, 2010). These findings are comparable to studies in relation to heart disease (Hunt-Shanks, Blanchard, Reid, 2009) and cancer (Baider, Perez, & De-Nour, 1989).

Conversely, a study of heart failure patients found that women reported superior health perceptions and fewer depressive symptoms when compared to men (Macabasco-O'Connell, Crawford, Stotts, Stewart, & Froelicher, 2010). While women tend to experience more chronic illnesses, rates of mortality are higher in men suffering acute life-threatening illnesses (Vlassoff, 2007). Numerous studies also suggest that men suffer more stigmatising effects of being diagnosed with a chronic illness compared to women (Charmaz, 1995), particularly in degenerative illnesses like arthritis (Verbrugge, 1985) and multiple sclerosis (MS) (Verbrugge & Wingard, 1987). The explanation for these discrepancies have been linked to both genetic and biological differences, however, social variables have also been identified as a cause of health inequalities in men and women (Denton, Prus, & Walters, 2004).

These social variables are clustered into three categories: behavioural, psychosocial factors and social structures (Denton, Prus, & Walters, 2004). In relation to behavioural mechanisms, while women are generally less active than men, research suggests that men are more likely to consume alcohol, smoke, have an unbalanced diet, and be overweight (Denton & Walters, 1999; Ross & Bird, 1994; Uitenbroek, Kerekovska, & Festchieva, 1996). The literature on gender differences in psychosocial factors related to self-esteem and perceived control found that women report lower resources in both constructs when compared to men (Ross & Mirowsky, 1989; Turner & Roszell, 1994). For social structures, as well as undergoing more stressful life experiences (De Vries & Watt, 1996), women report additional health problems due to greater demands and responsibilities within their social roles (Turner, & Avison, 1998). Despite evidence supporting gender differences and social factors influencing one's health status, studies investigating gender in relation to social support, loneliness, and social isolation amongst chronic illnesses are unclear.

Research has shown that men who experience low levels of social integration are at increased risk for illness and mortality when compared to women (House et al., 1988). For example, older men lacking social support are at increased the risk of allostatic load (i.e. prolonged stress) which is linked to chronic illness (Seeman, McEwen, Rowe, & Singer, 2001). However, previous research concerning social support and mortality in older adults suggests that men benefit from smaller social network supports than women (Shye, Mullooly, Freeborn, & Pope, 1995). Clarification for these findings can be found in research showing that men rely on spousal support rather than large social networks (Antonucci & Akiyama, 1987). In a study of older adults, feelings of loneliness were associated with increased risk for cardiovascular mortality, primarily in males (Olsen, Olsen, Gunner-Svensson & Waldstrøm, 1991). Conversely, in a 19-year follow up study assessing the relationship between loneliness and risk for CHD, higher levels of loneliness was linked to greater risk of CHD, for women only. No associations were found amongst men, even when controlling for symptoms of depression (Thurston & Kubzansky, 2009). Research also indicates that gender differences occur between C--reactive protein (CPR), linked to CVD, and social isolation. For example, social isolation was associated with higher CPR in older men, however, no association was found for males or females under the age of 60. These findings are supported by similar studies in both middle-aged and older males with CHD, with social isolation found to be a leading risk factor for diagnosis, even when controlling for physical inactivity and diabetes (Orth-Gomér, Rosengren & Wilhelmsen, 1993; Orth- Gomer, Unden, & Edwards, 1988; Ruberman, Weinblatt, Goldberg & Chaudhary, 1984). In a nationally representative study, social isolation was associated with cardiovascular disease and mortality in both men and women (Orth-Gomer & Johnson, 1987).

Chronic Illness and PTSD

Posttraumatic Stress Disorder (PTSD) is a mental health disorder that may arise subsequent to an individual experiencing a traumatic incident (Lehavot, Katon, Chen, Fortney & Simpson, 2018). The potential health consequences of the disorder include poorer physical well-being, a significant increase in mental illness comorbidities, diminished quality of life, and the threat of early mortality (Lehavot et al., 2018). PTSD has attained interest recently as the disorder has been observed not only in trauma-exposed individuals but also in the general population (Carmassi et al., 2017). Studies have highlighted associations between PTSD and chronic illnesses like coronary heart disease (CHD) (Kubzansky, Koenen, Spiro, Vokonas, & Sparrow, 2007) and cancer (Boscarino, 2006). In addition, symptoms of PTSD have been shown to worsen illness outcomes (Asmundson, Stein, & McCreary, 2002). For example, symptoms related to hyperarousal may be implicated in heart disease (Coughlin, 2011).

Chronic and life-threatening illnesses are considered a significant traumatic life event that has the potential to trigger symptoms of PTSD (Cordova et al., 2007; Kangas, Henry, & Bryant, 2002; Tedstone, & Tarrier, 2003). The introduction of the fourth edition of the DSM was significant for its inclusion of chronic and potentially life-threatening illnesses as a possible stressor that can induce symptoms of PTSD. This addition helped to restore interest in the field of clinical psychology as to how stress reactions evolve following the diagnosis of a serious illness. However, the latest changes introduced in the DSM-5 (APA, 2013) state that the experience of being diagnosed with a chronic illness no longer meets the criteria for a diagnosis of PTSD (Kangas et al., 2002). Despite this alteration, currently, a diagnosis of PTSD is being steadily observed in survivors of critical illnesses. It is estimated that 25% of patients diagnosed with a critical illness report symptoms of PTSD with this figure increasing to nearly 65% in specific critical illnesses, for example, in survivors of septic shock (Glaspey, Roberts, Mazzarelli, Trzeciak & Roberts, 2017). Similarly, for chronic illnesses like cancer, psychological symptoms related to PTSD such as avoidance of trauma-related phenomena, re-experiencing, and heightened arousal have all been reported in patients (Cella, & Tross, 1986; Lesko, Ostroff, Mumma, Mashberg, & Holland, 1992; Morris, Greer & White, 1977).

Research concerning PTSD and chronic illness has largely centred on individuals diagnosed with cancer, stroke patients, and acute coronary syndrome (ACS) (Ostacoliet et al., 2013). However, additional studies have highlighted a relationship between PTSD and other chronic illnesses including breast cancer (Mundy et al., 2000), fibromyalgia (Cohen et al., 2002; Roy-Byrne, Smith, Goldberg, Afari, & Buchwald, 2004), and enduring physical disorders (Sareen, Cox, Clara, & Asmundson, 2005). Research studies into medically-induced PTSD estimate that the prevalence rate may be as high as 30%, however, a more accurate assessment from both large observational and meta-analytic studies concluded that the prevalence rate was more likely between 12% and 25% (Edmondson, & Cohen, 2013; Edmondson, Richardson, Fausett, Falzon, Howard, & Kronish, 2013).

Epidemiological research has shown that females are two times more likely to develop symptoms of PTSD in the aftermath of experiencing a traumatic event (Breslau et al., 1998; Kessler, Sonnega, Bromet, Hughes & Nelson, 1995). Meta-analysis suggests that females were at greater risk for developing PTSD despite the fact that males experienced greater number of traumatic events in their lifetime (Tolin & Foa, 2006). Explanation for this finding is that woman are more likely to experience specific forms of trauma ranging from interpersonal violence to sexual assault (Breslau, Chilcoat, Kessler, Peterson & Lucia, 1999). It is suggested that these types of trauma may increase ones likelihood of developing symptoms of PTSD (Breslau, Davis, Andreski, Peterson & Schultz, 1997). Despite this, few studies have investigated gender vulnerability for PTSD among chronic illness populations. From these limited studies, Stukas et al., (1999) found that within a sample of individuals with a life-threatening heart condition, women were more likely to report symptoms of PTSD. Conversely, another study examined if gender difference was related to trauma type and subsequent PTSD diagnosis across a number of traumatic experiences, including chronic illnesses (Ditlevsen & Elklit, 2012). Results concluded that the largest gender difference occurred after exposure to natural disaster and accident, however, chronic illnesses showed no gender difference in risk for PTSD.

Social support, Loneliness, Social Isolation and PTSD

Currently, interest has grown around the social factors associated with PTSD, as research suggests that an individual's social context could be a prominent predictor in determining one`s likelihood of being diagnosed with the disorder (Vogt, Erbes & Polusny, 2017). Support for this assertion can be found in two meta-analyses (Ozer, Best, Lipsey, & Weiss, 2003; Brewin, Andrews, & Valentine, 2000) that investigated the multiple risk factors associated with the development of PTSD. Brewin et al. (2000) examined 14 distinctive risk factors for PTSD including age, gender, education, preceding trauma, psychiatric history, and social support. Results concluded that the absence of social support was one of the key post trauma predictors of PTSD. Ozer et al., (2003) found that peritraumatic dissociation (e.g. detachment during the event) to be the strongest predictor of an individual being diagnosed with PTSD. However, the authors concluded that social support warranted additional investigation as results from the meta-analysis indicated that social support acted as a cumulative secondary prevention variable, increasing with the amount of time elapsed since the traumatic event.

Across numerous traumatic events, social support has been found to be negatively associated with symptoms of PTSD. For example, in soldiers diagnosed with PTSD, post-deployment social support was negatively associated with symptoms of depression and severity of traumatic stress (Pietrzak, Johnson, Goldstein, Malley, & Southwick, 2009). For non-combatants, higher social support was associated with fewer symptoms of general anxiety disorder (GAD), major depression, and PTSD (Mugisha, Muyinda, Malamba, & Kinyanda, 2015). In studies of earthquake survivors, quality of life, positive adjustment and adaptive coping strategies have all been attributed to greater social support (Ke, Liu, & Li, 2010; Tang, 2006; Wang et al., 2011). For women who experienced both childhood abuse and rape in adulthood, greater social support predicted lower levels of PTSD severity (Schumm, Briggs, Phillips, & Hobfoll, 2006).

The precise characteristics of social support that guards against a diagnosis of PTSD remain unknown (Maheux & Price, 2016). The social-cognitive processing model of adjustment to trauma suggests that negative interactions within one`s social network can facilitate dysfunctional cognitions and thus intensify symptoms of PTSD (Lepore, 2001). Equally, following a traumatic experience, positive interactions and supportive social networks aid recovery. Previous studies support this model as it was found that following the experience of a trauma, social support could help an individual to change their cognitions of the event to more nonthreatening thoughts (Joseph, Williams, & Yule, 1997). Similarly, Ehlers and Clark (2000) found that an individual's social contacts could strongly affect attributions made regarding the traumatic experience.

Loneliness has been found to be positively associated with posttraumatic symptoms across a number of studies (Macleod, 1994; Solomon, & Mikulincer, 2006; Solomon, Mikulincer, & Waysman, 1991). For example, older adults exposed to multiple traumatic experiences (3 or more) in early adulthood, reported higher levels of loneliness later in life than those who experienced two traumas or less (Palgi, Shrira, Ben-Ezra, Shiovitz-Ezra, & Ayalon, 2012). Similarly, in a sample of older U.S. veterans, loneliness was positively associated with the number of traumatic experiences, current PTSD, and depressive symptoms. This relationship was negatively associated with the presence of superior social support, secure attachment, and being married/cohabitating (Kuwert, Knaevelsrud, & Pietrzak, 2014). Conversely, a sample of Danish individuals aged 16 - 102 years, found that for those diagnosed with life-threatening somatic conditions, moderate-to-severe loneliness was observed in middle adulthood (i.e. 45-59 years) (Lasgaard, Friis, & Shevlin, 2016).

Trauma survivors diagnosed with PTSD frequently display diminished capacity to reintegrate into close relationships and social interactions after a traumatic event (Cook, Riggs, Thompson, Coyne, & Sheikh, 2004; Riggs, Byrne, Weathers, & Litz, 1998). Numerous characteristics of posttraumatic symptoms such as feelings of alienation, prolonged hyperarousal, and avoidance have been highlighted as potential mechanisms by which individuals diagnosed with PTSD may experience social isolation (Maercker, & Müller, 2004; Nietlisbach, & Maercker, 2009). Several studies of combat-exposed individuals with PTSD report that social isolation and withdrawal are a direct consequence of problems resolving interpersonal matters (Nezu, & Carnevale, 1987; Roberts et al., 1982; Sutker, Davis, Uddo, & Ditta, 1995). Additionally, individuals with PTSD are also more likely to experience elevated feelings of social anxiety (Orsillo, Heimberg, Juster, & Garrett, 1996; Orsillo et al., 1996; Roszell, McFall, & Malas, 1991).

Current Field of Traumatology: DSM v ICD

Worldwide, two sets of criteria are used to categorize all behavioural and psychological disorders, the International Classification of Diseases (ICD) and the Diagnostic and Statistical Manual of Mental Disorders (DSM). A failure to coordinate both manuals has resulted in PTSD being classified in a contradictory manner across the latest editions of the DSM-5 (American Psychiatric Association, 2013) and the ICD-11 (Hafstad, Thoresen, Wentzel-Larsen, Maercker & Dyb, 2017). Despite the awareness of the severity of the disorder, the construct validity of PTSD has been the cause of copious deliberation and contention since the introduction of the diagnosis as a mental disorder in the third edition of DSM (American Psychiatric Association, 1980). The continued altering of the diagnostic requirements for the disorder, with each successive revision made to the DSM, highlights the evidence for this uncertainty (Rosen, & Lilienfeld, 2008).

The most recent edition the DSM, the DSM-5 (APA, 2013), is highly significant for the field of traumatology as the latest edition characterises PTSD under a new diagnostic classification titled "Trauma and Stress or-Related Disorders", moving away from the DSM-IV`s cataloguing of PTSD as an anxiety disorder (APA, 2013). Although the continual alterations made in the DSM offered a broad description of the disorder, many believe that these modifications have had various negative outcomes. Prior to the release of the DSM-5, the DSM-IV criteria for PTSD received condemnation for containing several symptoms that correspond with other mental disorders like anxiety, dissociative disorders, and mood disorders (Brewin, Lanius, Novac, Schnyder, & Galea, 2009; Rosen, & Lilienfeld, 2008; Rosen, Spitzer, & McHugh, 2008). These issues have only been intensified following the release of the DSM-5.

Brewin (2013) claims that reduction in comorbidity is only achievable when the 20-symptom structure of PTSD aligns itself with that of anxiety disorders, which commonly encompass two to eight symptoms and, major depression that contains nine symptoms. Galatzer-Levy and Bryant (2013) support this proposal by demonstrating that the DSM-5`s inclusion of 20 distinct symptoms, ordered into four clusters, means that there are 636,120 possible diagnostic combinations for PTSD. Validation for the selection of PTSD criteria and symptomatology for each revision of the DSM is guided by several factor analytic studies (e.g. Buckley, Blanchard, & Hickling, 1998; Larsson, 2000; Palmieri, & Fitzgerald, 2005). Despite this, Galatzer-Levy and Bryant (2013) claim that a significant proportion of these studies highlighted that the relationship between these factors were strongly correlated, thus challenging the discriminant validity of the DSM-5 PTSD model. The authors concluded that the DSM theory of distinct symptoms signifying diverse features of PTSD continuously produces a model that ineffectively fits the data.

