

**Predicting Psychological Responses after the February
22nd Christchurch Earthquake: Peritraumatic
Dissociation, Posttraumatic Stress Symptoms, Anxiety,
Depression, and Social Isolation**

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of Master of Science in Psychology

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ABSTRACT

Following exposure to trauma, stress reactions are initially adaptive. However, some individuals' psychological response can become maladaptive with long-lasting impairment to functioning. Most people with initial symptoms of stress recover, and thus it is important to distinguish individuals who are at risk of continuing difficulties so that resources are allocated appropriately. Investigations of predictors of PTSD development have largely focused on relational and combat-related trauma, with very limited research looking at natural disasters. This study assessed the nature and severity of psychological difficulties experienced in 101 people seeking treatment following exposure to a significant earthquake that killed 185 people. Peritraumatic dissociation, posttraumatic stress symptoms, symptoms of anxiety, symptoms of depression, and social isolation were assessed. Descriptive analyses revealed the sample to be a highly impaired group, with particularly high levels of posttraumatic stress symptoms. Path analysis was used to determine whether the experience of some psychological difficulties predicted experience of others. As hypothesised, peritraumatic dissociation was found to predict posttraumatic stress symptoms and symptoms of anxiety. Posttraumatic stress symptoms then predicted symptoms of anxiety and symptoms of depression. Depression and anxiety were highly correlated. Contrary to expectations, social isolation was not significantly related to any other psychological variables. These findings justify the provision of psychological support following a natural disaster and suggest the benefit of assessing peritraumatic dissociation and posttraumatic stress symptoms soon after the event to identify people in need of monitoring and intervention.

CHAPTER ONE

INTRODUCTION

Overview

The physiological response to acute threat has been found to be similar across those exposed to trauma and is considered to be an adaptive response necessary for survival (Bonne, Neumeister, & Charney, 2003). However, individual psychological and physical responses evoked in the aftermath of a traumatic event are more heterogeneous. The risk of developing long-term psychological difficulties, such as posttraumatic stress disorder (PTSD), heightens the importance of distinguishing those exhibiting an adaptive stress response from those responding in ways that are potentially harmful (Bonne et al., 2003; Norris, Friedman, Watson, & Byrne, 2002). Given the variety of psychological responses to trauma and the potential for long term impairment, identification of psychological responses that are associated with an increased likelihood of PTSD development could help identify individuals who would benefit most from early intervention in the hopes of preventing chronic disability.

This thesis assessed a number of psychological difficulties that were experienced at the time of a devastating earthquake and in the weeks following, to establish the nature and severity of experiences in a sample of people seeking psychological help following the event. It examined hypothesised relationships between these experiences through path analysis, to determine whether some psychological experiences, such as peritraumatic dissociation, increased the likelihood of experiencing others.

Psychological disorders that are associated with trauma exposure are firstly reviewed to show the wide-ranging reactions that individuals may experience following such exposure.

Following on from this, meta-analyses are reviewed to identify which psychological variables have been found to be most relevant to PTSD development. Those variables most strongly associated with PTSD are then explored in more depth. The current standing of research following natural disasters is then explored and the current study is introduced. In the present study, trauma reactions, especially those associated with dissociation, depression, anxiety and social isolation, are investigated in individuals exposed to an earthquake. The review below is focused on disasters and natural disasters where possible.

Psychological Impact of Trauma

Traumatic events can have widespread and long-lasting psychological consequences. While Posttraumatic Stress Disorder (PTSD) may be the classic psychological difficulty to result from trauma, many other forms of psychopathology frequently occur (Bonanno, Brewin, Kaniasty, & La Greca, 2010; North, 2003). The existence of a spectrum of trauma-induced disorders is supported by findings that many psychological disorders, rather than PTSD alone, result from the experience of trauma, and these difficulties are commonly comorbid with PTSD (Bremner, 2002; Ross, 2000). Ross (2000) maintains that early trauma is the most central causal factor to psychopathology in general. He suggests that a spectrum of trauma-induced disorders explains many of the treatment-resistant clinical presentations and the high level of comorbidity that is evident in current conceptualisations of disorder classification. Bremner (2002) argues that this core spectrum of disorders is the result of neurological deficits, for example involving the hippocampus and prefrontal cortex, induced by stress. This trauma model has implications for the treatment focus in those exposed to trauma (McFarlane, 2000), and also suggests the importance of looking beyond PTSD symptoms alone to understand trauma reactions (Bonanno et al., 2010). Some of the more common responses to trauma will now be outlined.

Posttraumatic Stress Disorder and Acute Stress Disorder

PTSD is causally linked with the experience of a traumatic event. In addition to such an experience, the Diagnostic and Statistical Manual of Mental Disorders, Fourth edition, text revision (DSM-IV-TR; American Psychiatric Association [APA], 2000) specifies that during the traumatic event the individual must experience “intense fear, helplessness or horror” (APA, 2000, p. 467). PTSD is characterised by symptoms of re-experiencing, avoidance, and increased arousal that causes distress, and impaired functioning and quality of life. These symptoms must be present for more than one month (APA, 2000). While a substantial proportion of the population experiences an event that satisfies the APA (2000) definition of trauma, the majority of post-trauma reactions are adaptive without long-lasting adverse effects (Bonanno et al., 2010). This is reflected by findings that show 10-25% of those who experience traumatic events go on to develop posttraumatic stress disorder, with lifetime prevalence rates found for PTSD of approximately 8% (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995).

Acute stress disorder (ASD) describes similar psychological experiences to those experienced in PTSD that occur within four weeks of the traumatic event. However, while both disorders involve symptoms of re-experiencing, avoidance and arousal, ASD also includes a dissociation symptom cluster (APA, 2000). ASD was introduced as a diagnosable disorder in 1994 to recognise the significant levels of distress that can be experienced in the immediate aftermath of a trauma, and to identify people likely to develop PTSD (Bryant & Harvey, 2000; Cardeña & Carlson, 2011). In a review of studies by Bryant and Harvey (2000) the incidence of ASD ranged from 6% to 33%, which indicates that a large proportion of people experience initial distress following trauma. ASD seems to be a strong predictor of PTSD, with 57% to 83% of those diagnosed with ASD later developing PTSD (Birmes et al.,

2003; Brewin, Andrews, Rose, & Kirk, 1999; Bryant, Moulds, & Guthrie, 2000; Yasan, Güzel, Tamam, & Ozkan, 2009). However, many who receive a diagnosis of PTSD do not initially experience ASD, which suggests an alternate path to developing PTSD other than through ASD (Harvey & Bryant, 2002).

Anxiety

Less research has been undertaken on anxiety disorders other than PTSD following trauma (McFarlane, van Hooff, & Goodhew, 2009). Nonetheless, elevated rates of these disorders have been found following trauma exposure. For example, rates of generalised anxiety disorder (GAD) were found to be higher in a disaster exposed sample compared to controls (Norris et al., 2002). In another study, those exposed to more severe traumas displayed higher levels of anxiety than those exposed to mild trauma (Goenjian, Steinberg, Najarian, & Fairbanks, 2000). In an earthquake-exposed population, rates of panic disorder, GAD, obsessive-compulsive disorder (OCD), social phobia and specific phobias were double the rate of the pre-earthquake national prevalence, three years following the earthquake (Önder, Tural, Aker, Kiliç, & Erdogan, 2006). A linear relationship between disaster exposure and anxiety has been found, indicating that increased exposure is associated with more anxiety difficulties (Bonanno et al., 2010). Further, increased anxiety following disaster exposure has been found after controlling for pre-disaster levels (Bonanno et al., 2010). Therefore, while PTSD may be the most common disorder following trauma, there is also an increased risk for other types of anxiety disorders in the aftermath of traumatic stress (Bonanno et al., 2010; Norris et al., 2002).

Depression

The co-occurrence of depression and PTSD following trauma is not unusual (O'Donnell, Creamer, & Pattison, 2004). After PTSD, depression is the most common

disorder experienced following trauma, and is the most common comorbid disorder with PTSD (Kessler et al., 1995). For example, rates of depression have been reported to be 44% in trauma survivors suffering PTSD and 50% in treatment seeking veterans with PTSD (Bleich, Koslowsky, Dolev, & Lerer, 1997; Shalev et al., 1998). Additionally, strong correlations ($r = 0.61$) have been reported between depression and acute stress disorder in children (Ellis, Nixon, & Williamson, 2009), suggesting a strong association between the classic symptoms of trauma and symptoms of depression following a traumatic event. In a large review of disaster victims, major depressive disorder was reported to be more frequent in those affected by disaster than normative groups (Norris et al., 2002). In a review by Katz, Pellegrino, Pandya, Ng and DeLisi (2002) severity of disaster exposure, family or personal depression history, outside stressors and lack of social support increased the risk of experiencing a major depressive episode following disaster exposure.

Substance Use Disorders

Increased substance use has been associated with traumatic experiences (Breslau, Davis, & Schultz, 2003; Feldner, Babson, & Zvolensky, 2007; Kosten, Fontana, Sernyak, & Rosenheck, 2000; McFarlane, 1998; Mills, Teesson, Ross, & Peters, 2006; Morissette, Tull, Gulliver, Kamholz, & Zimering, 2007; Stewart, 1996). Less, however, is known about this observed relationship (Katz et al., 2002). Factors found to be associated with increased substance use following trauma exposure include increased injury, peritraumatic dissociation and arousal, grief, posttraumatic stress symptoms, worry about safety, and difficulty functioning (Pfefferbaum et al., 2002). In a community study comorbid PTSD and substance use was associated with worse mental and physical health and greater impairment than those with substance use disorders only (Mills et al., 2006). While an increase in substance use following disasters has been found, some report no new diagnosed cases. Rather, increased

substance use occurs in those with pre-existing substance or other psychological difficulties (Bonanno et al., 2010; McFarlane, 1998; North, 2003; North et al., 1999; North et al., 2002; Pfefferbaum & Doughty, 2001).

Psychosis

The relationship between trauma and psychosis has been reviewed by Morrison, Frame and Larkin (2003) after observations that PTSD is more prevalent in people with severe mental illness compared to the general population. They found evidence to support claims that psychosis precipitates PTSD; that PTSD can cause psychosis; and that psychosis and PTSD are similar in that they fall on a spectrum of responses to trauma (Morrison et al., 2003). However, the relationship between natural disasters and psychosis has had little investigation (Katz et al., 2002). Relational trauma, which involves extreme stress in interpersonal relationships such as child physical abuse, has been found to predict psychosis (Schore, 2001; Shevlin, Dorahy, & Adamson, 2007). Such an increase in the incidence of psychosis following disasters has been inferred from the established association between stressful life events and the onset or relapse of psychosis (see Katz et al., 2002 for review). Additionally, poverty has been implicated in the development of schizophrenia (Cantor-Graae, 2007). Post-disaster economic disadvantage may similarly influence experiences of psychosis following the earthquake.

Summary

Trauma exposure can induce various forms of psychological responses. In addition to the development of ASD and PTSD subsequent to trauma, other psychological difficulties not specific to the event have also been found to occur at increased levels, including depression, anxiety, substance use and psychosis. Knowledge of these common psychological reactions

may help further understanding of individuals who are most likely to experience long term psychological difficulties related to a traumatic event.