Released in 2018, the 11th version of the International Classification of Diseases (ICD-11) has responded to calls for a more parsimonious representation of PTSD by decreasing the 20 symptoms outlined in the DSM-5, to just six symptoms (Walton et al., 2017). The ICD-11 proposes that the reduction in PTSD symptoms will address issues of high rates of psychiatric comorbidity and will enhance the diagnostic utility for clinicians (Maercker et al., 2013). Additionally, the selected symptoms are believed to represent the fundamental characteristics of PTSD and not those of other psychiatric disorders. Furthermore, the WHO Working Group responsible for the ICD-11 has proposed the addition of a new diagnostic category called Complex-PTSD (CPTSD: Maercker et al., 2013). CPTSD is more likely to occur as the consequence of extreme and continued exposure to trauma, typically relating to repeated, or multiple interpersonal traumatic events (Weiss, 2012). ICD-11 CPTSD includes the core symptoms of PTSD along with three further symptom clusters that reflect `disturbances in self-organisation` (DSO). The DSO symptoms reflect three categories: (1) affective dysregulation (AD), (2) negative self-concept (NSC), and (3) disturbances in relationships (DR).

Herman (1992) was the first to advocate the occurrence of complex trauma presentations among individuals who were exposed to sustained interpersonal trauma, and argued that the DSM-III criteria of PTSD failed to capture the psychological experiences of those who individuals. Upon this recommendation, the subsequent DSM-IV field trials included a category labelled `disorders of extreme stress, not otherwise specified` (DESNOS), a disorder considered comparable to CPSTD (Resick et al., 2012). Results from the field trial concluded that almost all individuals exhibiting symptoms of DESNOS also satisfied a diagnosis of PTSD (Roth, Newman, Pelcovitz, van der Kolk, & Mandel, 1997). These findings guided the committee to conclude that DESNOS integration into the DSM-IV should be termed as a related feature of PTSD, thus, failing to categorise DESNOS as an independent diagnosis.

Within the literature, debate continues as to whether CPTSD is simply an amalgamation of Borderline Personality Disorder (BPD) and PTSD, with this assumption grounded in previous studies that found a moderately high comorbidity between BPD and PTSD (Grant et al., 2008; Pagura, Stein, Bolton, Cox, Grant & Sareen, 2010). Cloitre, Garvert, Weiss, Carlson, and Bryant (2014) set out to examine whether BPD and CPTSD were distinguishable among a sample of 280 women pursuing treatment for childhood abuse. A latent class analysis (LCA) identified four distinct groups of individuals within the sample: a ‘Low Symptom class' who had low scores on all symptoms; a 'PTSD class' characterised by high levels of PTSD symptomatology but low levels of BPD and DSO symptoms; a 'CPTSD class' marked by high levels of PTSD and DSO symptoms but low BPD symptomology; and a 'BPD class' that displayed high BPD symptoms with low levels of PTSD and DSO symptomology. Cloitre et al. (2014) concluded that these findings supported the ICD-11 proposal for diverse trauma diagnoses in relation to CPTSD, PTSD, and BPD.

As highlighted, complex trauma denotes a category of traumatic experience that arises following repeated or prolonged trauma exposure from which escape is difficult or impossible (often due to maturational issues) . The classical understanding of complex trauma relates to interpersonal abuse during childhood, but can also include different forms of trauma such as domestic violence, combat exposure, and torture (Choi, Klein, Shin, & Lee, 2009; Cloitre et al., 2010, Courtois, 2008). Additionally, it is also suggested that complex trauma responses can result from situations of single acute traumatic exposure, including diagnosis of a chronic illness that require continual and exhaustive medical care and management (Courtois, 2008). Therefore, it is likely that the experience of a chronic illness, a condition that cannot be escaped from and is relentless, may well serve as a context in which complex trauma responses can develop. Furthermore, CPTSD is a disorder that, in addition to core trauma-based symptoms, includes disturbances in one's ability to regulate emotions, a negative self-concept, and a tendency to avoid of interpersonal relationships (De Jongh et al., 2016). These experiences are also common among patients with chronic illnesses (Ellis-Hill & Horn, 2000; Solberg Nes, Roach, & Segerstrom, 2009; Simmons, Smith, Bobb, & Liles, 2007) and given these associations, it is likely that individuals living with a chronic illness are at an increased risk of CPTSD.

Multiple Sclerosis (MS) and CPTSD

As previously highlighted, extensive research indicates that diagnosis of multiple chronic illnesses increases one`s risk of disability (Marengoni et al., 2011; Rijken et al.,, 2005), negatively impacts quality of life (Alonso et al., 2004; Djärv et al.,, 2012; Walker, 2007) and adversely alters self-reported health status (Galenkamp et al.,, 2011). Disturbances to one`s self-concept and ability to participate in social activities, caused by multiple chronic illnesses, are also highlighted as considerably distressing (Belgrave, 1990; Roberto & McCann, 2011). These negative consequences, associated with multiple chronic illnesses, are decidedly comparable to the consequences observed in specific degenerative chronic illnesses, particularly that of MS. The symptoms of MS are denoted by functional restriction and potential disabilities related with the illness (Mohr et al., 2004; Zorzon et al., 2001), which may increase the likelihood of social isolation, a reduced quality of life, and depression (Ford et al., 2001).

MS is the most immobilising neurological disease amongst young adults (Murray, 2006) and is defined as an inflammatory immune-mediated illness that affects an individual’s central nervous system (CNS) (Gourraud, Harbo, Hauser, & Baranzini, 2012). The typical period of MS onset is in individuals between 20 and 40 years of age (McDonald & Compston, 2006), causing disturbance to an individual's work, social, and family life. These instabilities are brought about due to common symptoms of the disorder ranging from variation in sensations, visual instabilities, difficulty with speech, swallowing disorders, bladder and bowel complications, exhaustion, and inability to regulate mood (Trisolini, Honeycutt, Wiener & Lesesne, 2010). Globally the prevalence rates of MS fluctuate greatly, with fewer than five cases per 100,000 in Asia, compared to Northern Europe and North America where it is estimated that MS is seen in 100-200 cases per 100,000 (Milo & Kahana, 2010). Subsequently, individuals of Northern European descent are of a greater risk of diagnoses (Goldenberg, 2012).

Currently, the aetiology of the illness is too complex to fully comprehend (Falk & Jacobson, 2017) however, it is agreed that mutual genetic vulnerability and non-heritable factors like environment, metabolism or a virus can combine to create an autoimmune disorder that repeatedly damages the CNS (Goldenberg, 2012). It is widely believed that the disorder`s incidence rate increases gradually with geographic latitude (Kurtzke, 2005), which subsequently places Ireland as a high-risk location for MS diagnoses. Pioneering research by Allison and Millar (1954) claimed that the prevalence rate of MS in Ireland was 73 cases per 100,000, with subsequent prevalence studies placing this figure as high as 290 cases per 100,000 in the most northern region of the country, that being, Donegal (Lonergan et al., 2011; McGuigan et al., 2004).

Individuals diagnosed with MS cluster into four categories, relapsing-remitting MS (RRMS), which is the most common type and is discernible by sudden flare-ups followed by a stage of remission and experienced by almost 80-85% of MS patients. About 65% of these individuals will progress to secondary progressive MS (SSMS) with symptoms of the illness continuing to worsen with periods of remission less likely (Balk et al., 2014). Around 10% present with primary-progressive MS (PPMS), where the trajectory of the illness continues to worsen from initial diagnosis with no remission, expect for plateaus in symptom severity. Finally, progressive-relapsing MS (PRMS) seen in less than 5% of patients is progressive from the beginning and is noticeable through sporadic flare-ups of worsening symptoms throughout the illness (Thompson et al., 2000). Similar to several other autoimmune diseases, MS has a higher prevalence rate in women compared to men, with a ratio of 2.6:1 for female to males (Eikelenboom, Killestein, Kragt, Uitdehaag & Polman, 2009). Despite this, men have poorer clinical outcomes (Koch, Kingwell, Rieckmann & Tremlett, 2010; Nicot, 2009) and report quicker illness stage progression than women (Khaleeli et al., 2008).

Symptoms associated with the condition, including tiredness, weakness, and cognitive deficiency have been associated with social isolation, a reduced quality of life, and depression (Ford, Gerry, Johnson, & Tennant, 2001). For patients diagnosed with MS, the lifetime occurrence for depression is approximately 50%, which is more than double that expected within the general population (Arnett & Randolph, 2006; Horwath, Johnson, Klerman, & Weissman, 1992). In light of the fact that MS is a degenerative illness, one would expect to observe a correlation between length of time living with the condition and poorer mental health. Surprisingly, shorter illness duration was associated with more negative mental health as research claims that the possibility of being diagnosed with depression is greatest in the first year subsequent to diagnosis (Chwastiak et al., 2002), and risk of suicide was more likely in the first 5 years after initial diagnosis (Stenager et al., 1992). Despite this, a number of studies have found no correlation between depression and the duration of MS (Möller, Wiedemann, Rohde, Backmund & Sonntag, 1994; Zorzon et al., 2001). Studies found that risk for depression was associated with functional restriction and potential disabilities related with the illness (Mohr et al., 2004; Zorzon et al., 2001). Nevertheless numerous other studies have not established a link between illness disability and depression (Patten, Beck, Williams, Barbui & Metz, 2003; Möller et al., 1994).

Recently, research has begun to focus on neurological illnesses and their possible connection to the development of PTSD (Qureshi et al., 2010; Yaffe et al, 2010). Despite this, within the area of neurodegenerative diseases, the condition of MS is one chronic illness not comprehensively explored, with only tentative steps made to investigate the association between PTSD and MS (Ostacoli et al., 2013). Currently, only three studies have investigated the likelihood of experiencing symptoms of PTSD subsequent to a diagnosis of MS and these have produced mixed findings (Chalfant, Bryant & Fulcher, 2004; Counsell, Hadjistavropoulos, Kehler, & Asmundson, 2013; Ostacoli et al., 2013). Chalfant, Bryant, and Fulcher (2004) conducted the first study into the presence of symptoms of PTSD in MS patients (N = 58) and found that 16% of these individuals met the criteria for PTSD diagnosis. Furthermore, 47% of participants reported having at least two symptoms related to re-experiencing, 62% reported having experienced two hyperarousal symptoms, and 75% displayed intrusive thoughts related to concerns regarding future prognosis, satisfying the re-experiencing criterion. Additionally, rates of depression were higher in those individuals who met the criteria for PTSD than those who didn`t and, PTSD severity was not significantly correlated to MS type such as the extremeness of symptoms or the length of time since initial diagnosis.

Expanding upon the above research, Counsell et al. (2013) set out to investigate how MS-related disability, stage of MS, and the period of the illness were related to symptoms of PTSD. Based on a sample of 126 MS patients, results indicated that 50% stated that they considered being diagnosed with the disease as at least somewhat traumatic. This finding appears to challenge the change to the DSM-

5 regarding PTSD and medical illnesses stating, “A life-threatening illness or debilitating medical condition is not necessarily considered a traumatic event. Medical incidents that qualify as traumatic events involve sudden, catastrophic events” (APA, 2013, p. 274). Furthermore, findings from this study show that when controlling for anxiety and depression, the only significant MS-related symptom associated with PTSD was that concerning potentially worse future MS-related disability. A subsequent study carried out by Ostacoli et al. (2013) showed that the prevalence of PTSD among MS patients was only 5.2%. Despite obtaining a relativity large sample (N = 232), findings from this study are limited by the fact that the majority of participants recruited reported a diagnosis of relapsing-remitting MS; the least severe form of the disorder. Therefore, the authors concluded that an assessment of how different MS types might predict PTSD diagnoses must be considered in future investigations.

A notable oversight in the aforementioned studies regarding PTSD and MS is that a noted limitation of all three studies is that, social isolation and loneliness, significant common risk factors highlighted within the trauma and chronic illness literature were not investigated. The importance of exploring the concept of loneliness and social isolation is evident throughout research into the association between MS and social withdrawal. A study of more than 600 MS patients by Beal and Stuifbergen (2007) highlighted that the broad collection of symptoms associated with the illness may result in an increased vulnerability for social exclusion/withdrawal, causing an alteration in the dynamics of both social and family contacts. For example, incontinence can cause diminished self-confidence and subsequently compel an individual to withdraw from social activities (Grimby, Milsom, Molander, Wiklund, & Ekelund, 1993; Wineman, 1990). Feeling of loneliness are also evident for individuals with MS, for example, women diagnosed with MS and who were not married reported greater feelings of loneliness that those who were married (Beal & Stuifbergen, 2007). Furthermore, another study found that MS patients regarded spouses or significant others as their principal source of social support (Stuifbergen, 1992). Exhaustion, present in 90% of MS patients, can also reduce an individual's level of social functioning (Janardhan, & Bakshi, 2002). Apprehension regarding one`s ability to walk or sudden loss of balance can force an individual to become housebound (Yorkston, Johnson & Klasner, 2005) and raise anxiety concerning stigmatisation (Grytten, & Måseide, 2006). Finally, unemployment status among MS patients said to be as high as 80% within a 10-year period of initial diagnosis and results in the loss, for many individuals, of a primary source of social connections (Chiaravalloti & DeLuca, 2008; Rao et al., 1991).

Evidence for an increased risk of CPTSD in individuals diagnosed with a chronic illness, and in particular MS, is observed in the additional symptom profile of the disorder, specifically those symptoms of disturbances in self-organization (DSO). These three additional symptoms concerning affective dysregulation (AD), negative self-concept (NSC) and dysfunctional relationships (DR) are commonly detected in individuals diagnosed with chronic illnesses. Affective dysregulation is consistently identified in studies relating to HIV-specific populations (Brandt, Gonzalez, Grover & Zvolensky, 2013). Deficits in ability to regulate emotions within this population are associated with the wide-ranging and detailed regular stressors of managing medical activities (Brandt et al., 2013), prevalent in MS populations and, numerous other chronic illnesses. Moreover, studies have highlighted that in chronic illnesses such as type 1 diabetes (T1D), hypoglycaemia underwrites an individual's failure to regulate emotions, and thus experience negative mood states (Young-Hyman et al., 2016). In addition, chronic pain, which is a characteristic of MS (Kalia & O` Connor, 2005) and numerous chronic illnesses, is linked to decreased mental flexibility (Karp et al., 2006). Subsequently, reduced mental flexibility may be accountable for an inability to regulate thoughts, feelings, and behaviours (Solberg Nes, Roach, & Segerstrom, 2009).

Self-concept is one`s essential underpinning for which all activities relating to the self are grounded and is extended to the presenting self (how an individual presents to others) (Rosenberg, 1979). Additionally, self-concept is also associated with self-preservation, conservation, and the development of one's self (Wilkins, 2000). Consequently, chronic illnesses that affect an individual's physical appearance, functional competencies, or societal responsibilities are believed to modify and even distort one`s self-concept (Bramble & Cukr, 1998; Falvo & Holland, 2017). For example, individuals living with rheumatoid arthritis (RA) may develop negative self-concepts as a direct consequence of physical alterations and limitations accompanying the illness. Furthermore, individuals are continuously forced to evaluate their self-concept as a result of the reactions of others in response to these physical changes (Lempp, Scott & Kingsley, 2006). This evidence suggests the undesirable potential of chronic illnesses to affect ones appearance, functional ability, social participation, and how they are perceived within their community. Taken together, it is evident that chronic illnesses, like MS, display numerous pathways that can negatively influence an individual's self-concept.

A recurrent characteristic of the majority of chronic illnesses is that the course of the illness is neither constant nor predictable (Livneh & Antonak, 2005). The continued alteration of an individual's prognosis, treatment, or illness severity may result in an individual's inability to construct personal significance. The term "perceived uncertainty in illness" was devised to describe an individual who is unable to form a cognitive representation of illness-related events (Mishel, 1981, p. 258). Moreover, decreased psychosocial adaptation in chronic illnesses such as cancer and MS are associated with not only uncertainty regarding illness symptoms and prognosis, but also uncertainty and disturbances in relationships with family members (Wineman, 1990). In addition, a number of individuals with a chronic illness may experience physical/emotional restrictions (Kessler, Ormel, Demler & Stang, 2003; Wells, Golding & Burnam, 1988) or the ability to care for themselves (Carlson, Riegel & Moser, 2001) which may require continuous support from family or friends in daily undertakings and finances. These circumstances disrupt the typical patterns of interaction between the individual and their social network. A number of studies highlight the adverse impact of these disturbances in relationship on the interaction, roles, and leisure of family members as a result of chronic illnesses (Thompson, Futterman, Gallagher-Thompson, Rose & Lovett, 1993; Schumacher, 1995; White-Means & Chang, 1994). Therefore, it is plausible that chronic illnesses, like MS, which are associated with disturbances in self-organisation (DSO) may increase the risk of experiencing symptoms of CPTSD in these populations.

Current Study

The current research project will contain two studies, with the first study focusing on mental health outcomes in chronic illnesses amongst older adults, while the second study will explore the psychological impact concerning the degenerative chronic illness of multiple sclerosis. Loneliness is highlighted as a recognised predictor across mental disorders (Bekhet, & Zauszniewski, 2012; (Cacioppo et al., 2010) and linked to numerous chronic illnesses (Boden-Albala et al., 2005; Thurston

& Kubzansky, 2009; Petitte et al., 2015). However, several studies claim that social isolation, linked to countless chronic illnesses (Barth et al., 2010; Bassuk et al., 1999; Cohen et al., 1997) and not loneliness, is a greater predictor of negative mental health outcomes (Bassuk et al., 1999; Cohen et al., 1997; Eng et al., 2002; Heffner et al., 2011; Holt-Lunstad et al., 2010). As a result, the first study will investigate how loneliness and social isolation impacts the mental health of older adults diagnosed with chronic illnesses. Similarly, a noted limitation of prior research into PTSD and MS (Chalfant et al., 2004; Counsell et al., 2013; Ostacoli et al., 2013) is that, social isolation and loneliness, mutual risk factors emphasised within the trauma and chronic illness literature were not investigated. Furthermore, conditions like MS are highly traumatic and evidence proposes that symptoms related to MS may amplified one`s vulnerability for social exclusion/withdrawal (Beal & Stuifbergen, 2007; Grimby et al., 1993; Wineman, 1990). Consequently, the second study will also investigate the role of loneliness and social isolation in predicting symptoms of CPTSD in MS populations.

Although rates of mortality are higher in males diagnosed with a chronic illness, females are more likely to report worse mental health, when living with a chronic illness (Denton, Prus, & Walters, 2004). Despite this, much-debate exists regarding gender differences in relation to social support, loneliness, and social isolation amongst chronic illness populations (House et al., 1988; Orth-Gomér et al., 1993; Orth- Gomer et al., 1988; Seeman et al., 2001; Shye et al., 1995; Thurston & Kubzansky, 2009). Therefore, the first study will examine gender discrepancies in relation to mental health outcomes amongst chronic illnesses populations. Conversely, it appears that some inconsistency exists regarding gender differences and specific chronic illnesses, particularly those of the degenerative nature.

Although the occurrence of MS diagnosis is greater in women (Eikelenboom, Killestein, Kragt, Uitdehaag & Polman, 2009), men are reported to have worse clinical outcomes (Koch, Kingwell, Rieckmann & Tremlett, 2010; Nicot, 2009) and report more rapid illness progression (Khaleeli et al., 2008). Several studies advocate that men experience more stigmatising effects, particularly in degenerative illnesses like arthritis (Charmaz, 1995; Verbrugge, 1985) and multiple sclerosis (MS) (Verbrugge & Wingard, 1987). Therefore, this second study will examine if the experience of stigmatising and degenerative chronic illnesses, like MS, impact males and females differently in relation to their mental health outcomes.

Finally, comprehensive research emphasizes the detrimental psychological outcomes from diagnosis and experiences of living with a single chronic illness (Bodenheimer et al., 2002; Newacheck, et al., 1991; Townsend et al., 2006; Wagner et al., 1996). However, insufficient studies highlight the experiences of those diagnosed with multiple chronic illnesses, despite the likelihood that adults with a single chronic illness will be diagnosed with multiple chronic illnesses as they transition into older adulthood (Clarke, & Bennett, 2013; Markle et al., 2015). Consequently, the first study will also explore the mental health outcomes of individuals diagnosed with a single chronic illness in comparison to individuals who experience living with multiple chronic illnesses. Similarly, the degenerative nature of a condition like MS would suggest a correlation between length of time living with the illness and poorer mental health. Two studies claim that risk for depression was associated with functional restriction and potential disabilities, both related with prolonged illness progression (Mohr et al., 2004; Zorzon et al., 2001). However, one study suggests that the risk of depression is greatest in the first year following diagnosis (Chwastiak et al., 2002). Nevertheless, numerous studies have failed to establish any relationship between mental health and the duration of time living with MS (Möller, Wiedemann, Rohde, Backmund & Sonntag, 1994; Zorzon et al., 2001). In light of this, the second study will explore if an association exists between the length of time since initial diagnosis and an individual's current mental health.

Social Factors and Mental Health Outcomes in Chronic Illnesses - Study 1

The overall aim of the first study is to examine the role of loneliness and social isolation in the mental health outcomes amongst older adults diagnosed with chronic illnesses. Additionally, the study will investigate a congested area of research regarding gender discrepancies among chronic illness populations. Finally, investigations will be carried out on the impact to the mental health of individuals who experience living with multiple chronic illnesses, in comparison to those diagnosed with a single chronic illness.

Rationale

The Impact of Social Factors on Mental Health in Chronic Illness Populations

Loneliness is a known significant predictor in psychological disorders such as anxiety (Bekhet, & Zauszniewski, 2012) and depression (Cacioppo et al., 2010), and has also been found to predict morbidity and mortality in adult populations (Luo et al., 2012; Perissinotto et al., 2012). Furthermore, numerous studies suggest that loneliness is linked with several chronic illnesses like heart disease, hypertension, stroke, metabolic syndrome, and diabetes (Boden-Albala et al., 2005; Thurston & Kubzansky, 2009; Petitte et al., 2015). Conversely, countless studies claim that individuals who are socially isolated or socially disconnected are more vulnerable to negative health outcomes than those who report or perceive feelings of loneliness (Bassuk et al., 1999; Cohen et al., 1997; Eng et al., 2002; Heffner et al., 2011; Holt-Lunstad et al., 2010). Social isolation has been linked to cognitive decline (Bassuk et al., 1999), cardiovascular disease (Barth et al., 2010), infection (Cohen et al., 1997) and mortality (Heffner et al., 2011; Udell et al., 2012). Furthermore, social isolation affects the health of all age groups (House et al., 1985), however, it is particularly perilous in older adults as they are more susceptible to disabilities, health issues (Brummett et al., 2001) and chronic illnesses (Lam & Perales, 2017; Ward, Schiller, & Goodman, 2014). This study will add significant findings to the literature concerning the impact of loneliness and social isolation on mental health outcomes.

Hypothesis

> *Loneliness, but not social isolation, will be significantly associated with increased levels of depression, psychological distress, and reduced levels of satisfaction with life.*

Gender Differences in Psychological and Social Factors of Chronically Ill Adults

Even though rates of mortality being higher in males diagnosed with a chronic illness, females are more likely to report greater levels of depression, distress and other psychiatric conditions, when living with a chronic illness (Denton, Prus, & Walters, 2004). For example, in COPD populations, women were twice as likely as men to report suffering from depression (Schneider, Jick, Bothner & Meier, 2010). Women were also more likely at be a greater risk for depression as the duration of the illness increased. Similarly, women displayed more symptoms of depression and poorer psychosocial adjustments, when compared to men in chronic illnesses like diabetes (Iida, Parris Stephens, Rook, Franks, & Salem, 2010), heart disease (Hunt-Shanks, Blanchard, Reid, 2009) and cancer (Baider, Perez, & De-Nour, 1989). Furthermore, women are anticipated to have longer life expectancies, worse health outcomes and suffer more debilitating chronic illnesses, in comparison to men (Denton et al., 2004; Warner, Roberts, Jeanblanc & Adams, 2019). Accompanying many of these chronic illnesses is the likelihood of functional impairments and the threat of disability, causing social isolation and reduced activity, both known risk factors for loneliness and depression. Therefore, it is plausible that women are at increased risk for experiencing depressive symptoms and reporting feelings of loneliness (Warner et al., 2019). Despite this, mixed findings have been produced regarding gender discrepancies in relation to social support, loneliness, and social isolation amongst chronic illness populations (House et al., 1988; Orth-Gomér et al., 1993; Orth- Gomer et al., 1988; Seeman et al., 2001; Shye et al., 1995; Thurston & Kubzansky, 2009).

Hypothesis

> *Males and females will differ in relation to their levels of social engagement, loneliness, psychological distress, depression, and satisfaction with life. It is expected that females will have higher levels of loneliness, psychological distress, and depression and while having lower levels of satisfaction with life and social engagement.*

Multiple Chronic Illnesses and Mental Health

Extensive research exists underlining the adverse psychological impact of suffering a single chronic illness (Bodenheimer et al., 2002; Newacheck, et al., 1991; Townsend et al., 2006; Wagner et al., 1996). Nevertheless, few studies concentrate on the experiences of individuals diagnosed with multiple chronic illnesses or the probability that older adults with a single chronic illness will be diagnosed with multiple chronic illnesses as they age (Clarke, & Bennett, 2013; Markle et al., 2015). Recent research suggests that those with 4 or more chronic illnesses, display greater levels of depressive symptoms when compared to individuals with 2 to 3 chronic illnesses and, those with a single chronic illness (Seo, Choi, Kim, Lee, & Oh, 2017). However, the risk for suffering symptoms of depression with each additional illness was only detected in middle-aged adults and not in older adults. Conversely, this conclusion is disputed in a study examining the effect that number of chronic illnesses has on the mental health of older adults (Buttorff et al.,, 2017). Findings propose that diagnosis of additional chronic illnesses did adversely impact the mental health of older adults. Furthermore, individuals diagnosed with five or more chronic illnesses had greater functional, cognitive, and social limitations than individuals with three or four chronic illnesses (Buttorff et al., 2017). Presently, the relationship between multimorbidity and mental health is not well understood (Clarke & Bennett, 2013; McDaid et al.,2013). Therefore, determining how the number of chronic illnesses influences an individual's mental health remains an essential area of scientific investigation.

Hypothesis

> *The number of chronic illnesses will influence an individual's levels of depression, psychological distress, and satisfaction with life. It is hypothesised that individuals diagnosed with multiple chronic illnesses will have higher levels of depression, psychological distress, and lower satisfaction with life compared to those diagnosed with a single chronic illness.*

Methods

Participants and Procedures

For study 1, the English Longitudinal Study of Ageing (ELSA) was utilised. ELSA is a nationally representative sample of community-dwelling males and females above the age of 50 from England. Participants for the study were obtained from respondents to the Health Survey for England (HSE). The first ELSA interviews (Wave 1) were carried out in 2002 and contained a core representative sample of 11,392 individuals. Participants were interviewed every two years; completing computer-assisted interviews followed by a self-completion questionnaire and also received a nurse assessment every four years. To avoid issues of attrition, ELSA was replenished with new study participants from the HSE at Wave 3 (2006), Wave 4 (2008), Wave 6 (2012), and Wave 7 (2014) so as to maintain sample size and representativeness.

The current study utilised Wave 3 of ELSA as this wave included a life history interview that obtained information regarding children, partnerships, significant health issues, and negative life events. Participants were asked if they had been diagnosed, by a doctor, with a range of chronic illnesses like asthma; arthritis; a cancer or a malignant tumour; chronic lung disease; diabetes; high blood pressure or hypertension; stroke or a range of heart problems. Wave 3 contained a total of 9,771 individuals but for the purpose of the current study, only individuals who reported a diagnosis of one or more chronic illnesses were selected.

Measures

Self-Report General Health: A self-report measure of general health was obtained in the ELSA dataset by asking participants to choose the description that best describes their current health status amongst 5 items ranging from "very good" (1), "good" (2), "fair" (3), "bad"(4), or "very bad" (5).

Social Engagement: A measure of social engagement was calculated using an index of 'social detachment' from ELSA by means of 8 items (Jivraj, Nazroo, & Barnes, 2012; Kobayashi, Wardle, & von Wagner, 2015). Participants were asked about their societal involvement (items 1-4) with questions related to their involvement in political parties, tenants 'groups, charities and religious organisations. For social/recreational activities (items 5-8), participants were asked about their membership in education groups, social assemblies, sports clubs and any other organisation, club or society. The eight items were based on a "yes" (1) or "no" (0) response format. A summed total score was calculated with higher scores indicating greater social engagement.

Loneliness: In wave 3 of ELSA, loneliness was measured by means of the 5 item version of UCLA Loneliness Scale (Russell, 1996) which measures subjective feelings of loneliness. Participants were asked: "*how often do you feel you lack companionship?*", "*how often do you feel left out?*", "*how often do you feel isolated from others?*", "*how often do you feel in tune with the people around you?*" and "*how often do you feel lonely?*". These items were assessed on a 3-point scale (0 = hardly ever; 1 = some of the time; 2 = often). Total scores ranged from 0-10 with higher scores signifying greater feelings of loneliness. The scale has a test-retest reliability of .73 over a one-year period and demonstrates convergent validity with other measures of loneliness (Russell, 1996). For the present study, internal reliability was satisfactory (α= .79).

Depression: To measure depression, a revised 8-item version of the Center for Epidemiological Studies-Depression Scale (CESD-8) (Radloff, 1977) was used. The CES-D- 8 is a revised version of the full, 20 item version of the CED. The CESD- 8 measures the occurrence and severity of emotions and behaviours over the previous week (Radloff, 1977). Participants were asked to specify how frequently they 1) "*felt depressed*", 2) "*felt everything they did was an effort*", 3) "*had restless sleep*", 4) "*were happy*", 5) "*felt lonely*", 6) "*enjoyed life*", 7) "*felt sad*", and 8) "*could not get going*". Possible responses to the questions were "yes" (1) or "no" (0) and scores ranged from 0-8, with higher scores signifying higher levels of depression. A cut-off point of three is frequently utilised to indicate the potential presence of depression (Han, 2002; Turvey, Carney, Arndt, Wallace, & Herzog, 1999). Previous studies report Cronbach`s alpha levels .81 in male participants and .85 in female participants (Van de Velde, Bracke, Levecque, & Meuleman, 2010). The internal reliability of the CESD-8 among the current sample was acceptable (α = .81).