Factors Associated with PTSD

Findings from Meta-Analyses

While the experience of trauma is a relatively common occurrence, long term negative psychological consequences do not occur in the majority of trauma-exposed individuals (Bonanno et al., 2010; Frans, Rimmö, Åberg, & Fredrikson, 2005; Kessler et al., 1995). Consequently, investigations of factors associated with posttraumatic psychopathology are an important avenue of research. A number of variables associated with the development of PTSD have emerged in the literature. These factors have been categorised according to their temporal relationship with the traumatic event, thus there are pre-trauma variables, peritraumatic variables (those that occur during and immediately after the event), and post-trauma variables (Dalgleish, 2004). Variables that were present before, during and after a traumatic event have been found to relate to the development of PTSD, whereas those present during and after have been associated with the maintenance of PTSD (Schnurr, Lunney, & Sengupta, 2004). Knowledge of the specific variables most strongly related to trauma psychopathology is important to aid identification of those likely to develop more severe problems and provide direction for appropriate targets in intervention.

Brewin, Andrews and Valentine (2000) completed a meta-analysis of studies of adults exposed to trauma to explore different risk factors for PTSD. They found that variables that occurred during and after the event were more strongly related to PTSD development than pre-trauma variables. All 14 risk factors that they investigated were found to be statistically significant. However, this does not imply that all variables were clinically significant and many of the effect sizes, a standardized correlation coefficient, were modest. Lack of social

support following trauma had the largest weighted average effect size of $r = 0.4$, followed by life stress ($r = 0.32$) and then trauma severity ($r = 0.23$). Factors that preceded the event were found to have smaller effect sizes (0.1 to 0.19). These included lack of education, psychiatric history, previous trauma, family psychiatric history, female gender, low socio-economic status, childhood abuse, low intelligence, and other childhood adversity. Race, and a younger age at trauma, were both found to have virtually no relationship with PTSD. The meta-analysis found factors that moderated the predictive effect of these risk factors, which included gender, and characteristics of the study – such as military compared with civilian samples, retrospective compared to prospective research design, and how PTSD was measured.

A meta-analysis by Ozer, Best, Lipsey, and Weiss (2003) investigated the predictors of PTSD, including additional psychological variables that were not analyzed by Brewin et al. (2000). Pre-trauma variables were found to have small but significant effect sizes, with history of prior trauma, psychological adjustment difficulties prior to trauma, and psychopathology in the family of origin all having an effect size (weighted r) of 0.17. Small to medium effect sizes were found for perceived life threat and negative emotional responses ($r = 0.26$), and for perceived support following the trauma ($r = -0.28$). Peritraumatic dissociation was found to be the most strongly associated variable with PTSD development, with an effect size of $r = 0.35$. The effect sizes of the predictor variables were found to be moderated by variables such as trauma type, sample, time elapsed since trauma, and method of PTSD measurement. These findings were similar to Brewin and colleagues (2000) in that variables present during and after the trauma were more strongly related to PTSD development than pre-trauma variables. However, the important relationship between dissociation and PTSD development was not assessed by Brewin et al. (2000). Given the

strength of association between peritraumatic dissociation and PTSD development found in the meta-analysis by Ozer et al. (2003), this relationship will be examined in more detail next.

PTSD and Peritraumatic Dissociation

Peritraumatic Dissociation

Dissociation is characterised by experiences such as distortions of time, alterations in consciousness, disorientation, feeling outside one's own body, feeling like the situation is happening to someone else, and memory difficulties (APA, 2000). Peritraumatic dissociation refers to dissociative experiences that occur at the time of a traumatic event and immediately following (Marmar et al., 1994).

Evidence for the Relationship between Peritraumatic Dissociation and PTSD

Literature on trauma-exposed individuals suggests an important relationship between peritraumatic dissociation and PTSD in a variety of trauma populations. Bremner and Brett (1997) found that in trauma-exposed veterans, peritraumatic dissociation was higher in those who developed PTSD than those who were exposed but did not subsequently develop PTSD. Peritraumatic dissociation has also been found to differentiate police officers exposed to trauma who display a resilient post-trauma pathway from those who display initial distress and then either improve or worsen (Galatzer-Levy, Madan, Neylan, Henn-Haase, & Marmar, 2011). The relationship has also been established in victims of accidents, violence, terrorism, human-made disasters, traumatic childbirth, natural disasters and cancer (Birmes et al., 2003; Engelhard, Van Den Hout, Kindt, Arntz, & Schouten, 2003; Johansen, Wahl, Eilertsen, & Weisaeth, 2007; Lawyer et al., 2006; Lensvelt-Mulders et al., 2008; Van der Velden et al., 2006).

Overwhelmingly, empirical evidence supports a small to moderate association between

the two variables. A meta-analysis completed by Breh and Seidler (2007) investigated the relationship between peritraumatic dissociation and PTSD in retrospective studies and in quasi-prospective studies that measured peritraumatic dissociation following trauma but before the onset of PTSD. The effect size for all data sets included was 0.36, which was statistically significant. The effect size was also found to be homogenous, indicating that the relationship between peritraumatic dissociation and PTSD was independent of individual study characteristics. Additionally, comparisons of the retrospective studies to the quasi-prospective studies revealed very similar effect sizes of 0.37 and 0.35, respectively. Consequently, as quasi-prospective studies were included in the analyses, the authors concluded that peritraumatic dissociation is a risk factor for PTSD and that study design has little impact on the strength of effect size (Breh & Seidler, 2007).

While another review by Van der Hart, Van Ochten, Van Son, Steele and Lensvelt-Mulders (2008) found the majority of studies to support this relationship, some conclusions were mixed. Of 53 studies that were investigated, 34 found a significant positive relationship between peritraumatic dissociation and PTSD, 9 found a non-significant relationship, and 10 found the relationship to be unclear. The authors suggest that methodological differences between the studies have a substantial impact on the relationships that were found, a conclusion inconsistent with Breh and Seidler's (2007) findings of homogeneity between studies.

Another meta-analysis completed by Lensvelt-Mulders et al. (2008) found a moderate standardized effect size ($r = 0.4$) between peritraumatic dissociation and PTSD. While this was not initially found to be homogenous, controlling for the quality of studies removed heterogeneity between studies. It was concluded that while peritraumatic dissociation increases the probability of subsequently developing PTSD, claims of a causal relationship

between the variables cannot be made given the current difficulties with study methodology (Lensvelt-Mulders et al., 2008).

To overcome methodological difficulties that prevent conclusions about a causal relationship between peritraumatic dissociation and symptoms of posttraumatic stress, methodologically sound prospective research is required (Lensvelt-Mulders et al., 2008). Such studies would involve measuring peritraumatic dissociation immediately after the traumatic event. However, given the difficulty of predicting future traumatic events, such research is challenging.

While methodological difficulties still exist, and the time that elapses between the traumatic event and measurement of peritraumatic dissociation varies between studies that claim to be prospective designs (Van der Velden & Wittmann, 2008), research that measures peritraumatic dissociation prospectively has been completed. One prospective investigation was completed in 67 women who underwent an elective surgical abortion (Van Emmerik, Kamphuis, & Emmelkamp, 2008). Prior to the abortion the participants completed measures of dissociative experiences, and within 30 minutes of the abortion they completed measures of peritraumatic dissociation. Symptoms of PTSD were measured two months after the procedure. Multiple regression analyses found moderate correlations between peritraumatic dissociation and intrusion symptoms ($r = 0.4$), and avoidance symptoms ($r = 0.32$). Van Emmerik et al. (2008) concluded that peritraumatic dissociation is a significant predictor of these symptoms of PTSD, and that as peritraumatic dissociation was measured immediately after the event, there was little time for memories of peritraumatic dissociative reactions to be altered as time passed and PTSD symptoms emerged.

In a review by Van der Velden and Wittman (2008), which included studies that measured peritraumatic dissociation up to one month following the traumatic event,

peritraumatic dissociation and PTSD were found to be associated in cross-sectional and bivariate analyses. Findings from these prospective studies provide preliminary support for the utility of screening for peritraumatic dissociation to identify those at risk of developing posttraumatic stress symptoms.

Peritraumatic Dissociation as an Independent Predictor of PTSD

While the relationship between peritraumatic dissociation and PTSD appears well established, whether peritraumatic dissociation predicts PTSD independently of any other psychological variables (i.e., is an independent predictor) is contentious. In a prospective study of 662 victims of a fireworks disaster, PTSD symptoms and peritraumatic dissociation measured two to three weeks after the disaster were correlated (Van der Velden et al., 2006). However, 18 months and four years after the disaster peritraumatic dissociation was not found to be a strong predictor of intrusions, avoidance or PTSD severity over and above initial intrusions, avoidance and distress (Van der Velden et al., 2006). The role of peritraumatic dissociation was investigated in victims of single incident (so called type I) trauma in a review of prospective studies (Van der Velden & Wittmann, 2008). Of 17 studies reviewed, most of the studies demonstrated little or no evidence for peritraumatic dissociation as an independent predictor of PTSD, with only three studies supporting peritraumatic dissociation as a strong independent predictor. The authors concluded that while there is an association between the variables this is likely to be confounded by variables, such as other psychological difficulties present at the same time (Van der Velden & Wittmann, 2008). An investigation into some of the variables that may explain the relationship between peritraumatic dissociation and PTSD follows.

Mediators of the Relationship between Peritraumatic Dissociation and PTSD

A longitudinal study by Engelhard et al. (2003) completed measures on 1370 women in

early stages of pregnancy. Of these women, 118 lost the pregnancy and completed questionnaires one month after the loss. Reduced emotional control, general dissociative tendencies, and lower education all predicted peritraumatic dissociation independently. After controlling for these predictors, peritraumatic dissociation was moderately associated with acute PTSD ($r = 0.46$), which was mediated by fragmented memory and thought suppression. A correlation of 0.29 was found between peritraumatic dissociation and PTSD four months after pregnancy loss, which was mediated by the acute PTSD symptoms (Engelhard et al., 2003). These results suggest that peritraumatic dissociation may be especially important for short-term psychological difficulties following trauma.

Coping style has also been found to mediate the relationship between peritraumatic dissociation and PTSD in a prospective study of motor vehicle accident victims by Pacella et al. (2011). Path analyses found that avoidant coping – which consisted of denial, behavioural disengagement, and self-distraction – was a partial mediator between peritraumatic dissociation and PTSD 6 months and 12 months following the accident, after controlling for age, gender, depression and PTSD at 6-weeks. Cognitive processes during and after the event thus appear important for the development of PTSD symptoms.

Research has revealed that persistent dissociation may play a role in the explanation of the relationship between peritraumatic dissociation and PTSD. Briere, Scott and Weathers (2005) found that peritraumatic dissociation ceased to be predictive when other variables were controlled for. In their univariate analysis peritraumatic dissociation was a significant predictor of PTSD, but when controlling for persistent dissociation in multivariate analyses this relationship was no longer significant. This suggests that dissociation that continues over time (i.e., persistent dissociation) plays an important role in the development of PTSD. Furthermore, persistent dissociation was more strongly correlated with severity of ASD and

intrusion symptoms than peritraumatic dissociation, and was similarly related to avoidance and anxiety symptoms (Panasetis & Bryant, 2003). Persistent dissociation was also found to remain a significant predictor of chronic PTSD after controlling for peritraumatic dissociation (Murray, Ehlers, & Mayou, 2002). Murray and colleagues (2002) believed that those who dissociate during the traumatic event are at risk of continuing to dissociate if adaptive processing of the event does not occur in the aftermath of the traumatic experience.

Taken together, the literature suggests a relationship of small to moderate magnitude between peritraumatic dissociation and PTSD. While this indicates that those who dissociate during a traumatic event are at an increased risk of developing PTSD, it also suggests a complex relationship where many other variables exist to determine the psychological wellbeing of an individual exposed to trauma.