Psychological Distress: The General Health Questionnaire (GHQ) is a measure of current mental health status and it has been widely used in diverse settings and cultures. A shortened, 12-item version of the General Health Questionnaire (GHQ-12; Goldberg & Williams, 2000) was used in ELSA to measure psychological distress. The GHQ-12 is commonly accepted as a reliable and valid scale of psychological distress (Montazeri et al., 2003). Participants were asked if they had recently experienced abnormal thoughts, feelings, or behaviour (e.g., difficulties sleeping, diminished confidence, continually under strain). Participants respond to the GHQ-12 items with respect to their current state using a four-point

Likert scale: "*much less than usual*", "*less than usual*", "*same as usual*" and "*better than usual*". For the 12 items, six questions are positively worded while the remaining six are negatively worded. In the current study, each item is rated on a four-point scale (1–4), with the most positive responses scored as one and the most negative responses scored as four. Previous studies suggest a cut-off score of 24 (12 points above the lowest possible score) to interpret mean scores (Quinn, Carr, Carroll, & O'Sullivan, 2007). Therefore, scores ranged from 12-48 with a score of 24 and above indicating higher levels of psychological distress. The internal reliability of the GHQ-12 among the current sample was satisfactory (α = .89)

Satisfaction with Life: To assess life satisfaction, ELSA used the 5-item Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985). The SWLS is intended to calculate an individual's global life satisfaction instead of associated constructs of well-being (e.g., positive affect) (Diener et al, 1985). Participants report their overall satisfaction with life by indicating the extent to which they agree or disagree with the following five statements: "*In most ways, my life is close to my ideal*", "*The conditions of my life are excellent*", "*I am satisfied with my life*", "*So far I have got the important things I want in life*" and "*If I could live my life again, I would change almost nothing*". Items are rated on a scale ranging from 1 ("strongly agree") to 7 ("strongly disagree"). Scores ranged from 5-35 with higher scores indicating lower satisfaction with life. Diener et al. (1985) suggests that a score above 20 indicates an individual's dissatisfaction with life. Neto (1993) reports that the SWLS has adequate psychometric properties (Cronbach's a = .78). The internal reliability of SWLS among the current sample was excellent (α = .90).

Statistical Analysis

All data analyses were carried out using SPSS version 23. In advance of analyses, the data was checked for errors and subsequently cleaned to ensure it was constant and coherent. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. Additionally, the correlations between the predictor variables included in the study were examined. All correlations were weak-to-moderate, ranging between $r = .01$, to $r = .33$, (see Table 8). Further, all VIF values were below 4 indicating that multicollinearity was unlikely to be a problem (O` Brien, 2007). All predictor variables were statistically correlated with depression, psychological distress, and satisfaction with life, which indicates that the data was suitably correlated with the criterion variables for examination by multiple linear regression.

Gender Differences in Psychological and Social Factors of Chronically Ill Adults - Independent samples t-tests were performed as a means of assessing if males and females differed in relation to their scores for social engagement, loneliness, depression, psychological distress, and satisfaction with life. To control for the increased likelihood of Type 1 error due to multiple testing, a Bonferroni adjustment was applied for these analyses. The alpha level for determining statistical significance for these analyses was therefore $p < .01$ (i.e., .05 / 5 = .01). Cohen’s d was used to measure the magnitude of the differences between males and females, and d values up to .40 indicate a small effect, values from .50 to .80 indicate a medium effect, and values greater than .80 indicate a large effect.

Multiple Chronic Illnesses and Mental Health - To examine differences in scores on the mental health outcomes across individuals diagnosed with a single chronic illness, those with 2-3 chronic illnesses, and those diagnosed with 4-5 chronic illnesses, one-way between groups analysis of variance (ANOVA) tests were conducted.

The Impact of Social Factors on Mental Health in Chronic Illness Populations - Finally, standard multiple regression analyses was performed to investigate the relationship between the independent variables (demographics, self-reported health, social engagement, and loneliness) and the dependent variables (depression, psychological distress, and satisfaction with life).

Results

Table 1 represents the descriptive statistics for the demographic variables from 3,771 participants (38.6%) who indicated having a chronic illness and these respondents were included in the final analysis. The age range of this sample was 50 - 99 years (Mean = 69.50, SD = 10.21) with 36.7% (*n* = 1,383) males (Mean = 69.38, SD = 9.56) and 63.3% (*n* = 2,388) females (Mean = 69.57, SD = 10.48). The majority of respondents were retired (62.8%), married/cohabiting (62.2%), and 25.3% reporting having a college education. The majority of participants (74.6 %) reported fair general health with 11.7% reporting bad general health.

Table 1

Descriptive Statistics of Categorical Demographic Variables

Variable	Frequency	Valid Percentage
Gender		
Male	1383	36.7
Female	2388	63.3
Employment		
Employed/Self Employed	705	18.7
Retired	2370	62.8
Unemployed/Sick/Other	696	18.5
Relationship Status		
Married/Cohabitating	2359	62.6
Single	1412	37.4
Education		
College	952	25.3
School	1400	37.1

No qualification	1417	37.6
Ethnicity		
White	3696	98.0
Non-white	74	2.0
Self-Reported General Health		
Very good	504	13.7
Fair	2737	74.6
Bad	428	11.7

Table 2 reports the descriptive statistics for social engagement, loneliness, depression, psychological distress, and satisfaction with life in the ELSA dataset. These results highlight that levels of social engagement (Mean= 1.15, SD = 1.37) and loneliness (Mean = 2.68, SD = 2.44) were low, on average. In relation to mental health, while the current sample had low levels of depression (Mean = 1.99, SD = 2.18), a psychological distress score of 27.92 (SD = 2.67), indicates that the sample displayed high levels psychological distress, on average, and had mean satisfaction with life scores in the moderate range (Mean = 16.06, SD = 6.85).

Table 2

Descriptive Statistics for Social Engagement, Loneliness, Depression, Psychological Distress and Satisfaction with Life

	N	M	SD	Range	Cut off	%
Social Engagement	3771	1.15	1.37	0-8	-	
Loneliness	3117	2.68	2.44	0-10	≥ 6	11%
Depression	3066	1.99	2.18	0-8	≥ 3	30%
Psychological Distress	3066	27.92	2.67	12-48	≥ 24	80%
Satisfaction with Life	3047	16.06	6.85	5-35	≥ 20	23%

Comparing Gender Differences in Social Engagement, Loneliness, Depression, Psychological Distress and Satisfaction with Life

Independent samples t-tests were conducted to compare social engagement, loneliness, depression, psychological distress, and satisfaction with life scores between males and females (see table 3). There was a significant difference in levels of depression (*t* (3654) = -7.72, *p* < .001, two-tailed), with females (Mean = 2.19, SD = 2.26) scoring higher than males (Mean = 1.64, SD = 2.00). Similarly, there was a significant difference for feelings of loneliness (*t* (3115) = -6.29, *p* < .001 two-tailed), with females (Mean = 2.88, SD = 2.22) scoring higher than males (Mean = 2.34, SD = 2.53). There was also significant difference in psychological distress (*t* (3654) = -7.63, *p* < .001 two-tailed), with females (Mean = 28.20, SD = 2.66) scoring higher than males (Mean = 27.50, SD = 2.62).

For satisfaction with life scores differences between males (Mean = 15.70, SD = 6.74) and females (Mean = 16.27, SD = 6.90) did not reach the level of statistical significance following the application of the Bonferroni adjustment (*t* (3045) = -2.23, *p* = .026 two-tailed). Finally, there was no significant difference between males (Mean = 1.12, SD = 1.31) and females (Mean = 1.18, SD = 1.40) in scores of social engagement (*t* (3769) = -1.30, *p* = .193 two-tailed). The magnitude of the differences in the means for social engagement, loneliness, depression, psychological distress, and satisfaction with life scores between males and females was small (Cohen's *d* - .00 to .03).

Table 3

Results of T-Tests Comparing Gender in Scores of Depression, Loneliness, Psychological Distress, Satisfaction with Life and Social Engagement

	Male			Female					
	N	M	SD	N	M	SD	*t*	*p*	*d*
Depression	1324	1.64	2.00	2327	2.19	2.26	-7.72	<.001***	.03
Loneliness	1142	2.34	6.74	1975	2.88	6.90	-6.29	<.001***	.01
Psychological distress	1136	27.45	2.62	1430	28.20	2.66	-7.63	<.001***	.03
Satisfaction with life	1127	15.70	6.74	1420	16.27	6.90	-2.23	.026*	.01
Social Engagement	1383	1.12	1.31	2388	1.18	1.40	-1.28	.201	.00

Statistical significance: **p* <.05; ***p* < .01; ****p*< .001.

The impact of multiple chronic illnesses on depression: The number of chronic illnesses was split into three groups; those with a single chronic illness, individuals diagnosed with 2-3 chronic illnesses, and individuals with 4-5 chronic illnesses. There was a statistically significant difference between the three groups: *F* (2, 3653) = 97.50, *p* < .001. The effect size, calculated using eta squared, was .05.

Post-hoc comparisons were conducted using Tukey's HSD, and found significant (*p* < .001) pairwise differences across all groups (see Table 4). Those with 4-5 chronic illnesses had the highest levels of depression and those who had 1 chronic illness had the lowest levels of depression.

Table 4

ANOVA Comparisons of Depression and Number of Chronic Illnesses

				Tukey's HSD Comparisons	
Group	*n*	Mean	*SD*	1 Chronic illness	2-3 Chronic illnesses
1 Chronic illnesses	2,683	1.71	2.02		
2-3 Chronic illnesses	938	2.73	2.41	<.001	
4-5 Chronic illnesses	35	4.04	2.34	< .001	< .001

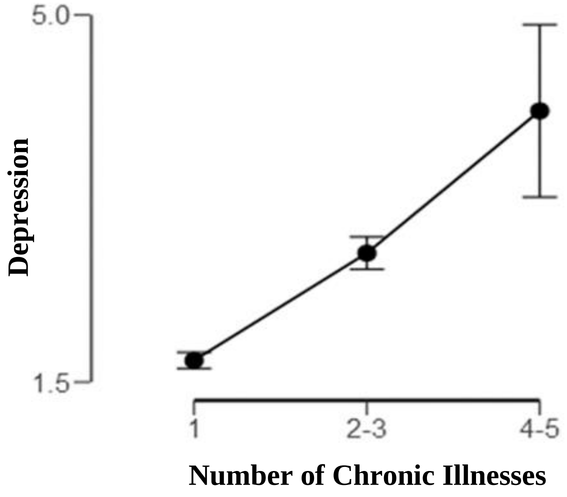

Figure 1. Means plot for number of chronic illnesses and levels of Depression. Illustrating that individuals with multiple chronic illnesses reported higher levels of depression.

The impact of multiple chronic illnesses on psychological distress: There was a statistically significant difference between the three groups: *F* (2, 3063) =

20.88, *p* < .001. The effect size, calculated using eta squared, was .01. Post-hoc comparisons using Tukey's HSD indicated that those with one chronic illness had the lowest levels of psychological distress (see Table 5). There was no significant difference between those with 2-3 and 4-5 chronic illnesses.

Table 5

ANOVA Comparisons of Psychological Distress and Number of Chronic Illnesses

				Tukey's HSD Comparisons	
Group	*n*	Mean	*SD*	1 Chronic illness	2-3 Chronic illnesses
1 Chronic illnesses	2295	27.74	2.63		
2-3 Chronic illnesses	743	28.45	2.71	<.001	
4-5 Chronic illnesses	28	28.57	2.46	.203	.967

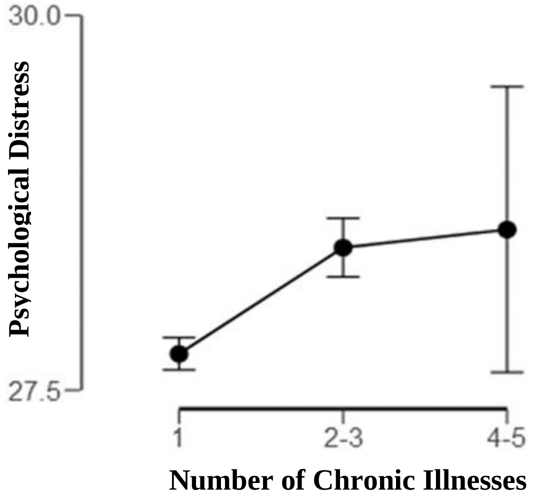

Figure 2. Means plot for number of chronic illnesses and levels of psychological distress. Illustrating that individuals with multiple chronic illnesses reported higher levels of psychological distress.

The impact of multiple chronic illnesses on satisfaction with life: There was a statistically significant difference between the three groups: *F* (2, 3044) =

34.49, *p* < .001. The effect size, calculated using eta squared, was .02. Post-hoc Tukey HSD comparisons indicated that there was a statistical significance difference (*p* < .001) between those with one chronic illness (Mean = 15.50, SD = 6.50), those with 2-3 chronic illnesses (Mean = 17.67, SD = 7.55) and those with 4-5 chronic illnesses (Mean = 20.69, SD = 7.88). However, there was no significant difference (*p* = .060) between those with 2-3 chronic illnesses and those with 4-5 chronic illnesses.

Table 6

ANOVA Comparisons of Satisfaction with Life and Number of Chronic Illnesses

				Tukey's HSD Comparisons	
Group	*n*	Mean	*SD*	1 Chronic illness	2-3 Chronic illnesses
1 Chronic illnesses	2,290	15.50	6.50		
2-3 Chronic illnesses	730	17.67	7.55	<.001	
4-5 Chronic illnesses	27	20.59	7.88	< .001	.060

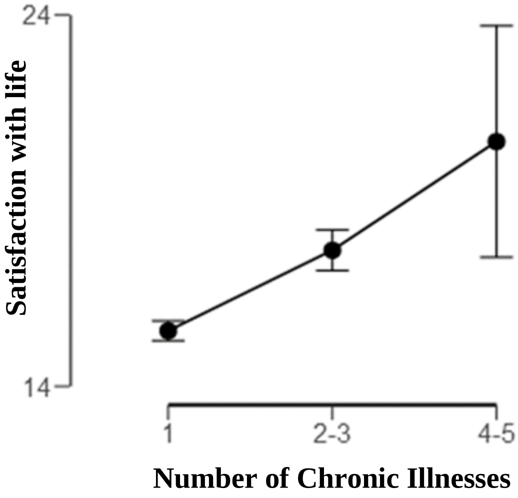

Figure 3. Means plot for number of chronic illnesses and satisfaction with life. Illustrating that individuals with multiple chronic illnesses reported lower scores on satisfaction with life.

Investigating the Impact of Gender, Age, Relationship Status, Self-report Health, Social Engagement, and Loneliness on Mental Health Outcomes

Standard multiple regression analysis was performed to investigate how gender, age, relationship status, self-report health, social engagement, and loneliness are related to levels of depression, psychological distress, and satisfaction with life, respectively (see Table 8 for full details). A post hoc power analysis was conducted using Post-hoc Statistical Power Calculator for Multiple Regression software package (Soper, 2019). The sample size of 3,771 and 6 predictor variables were utilized for the statistical power analyses. The alpha level used for this analysis was $p < .01$, as well the coefficient of determination for $R^2 = .37$, $R^2 = .22$, and $R^2 = \cdot 31$. All post hoc analyses revealed the statistical power for this study was 1.0. Thus, there was more than adequate power in comparison to the recommended .80 benchmark.

Table 7

Bivariate Correlations Between all Variables Included in the Standard Multiple Regression

Variables	1	2	3	4	5	6	7	8	9
1. Depression	1								
2. Psychological Distress	.42**	1							
3. Satisfaction with Life	.50**	.37**	1						
4. Age	.05**	-.20**	-.09**	1					
5. Sex [a]	.12**	.14**	.04**	.01	1				
6. Relationship [b]	.25**	.01	.26**	.32**	.24**	1			
7. Self-reported General Health	.40**	.13**	.29**	.06**	-.04**	.11**	1		
8. Social Engagement	-.19**	-.01	-.12**	-.08**	.02	-.10**	-.24**	1	
9. Loneliness	.53**	.39**	.51**	.05**	.11**	.33*	.24**	-.16**	1

Note: [a] reference group = Males; [b] reference group = Married/Co-habiting. Statistical significance: *$p < .05$; **$p < .01$; ***$p < .001$.

Depression: Since no *a priori* hypotheses had been made to determine the order of entry of the predictor variables, a direct method was used for the multiple linear regression analysis. The six independent variables explained 37% of variance in levels of depression (*F* (6, 3107) = 311.13, *p* < .001). In the final model, gender, relationship status, self-reported general health, social engagement, and loneliness were statistically significantly associated with depression, but age was not. Loneliness recorded the strongest standardized beta value (β = .43, p < .001), followed by self-reported general health (β = .28, *p* < .001), gender (β = .08, *p* < .001), relationship status (β = .06, *p* < .05), and social engagement (β = -.05, *p* < .001).

Psychological Distress: The six independent variables explained 22% of variance in psychological distress scores (*F* (6, 2989) = 138.22, *p* < .001) and in the final model all variables were statistically significant. Once again, loneliness recorded the strongest standardized beta value (β = .40, *p* < .001), followed by gender (β = .19, *p* < .001), age (β = -.19, *p* < .01), relationship status (β = -.09, *p* < .001), self-reported general health (β = .08, *p* < .001), and social engagement (β = .05, *p* < .001).

Satisfaction with Life: Finally, the six independent variables explained 31% of variance in the satisfaction with life scores (*F* (6, 2978) = 228.00, *p* < .001) and in the final model all independent variables with the exception of gender and social engagement were statistically significant. Loneliness was, once again, most strongly associated with satisfaction with life scores (β = .43, *p* < .001), followed by self-reported general health (β = .18, *p* < .001), age (β = -.16, *p* < .01) and relationship status (β = .12, *p* < .01).

Table 8

Multiple Regression Models Predicting Depression, Psychological Distress, and Satisfaction with Life.

	Depression			**Psychological Distress**			**Satisfaction with Life**		
	β (95% CI)	**B**	**SE**	**β (95% CI)**	**B**	**SE**	**β (95% CI)**	**B**	**SE**
R^2	**.37*****			**.22*****			**.31*****		
F (df)	**311.13 (6, 3107)**			**138.22 (6, 2989)**			**228.00 (6, 2978)**		
Sex (female)[a]	.08*** (.02/.47)	.34	.07	.12***(.47/.84)	.66	.09	-.01(-.81/.07)	-.37	.22
Age	-.02 (-.01/.00)	-.00	.00	-.19***(-.06/-.04)	-.05	.00	-.16***(-.13/-.09)	-.11	.01
Relationship Status (Single)[b]	.06***(.14/.43)	.28	.07	-.09*** (-.71/-.30)	-.51	.10	.12***(1.22/2.19)	1.70	.25
Self-reported General Health	.28***(.60/.74)	.67	.04	.08***(.12/.31)	.22	.05	.18***(1.10/1.57)	1.33	.12
Social Engagement	-.05**(-.13/-.03)	-.08	.02	.05**(.04/.17)	.10	.03	-.00(-.17/.14)	-.01	.08
Loneliness	.43*** (.36/.41)	.39	.01	.40***(.40/.48)	.44	.02	.44***(1.13/1.32)	1.23	.05

Note: [a] reference group = Males; [b] reference group = Married/Co-habiting; β (95% CI) = standardized beta value with 95% confidence intervals.

Statistical significance: **p* <.05; ***p* < .01; ****p*< .001.

Findings and Implications

The Impact of Social Factors on Mental Health in Chronic Illness Populations

As a means of examining specific social factors that may be associated with mental health varibables, study one hypothesized that loneliness would be a stronger predictor of negative mental health in the current sample of chronically ill individuals than social isolation. The results of the multiple regression analyses found that loneliness was most strongly associated with depression, psychological distress, and satisfaction with life. This supports the hypothesis that within a chronic illness population of older adults, loneliness has a greater association with negative mental health outcomes than social isolation. Several prior studies have emphasized the role of social factors and negative mental health within chronic illness populations (Lam & Perales, 2017; Petitte et al., 2015; Reblin & Uchino, 2008; Thurston & Kubzansky, 2009; Ward et al., 2014). The current finding is comparable to previous literature showing that the subjective experience of social isolation - loneliness - is robustly correlated with negative health outcomes (Cacioppo et al., 2000; Doane & Adam, 2010; Hackett et al., 2012; Hawkley et al., 2010; Perissinotto et al., 2012). Additionally, the current sample was composed of individuals diagnosed with a variety of chronic illnesses. The present finding is also consistent with several studies observing an association between loneliness and a wide range of chronic illnesses (Boden-Albala et al., 2005; Cox et al., 2006; Löfvenmark et al., 2009; Nausheen et al., 2007; Norman et al., 2011; Momtaz et al., 2012; Tobo-Medina & Canaval-Erazo, 2010). Despite the current sample reporting low levels of both loneliness and social engagement, loneliness was still the strongest predictor across a range of negative mental health outcomes.

These findings challenge prior studies indicating that social isolation may be the strongest predictor for adverse mental health in chronic illness populations (Bassuk et al., 1999; Cohen et al., 1997; Eng et al., 2002; Heffner et al., 2011; Holt-Lunstad et al., 2010). This result is important as it adds valuable understanding to the clinical significance of loneliness in the field of chronic illnesses, particularly for older adults. In view of the current sample displaying mean levels of psychological distress beyond what is considered normal for the general population (Goldberg & Williams, 1988), it highlights the need to identify feelings of loneliness for what may be considered a vulnerable group. Theeke and Mallow (2013) suggest that training clinicians in the assessment of feelings of loneliness is essential. Clinicians are frequently the first point of contact for chronically ill patients and, this may be an important opportunity to identify those most in need of assistance and prevent the adverse effect of loneliness.

Gender Differences in Psychological and Social Factors of Chronically Ill Adults

The current study also sought to explore gender differences amongst the current sample of older adults with chronic illnesses and it was hypothesized that females would have worse levels of mental health compared to males. This hypothesis was supported, as findings concluded that there was a significant gender difference among the current sample, with females reporting poorer scores in relation to their levels of depression, loneliness, and psychological distress. These findings are consistent with previous literature suggesting that among chronic illness populations women are more likely to report feelings of loneliness (Thurston & Kubzansky, 2009), to have greater levels of depression and to have worse psychological adjustment (Denton et al., 2004; Iida et al., 2010; Schneider et al., 2010). Previous literature has highlighted gender differences in mental health however these findings were limited to specific chronic illnesses like heart disease and cancer (Baider et al., 1989; Hunt-Shanks et al., 2009; Macabasco-O'Connell et al., 2010). The importance of the current findings is that it is one of few studies to establish that women report significantly worse mental health outcomes across a broad range of chronic illnesses. Although the current study's hypothesis was supported, it is essential to clarify that the effect sizes for these gender differences were all of a small magnitude. Therefore, these results stress the need for clinicians to be cognisant of a slightly increased risk of mental health problems among female populations however such differences may not be practically or clinically significant and therefore clinicians should also be aware of the mental health difficulties of their male patients. From a clinical standpoint, the present study supports the need for recommending psychological interventions that are aimed at both men and women with chronic illnesses. In light of this conclusion, a treatment like mindfulness-based stress reduction (MBSR) has been shown to lessen feeling of depression and anxiety while developing greater coping abilities across a variety of chronic illnesses, for both males and females (Grossman, Niemann, Schmidt & Walach, 2004; Speca, Carlson, Goodey & Angen, 2000).

Multiple Chronic Illnesses and Mental Health

The present study also investigated how the number of chronic illnesses may affect an individual's mental health. It was hypothesised that individuals diagnosed with multiple chronic illnesses would have greater levels of depression, psychological distress, and satisfaction with life when compared to those with a single chronic illness. This hypothesis was partially supported, as it was detected that there was a continuous increase in levels of depression between the three groups as the number of chronic illnesses increased. Those reporting four or five chronic illnesses having higher levels of depression than individuals reporting two or three chronic illnesses do and subsequently, those reporting two or three chronic illnesses having higher levels of depression than those with a single chronic illness. This finding was not repeated for levels of distress or satisfaction with life. Although those with two or three chronic illnesses reported higher levels of distress than those with one chronic illness, there was no difference between those with two or three chronic illnesses and those with four or five chronic illnesses. Similarly, those with one chronic illness reported greater scores than those with two or three chronic illnesses in satisfaction with life. However, there was no difference in satisfaction with life scores between those reporting two or three chronic illnesses and those diagnosed with four or five chronic illnesses. In light of these findings, it is important to state that these results must be interpreted with caution as the cross-sectional nature of the current study stipulates that causality cannot be determined. Previous research on the impact of mental health in the event of an individual being diagnosed with multiple chronic illnesses is not well understood (Clarke & Bennett, 2013; McDaid et al., 2013). One study suggests that, compared to middle-aged adults, older adults are less likely to experience adverse mental health when diagnosed with additional chronic illnesses (Seo et al., 2017). However, this sample was obtained from a Korean community health survey where attitudes towards reporting symptoms of depression are negatively viewed (Turvey, Jogerst, Kim, & Frolova, 2012). Therefore, results may not be generalizable to older adults in western cultures. The results of the current study are more comparable to Buttorff et al.`s (2017) recent findings that, numerous undesirable outcomes linked to depression such as functional, cognitive, and social limitations, are observed in older cohorts who experience an increase in their number of chronic illnesses. The significance of the current finding is that it emphasises the risk of adverse mental health for older adults diagnosed with multiple chronic illnesses and the increased threat of depression for each additional chronic illness. However, the small effect sizes between the groups is not sufficient to suggest that those with the most number of chronic illnesses experienced meaningfully worse mental health than those with fewer chronic illnesses. Despite this, these findings may increase the need for awareness, for both patients and clinicians, of the threat of living with multiple chronic illnesses and the future risk for depression in the likelihood of being diagnosed with additional illnesses. Numerous studies have also highlighted a paucity in research that offers a comprehensive understanding of the association between mental health and multiple chronic illness (Clarke, & Bennett, 2013; Markle et al., 2015). The implications of these findings are that they add valuable insight into the experience of individuals living with multiple chronic illnesses. A recent systematic review found that traditional interventions, aimed at individuals with single chronic illnesses, fail to address the requirements of those with multiple chronic illnesses (Hopman et al., 2016). The clinical implication of the current findings is that they extend support to calls for future studies to investigate effective interventions targeting those diagnosed with additional chronic illnesses.

Traumatic Experiences and Social Factors in Multiple Sclerosis - Study 2

Individuals diagnosed with multiple chronic illnesses share mutual experiences to those diagnosed with specific degenerative chronic illnesses, for example, threat of disability (Marengoni et al., 2011; Rijken et al.,, 2005), reduced quality of life (Alonso et al., 2004; Djärv et al.,, 2012; Walker, 2007) functional restriction (Mohr et al., 2004; Zorzon et al., 2001) and depression (Ford et al., 2001). In light of this, the aim of the second study is to examine the impact of loneliness and social isolation in predicting symptoms of CPTSD in MS populations. In addition, this study will investigate if males and females differ in their experience of stigmatising and degenerative chronic illnesses, particularly MS, in relation to their mental health outcomes. Finally, the study will explore the relationship between mental health and the length of time since initial diagnosis.

Rationale

The Impact of Trauma, Loneliness, and Social Connectedness on Symptoms of Complex Posttraumatic Stress Disorder

A significant oversight and a noted limitation of all three previous studies regarding PTSD and MS (Chalfant et al., 2004; Counsell et al., 2013; Ostacoli et al., 2013) is that, social isolation and loneliness, noteworthy common risk factors emphasised within the trauma and chronic illness literature were not explored. Furthermore, a diagnosis of a condition like MS is highly traumatic and evidence suggests the wide-ranging collection of symptoms associated with MS may result in an amplified vulnerability for social exclusion/withdrawal within this population (Beal and

Stuifbergen, 2007; Grimby et al., 1993; Wineman, 1990). Therefore, investigating the role of loneliness and social connectedness and the subsequent development of a disorder like CPTSD in MS poulations is crucial.

Hypotheses

> *In a sample of MS patients, higher levels of traumatic exposure, lower levels of social connectedness, and higher levels of loneliness will be associated with increased levels of CPTSD.*

Gender Differences in loneliness, social connectedness, and symptoms of CPTSD amongst Multiple Sclerosis Populations

Women are at increased risk for negative mental health outcomes among chronic illness populations (Baider et al., 1989; Denton et al., 2004; Hunt-Shanks et al., 2009; Iida et al., 2009; Roberts et al., 2019; Schneider et al., 2010; Warner et al., 2019). However, irregularity exists regarding gender differences and specific chronic illnesses. To date, only two studies have investigated gender differences in loneliness among MS populations (Beal & Stuifbergen, 2007; Rokach, 2004) and neither of these studies incorporated validated measures of loneliness (Balto et al., 2019). Despite the prevalence rate of MS being higher in women (Eikelenboom et al., 2009), men have poorer clinical outcomes (Koch et al., 2010; Nicot, 2009) and faster illness stage progression (Khaleeli et al., 2008). Furthermore, men experience more stigmatising effects, particularly in degenerative illnesses like arthritis (Charmaz, 1995; Verbrugge, 1985) and multiple sclerosis (MS) (Verbrugge & Wingard, 1987). MS is associated with various stigmatising characteristics (Trisolini et al., 2010) and, subsequently, individuals experiencing these symptoms, particularly men, may experience reduced self-confidence and be forced to withdraw from social activities (Grimby et al., 1993; Wineman, 1990). Conversely, epidemiological research shows females are two times more likely to develop symptoms of PTSD in the aftermath of experiencing a traumatic event (Breslau et al., 1998; Kessler, Sonnega et al.,, 1995). In addition, meta-analysis suggests that females are at greater risk for developing PTSD despite the fact that males experienced greater number of traumatic events in their lifetime (Tolin & Foa, 2006). Therefore, it is plausible that males maybe at an increased risk of loneliness, when diagnosed with stigmatising and restrictive degenerative chronic illnesses like MS, however females are more likely to display symptoms of CPTSD.

Hypotheses

In an MS sample, males and females will differ in relation to their levels of loneliness, social connectedness, and CPTSD. It is expected that males will have higher levels of loneliness and have lower levels of social connectedness, while females will have higher levels of CPTSD.