Explanation of the Role of Peritraumatic Dissociation

Peritraumatic dissociation is thought to occur to restrict an individual's awareness of the traumatic event in order to limit emotional distress (Van der Kolk & Van der Hart, 1989). While initially adaptive in limiting the full impact of negative emotions associated with the trauma, peritraumatic dissociation may have a detrimental long-term impact because it prevents adequate processing of trauma-related memories and impairs subsequent emotional processing (Bryant, 2009; Marmar et al., 1994; Spiegel, Koopman, Cardena, & Classen, 1996). Foa and Kozak (1986) suggest that trauma memories involve maladaptive levels of fear, which results in posttraumatic stress symptoms such as avoidance and hyperarousal. Alterations to the trauma memory network, such as by incorporating new information that is incompatible with fear, is believed to decrease the negative emotional response (Foa & Kozak, 1986). For this to occur, the trauma memory must be activated to a level where arousal is neither too low nor too high, a process which is hindered by dissociation (Foa &

Kozak, 1986; Rauch & Foa, 2006). Consequently, when individuals dissociate, adequate fear reduction does not occur and fear related posttraumatic stress symptoms are experienced in response to the high levels of fear.

Another explanation for the role of peritraumatic dissociation is that dissociation is a response to heightened physiological arousal (Friedman, 2000). The relationship between panic and dissociation has been investigated due to the hyperarousal involved in panic and the disorganizing effect that panic is believed to have on cognitive functioning (Bryant & Panasetis, 2005; Marmar, Weiss, Metzler, Ronfeldt, & Foreman, 1996). Peritraumatic dissociation was found to be more strongly associated with panic than it was with symptoms of re-experiencing, avoidance, anxiety and depression (Bryant & Panasetis, 2005). Bryant and colleagues (2011) found that derealisation mediated the relationship between panic and PTSD and concluded that derealisation is influenced by panic symptoms. Physical and cognitive panic symptoms were also found to explain the relationship between peritraumatic fear, helplessness and horror, and peritraumatic dissociation (Fikretoglu et al., 2007). In support of the hyperarousal explanation of peritraumatic dissociation, these findings suggest that panic has an important role in the occurrence of peritraumatic dissociation.

PTSD and Social Support

Social support has consistently been found to be related to the development of PTSD following a traumatic event. Two meta-analyses on variables associated with PTSD development have established that lack of social support after a traumatic experience is associated with an increased risk of PTSD development (Brewin et al., 2000; Ozer et al., 2003). Brewin and colleagues (2000) found that of all variables included, lack of social support had the strongest weighted average correlation ($r = 0.4$), and Ozer et al. (2003) found that perceived social support was one of the best predictors of PTSD development, with a

weighted average correlation of $r = -0.28$. Lack of social support, or alternatively social isolation, therefore appears to be an important risk factor for the development of posttraumatic stress symptoms following trauma.

While the connection between social support and PTSD has been well established, less is known about the process through which this occurs (Guay, Billette, & Marchand, 2006). One explanation of this relationship asserts that social support interacts with symptoms of PTSD by altering the individual's appraisals of the event and by impacting on emotional states and coping strategies (Joseph, Williams, & Yule, 1997). Similarly, Lepore's (2001) social-cognitive processing model posits that talking about stressful experiences can enable cognitive and emotional processing. In both of these models, social interactions can have either a positive or negative impact on PTSD symptoms depending on the adequacy of the support that is provided (Guay et al., 2006). This has implications for the importance of fostering supportive relationships following a traumatic experience, involving positive responses to trauma-related discourse. Poor social support has also been associated with the maintenance of PTSD, as well as the onset, where it is thought to influence re-experiencing and arousal symptoms of PTSD (Guay et al., 2006; Schnurr et al., 2000; Schnurr et al., 2004). Social support plays an important role in the development and maintenance of PTSD, which is likely due to the impact that adequate support has on an individual's emotional, cognitive and behavioural processing (Guay et al., 2006).

Research on victims of natural disasters has provided evidence that perceived social support (including tangible, emotional and informational support) deteriorates following the traumatic event (Bonanno et al., 2010; Kaniasty, Norris, & Murrell, 1990). The authors believed that this could be a result of expectations of support not being met; that distress may affect one's perceptions of support; or that the natural disaster limits the availability of

support due to many people being affected by the event. Further, despite some suggestion that sense of community and immediate support increases following disasters, Bonanno et al. (2010) found most evidence to support a deterioration in relationships and sense of community. Following on from these findings, Norris and Kaniasty (1996) hypothesised that received social support (such as provision of equipment) would suppress the deterioration in perceived social support and thereby benefit the psychological wellbeing of victims; which they termed the Social Support Deterioration Deterrence Model (SSDDM). Evidence in support of this model was found by Norris and Kaniasty (1996) over two studies on victims of severe hurricanes. The authors found a direct relationship between exposure to disaster and distress (which included measures of depression and perceived stress) up to one year post-hurricane. However, an indirect effect was found in the long term, where the relationship between disaster exposure and distress was mediated by perceived support. Additionally, following disaster exposure, received support did not impact distress directly but reduced distress by increasing perceived social support, which then impacted on distress. These findings support the SSDDM, and highlight the importance of both received and perceived support on long-term psychological wellbeing following stressful events.

Social Isolation and Depression Following Trauma

Depression and perceived social support have been found to correlate negatively ($r = -0.49$) post trauma (Ellis et al., 2009). Social isolation may result from depressive symptoms (Guay et al., 2006) and vice versa. Potentially negative experiences have been associated with interacting with a person who is depressed compared to someone who is not (for a review, see Guay et al., 2006). This may result in withdrawal of support by others. Similarly, maintenance of social relationships in depressed individuals may then require additional energy, which is not required by those who are not depressed (Coyne, 1999). Additionally,

the actual symptoms of depression may contribute to social isolation in those who become depressed following a traumatic event. For example, social interactions may cease to be reinforcing in those experiencing anhedonia. Consistent with this, anhedonia has been found to underlie the social withdrawal that is seen in schizophrenia (Meehl, 1962). Further, social interactions may decrease in depressed individuals as these interactions may become more difficult in those with symptoms such as low levels of energy or difficulty concentrating (Coyne, 1999).

It is also conceivable that social isolation may contribute to depression following a traumatic event, particularly after a natural disaster such as an earthquake where travel, communication and living arrangements are disrupted, making social contact more difficult. This is supported by Lewinsohn's behavioural theory of depression which claims that an environment low in positive reinforcement, such as that in a socially isolated environment, is a cause of depression (Lewinsohn, Sullivan, & Grosscup, 1980). In support of this, both human and experimental animal studies have found social isolation to be a risk factor for depression (Bruce, 2002; Coyne, Kahn, Gotlib, & Jacob, 1987; Grippo et al., 2007).

Social support has also been established as a moderating variable following trauma. In a study of Southeast Asian refugees, social support was found to moderate the risk of developing depression, which was thought to be due to the impact that social support has on one's sense of identity and belonging (Beiser, Turner, & Ganesan, 1989).

An interactional model of depression and social support has been suggested by Coyne (1976). In Coyne's interactional model a complex and reciprocal relationship exists between depression and interpersonal relationships. For example, depressed individuals have been noted to lack social skills, which then in turn contributes to them becoming depressed (Coyne, 1999). Importantly, this model stresses the reciprocal interaction of both variables in

the development and maintenance of the other and thus provides support for both of the aforementioned links – from depression to social isolation, and from social isolation to depression.

Depression and Trauma

As outlined earlier, symptoms of depression and comorbid PTSD and depression are common following trauma exposure (Kessler et al., 1995). The observed relationship with depression and trauma symptoms has sparked research into the nature of the relationship between the two disorders.

A prospective study of 211 trauma survivors presenting to a hospital emergency room was completed by Shalev et al. (1998). Of those with PTSD at one month follow up (29.9% of the sample), 44.5% reported comorbid depression. Similarly, of those with PTSD at four months follow up (17.5% of the sample), 43.2% reported comorbid depression. Compared to those presenting with PTSD only, people with comorbid PTSD and depression reported more symptoms and had lower functioning. However, there were some differences between those with PTSD and those with depression. People with PTSD had higher heart rate levels when presenting to the hospital, and reported higher intrusion symptoms, peritraumatic dissociation, and exaggerated startle response. Based on these findings, Shalev et al. (1998) concluded that major depression and PTSD were independent disorders following trauma, that PTSD did not predict development to depression, and that comorbidity predicted greater severity of symptoms.

In contrast with this, O'Donnell, Creamer, and Pattison (2004) followed 363 injury survivors for 12 months. The authors investigated the course of PTSD, depression, and co-occurring PTSD and depression over this time. Half of those who met criteria for one of these diagnoses three months post injury did not receive a diagnosis at the 12 month follow up.

Substantial movement between the diagnostic categories occurred over time, with 42% of people receiving a diagnosis at 12 months different to that obtained three months post injury. Notably, the majority of those originally diagnosed with PTSD (63%) or comorbid PTSD and depression (60%) met criteria for one of the three categories at 12 months, but only 8% of those with depression only at three months received a diagnosis at follow up. Therefore, the occurrence of acute PTSD or comorbid depression and PTSD appears to be a risk factor for psychopathology in general, whereas the majority of people with acute depression became diagnosis free. In addition to this, O'Donnell et al. (2004) found that PTSD only and comorbid PTSD and depression shared virtually the same predictor variables and were not able to be distinguished from each other. On the other hand, depression alone was distinguished from the comorbid disorders and from PTSD alone. Based on these results, O'Donnell and colleagues (2004) concluded that most of the psychopathology following trauma represents a general traumatic stress factor where PTSD, comorbid PTSD and depression, and chronic depression are not independent of each other. Acute depression on the other hand appeared to be a unique construct in the initial months following the trauma (O'Donnell et al., 2004).

Consistent with this, Breslau, Davis, Peterson and Schultz (2000) compared the rates of depression in a community sample of trauma exposed individuals with and without PTSD using both retrospective and prospective data. Following trauma, those who developed PTSD were at greater risk of experiencing depression. Compared to people not exposed to trauma, those who developed PTSD were 2.8 times more likely to experience major depression, whereas those exposed to trauma that did not develop PTSD were only 1.3 times more likely to experience depression, which was not statistically significant. They also found that in a five year follow up period of people without a history of major depression, the risk of

developing major depression for the first time following trauma exposure only increased in those who developed PTSD. Breslau and colleagues (2000) results suggest that trauma does not increase the risk of depression independently of PTSD.

Posttraumatic Psychopathology Following Natural Disasters

The relationship between peritraumatic dissociation and posttraumatic stress symptoms has been well established in many trauma populations, such as those exposed to relational trauma. However, only a small minority of studies involve disasters affecting large populations – a category which includes both human-made disasters (e.g., factory explosion; Lensvelt-Mulders et al., 2008; Van der Velden et al., 2006), and natural disasters such as flood, fire, tornado and earthquakes. There is a paucity of research investigating the relationship between peritraumatic dissociation and other post trauma psychopathology in victims of natural disasters. Therefore, evaluations of the relationship in samples from natural disaster populations is needed to establish the generality of research findings from other trauma studies to those exposed to natural disasters.

The Christchurch Earthquake

In September, 2010 in the early hours of the morning of Saturday 4th, a 7.1 magnitude earthquake hit the Canterbury region, New Zealand (Quigley et al., 2010). The quake epicentre was 40 kilometres west of Christchurch's city centre and was 10 kilometres deep. Severe property damage and general disruption resulted (Quigley et al., 2010), but there were few injuries and no deaths. Almost 6 months later, at 12.51 pm on Tuesday, February 22, 2011, a 6.3 magnitude aftershock with an epicentre only 10 kilometres south-east of the Christchurch city centre and five kilometres deep hit the city. The timing and location of this major aftershock resulted in greater devastation to the region than was caused by the initial earthquake. Unlike the September earthquake where deaths were avoided, 185 people were

killed in the February quake (www.police.govt.nz/list-deceased). Thousands of homes were damaged and left uninhabitable and severe and long-lasting disruption was caused to daily services such as water and power. It has been estimated that the Christchurch rebuild could reach NZ 30 billion dollars (Conway, 2011). In addition to the stress and disruption resulting from these major quakes, there have been close to 10000 aftershocks greater than magnitude 3 since the first earthquake in September. The occurrence of the devastating February earthquake was a major traumatic event, and one that it is ongoing with continuous stress caused by aftershocks. Consequently, psychological difficulties are likely to be experienced in a proportion of those affected by the quakes and such reactions should be investigated.