Illness Duration and Symptoms of Complex Posttraumatic Stress Disorder

Research into a relationship between mental illness and the duration since an individual was diagnosed with MS is unclear. Considering that MS is a degenerative illness, it would be anticipated that there would be a positive correlation between length of time living with the illness and worse mental health. However, several of studies have found no association between depression and the duration of MS (Möller, Wiedemann, Rohde, Backmund & Sonntag, 1994; Zorzon et al., 2001) while one study suggests that the likelihood of depression is greatest in the first year following diagnosis (Chwastiak et al., 2002). Therefore, investigating how the traumatic experience of being diagnosed with a chronic illness will add clarity to the uncertainty regarding the impact of MS duration on mental health.

Hypotheses

> *The number of years since MS diagnosis will predict levels of CPTSD. It is hypothesised that for those recently diagnosed with MS will have increased levels of CPTSD.*

Methods

Participants

For study 2, a sample of 32 individuals who were diagnosed with MS were recruited. Four of these individuals were excluded as they had failed to complete the survey, resulting in a final sample of n = 28.

Procedures

All participants for the current study were recruited through the Multiple Sclerosis Society of Ireland. Multiple Sclerosis patients within the MS Society of Ireland, who agree to partake in research relating to the condition, are issued a monthly newsletter. A research article outlining the current study`s recruitment of potential participants was published in the monthly newsletter circulated by the MS Society of Ireland. The article provided an overview of the present study and provided potential participants with information regarding their involvement. The options outlined for partaking in the study was a link to the Qualtrics survey software that was accessed through the online monthly newsletter. Alternately, participants could directly contact the researcher to request obtaining a paper-and-pencil booklet, which could be returned to the researcher. All participants chose the Qualtrics survey software online link format as the preferred means of partaking in the study. All participants were provided with an information sheet regarding the nature and objectives of the study. Furthermore, participants were assured about issues of confidentiality and that participation in the study would in no way affect their current or future treatment. No requirements to partake in the study were placed upon prospective participants nor were any incentives utilised to recruit individuals. Ethical approval for the current study was obtained from both the Maynooth University research ethics committee and the MS Society of Ireland.

Measures

Demographic Information and Illness Characteristics: Participants were required to answer a number of demographic related questions, for example, *"What is your sex?"* (Male/Female), *"Where do you live"* (City, Suburb, Urban town, Semi-rural environment, Rural environment) and *"What is your Date of Birth?".* Participants were also required to indicate information relating to their MS diagnosis. As a means of obtaining data regarding the duration an individual had been living with the illness, participants were asked *"In what year were you diagnosed with Multiple Sclerosis?".* To establish the MS stage with which participants were currently diagnosed with, participants were asked *"What stage is your current Multiple Sclerosis diagnosis?"* to which possible responses included *"Relasping-remitting", "Primary-progressive", "Secondary-progressive" or "Progressive-relasping".*

Traumatic Exposure: The Life Events Checklist for DSM-5 (LEC-5: Weathers et al., 2013) is a 17-item self-report measure of an individual's exposure to lifetime trauma. The LEC-5 evaluates one`s lifetime exposure to 16 traumatic events (e.g., Life-threatening illness/injury, Sexual assault, Physical assault) along with a 17th item, "*Any other very stressful event/experience*", employed to capture an experience of a trauma not otherwise listed. Possible responses to the questions include "*happened to me*", "*witnessed it*", "*learned about it*", "*part of my job*", "*not sure*", and "*doesn't apply*". In the current study, responses were dichotomised to reflect direct experience of the traumatic event (if a person indicated that the event "happened to me" or "witnessed it") (1) or not (all other responses) (0). Scores ranged therefore from 0-17. For the present study, internal reliability was satisfactory (α = .78).

Social Network Index: The Social Network Index (SNI: Cohen et al., 1997) measures an individual across 12 types of diverse social relationships. These comprise of interactions with a spouse, parents, parents-in-law, children, other close family members, close neighbours, friends, workmates, schoolmates, fellow volunteers, members of groups without religious affiliation, and religious groups. One point is allocated for each type of relationship for which respondents indicate that they communicate with (in person or on the phone) at a minimum of once every two weeks. The maximum SNI score is 12. Three groups of social network diversity were created based on the SNI score: a score between 1–3 signifies a “limited” social network, scores between 4–5 signify a “medium” social network, and a score greater than 6 signifies a “diverse” social network. The internal reliability of the SNI among the current sample was α = .91.

Complex PTSD: The International Trauma Questionnaire (ITQ: Cloitre et al., in press) is a 12-item, self-report measure of ICD-11 CPTSD symptomatology. Six of these items represent the core PTSD symptoms of re-experiencing in the here and now (items 1-2), avoidance (items 3-4) and sense of threat (items 5-6). The remaining six items capture the ‘Disturbances in Self-Organisation’ symptoms of affective dysregulation (items 7-8), negative self-concept (items 9-10), and disturbances in relationships (items 11-12). Possible responses to the questions were: "*not at all*" (0), "*a little bit*" (1), "*moderately*" (2), "*quite a bit*" (3) and "*extremely*" (4). Scores can range from 0-48 and higher scores indicate greater CPTSD symptomatology. For the present study, internal reliability was satisfactory (α = .89).

Loneliness: A short version of the original 11-item De Jong Gierveld Loneliness Scale (DJGLS) (De Jong & van Tilburg, 2006) containing 6 items was used in the current study to measure loneliness. Three questions measure emotional loneliness and these items are negatively phrased: "*I experience a general sense of emptiness*", "*I miss having people around me*" and "*I often feel rejected*". Three items measure social loneliness and these items are positively phrased: "*There are plenty of people that I can lean on when I have problems*", "*There are many people that I can count on completely*" and "T*here are enough people that I feel close to*". Possible responses to items are: "*yes*" (1), "*more or less*" (2) and "*no*" (3) providing a possible scoring range of 6-18. Hansen and Slagvold (2015) claim that choosing a cut-off score of 12 and above helps capture more serious and problematic level of loneliness, therefore, a score greater than 12 indicates an extreme global sense of loneliness. The internal reliability of the DJGLS among the current sample was α = .86.

Statistical Analysis

All data analyses were carried out using SPSS version 23. In advance of analyses, the data was checked for errors and subsequently cleaned to ensure it was constant and coherent. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. Additionally, the correlations between the predictor variables included in the study were examined. All correlations were weak-to-moderate, ranging between r = -.01, to r = .47, (see Table 13). Further, all VIF values were below 4 indicating that multicollinearity was unlikely to be a problem (O` Brien, 2007). In relation to the predictor variables, only loneliness was statistically correlated with Complex PTSD.

Gender Differences in loneliness, social connectedness, and symptoms of CPTSD amongst Multiple Sclerosis Populations - Independent samples t-tests were conducted to investigate if males and females differed in relation to the number of lifetime traumas experienced, feelings of loneliness, social connectedness, and levels of CPTSD. To control for the increased likelihood of Type 1 error due to multiple testing, a Bonferroni adjustment was applied for these analyses. The alpha level for determining statistical significance for these analyses was therefore $p < .0125$ (i.e., .05 / 4 = .0125). Cohen's *d* was used to measure the magnitude of the differences between males and females, and d values up to .40 indicate a small effect, values from .50 to .80 indicate a medium effect, and values greater than .80 indicate a large effect.

Illness Duration and Symptoms of Complex Posttraumatic Stress Disorder - To explore the relationship between the number of years living with multiple sclerosis and symptoms of CPTSD, a one-way between groups ANOVA was conducted.

The Impact of Trauma, Loneliness, and Social Connectedness on Symptoms of Complex Posttraumatic Stress Disorder: - Finally, standard multiple regression analysis was performed to examine the relationship between the independent variables (demographics, number of traumatic experiences, social connectedness, and loneliness) and the dependent variable relating to levels of CPTSD.

Results

Table 9 represents the descriptive statistics for the demographic variables from the participants included in the analysis. The participants ranged in age from 21 - 67 years (Mean = 43.68, SD = 11.08), with 31.1% (*n* = 9) being male (Mean = 40.44, SD = 9.50) and 67.9% (*n* = 19) being female (Mean = 45.21, SD = 11.68). The majority of participants resided in rural areas (35.7%), with 21.4% in urban towns or semi-rural areas (17.9%), and the remaining living in suburbs (10.7%) and city areas (14.3%). The majority of participants indicated having a relapse-remitting (85.7%) diagnosis of MS with one participant reporting a primary-progressive (3.1%) diagnosis, and three participants diagnosed with secondary-progressive (10.7%).

Table 9

Participant Demographic and Characteristics

Variable	Frequency	Valid Percentage
Gender		
Male	9	32.1
Female	19	67.9
Residency		
City	4	14.3
Suburb	3	10.7
Urban town	6	21.4
Semi-rural environment (village)	5	17.9
Rural environment (countryside)	10	35.7
Current MS Stage		
Relapsing-remitting	24	85.7

Primary-progressive	1	3.6
Secondary-progressive	3	10.7

Table 10 illustrates the descriptive statistics for Complex PTSD, number of traumas experienced, social connectedness, and loneliness among patients with MS. Participants reported a mean number of traumatic life events of 3.64 (SD = 2.80). Only 6% of the current sample reported experiencing a single trauma, and 34% experienced five or more traumatic events. The current sample reported moderate levels of Complex PTSD (Mean = 19.07, SD = 9.10). Furthermore, participants displayed moderate levels of social connectedness (Mean = 4.61, SD = 3.72) and moderate feelings of loneliness (Mean = 11.75, SD = 3.30).

Table 10

Descriptive Statistics for Complex PTSD, Number of Traumas Experienced, Social Connectedness, Loneliness

	N	M	SD	Range	Cut off	%
Complex PTSD	28	19.07	9.10	0-48	-	
Number of Traumatic Experiences	28	3.64	2.80	0-17	-	
Social Connectedness	28	4.61	3.72	0-12	≤ 3	44%
Loneliness	28	11.75	3.30	6-18	≥ 12	34%

Examining Gender Differences in Traumas, Loneliness, Social Connectedness and Complex-PTSD

Independent samples t-tests were conducted to determine if males and females differed in relation to the number of traumas experienced, feelings of loneliness, social connectedness and levels of Complex-PTSD. There was a significant difference between males and females in number of traumas experienced (*t* (26) = -2.72, *p* = .003) two-tailed, with females (Mean = 4.53, SD = 2.82) scoring higher than males (Mean = 1.78, SD = 1.56). The magnitude of the differences in the means (mean difference = -2.75, 95% CI: -4.83 to -.67) was large (Cohen`s *d* = 1.21). Despite females having experienced more traumatic events than males, there was no significant difference for loneliness, social connectedness, or Complex PTSD (see Table 11 for full details).

Table 11

Results of Independent Samples T-Tests Comparing Males and Females on Scores of Complex PTSD, Loneliness, Social Connectedness and Number of Traumas Experienced

	Male			Female					
	N	M	SD	N	M	SD	*t*	*p*	*d*
Complex PTSD	9	19.22	7.33	19	19.00	10.01	.060	.953	.00
Loneliness	9	11.78	2.49	19	11.74	3.60	.031	.980	.00
Social Connectedness	9	3.11	3.14	19	5.32	3.83	-1.50	.150	.06
Number of Traumas Experienced	9	1.78	1.56	19	4.53	2.82	-2.72	.003**	1.21

Statistical significance: **p* <.05; ***p* < .01; ****p*< .001.

Number of years living with Multiple Sclerosis and Complex PTSD: The number of years was split into three groups; those who were diagnosed within the last 5 years, those living with MS for 6-10 years, and those who have had the condition for 10 years or more. There was no statistically significant difference between the three groups: (*F* (2, 25) = .50, *p* = .610). The effect size, calculated using eta squared, was .04. Post-hoc comparisons were conducted using Tukey's HSD, and found no significant pairwise differences across all groups (see Table 12). Those diagnosed with multiple sclerosis within the last 5 years (Mean = 21.30, SD = 8.80) were not significantly different in scores of Complex PTSD from those living with the condition for 6-10 years (Mean = 18.56, SD = 4.30) and those who had the condition for more than 10 years (Mean = 17.11, SD = 12.76).

Table 12

ANOVA Comparisons of Number of Years with Multiple Sclerosis and Symptoms of Complex-PTSD

				Tukey's HSD Comparisons	
Number of years with Multiple Sclerosis	N	Mean	SD	1-5 years	6-10 years
1-5 years	10	21.30	8.80		
6-10 years	9	18.56	4.30	.797	
10 years or more	9	17.11	12.76	.594	.942

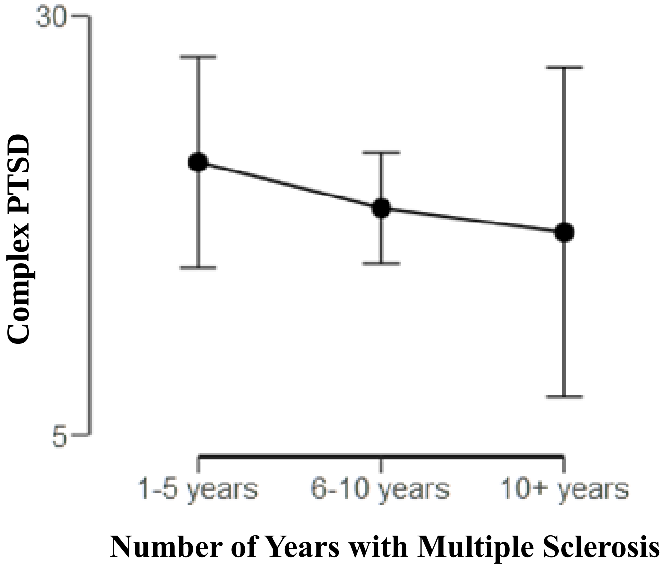

Figure 1. Means plot for number of years diagnosed with MS and symptoms of CPTSD. Illustrating that individuals diagnosed with MS within the last 5 years, did not differ significantly from those living with the condition for 6-10 years and those who had the condition for more than 10 years.

Examining the Impact of Gender, Age, Trauma, Social Connectedness, and Loneliness in Complex PTSD.

Standard multiple regression analysis was performed to investigate how gender, age, number of traumatic experiences, social connectedness, and loneliness were related to Complex PTSD. A post hoc power analysis was conducted using Post-hoc Statistical Power Calculator for multiple regression software package (Soper, 2019). The sample size of 28 and 5 predictor variables was utilized for the statistical power analyses. The alpha level used for this analysis was $p < .01$ as well the coefficient of determination $R^2 = .58$. The post hoc analyses revealed the statistical power for this study was .79, thus, despite the low sample size study two was approaching adequate statistical power in comparison to the recommended .80 benchmark.

Table 13

Bivariate Correlations Between all Continuous Variables

Variables	1	2	3	4	5	6
1. Complex PTSD	1					
2. Gender	-.12	1				
3. Age	-.30	.21	1			
4. Number of Traumatic Experiences	.24	.47**	.29	1		
5. Social Connectedness	-.16	.28	.31	.45**	1	
6. Loneliness	.77***	-.01	-.19	.28	.03	1

Note: Statistical significance: *p <.05; **p < .01; ***p< .001.

Complex PTSD: The results of the multiple regression results are reported in Table 13. The five independent variables explained 58% of variance in Complex PTSD scores (F (5, 22) = 8.40, $p < .001$) and loneliness ($\beta = .69$, $p < .001$) was the only independent variable statistically significantly associated with Complex PTSD.