The Present Study

In the present study, psychological difficulties experienced in the aftermath of a natural disaster – the February 22, 2011, Christchurch earthquake – are explored. Whereas the majority of post-disaster research is limited to posttraumatic stress reactions (McFarlane et al., 2009), the current study investigates a number of psychological reactions that have been found associated with trauma exposure. Exploration of the relationships among posttraumatic psychological experiences will increase understanding of how peritraumatic dissociation relates with other posttraumatic psychological sequelae in the context of a natural and ongoing disaster, contributing to an area with limited research to date. The hypothesised nature of these relationships following trauma will be tested using path analysis, where two alternative models will be compared.

Hypothesised Model

In the first model, it is hypothesised that the psychological experiences measured in the acute aftermath of the February 2011 quake will relate to each other as depicted below in Figure 1.

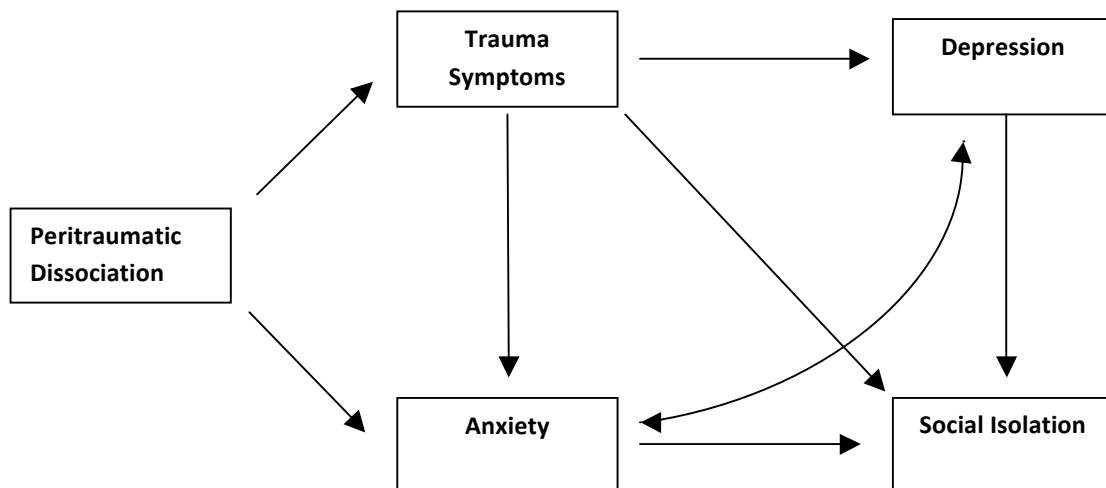


Figure 1. Hypothesised Model 1

Peritraumatic Dissociation

Based on the conceptual understanding of peritraumatic dissociation, it is anticipated that this will temporally be the first psychological experience following the earthquake. Given the wealth of research outlined previously that indicates an increased risk of developing posttraumatic stress related symptoms in those who experience dissociation during the traumatic event, it is hypothesised that this relationship will be observed in victims of the Christchurch quake.

It is also predicted that the experience of peritraumatic dissociation will be associated with an increased risk of general symptoms of anxiety in the weeks following the event. This prediction is based on findings that peritraumatic dissociation is associated with increased psychopathology in general, including symptoms of anxiety (Bremner & Brett, 1997). Furthermore, Bronner and colleagues (2009) found a strong association with peritraumatic dissociation and anxiety and depression in children and adolescents following admission to an intensive care unit.

Posttraumatic Stress Symptoms

Based on the literature discussed above that has found high comorbidity of PTSD and depression (Kessler et al., 1995), trauma symptoms are hypothesised to predict symptoms of depression. This relationship is further supported by research outlining a possible shared vulnerability to both PTSD and depression following trauma (e.g., Breslau et al., 2000; O'Donnell et al., 2004), as well as from findings that depressive symptoms may have been the result of traumatic experiences and posttraumatic stress symptoms (Goenjian et al., 2000). Moreover, the direction of this path is supported by O'Donnell et al. (2004) who found that acute PTSD predicted subsequent psychopathology, including depression, whereas acute depression did not predict later psychopathology.

Trauma symptoms are hypothesised to predict general anxiety symptoms due to the classification of PTSD as an anxiety disorder, and also research indicating high levels of comorbidity between anxiety disorders (Scott, McGee, Browne, & Wells, 2006). In addition, this relationship is predicted by findings of increased rates of other anxiety disorders following trauma exposure, as outlined by Norris and colleagues (2002) and Bonanno et al. (2010).

Trauma symptoms are anticipated to influence social isolation, based on suggestions that social support has been found to deteriorate following natural disasters (Bonanno et al., 2010; Kaniasty et al., 1990). It is therefore anticipated that experiencing increased posttraumatic stress symptoms will predict social isolation, where individuals have fewer people to talk to about the event.

Depression

It is anticipated that symptoms of depression will influence social isolation. As discussed, individuals with depression may elicit the withdrawal of support by others because interactions with the depressed individual may not be reinforcing. The actual symptoms of depression, such as anhedonia and difficulty concentrating, may also result in social isolation (Coyne, 1999; Guay et al., 2006). While conceivable that this path may run in the other direction, these findings were thought to provide greater justification for a path from depression to social isolation, than the support that exists for a path from social isolation to depression in this population.

A correlation is hypothesised to exist between symptoms of anxiety and symptoms of depression. Both anxiety and depression occur at increased rates following trauma (Norris et al., 2002; North, 2003). The two disorders are also highly comorbid in the general population, with more than half of those found to have a major depressive disorder reporting a history of at least one anxiety disorder (Kaufman & Charney, 2000). Additionally, rates of comorbid PTSD, depression and anxiety have been found to be higher in veterans than rates of PTSD, of comorbid PTSD and depression, and of comorbid PTSD and anxiety (Ginzburg, Ein-Dor, & Solomon, 2010). Finally, in adolescents, the experience of either depression or an anxiety disorder often increases the risk of subsequently experiencing the other disorder (Garber & Weersing, 2010). This relationship between depression and anxiety that is consistently found in the literature suggests theoretical reasons for a correlation between the two experiences in the present study.

This correlation is also predicted methodologically. In the current study, questions relating to symptoms of depression and anxiety are presented together in the same section of the questionnaire and have the same rating scale.

Anxiety

Lastly, anxiety is hypothesised to influence social isolation following trauma exposure. In children, anxiety has been associated with social isolation (Rubin, Coplan, & Bowker, 2009), and a similar relationship is expected in adults following trauma. It is also possible that anxiety following the quake would predict social isolation as a result of avoidance of feared situations (e.g., avoiding shopping malls, theatres, restaurants, and driving on earthquake-affected roads).

Hypothesised Model 2

An alternative hypothesised model, Model 2, is depicted below in Figure 2. In this model, social isolation is anticipated to exert influence on psychological experiences following trauma, rather than be influenced by these experiences as in Model 1. Pathways that differ to those in Model 1 will be discussed.

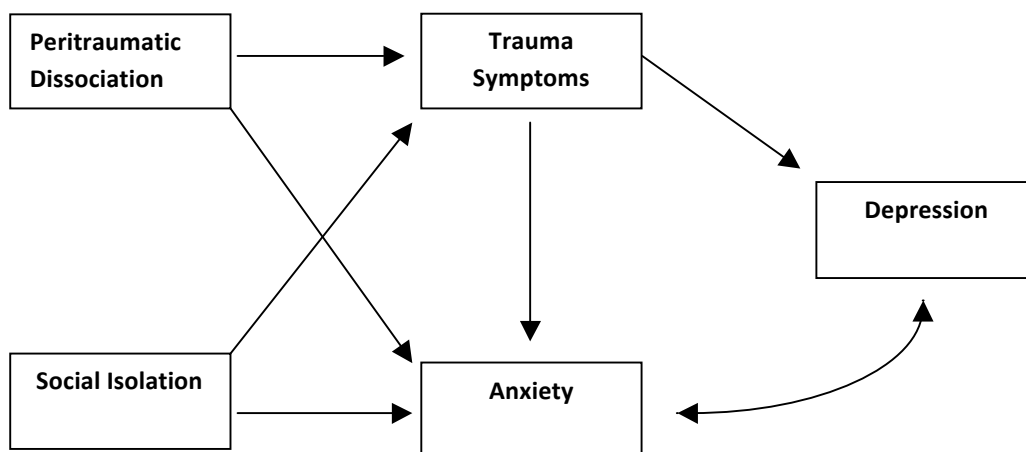


Figure 2. Hypothesised Model 2

Social Isolation

Social isolation is hypothesised to predict trauma symptoms following findings from meta-analyses that perceived social support is negatively associated with the development of

symptoms of PTSD (Brewin et al., 2000; Ozer et al., 2003). Joseph et al. (1997) believe appraisals to play a role in the development of PTSD. This belief is consistent with cognitive theories of PTSD by Ehlers and Clark (2000) that support the causal role of cognitive appraisals in persistent PTSD.

Theoretical explanations for this are provided by Joseph et al. (1997) and Lepore (2001) who assert that social support impacts cognitive appraisals of the event. For example, Joseph et al. (1997) suggest that conscious appraisal of trauma-related cognitions occurs through disclosure of trauma to people within the victim's social network. It may be that adaptive alternatives to maladaptive PTSD-related cognitions are facilitated socially through discussions about the traumatic event. Therefore, social isolation is hypothesised to predict greater posttraumatic stress symptoms.

Social isolation may also influence the experience of general anxiety symptoms. This is supported by animal studies, such as by Lukkes, Mokin, Scholl and Forster (2009) that found early social isolation to predict anxiety behaviours in later life. Therefore, greater social isolation is anticipated to increase the likelihood of experiencing anxiety.

CHAPTER TWO

METHOD

Participants

Participants were 101 treatment-seeking individuals attending a free, brief-intervention, counselling and health-care clinic in Christchurch following the February 22nd Earthquake. Participants completed a brief screening interview between two and eight weeks after the earthquake as part of their clinical assessment and care. There were no inclusion or exclusion criteria applied beyond participants being aged over 17. To ensure confidentiality, the researcher was given access to anonymous data for purpose of analysis.

Information regarding gender and age was not provided for all participants. Of those participants whose gender was recorded on the questionnaire ($n = 13$), 77% were female and 23% were male. The mean age of the participants who had this information supplied ($n = 43$) was 42.86 years ($SD = 15.2$; range 17-84 years).

Measures

Following the February 22nd Christchurch Earthquake a questionnaire was rapidly designed, independent of this project, by clinical psychologists in Christchurch for use as a clinical screening tool in health and mental health services dealing with those experiencing mental health difficulties as a result of the quake. This assessment tool was called the Brief Trauma Screening Interview (BTSI; see Appendix A). It integrates items from a number of existing measures and indexes posttraumatic re-experiencing and arousal symptoms, depression and anxiety, peritraumatic dissociation, auditory hallucinations, and social isolation. The BTSI consists of 21 items that involved dichotomous 'yes/no' responses and ratings on a Likert scale. The source of the BTSI items is described below.