Table 14

Multiple Regression Model Predicting Complex PTSD

	R^2	***β***	***B***	***SE***	**CI 95% (B)**
Model	.58***				
Gender		-.00	-.08	2.57	-5.40 / 5.25
Age		-.16	-.12	.16	-.34 / .10
Number of Traumatic Experiences		.19	.56	.49	-.46 / 1.58
Social Connectedness		-.21	-.48	.32	-1.14 / .19
Loneliness		.69***	1.94	.39	1.14 / 2.74

Note. Statistical significance: **p* < .05; ***p* < .01; ****p* < .001

Findings & Implications

The Impact of Trauma, Loneliness, and Social Connectedness on Symptoms of Complex Posttraumatic Stress Disorder

The second study aimed to address paucity in the literature regarding the relationship between social factors and the traumatic experiences of individuals diagnosed with MS. Study two hypothesized that a higher level of loneliness, higher levels of traumatic exposure and lower levels of social connectedness would be related to a relatively new condition, CPTSD in a sample of MS patients. The hypothesis for study two was partially supported, as loneliness was significantly and positively associated with CPTSD but the number of traumatic experiences and levels social connectedness were not. Considering the limited sample size, results from this study must be interpreted with prudence. However, the current finding of an association between loneliness and CPTSD is generally consistent with the literature in the field of traumatology indicating a positive association between trauma exposure, PTSD, and feelings of loneliness (Macleod, 1994; Solomon, & Mikulincer, 2006; Solomon et al., 1991). Equally, the experience of loneliness has been frequently recognised in MS populations (Beal & Stuifbergen, 2007; Rokach, 2004). Despite prior research supporting the current findings by indicating that posttraumatic symptoms may develop in particular neurological illnesses (Qureshi et al., 2010; Yaffe et al, 2010), only three studies have examined the probability of suffering symptoms of PTSD within MS patients and these have produced varied results (Chalfant et al., 2004; Counsell et al., 2013; Ostacoli et al., 2013). In light of this, the current study focused on the likelihood that symptoms of CPTSD might manifest in individuals diagnosed with MS. The reason for this is that in addition to the core trauma-based symptoms, CPTSD consists of symptoms of an inability to regulate emotions, an adverse self-concept, and a propensity to avoid interpersonal relations (De Jongh et al., 2016). These experiences are also shared among patients diagnosed with chronic illnesses (Ellis-Hill & Horn, 2000; Solberg Nes, et al., 2009; Simmons et al., 2007). Despite this, no studies have examined the possibility of MS population's exhibiting symptoms of CPTSD. The implications of these findings are that they may provide much-needed clarity to a rather muddled and limited area of research concerning traumatology and chronic illnesses. Furthermore, the present study is the first to establish a possible relationship between feelings of loneliness and the likelihood of experiencing symptoms of CPTSD in a sample of MS suffers. From a clinical perspective, the current findings highlight the need to offer interventions aimed at lessening feelings of loneliness in MS populations. Interventions aimed at improving self-efficacy, which has a strong link with improved social functioning in patients with MS (Amtmann et al., 2012) and traumatic recovery (Cieslak et al., 2009), have been shown to provide individuals with the capability to avoid and manage feelings of loneliness.

Gender Differences in loneliness, social connectedness, and symptoms of CPTSD amongst Multiple Sclerosis Populations

Study two also examined if gender differences existed in the current sample of MS patients in relation to loneliness, social connectedness, and symptoms of CPTSD. It was hypothesised that males would have higher levels of loneliness, lower levels of social connectedness, while females would report higher levels of CPTSD. The results of the present study found that for individuals diagnosed with MS, there was no significant difference between males and female in their levels of CPTSD, loneliness and social connectedness. Therefore, the first hypothesis for study two was not supported. It is worth noting that this finding may be reflective of the uneven nature of the sample as the present study recruited almost twice as many females in comparison to male participants. Prior research has indicated that in MS populations men have poorer clinical outcomes than women (Koch et al., 2010; Nicot, 2009) while other studies highlight the role of social support for reducing feelings of loneliness, particularly in women (Beal & Stuifbergen, 2007; Stuifbergen, 1992). However, this finding is surprising and not consistent with previous literature suggesting that men suffer greater stigmatising effects of being diagnosed with a chronic illness compared to women (Charmaz, 1995), predominantly in degenerative illnesses like arthritis (Verbrugge, 1985) and multiple sclerosis (MS) (Verbrugge & Wingard, 1987). However, one study investigating gender differences in relation to types of trauma did conclude that for non-malignant diseases gender variance was moderate, while for chronic illnesses gender difference were small (Ditlevsen & Elklit, 2012).

Illness Duration and Symptoms of Complex Posttraumatic Stress Disorder

Finally, study two also investigated if the number of years living with MS impacted one`s levels of CPTSD. It was hypothesized that those recently diagnosed with MS would have greater symptoms of CPTSD than those living with the condition for longer periods. In the current sample, individuals diagnosed with MS in the last five years did not differ significantly from those living with the condition for 6-10 years and those who had the condition for more than 10 years. Therefore, the third hypothesis for study two was not supported. These results suggest that those most recently diagnosed are not more traumatised than individuals living with the condition for longer periods. This finding has been observed in previous research that suggests no association exists between negative mental health and time elapsed since first diagnosis (Möller et al., 1994; Zorzon et al., 2001). Furthermore, these studies suggested that disability accompanying the progression of MS is the strongest indication of subsequent negative mental health and not illness duration (Mohr et al., 2004; Zorzon et al., 2001). Considering that the majority of participants in the current sample reported a relapse-remitting diagnosis of the illness, the least immobilising, it is unlikely that disability would have been associated with mental health. Interestingly, despite the current study not detecting a significant difference between the three groups, it is worth noting that those diagnosed within the last five years did report higher mean levels of CPTSD than the other two groups. Furthermore, levels of CPTSD continued to decrease the longer time had elapsed since the first diagnosis of the illness, with those living with MS the longest displaying the lowest mean levels of CPTSD. Given the small sample size, it is plausible that individuals diagnosed within the last five years may be at greater risk for CPTSD but the study`s lack of statistical power was unable to detect this effect. This increased risk to mental health for those recently diagnosed has been observed in other MS studies that suggest the threat of adverse mental health is greatest at the initial diagnosis of the illness (Chwastiak et al., 2002; Stenager et al., 1992). Similarly, an increased risk for negative mental health outcomes at primary diagnosis is also seen in other chronic illnesses like cancer (Grassi, Malacarne, Maestri & Ramelli, 1997). In MS populations, prior studies also observed a lessening in symptoms of depression for those living with the illness for longer periods when compared to individuals most recently diagnosed (Chwastiak et al., 2002; Patten et al., 2000). Furthermore, it is suggested that individuals diagnosed with MS may adapt constructive coping mechanisms as the duration of the illness increases (Chwastiak et al., 2002). The significance of the current research is that it may highlight the need for clinicians to be more cognisant of the threat to individuals recently diagnosed. Given the degenerative nature of MS, those with extensive illness duration and disability are commonly considered the most vulnerable, while those recently diagnosed and without signs of disability are considered least susceptible to adverse mental health. Calls for this awareness of clinicians are supported by a recent study recommending psychological interventions aimed at newly diagnosed MS patients. The treatment concentrates on building resilience and problem-solving coping to decrease the feeling of depression, anxiety and avoidance (Tan-Kristanto & Kiropoulos, 2015).

General Discussion

In the Republic of Ireland, 11% of individuals aged 50 and over experience being diagnosed with two or more chronic illnesses. This number increases to 18% for similar adults in Northern Ireland (Savva & McDaid, 2011). In addition, extensive research places Ireland as a high-risk setting for a diagnosis concerning the degenerative chronic illness of MS (Allison & Millar, 1954; Kurtzke, 2005; Lonergan et al., 2011; McGuigan et al., 2004). Research indicates that those living with multiple chronic illnesses share mutual experiences to individuals diagnosed with a degenerative chronic illness like; functional restrictions, disability, threat of social limitations and depression (Alonso et al., 2004; Djärv et al., 2012; Ford et al., 2001; Marengoni et al., 2011; Mohr et al., 2004; Rijken et al.,, 2005; Walker, 2007; Zorzon et al., 2001). The current research, derived from two distinct samples of chronically ill adults, investigated how social factors affects the mental health outcomes of individuals diagnosed with single and multiple chronic illness and, similarly, how social factors influence the traumatic experiences of individuals living with a degenerative chronic illness, like MS.

The Impact of Social Factors on Mental Health in Chronic Illness Populations

An extensive body of research supports the relationship between adverse mental health and chronic illness diagnosis (Cassano & Fava, 2002; Cassileth et al., 1984; Chapman et al., 2005; Noël et al., 2004). Additionally, it is suggested that the absence of social connectedness may increase the likelihood of multimorbidity as research demonstrates that, individuals living alone are diagnosed with more chronic illnesses when compared to those living with a significant other (Savva & McDaid, 2011). Therefore, the first study was performed to examine how specific social factors concerning social support, loneliness, and social isolation influences the mental health of older adults diagnosed with at least one chronic illnesses. The results of this study demonstrated that loneliness was most strongly associated with depression, psychological distress, and satisfaction with life amongst chronically ill older adults.

The Impact of Trauma, Loneliness, and Social Connectedness on Symptoms of Complex Posttraumatic Stress Disorder

Similarly, loneliness and social isolation is evident throughout research into the association between MS and social withdrawal. Symptoms associated with the illness may increased vulnerability for social exclusion/withdrawal, causing an alteration in the dynamics of both social and family contacts (Beal & Stuifbergen, 2007). Incontinence, linked to the illness, can cause diminished self-confidence and subsequently compel an individual to withdraw from social activities (Grimby et al.,1993; Wineman, 1990). Despite loneliness and social isolation being common risk factors for disorders like PTSD, to date only three studies have investigated the impact loneliness and social on symptom of PTSD in MS populations (Chalfant et al., 2004; Counsell et al., 2013; Ostacoli et al., 2013). In light of this, the second study also examined how social factors might predict mental health outcomes in a relatively novel traumatic condition like CPTSD; in a specific chronic illness, population of MS suffers. Comparable to the findings observed in study one, a relationship was also detected between feelings of loneliness and symptoms of CPTSD in a sample of patients diagnosed with MS, as loneliness was significantly and positively associated with CPTSD.

Gender Differences in Psychological and Social Factors of Chronically Ill Adults

Despite significantly more men dying from chronic illnesses, women report greater levels of depression, distress and other psychiatric conditions, subsequent to being diagnosed with a chronic illness (Denton et al., 2004). Women were also more likely to be at a greater risk for depression as the duration of the illness increased and exhibited worse psychosocial adjustments across numerous chronic illnesses ((Baider et al., 1989; Hunt-Shanks et al., 2009; Iida et al., 2010). Additionally, in comparison to men, women are estimated to have longer life expectancies, worse health outcomes and suffer more debilitating chronic illnesses (Denton et al., 2004; Warner, Roberts et al., 2019). In light of this, the first study sought to explore gender differences in relation to mental health outcomes amongst a sample of older adults with chronic illnesses. The results of this study concluded that there was a significant gender difference among the current sample, with females reporting worse scores in relation to their levels of depression, loneliness, and psychological distress.

Gender Differences in loneliness, social connectedness, and symptoms of CPTSD amongst Multiple Sclerosis Populations

Conversely, these gender differences are not observed in all chronic illnesses and may manifest differently in illnesses that are degenerative in nature. The incidence of MS diagnosis is higher in women than men (Eikelenboom, et al., 2009) and, worse clinical consequences and quicker illness stage development are detected in males (Khaleeli et al., 2008; (Koch et al., 2010; Nicot, 2009). Furthermore, several studies indicate that men suffer more stigmatising effects in deteriorating illnesses like arthritis (Charmaz, 1995; Verbrugge, 1985) and multiple sclerosis (MS) (Verbrugge & Wingard, 1987). Comparable to study one, the second study also examined if gender differences existed in the current sample of MS patients in relation to their loneliness, social connectedness, and symptoms of CPTSD. It was found that for individuals diagnosed with MS, there was no significant difference between males and female in their levels of CPTSD, loneliness and social connectedness.

Multiple Chronic Illnesses and Mental Health

The consequences of being diagnosed with multiple chronic illnesses share mutual characteristics to a diagnosis of a degenerative chronic illness, like MS, in that they both affect functional ability, reduce an individual's capacity for social interaction and, increase the risk of disability and depression. It is suggested that this threat of functional, cognitive, and social limitations associated with multiple chronic illnesses, commonly seen in older adults as they age, negatively impacts mental health (Buttorff et al., 2017). Conflicting research suggests, that it is not the threat of functional, cognitive, and social restrictions that negatively impact mental health, but rather an inability of the individual to adjust psychologically to being diagnosed with multiple chronic illnesses (Seo et al., 2017). The first study examined if functional, cognitive, and social restrictions associated with multiple chronic illnesses negatively impacts an individual's mental health. The results of this study indicated that those individuals with the most chronic illnesses displayed an increase in levels of depression. Subsequently, having four or five chronic illnesses was associated with higher levels of depression than individuals reporting two or three chronic illnesses were and, those reporting two or three chronic illnesses had higher levels of depression than those with a single chronic illness.

Illness Duration and Symptoms of Complex Posttraumatic Stress Disorder

A similar debate exists concerning MS populations as studies suggest that as the illness duration increases the likelihood of functional, cognitive and social limitations intensifies which negatively affects one`s mental health (Mohr et al., 2004; Zorzon et al., 2001). Conversely, other studies propose that the risk to mental health of those diagnosed with MS, is greatest in the first year and, similar to a diagnosis of multiple chronic illnesses, and is associated with a failure to adjust psychologically (Chwastiak et al., 2002; Stenager et al., 1992). In light of this, the second study explored if an individual's inability to psychologically adjust to being diagnosed with a degenerative illness, like MS, was associated with an increased risk for negative mental health. Results from the second study indicated that, individuals diagnosed with MS in the last five years did not differ meaningfully from those living with the condition for 6-10 years and those who had the condition for more than 10 years. These findings indicate that those most recently diagnosed with a condition such as MS, are no more distressed than individuals living with the condition for extensive periods.

The current findings offer important contributions to existing theories of mental health regarding loneliness, social factors, and chronic illness research. Numerous studies highlight the stress-buffering hypothesis' (Cohen & Wills, 1985) which advocates the beneficial effects of social support during periods of extreme stress. For example, cancer survivors profited from supportive social networks and exhibited fewer intrusive beliefs concerning their illness when compared to less supported individuals (Carpenter et al., 2010). For diabetes sufferers, superior social support was related to healthier glycemic control (Okura et al., 2009). The current study underlines the importance of the stress-buffering hypothesis, as overall, participants in study one displayed low levels of social engagement, while subsequently 80% of this sample reported high levels of psychological distress. These findings concur with the stress-buffering hypothesis by indicating that a lack of social support in chronically ill individuals is associated to negative mental health outcomes.