Re-experiencing and Arousal

The posttraumatic re-experiencing and arousal symptoms are assessed via the 10-item Trauma Screening Questionnaire (TSQ; Brewin et al., 2002). This tool was designed to identify those at risk of developing posttraumatic stress disorder following a traumatic event. The questionnaire contains five re-experiencing items, for example, 'Feeling upset by reminders of the event,' and five arousal items, such as 'Difficulty concentrating.' Each item requires a 'yes/no' response, where participants indicate 'yes' if the particular symptom has been experienced at least twice in the last week. The authors found that a cut off of six 'yes' responses was optimal, with excellent sensitivity (0.86) and specificity (0.93; Brewin et al., 2002). The items also have excellent internal consistency, with a Cronbach's α of 0.78 for the re-experiencing items and 0.82 for the arousal items (Foa, Riggs, Dancu, & Rothbaum, 1993). For development of the BTSI a new rating scale was added to each item to assess symptom severity. Thus, for questions affirmed with a 'yes,' participants were asked to rate the severity of their experience on a 5-point Likert scale from 0 (*A little bit*) to 4 (*Extremely*).

Anxiety and Depression

Three items measuring anxiety symptoms and two items measuring symptoms of depression were included in the BTSI. The three anxiety items were taken from the Generalized Anxiety Disorder-7 scale (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006). It is a psychometrically sound measure of general anxiety symptoms, with excellent internal consistency ($\alpha=0.92$; Spitzer et al., 2006). An anxiety example item is 'Feeling nervous, anxious or on edge.' The two depression items were taken from the depression module of the Patient Health Questionnaire (PHQ; Spitzer, Kroenke, Williams, & the Patient Health Questionnaire Primary Care Study Group, 1999). The PHQ-9 is a reliable and valid measure of depression severity, with excellent internal consistency, having a Cronbach's α of 0.89

(Kroenke, Spitzer, & Williams, 2001). A depression example item assesses, 'Feeling down, depressed, or hopeless.' Responses indicated how often the individual was bothered by these difficulties since the earthquake. Each item was rated on a 5-point Likert scale, ranging from 0 ('Not at all') to 4 ('Everyday'), where higher ratings represent more frequent experiences of anxiety and depression.

Peritraumatic Dissociation

The experience of dissociation during and immediately after the earthquake was measured by four items that were based on selected items from the Peritraumatic Dissociative Experiences Questionnaire (PDEQ; Marmar et al., 1994). The PDEQ consists of 10 items and has good psychometric properties, including high internal consistency with a Cronbach's α of 0.8 (Marmar et al., 1994; Weiss, Marmar, Metzler, & Ronfeldt, 1995). The 4 items chosen (items 3-6) were found to be the best predictors of acute stress symptoms and best reflect derealisation-depersonalisation experiences at the time of trauma (Brooks et al., 2009). An example item includes, 'your sense of time changed – things seemed to be happening in slow motion.' Each item was rated on a 5-point Likert scale, ranging from 0 ('not at all') to 4 ('Extremely'). Higher ratings represent more intense experiences of peritraumatic dissociation.

Auditory Hallucinations

To measure the severe trauma-related symptom of auditory hallucinations, an item was included that assessed voice-hearing since the earthquake. This item was adapted from one given in the psychometrically sound Mental Health Research Institute Unusual Perceptions Schedule (MUPS; Carter, Mackinnon, Howard, Zeegers, & Copolov, 1995). It read, 'Since the earthquake, have you heard voices or other noises that you suspect others don't hear or report hearing?' This item was rated on a 5-point Likert scale from 0 ('Not at

all’) to 4 (‘Constantly’). Higher scores represent more auditory hallucinations. For those who gave an affirmative response to this item, a follow-up item was given regarding whether they had experienced auditory hallucinations before the earthquake.

Social Isolation

Social isolation, a significant predictor of mental health difficulties following distressing events (Brewin et al., 2000), was measured with the following item: ‘Have you got people around that you can talk to about what you have experienced during and since the earthquake?’ This item was rated on a 5-point Likert scale from 0 (‘Not at all’) to 4 (‘Constantly’). Lower ratings represented greater social isolation.

Procedure

Individuals seeking counselling for earthquake-related distress were assessed with the BTSI as part of routine clinical care. As the BTSI was designed as a screening interview, professionals worked through the questions in-session with clients. The completed forms were then kept on file and anonymous copies were provided to the research team. Ethical approval for this study was granted by the Upper South A Regional Health and Disability Ethics Committee and the University of Canterbury Human Ethics Committee (approval letters can be seen in Appendices B and C).

Statistical Analyses

Data were entered into the Statistical Package for the Social Sciences (SPSS; version 19) and the following statistical analyses were completed in SPSS, unless otherwise specified. Descriptive statistics were calculated to characterise the demographic information and responses to the BTSI. This included information on age and gender; evaluation of the distribution and dispersion of questionnaire scores; reliability analyses calculating

Cronbach's alpha; and calculation of the means and standard deviations for each variable.

Analysis of intercorrelations between variables measured by the BTSI was also completed.

Path analysis, assessment of multivariate normality, and multicollinearity were completed in an add-on module of SPSS – Analysis of Moment Structures (AMOS; version 18). Path analysis completed in AMOS provided the standardised regression weights between paths. To assess goodness-of fit between the specified models and the data, a number of fit indices were used, as suggested by Schermelleh-Engel, Moosbrugger, and Müller (2003). Of the numerous indices that exist, the Chi-square (χ^2), Root Mean Square Error of Approximation (RMSEA), and Comparative Fit Index (CFI) were chosen to indicate model fit.

When interpreting the χ^2 , p values greater than 0.05 are indicative of good model fit, suggesting a significant difference does not exist between the model and the data (Schermelleh-Engel et al., 2003). Schermelleh-Engel et al. (2003) state that RMSEA values less than or equal to 0.05 indicate a good fit between the model and the data, therefore 0.05 was used as a cut-off to indicate good fit for the tested models. CFI values greater than 0.95 have been suggested to indicate acceptable fit, with values greater than 0.97 indicating good fit (Schermelleh-Engel et al., 2003). Consequently, 0.95 was used as a threshold for determining model fit using the CFI.

CHAPTER THREE

RESULTS

Descriptive Statistics

Distribution and Dispersion of Scores

The distribution and dispersion of scores for the variables measured in the BTSI that were relevant to this study were assessed. These analyses revealed that the distribution of scores did not violate assumptions of skew or kurtosis. Histograms for each variable can be seen in Appendix D.

Measures of Central Tendency

The mean and standard deviation of each variable measured in the BTSI, and the minimum and maximum score of each variable are shown in Table 1. As not all sections of questionnaires were completed by each participant, the number of participants (N) included in each analysis is also reported in the table.

The TSQ was not altered significantly for use in the BTSI. As such, the percentage of people reaching the suggested threshold of 6 symptoms was calculated (Brewin et al., 2002). This revealed that 81% of the sample reported experiencing at least 6 of the possible 10 symptoms.

Internal Consistency

Internal consistency, measured by Cronbach's alpha (α), is reported in Table 1 for subscales in the BTSI that have more than one item. Using the cut off of 0.7 (Nunnally, 1978), all the alpha coefficients exceed or were near this cut off, suggesting adequate internal consistency for the variables in the BTSI.

Table 1.
Descriptive Statistics for Brief Trauma Screening Interview

Variable	N	Mean	Std. Deviation	Minimum	Maximum	Alpha (α)
Total TSQ Score	101	7.86	1.97	3	10	.67
Mean Anxiety	100	2.42	1.05	0	4	.84
Mean Depression	100	1.81	1.20	0	4	.67
Mean Peri. Dissoc.	99	1.49	1.07	0	4	.74
Social Isolation	99	2.31	1.29	0	4	-

Note: TSQ = Trauma Screening Questionnaire; Peri. Dissoc = Peritraumatic Dissociation; Std. Deviation = Standard deviation.

Correlations

Pearson's correlation coefficients (r) were calculated to determine the strength of the relationship between variables measured by the BTSI. Guidelines by Cohen (1988) for correlation strength in psychology have been used, where $r \geq 0.5$ indicates a strong correlation, r between 0.3 and 0.5 a moderate correlation, and $r < 0.1$ a small correlation. As can be seen in Table 2, significant moderate to large positive correlations were found between the total TSQ score and mean anxiety, depression, and peritraumatic dissociation scores. This suggests that higher mean scores on the anxiety, depression, and peritraumatic dissociation items were associated with a higher total number of posttraumatic stress symptoms. A significant moderate positive correlation was found between mean peritraumatic dissociation score and mean anxiety score, indicating that higher mean peritraumatic dissociation scores were associated with higher anxiety scores. A significant strong positive correlation was found between anxiety and depression, revealing that higher mean anxiety scores were associated with higher mean depression scores.

A small non-significant correlation was found between depression and peritraumatic dissociation, revealing that higher mean depression scores were not associated with higher mean peritraumatic dissociation scores.

Small negative, non-significant correlations were observed between the social isolation rating and all other variables. This suggests that in this particular sample, lower availability of people to talk to about the traumatic experience is not significantly associated with increased psychopathology.

Table 2.
Intercorrelations among Brief Trauma Screening Interview variables

	Mean Anxiety	Mean Depression	Mean Dissociation	Social Isolation
Total TSQ Score	0.559**	0.408**	0.377**	-0.167 ns
Mean Anxiety	-	0.704**	0.329**	-0.127 ns
Mean Depression	-	-	0.135 ns	-0.147 ns
Mean Dissociation	-	-	-	-0.188 ns

Note: TSQ=Trauma Screening Questionnaire; ** = $p < 0.01$; ns = not significant.

Model Fit: Path Analysis

Assumptions

Multivariate Normality – Structural equation modeling (SEM), and path analysis, assumes normality of the data (Byrne, 2001). Consequently, the data was assessed for multivariate normality. For univariate skewness and kurtosis, values less than -1 or greater than +1 are suggested to indicate non-normality (Muthén & Kaplan, 1985). Skewness values for the measured variables ranged from -0.91 to +0.3 and kurtosis values ranged between -1.0

and -0.29, indicating univariate normality. Multivariate normality is implied when the critical ratio of Mardia's coefficient of multivariate kurtosis is less than 1.96 (Gao, Mokhtarian, & Johnston, 2008). The Mardia's coefficient for the variables included in this study was -0.319, with a critical ratio of -0.189, which suggests multivariate normality.

Multicollinearity – To ensure all variables were not affected by multicollinearity, collinearity statistics were calculated, using a threshold of 0.2 (O'Brien, 2007). The Tolerance values for all variables ranged between 0.72 and 0.95, which suggests collinearity is not problematic in these variables.

Model 1

The path analysis for Model 1, with standardised regression weights for each hypothesised path can be seen below in Figure 3.

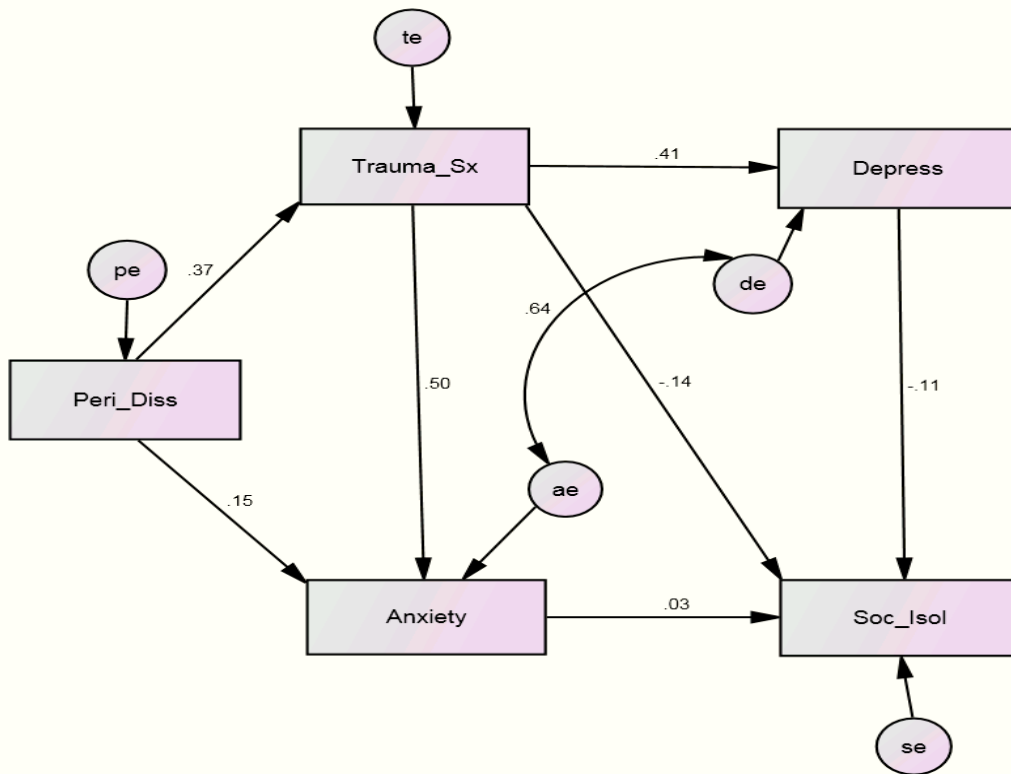


Figure 3. Model 1 Fitted.

Peri_Diss = Peritraumatic Dissociation; Trauma_Sx = Total Trauma Symptoms; Depress = Depression; Soc_Isol = Social Isolation; pe = peritraumatic dissociation error term; te = trauma symptom error term; de = depression error term; ae = anxiety error term; se = social isolation error term.

The model shows that higher mean peritraumatic dissociation scores moderately predict an increase in the number of trauma symptoms that are experienced ($r = 0.37, p < 0.001$) and somewhat predict increased anxiety symptoms ($r = 0.15, p < 0.05$). Higher total number of trauma symptoms, measured by the TSQ, then moderately to strongly predict increased depression symptoms ($r = 0.41, p < 0.001$) and anxiety symptoms ($r = 0.5, p <$

0.001). A strong correlation was observed between depression and anxiety ($r = 0.64, p < 0.001$).

Interestingly, increased anxiety did not significantly predict increased social isolation ($r = 0.03, p = 0.85$). Nor did trauma symptoms ($r = -0.14, p = 0.25$) or depression symptoms ($r = -0.11, p = 0.43$) significantly predict social isolation score.

The fit indices, displayed in Table 3, indicate an excellent fit between the hypothesised model and the data.

Table 3.
Fit Indices for Model 1

<i>Model</i>	χ^2	<i>p</i>	RMSEA	CFI
1	2.257	0.324	0.036	0.998
1a	2.292	0.514	0	1
1b	3.03	0.553	0	1
1c	5.802	0.326	0.04	0.993

In Model 1 the three pathways leading to social isolation are not statistically significant. Consequently, to make the model more parsimonious the non-significant pathways were trimmed as suggested by Duncan (1975). These paths were trimmed one at a time, starting with the path with the smallest standardised regression coefficient.

In Model 1a, the pathway from anxiety to social isolation was removed. The fit for this model can be seen in Table 3, and Model 1a can be seen in Appendix E. This model has an excellent fit, however the non-significant paths remain.

In Model 1b, the pathway from depression to social isolation was removed. Model 1b can be seen in Appendix E. As shown in Table 3 the fit for this model is excellent, however the non-significant path between trauma symptoms and social isolation remains.

Finally, Model 1c forces the path from trauma symptoms to social isolation to be zero (effectively trimming this path) to keep the social isolation variable in the model as was originally hypothesised (Blunch, 2008). In Model 1c all paths and correlations remain statistically significant, and the regression weights are unchanged from Model 1. Model 1c is displayed below in Figure 4. The fit indices for the trimmed Model 1c, which can be seen in Table 3, indicate an excellent fit between the model and the data. All trimmed models have a similarly excellent fit with the data, but Model 1c represents the most parsimonious model.

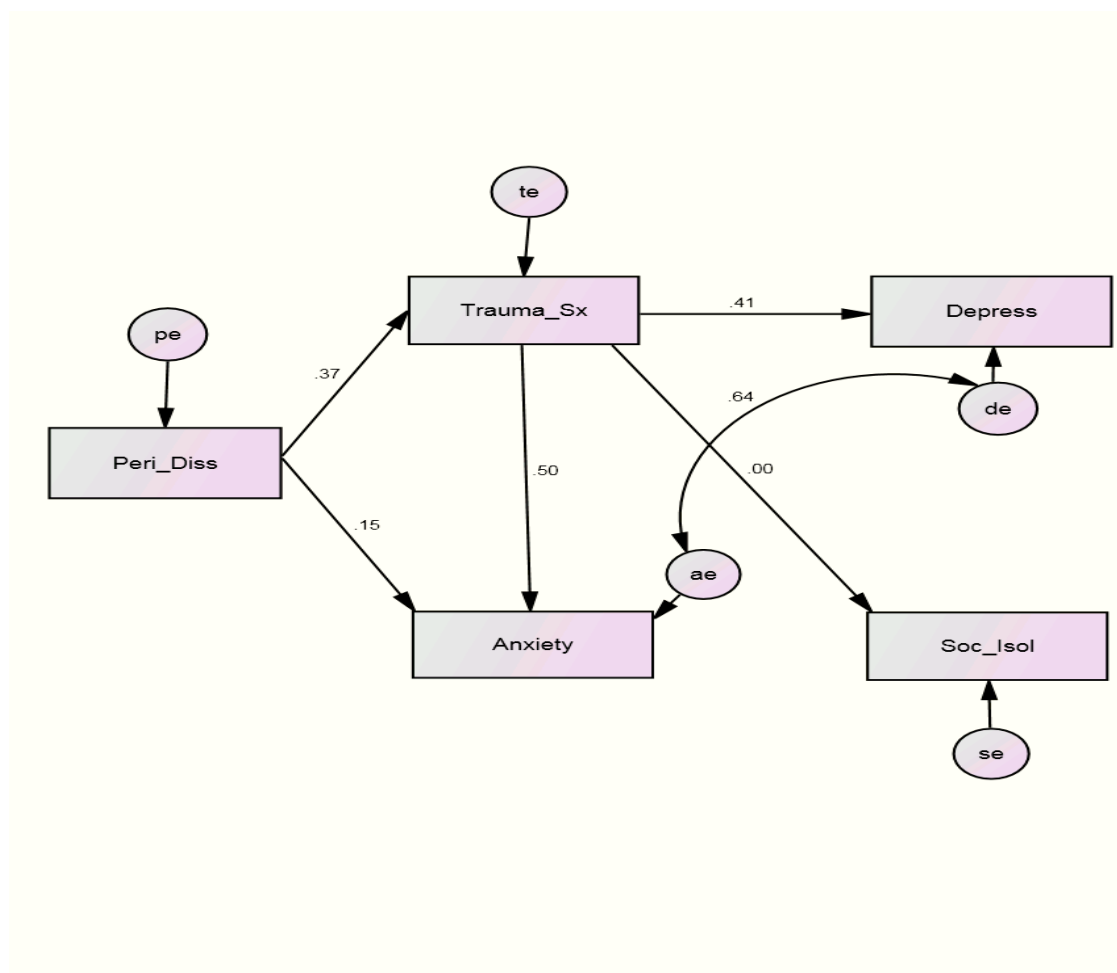


Figure 4. Trimmed Model 1c.

Peri_Diss = Peritraumatic Dissociation; Trauma_Sx = Total Trauma Symptoms; Depress = Depression; Soc_Isol = Social Isolation; pe = peritraumatic dissociation error term; te = trauma symptom error term; de = depression error term; ae = anxiety error term; se = social isolation error term.

Model 2

Model 2, fitted with standardised regression weights, is displayed in Figure 5. As for Model 1, increased peritraumatic dissociation scores moderately predict increased total number of reported trauma symptoms ($r = 0.36, p < 0.001$) and predict a slight increase in anxiety symptoms ($r = 0.16, p < 0.05$). Trauma symptoms then moderately to strongly predict increased depression symptoms ($r = 0.4, p < 0.001$) and anxiety symptoms ($r = 0.5, p < 0.001$). A strong correlation again exists between depression and anxiety symptoms ($r = 0.64, p < 0.001$). Social isolation scores did not significantly predict total trauma symptoms ($r = 0.1, p = 0.284$), or anxiety symptoms ($r = 0.03, p = 0.612$).

Fit indices, displayed in Table 4, indicate that Model 2 has a relatively poor fit with the data, with the RMSEA exceeding the desired cut off value.

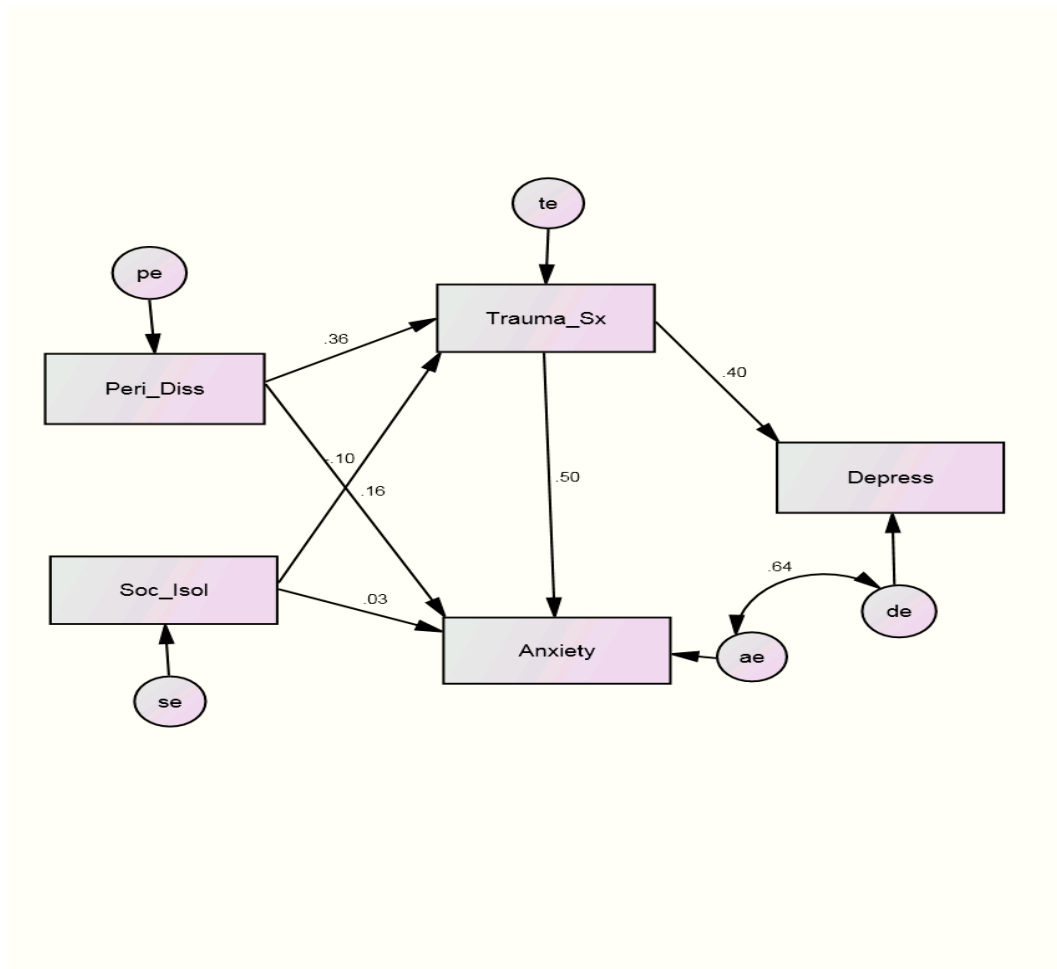


Figure 5. Model 2 Fitted.