The current study also adds noteworthy contributions to research concerning loneliness, mental health, and trauma in chronic illness populations. Lynch's (1977) innovative research was one of the earliest indications that associated health consequences to the experience of loneliness. Lynch (1977) theorised that the impact of loneliness correlated directly with an individual's health behaviours, morbidity, and mortality. Consequently, recent research suggests that loneliness is associated with numerous chronic illnesses (Petitte et al., 2015). Loneliness is also extensively highlighted and recognised in the context of trauma and PTSD. Several studies have identified loneliness to be positively related with posttraumatic symptoms amongst diverse populations (Solomon et al., 2015). The current research contributes to previous findings highlighting the role of loneliness in negatively impacting the mental health of chronically ill adults. In the first study, loneliness was associated with depression, psychological distress, and satisfaction with life in chronically ill older adults. Similarly, the second study also highlighted loneliness as being significantly and positively associated with CPTSD. This study adds essential findings to a limited area of research concerning the role of loneliness and trauma in MS population and, it is one of the first studies to explore the impact of loneliness on the novel and distinctive condition of CPTSD.

Strengths and Limitations

A major strength from study one was the use of a sample of chronically ill older adults who were drawn from a large nationally representative of sample of older English adults. This was beneficial to the current study as all findings are therefore highly generalizable and likely to represent the experiences of community-dwelling older Irish adults with chronic illnesses reasonably well. Another strength of this research project was that study two was the first to investigate symptoms of CPSTD in patients diagnosed with MS. Furthermore, it was the first study to examine potential traumatic experiences in MS sufferers in the Republic of Ireland, which is considered a high-risk location (Lonergan et al., 2011; McGuigan et al., 2004).

As in all research undertakings, this study contained a number of limitations that need to be addressed. Similar to previous studies, it proved difficult to recruit participants from MS populations (Chalfant et al., 2004), and the sample obtained for study two was relatively small. Consequently, this limitation may have increased the possibility of Type II errors and thus biasing the results of the study. The consequence of Type II errors in the current sample is that it may limit the interpretability and generalisability of the results. Although a larger sample would have been desirable, practical and time restrictions related to accessing this population limited the number of participants that were ultimately recruited. In addition, both the secondary dataset used in study one and the primary dataset used in study two contained a number of self-report measures. Although good internal reliability was found across all measures used, it must be acknowledged that the results obtained from self-reported measures are commonly viewed with caution. One concern arising from using self-report measures is common method variance or measurement bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Spector, 2006). This is the view that the variance detected can be credited to the method rather than the constructs actually being measured and may contribute to both Type I and Type II errors.

The English healthcare system available to participants in the ELSA dataset, used in the first study, is unlike that experienced by Irish adults. Therefore, caution must be taken as to the extent these findings represent an Irish population of chronically ill individuals. The ELSA sample utilised in study one included a majority (98%) of English, older white adults, who were chronically ill. Therefore, the results of the present study may not be generalizable to other ethnic groups or younger aged cohorts. Also, the participants recruited for study two were drawn from an MS population within the Republic of Ireland, therefore, the cross-cultural generalizability of these findings are also restricted. Comparable to previous studies relating to MS (Ostacoli et al., 2013) the current study obtained more females than males and was restricted to individuals diagnosed with the least distressing stage of MS (relapse-remitting). Therefore, it is unlikely that results from the current study are generalizable in relation to both gender difference or to MS patients with more aggressive forms of the illness. These limitations are likely due to women having higher prevalence rates of the illness than men and that MS patients at more advanced stages of the illness being incapable of participating in such research. Finally, due to the cross-sectional design utilised in the current study, it is impossible for causation to be inferred from the results of this research.

Future Directions

Future studies would benefit from obtaining a larger and more diverse illness stage progression in MS populations. Previous studies in these cohorts have experienced difficulty with both small sample sizes and recruiting samples that report all four stages of the illness (Chalfant et al., 2004; Ostacoli et al., 2013). Achieving a larger sample would allow a greater understanding and interpretation of the findings while subsequently improving the generalisability of future findings concerning MS patients. Furthermore, in light of the degenerative nature of MS, prospective studies that could obtain all four stages of the MS illness would permit greater examination of mental health outcomes as the illness progresses. Future research should consider longitudinal design studies as previous studies suggest worse mental health outcomes are associated with disability (Möller et al., 1994; Zorzon et al., 2001). Utilising this approach can help to clarify how mental health is affected by the likelihood of reduced mobility related to illness progression.

The majority of participants in study two were female and indicated moderate levels of social connectedness therefore it is likely that social connectedness may have assisted in safeguarding against the effect of suffering multiple traumatic experiences. The current sample may be deemed a highly traumatised group, having experienced multiple traumas however the number of traumas experienced was not associated with symptoms of CPTSD. Future studies may investigate the relationship between gender, social connectedness and the number of traumatic experience. Numerous studies highlight the benefit of social support after a traumatic event with a reduction in symptom-severity, lower levels of PTSD, positive adjustment and coping strategies all being attributed to social support (Ke et al., 2010; Tang, 2006; Wang et al., 2011), particularly in females (Schumm et al., 2006).

Future research in chronic illness populations should explore how different combinations of chronic illnesses may impact mental health outcomes. Previous literature suggests that males may suffer greater stigmatising effects of being diagnosed with specific degenerative illnesses (Charmaz, 1995; Verbrugge, 1985; Verbrugge & Wingard, 1987). Therefore investigating if diverse combinations of chronic illnesses affect men and women differently could help identify those individuals most at risk. Furthermore, the current study was unable to ascertain the severity of the reported chronic illnesses in the present sample. Previous research suggests that incapacity, discomfort, or stigmatisation associated with the severity of specific illnesses may increase adverse mental health outcomes (Grytten, & Måseide, 2006; Mohr et al., 2004; Prince et al., 1997; Zorzon et al., 2001). Future studies may improve the significance of the current findings by measuring characteristics like levels of pain, disability, or perceptions associated with the illness, as individuals with similar chronic illnesses may have different experiences of daily living.

Conclusions

The current study investigated the impact of social factors in relation to the mental health of patients diagnosed with a variety of chronic illnesses. The findings from study one highlight the adverse impact of loneliness on mental health among individuals with a range of chronic illnesses. Although gender differences were observed, with women having worse mental health across a number of psychological variables, the small effect size indicates that both men and women suffered psychological distress that is above what is considered normal for non-chronically ill populations. Similarly, diagnosis of multiple chronic illnesses was associated with increased levels of depression in the current sample however, the small effect size between the groups indicated that the risk for negative mental health was just as likely for those reporting a single chronic illness. The cross-sectional nature of study one restricts interpretation regarding the causality of these results and similarly the lack of diversity of the sample limits cross-cultural generalisability of the findings.

The findings generated from study two highlight the need for further investigation into how feelings of loneliness, in a specific chronic illness group, may influence symptoms of CPTSD. Surprisingly, the hypothesis that women would have worse mental health than men in study two was not supported. This finding may be in part due to the uneven number of females recruited thus highlighting the need for more comparative recruiting in future MS research. Similarly, although the impact of illness duration on mental health was not established, the current study endorses the need for further investigation with larger samples into the risk for individuals recently diagnosed with a life-threatening illness. The sample obtained for study two was quite small, therefore, the generalisability of the results are restricted.

The clinical implications of this study highlight the need for clinicians to be more proficient in their ability to recognise feelings of loneliness among individuals with chronic illnesses. Furthermore, it supports the need for health care services such as MBSR to be in place for chronically ill patients aimed at safeguarding against feelings of loneliness and psychological distress. Finally, the use of individualised treatments adapted for different types of chronic illness should be considered. For example, interventions aimed at improving self-efficacy, resiliency and problem-solving coping in MS populations may provide superior outcomes in reducing feelings of loneliness.

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Appendix A

Life Events Checklist

Listed below are a number of difficult or stressful things that sometimes happen to people. For each event, check one or more of the boxes to the right to indicate that:

(a) It happened to you personally, (b) you witnessed it happen to someone else, (c) you learned about it happening to someone close to you, (d) you're not sure if it applies to you, or (e) it doesn't apply to you.

Mark only one item for any single stressful event you have experienced. For events that might fit more than one item description, choose the one that fits best.

Be sure to consider your entire life (growing up, as well as adulthood) as you go through the list of events.

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Event	Happened to me	Witnessed it	Learned about it	Not Sure	Doesn't apply
1. Natural disaster (for example, flood, hurricane, tornado, earthquake)					
2. Fire or explosion					
3. Transportation accident (for example, car accident, boat accident, train wreck, plane crash)					
4. Serious accident at work, home, or during recreational activity					
5. Exposure to toxic substance (for example, dangerous chemicals, radiation)					
6. Physical assault (for example, being attacked, hit, slapped, kicked, beaten up)					
7. Assault with a weapon (for example, being shot, stabbed, threatened with a knife, gun, bomb)					
8. Sexual assault (rape, attempted rape, made to perform any type of sexual act through force or threat of harm)					
9. Other unwanted or uncomfortable sexual experience					

10. Combat or exposure to a war-zone (in the military or as a civilian)					
11. Captivity (for example, being kidnapped, abducted, held hostage, prisoner of war)					
12. Life-threatening illness or injury					
13. Severe human suffering					
14. Sudden, violent death (for example, homicide, suicide)					
15. Sudden, unexpected death of someone close to you					
16. Serious injury, harm, or death caused to someone else					
17. Any other stressful event or experience					

Appendix B

ICD-11 Trauma Questionnaire

Instructions: Please identify the experience that troubles you most and answer the questions in regards to this experience.

Experience____

When did the experience occur? (circle one)

a. less than 6 months ago

b. 6 to 12 months ago

c. 1 to 5 years ago

d. 5 to 10 years ago

e. 10 to 20 years ago

f. more than 20 years ago

Do you have a clear memory of the event or events? ○ yes ○no.

If not, is this because:

○ It happened in childhood

○ I suffered a head injury at the time of the experience

○ I was drugged or affected by alcohol or drugs at the time of the experience

○ Other___________________________________

Please read each item carefully, then circle one of the numbers to the right to indicate how much you have been bothered by that problem in the past month.

	Not at all	*A little Bit*	*Moderately*	*Quite a bit*	*Extremely*
1. Having upsetting dreams that replay part of the experience or are clearly related to the experience?	0	1	2	3	4
2. Having powerful images or memories that sometimes come into your mind in which you feel the experience is happening again in the here and now?	0	1	2	3	4
3. Avoiding internal reminders of the experience (for example, thoughts, feelings, or physical sensations)?	0	1	2	3	4
4. Avoiding external reminders of the experience (for example, people, places, conversations, objects, activities, or situations)?	0	1	2	3	4
5. Being “super-alert,” watchful, or on guard?	0	1	2	3	4
6. Feeling jumpy or easily startled?	0	1	2	3	4
7. When I am upset, it takes me a long time to calm down.	0	1	2	3	4
8. I feel numb or emotionally shut down.	0	1	2	3	4
9. I feel like a failure.	0	1	2	3	4
10. I feel worthless.	0	1	2	3	4
11. I feel distant or cut off from people.	0	1	2	3	4
12. I find it hard to stay emotionally close to people.	0	1	2	3	4

Appendix C

Social Network Index

Instructions: This questionnaire is concerned with how many people you see or talk to on a regular basis including family, friends, workmates, neighbours, etc. Please read and answer each question carefully. Answer follow-up questions where appropriate.

1. Which of the following best describes your marital status?
____ (1) currently married & living together, or living with someone in marital-like relationship
____ (2) never married & never lived with someone in a marital-like relationship
____ (3) separated
____ (4) divorced or formerly lived with someone in a marital-like relationship
____ (5) widowed

2. How many children do you have? (If you don't have any children, check '0' and skip to question 3.)
____0 ____1 ____2 ____3 ____4 ____5 ____6 ____7 or more

2a. How many of your children do you see or talk to on the phone at least once every 2 weeks?
___0 ____1 ____2 ____3 ____4 ____5 ____6 ____7 or more

3. Are either of your parents living? (If neither is living, check '0' and skip to question 4.)
__(0) neither ____ (1) mother only ____ (2) father only ___(3) both

3a. Do you see or talk on the phone to either of your parents at least once every 2 weeks?
__(0) neither ____ (1) mother only ____ (2) father only ____ (3) both

4. Are either of your in-laws (or partner's parents) living? (If you have none, check the appropriate space and skip to question 5.)
__(0) neither __(1) mother only___(2) father only___(3) both__(4) not applicable

4a. Do you see or talk on the phone to either of your partner's parents at least once every 2 weeks?
___(0) neither ____(1) mother only _____ (2) father only____ (3) both

5. How many other relatives (other than your spouse, parents & children) do you feel close to? (If '0', check that space and skip to question 6.)
____0 ____1 ____2 ____3 ____4 ____5 ____6 ____7 or more

5a. How many of these relatives do you see or talk to on the phone at least once every 2 weeks?
____0 ____1 ____2 ____3 ____4 ____5 ____6 ____7 or more

6. How many close friends do you have? (meaning people that you feel at ease with, can talk to about private matters, and can call on for help)
____0 ____1 ____2 ____3 ____4 ____5 ____6 ____7 or more

6a. How many of these friends do you see or talk to at least once every 2 weeks?
____0 ____1 ____2 ____3 ____4 ____5 ____6 ____7 or more

7. Do you belong to a church, temple, or other religious group? (If not, check 'no' and skip to question 8.)
_____ no _____ yes

7a. How many members of your church or religious group do you talk to at least once every 2 weeks? (This includes at group meetings and services.)
____0 ____1 ____2 ____3 ____4 ____5 ____6 ____7 or more

8. Do you attend any classes (school, university, technical training, or adult education) on a regular basis? (If not, check 'no' and skip to question 9.)
_____ no _____ yes

8a. How many fellow students or teachers do you talk to at least once every 2 weeks? (This includes at class meetings.)
____0 ____1 ____2 ____3 ____4 ____5 ____6 ____7 or more

9. Are you currently employed either full or part-time? (If not, check 'no' and skip to question 10.)
____(0) no _____(1) yes, self-employed _____ (2) yes, employed by others

9a. How many people do you supervise?
____0 ____1 ____2 ____3 ____4 ____5 ____6 ____7 or more

9b. How many people at work (other than those you supervise) do you talk to at least once every 2 weeks?
____0 ____1 ____2 ____3 ____4 ____5 ____6 ____7 or more

10. How many of your neighbours do you visit or talk to at least once every 2 weeks?
__0 ____1 ____2 ____3 ____4 ____5 ____6 ____7 or more

11. Are you currently involved in regular volunteer work? (If not, check 'no' and skip to question 12.)

_____ no _____ yes

11a. How many people involved in this volunteer work do you talk to about volunteering-related issues at least once every 2 weeks?

___0 ____1 ____2 ____3 ____4 ____5 ____6 ____7 or more

12. Do you belong to any groups in which you talk to one or more members of the group about group-related issues at least once every 2 weeks? Examples include social clubs, recreational groups, trade unions, commercial groups, professional organizations, groups concerned with children like the PTA or Boy Scouts, groups concerned with community service, etc. (If you don't belong to any such groups, check 'no' and skip the section below.)

_____ no _____ yes

Appendix D

De Jong Gierveld 6-Item Loneliness Scale (DJGLS) (De Jong & van Tilburg, 2006)

Instructions: The following statements describe how people sometimes feel. For each statement, please indicate how often you feel this way by writing a number in the space provided.

Yes	More or Less	No
1	2	3

1. I experience a general sense of emptiness _______

2. I miss having people around me _____

3. I often feel rejected _____

4. There are plenty of people that I can lean on when I have problems ____

5. There are many people that I can count on completely _____

6. There are enough people that I feel close to _____