Note: Peri_Diss = Peritraumatic Dissociation; Trauma_Sx = Total Trauma Symptoms; Depress = Depression; Soc_Isol = Social Isolation; pe = peritraumatic dissociation error term; te = trauma symptom error term; de = depression error term; ae = anxiety error term; se = social isolation error term.

Table 4.
Fit Indices for Model 2.

Model	χ^2	<i>p</i>	RMSEA	CFI
2	4.439	0.218	0.069	0.988
2a	4.684	0.321	0.041	0.994
2b	5.802	0.326	0.04	0.993

In addition to a relatively poor fit observed in Model 2, the two pathways predicted from social isolation are not statistically significant. As with Model 1, to make the model

more parsimonious the non-significant pathways were removed, starting with the pathway with the smallest standardised regression coefficient.

The pathway from social isolation to anxiety was first removed in Model 2a, which can be seen in Appendix E. The fit for this trimmed model is shown in Table 4, and indicates an excellent fit with the data. However, the non-significant pathway from social isolation to trauma symptoms remains in the model. To maintain the social isolation variable, the regression coefficient for this path was forced to be zero (effectively removing this path). This model, Model 2b, is displayed in Figure 6. Table 4 shows that the fit indices for Model 2b are excellent, with the best fit of the three models tested; it is also the most parsimonious version of Model 2.

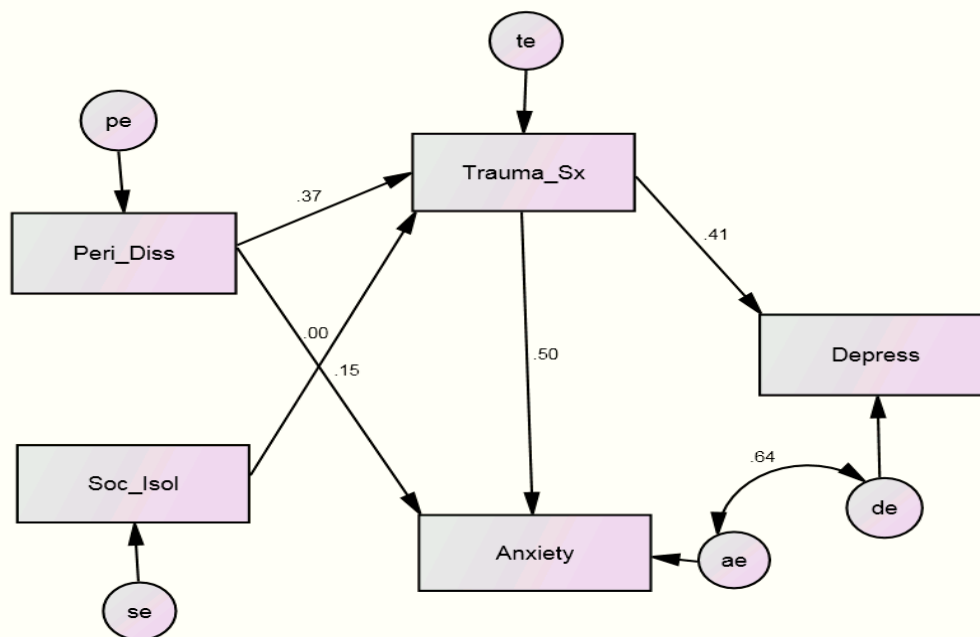


Figure 6. Trimmed Model 2b.

Peri_Diss = Peritraumatic Dissociation; Trauma_Sx = Total Trauma Symptoms; Depress = Depression; Soc_Isol = Social Isolation; pe = peritraumatic dissociation error term; te = trauma symptom error term; de = depression error term; ae = anxiety error term; se = social isolation error term.

Comparison of Model 1 and 2

The most parsimonious version of each model – Models 1c and 2b – both displayed an equivalent excellent fit with the data and transpired to be essentially identical models.

Both of these models found peritraumatic dissociation to be a predictor of trauma symptoms and anxiety, trauma symptoms to be a predictor of symptoms of depression and anxiety, and

found a strong correlation between depression symptoms and anxiety symptoms. Importantly, in the sample studied social isolation was not found to be predicted by any of the psychological experiences included in the model, nor was it found to be a predictor of these variables.

CHAPTER FOUR

DISCUSSION

This study set out to assess people seeking treatment following exposure to an ongoing natural disaster to determine the types of resultant psychological difficulties experienced. The hypothesised relationships between these variables were then tested by comparing two alternative models with path analysis.

Summary of Findings

Level of Psychological Impairment

The responses to the BTSI by the help-seeking sample studied demonstrate a high level of psychological impairment present two to eight weeks following the February 22nd Christchurch Earthquake. The mean total for the Trauma Screening Questionnaire indicated that on average, people reported experiencing almost eight of the ten listed posttraumatic symptoms. This exceeds the suggested threshold of six symptoms that identifies people likely to develop PTSD (Brewin et al., 2002). The mean was also higher than that found in other traumatised samples, for example the mean score was 5.5 in a sample of people affected by the 2005 London terrorist bombings (Brewin, Fuchkan, Huntley, & Scragg, 2010). In addition, a higher proportion of participants in the present study reached the suggested symptom threshold (81%) compared to other samples, such as those exposed to the 2005 London terrorist bombings (51%) and victims of a train accident (34%; Brewin, Fuchkan, et al., 2010; Brewin et al., 2002). This suggests the present sample were highly traumatised, experiencing a particularly high level of hyperarousal and re-experiencing posttraumatic stress symptoms and may subsequently have an elevated level of PTSD if formally assessed.

Anxiety was also reported at high levels. The mean rating of anxiety symptoms indicated that, on average, anxiety was experienced more than half the days to nearly every day since the earthquake. Symptoms of depression were also elevated, with the mean rating indicating that depression symptoms were experienced on several days to more than half the days since the February quake. These results are similar to that found in a community study that involved people experiencing stress following the earthquake (J. Rucklidge, personal communication, February 15, 2012). In this study, participants completed the Depression, Anxiety and Stress Scale (DASS-42; Crawford & Henry, 2003; Lovibond & Lovibond, 1995), where the mean anxiety score was 10.7, and the mean depression score was 15.9. These scores indicate a moderate mean level of anxiety and depression (Lovibond & Lovibond, 1995).

The mean peritraumatic dissociation rating revealed that during and immediately after the earthquake, on average people were slightly to somewhat affected by dissociative experiences. This suggests that while some people experienced high levels of peritraumatic dissociation, as indicated by the maximum score, the mean was not particularly high.

Social isolation did not appear to be a significant problem overall. The mean social isolation rating indicated that the respondents had people to talk to about their experience some of the time.

Overall, the mean scores on the BTSI subscales indicate that the participants reported substantial psychological difficulties, suggesting that this study had recruited a highly impaired sample. While it is unknown how the individuals studied would have scored prior to the earthquake, high levels of an array of psychological difficulties in the aftermath of such an event are consistent with the literature. For example, increased rates of anxiety disorders

and depression have been found following disaster exposure (Norris et al., 2002; Önder et al., 2006).

Relationships between Psychological Variables

Path analysis was completed to test two models each with an alternative sequence of psychological variables experienced following the earthquake. The key difference between these models was the position of social isolation, based on different findings in the literature (Brewin et al., 2000; Kaniasty et al., 1990; Norris & Kaniasty, 1996; Ozer et al., 2003).

The most parsimonious version of both models revealed that, as hypothesised, peritraumatic dissociation moderately predicted trauma symptoms. Further, trauma symptoms then moderately to strongly predicted symptoms of depression and symptoms of anxiety. Peritraumatic dissociation was also a weak predictor of anxiety symptoms. Finally, a strong, significant correlation was found between symptoms of depression and symptoms of anxiety.

In contrast to what was hypothesised, social isolation was not significantly predicted by any of the variables included in the model. Neither was social isolation a significant predictor of any of these variables that were measured.

When non-significant paths were trimmed from the models, Model 1 and Model 2 converged to be essentially the same model. Both models had an identical excellent fit with the data. The same significant paths were found in both models, as was the lack of significant paths to or, alternatively, from social isolation. This suggests that in the sample studied social isolation was not an important factor related to the experience of other psychological difficulties following the February 22nd Christchurch Earthquake.

Peritraumatic Dissociation and Posttraumatic Stress Symptoms

Comparison of Findings with Previous Literature

The finding that peritraumatic dissociation was a significant predictor of posttraumatic stress symptoms adds support to previous research that overwhelmingly demonstrates a moderate sized relationship between these variables. The present study was one of the first to assess this relationship in a sample of people exposed to a significant earthquake. These findings are therefore compared to existing literature, where research on natural disaster victims is limited.

The regression coefficient found in the present study ($r = 0.37$) is similar to that found in a meta-analysis of predictors of PTSD by Ozer et al. (2003), who found an average weighted correlation of $r = 0.35$. Breh and Seidler (2007) also found a similar effect size of 0.36 in a meta-analysis of studies that investigated this relationship, concluding that peritraumatic dissociation is a risk factor for PTSD development. In another meta-analysis an effect size of 0.4 was found, however the authors cautioned against claims of causality due to methodological difficulties (Lensvelt-Mulders et al., 2008). Moderate effect sizes of 0.4 and 0.32 have also been found between peritraumatic dissociation and trauma symptoms in studies using a prospective design (Van Emmerik et al., 2008). This lends substantial support to the present study's findings that peritraumatic dissociation is a predictor of trauma symptoms as prospective studies avoid some of methodological difficulties that limit cross sectional research.

Consistency between the findings of the current study and the average effect sizes found in a number of meta-analyses suggests that peritraumatic dissociation is an important predictor for the development of posttraumatic stress symptoms in victims of an ongoing natural disaster. This provides some evidence to support the generality of such research from

those exposed to relational trauma to those exposed to natural disasters, and more specifically, to earthquakes. Consequently, peritraumatic dissociation appears to be an important variable to assess shortly after the experience of trauma in the hope of identifying people at risk of developing PTSD.

Theoretical Explanations

Dissociation has been described as a maladaptive avoidant coping strategy (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). This may offer one explanation for the observation that peritraumatic dissociation predicts posttraumatic stress symptoms. In line with this idea, dissociation is considered adaptive initially, where trauma related stimuli are avoided to promote coping (Wagner & Linehan, 1998). However, avoidance has been found to increase trauma-related emotions, thoughts, memories and sensations (Hayes et al., 1996). Posttraumatic stress symptoms may then be the by-product of the avoidant coping style (Marx & Sloan, 2005). Support for the role of avoidance comes from Pacella et al. (2011), who found avoidant coping to partially mediate the relationship between peritraumatic dissociation and PTSD. Persistent dissociation has also been found to account for some of the relationship between peritraumatic dissociation and PTSD (Briere et al., 2005). And as with peritraumatic dissociation, persistent dissociation may impact on PTSD due to the avoidance that is inherent in dissociation.

Peritraumatic dissociation may also impede the process of memory integration. Peritraumatic dissociation is believed to restrict awareness of the traumatic event (Van der Kolk & Van der Hart, 1989). The avoidant function of dissociation does not allow activation of the fear network, which may then prevent adequate processing of the trauma memory (Bryant, 2009; Joseph et al., 1997; Marmar et al., 1994; Rauch & Foa, 2006; Spiegel et al., 1996). Consequently, emotional processing and subsequent reduction fear is prevented (Foa

& Kozak, 1986). The trauma memory is considered to be an influential factor in persistent PTSD (Ehlers & Clark, 2000), and impaired memory processing which facilitates and maintains trauma memory fosters posttraumatic stress symptoms. Consistent with this framework is the finding that fragmented memory was found to be a mediator between peritraumatic dissociation and acute PTSD (Engelhard et al., 2003).

Peritraumatic Dissociation as a Predictor of Anxiety

Comparison of Findings with Previous Literature

Previous research has not focussed on investigating the relationship between peritraumatic dissociation and anxiety symptoms, and the finding that peritraumatic dissociation is a predictor of anxiety therefore adds to a relatively limited area of research. This finding from the current study is consistent with what has been implied by Bremner and Brett (1997), who found that peritraumatic dissociation increased the risk of psychopathology in general, which included measures of anxiety. It is also consistent with findings from a pilot study that found peritraumatic dissociation to be strongly associated with anxiety (Bronner et al., 2009), and findings that trait dissociation is correlated with anxiety (Wolfradt & Meyer, 1998).

Theoretical Explanations

Peritraumatic dissociation may predict symptoms of anxiety because of its regulatory function discussed earlier to enable coping. This avoidant coping mechanism is maladaptive because it increases the likelihood of experiencing other psychological difficulties, as found in this study. People who dissociated extensively at the time of the earthquake may represent individuals with less effective emotion regulation strategies (Wolfradt & Meyer, 1998), and this may therefore increase the likelihood of suffering from anxiety symptoms.

Posttraumatic Stress Symptoms as a Predictor of Symptoms of Depression and Anxiety

Comparison of Findings with Previous Literature

Trauma symptoms were a significant predictor of symptoms of depression, which is consistent with findings by O'Donnell et al. (2004) who found that PTSD three months post trauma was a risk factor for psychopathology, including depression, 12 months following the trauma. The findings from the current study are also in line with that of Breslau et al. (2000), who found people with PTSD following trauma were at greater risk of experiencing depression than those without PTSD. The results from the current study are inconsistent with research by Shalev et al. (1998) who did not find PTSD to predict depression development. This study by Shalev et al. (1998) assessed people following a short, single event. In contrast, participants in the current study were exposed to prolonged stress as a result of continuing aftershocks and disruptions caused by the earthquake that may have left people feeling helpless. The prolonged exposure and potential helplessness associated with the current study may have resulted in the prediction of depression symptoms by posttraumatic stress symptoms (Brewin, Gregory, Lipton, & Burgess, 2010).

Trauma symptoms were also a predictor of anxiety symptoms. This is in line with findings of high comorbidity amongst anxiety disorders (Scott et al., 2006). This result is also consistent with findings that PTSD predicts psychopathology in general (O'Donnell et al., 2004).

While mixed findings have been reported in the literature, the results from the present study support the predictive qualities that trauma symptoms have in the development of symptoms of depression. The results also suggest that trauma symptoms are a risk factor for symptoms of general anxiety. Therefore, evaluation of posttraumatic stress symptoms is

valuable in understanding people who are at risk of experiencing other psychological difficulties after a traumatic event.

Theoretical Explanation

Posttraumatic stress symptoms may increase the risk of depression and anxiety symptoms due to the shared risk factors for both anxiety disorders and depression (Barlow & Durand, 2005). As PTSD is an anxiety disorder, risk factors for developing posttraumatic stress symptoms may increase the risk of general anxiety symptoms as well as depression symptoms. Consistent with this, Breslau et al. (2000) and O'Donnell et al. (2004) found that risk factors for developing PTSD and depression following trauma were similar. It was concluded that much of the psychopathology following trauma could be considered a general traumatic stress factor, where the different psychological experiences are not independent of each other (O'Donnell et al., 2004). Anxiety sensitivity, which represents a fear of anxiety symptoms due to beliefs about the consequence of such symptoms, is believed to then increase these anxiety symptoms (Reiss, 1991; Reiss & McNally, 1985). Anxiety sensitivity may act as a shared risk factor for both PTSD and symptoms of general anxiety. Consistent with this idea, anxiety sensitivity has been found at higher levels than controls across the anxiety disorders (Taylor, Koch, & McNally, 1992).

Correlation between Depression and Anxiety

Comparison of Findings with Previous Literature

The strong correlation found between symptoms of depression and anxiety fit with findings that suggest the two disorders are highly comorbid in the general population, and in trauma populations (Ginzburg et al., 2010; Kaufman & Charney, 2000). The experience of

one of these disorders has also been found to predict experience with the other, which is also consistent with the current findings of a strong correlation (Garber & Weersing, 2010).

The strong correlation found in this study suggests that it is important to assess both psychological experiences in the aftermath of trauma.

Theoretical Explanations

There are a number of possible explanations as to why symptoms of depression and anxiety were found to be highly correlated, and similarly, why they are highly comorbid in the literature. The two disorders may share common etiological factors, such as biological pathways and cognitive biases, and therefore the risk factors increase the likelihood of experiencing both disorders (Barlow & Durand, 2005; Levine, Cole, Chengappa, & Gershon, 2001; Seligman & Ollendick, 1998).

Alternatively, depression and anxiety have been said to have a common factor as well as components that are unique to each (Mineka, Watson, & Clark, 1998). The strong correlation may result from the shared factor. This is consistent with explanations for high correlations between the two disorders in the tripartite model (see below), which suggests the two both involve high negative affect (Clark & Watson, 1991; Seligman & Ollendick, 1998; Steer, Clark, Beck, & Ranieri, 1995; Watson & Tellegen, 1985).

The tripartite model proposes that depression and anxiety have a shared component, general affective distress, which consists of distress, demoralization, irritability, sleep and appetite disturbance, distractibility, and vague somatic complaints (Clark & Watson, 1991). The model suggests that depression and anxiety can, however, be differentiated by symptoms that are unique to each disorder, with physiological hyperarousal specific to anxiety and anhedonia specific to depression (Clark & Watson, 1991). It should be noted, however, that

the tripartite model has had some inconsistent findings in the literature, with some studies finding lower correlations between the non-specific factors than the shared factor, and others finding the unique factors less differentiating than the shared variables (Burns & Eidelson, 1998). Nonetheless, as was the case with shared risk factors, experiencing high negative affect may therefore increase the risk of symptoms of depression and anxiety, resulting in a high correlation between the two. This highlights the methodological importance of assessing symptoms specific to each disorder to ensure the constructs are measured independently.

Anxiety sensitivity (Reiss, 1991; Reiss & McNally, 1985) could also be an important variable that is specific to anxiety and may therefore differentiate depression from anxiety. In support of this idea, Ho et al. (2011) found that anxiety sensitivity predicted anxious, but not depressive symptoms in a sample of university students.

Depression and anxiety symptoms were also presented in the same section of the BTSI, and responses were measured with the same response scale. Subsequently, participants may have responded to these items similarly, contributing to the observed correlation.

Social Isolation

Comparison of Findings with Previous Literature

The lack of a significant path from social isolation to trauma symptoms is inconsistent with existing research that suggests social support plays an important role in PTSD development. For example, lack of social support was the best predictor of PTSD in one meta-analysis, and was one of the best predictors in another (Brewin et al., 2000; Ozer et al., 2003). It is also inconsistent with indications that increasing perceived social support following natural disasters predicts reductions in psychological distress (Norris & Kaniasty, 1996). Because social isolation prior to the earthquake was not assessed, the direct impact of

trauma on social relationships is not able to be determined in this study. However, since greater social isolation was not predicted by trauma symptoms in this study, it can be inferred that deterioration in social relationships did not occur following trauma. This is inconsistent with Kaniasty et al. (1990), who found social support to deteriorate following a natural disaster. The lack of a significant relationship found in the current study may have occurred because more trauma symptoms are not directly related to social isolation. It is possible that the wider context is more important, such as whether an individual's social network is aware of the difficulties they are experiencing, or how affected the social network is by the traumatic event.

Lack of a significant path from social isolation to anxiety is inconsistent with animal studies that have found early social isolation to predict anxiety behaviours later in life (Lukkes et al., 2009). The non-significant path from anxiety to social isolation conflicts with findings of an association between the two variables in children (Rubin et al., 2009), and is not compatible with the hypothesis that social isolation may result from avoidance of feared situations relating to the earthquake.

The non-significant path from depression to social isolation (Model 1) is not consistent with suggestions by Guay et al. (2006) that depressed individuals may elicit social isolation due to the nature of potential social interactions with the depressed individual, and that symptoms of depression may lead to social isolation. As it is possible that this path could run in the reverse direction, Model 1 was run with the path going from social isolation to depression. This path was not statistically significant either, and the model can be seen in appendix F. This was in contrast with predictions that earthquake disruptions may cause social isolation, which through a lack of positive reinforcement may then influence symptoms of depression. Such findings are in contrast to predictions made by the interactional model of

depression by Coyne (1976), which implicates a developmental role of depressive behaviours in social isolation and vice versa (Doerfler & Chaplin, 1985).

In the sample of people studied in this thesis, social isolation was not related to any of the psychological variables that were assessed. Therefore, as it was measured, social isolation did not enhance understanding of what predicts psychological difficulties experienced following a major earthquake.

Possible Explanations

The results indicate that social isolation is not an outcome of, or predicted by, other psychological difficulties. This may in fact be true for the participants of the current study, whereby social isolation is not related to any other psychological variables and does not help enhance understanding of posttraumatic psychopathology.

Alternatively, the earthquake(s) affected people in a variety of ways, for example some people were physically injured, some were forced to move out of their homes, and others lost loved ones. It is possible that the heterogeneity of experiences affected the ability to find a consistent predictive relationship in the data between social isolation and any of the other variables. If this was the case, relationships with social isolation and other experiences may exist for some groups of people.

The lack of significant relationships may also reflect methodological difficulties, whereby social isolation may not have been measured adequately. The construct of social isolation may not have been captured sufficiently by one question. Additional items may improve the measurement of social isolation. Alternatively, the social isolation item itself may measure something other than social isolation. For example, having people to talk with constantly about the event may not reflect social support and alternative forms of social

support may be utilised by those with less people to talk to. Similarly, the fact of having people around to talk to about the traumatic experience may not eventuate in these people ever discussing what was experienced, and thus the benefits may not be received.

The length of time the potentially isolated individual has had few people to talk to may also be important in the development of post-trauma psychopathology. Social isolation could need to be present for a longer period of time than measured in this study before the psychological impact is seen, as most participants (68%) were assessed within 4 weeks, and only 7% of participants were assessed 6 to 8 weeks following the quake. Consistent with this idea, the Ozer et al. (2003) meta-analysis found that the relationship between social support and PTSD was stronger when the period of time between the trauma and the assessment point was longer. They concluded that social support may serve as a secondary protective factor in PTSD development. This study measured reactions shortly after the trauma and social isolation may indeed play a role in post trauma psychopathology in this population as more time passes.

Implications

Assessment

The findings in the current study showing predictive relationships between many of the psychological experiences that were measured in the weeks following a major earthquake demonstrates the importance of assessing a variety of psychological phenomena following trauma, rather than simply posttraumatic stress symptoms. Peritraumatic dissociation and posttraumatic stress symptoms may act as predictive markers for developing other psychological difficulties, so early assessment of these could identify those people at greater risk of developing other psychological difficulties who should be monitored closely to enable appropriate support to be provided.

Intervention

People who dissociate at the time of the trauma are more likely to continue to dissociate, and persistent dissociation has been found to mediate the relationship between peritraumatic dissociation and the development of PTSD (Briere et al., 2005; Murray et al., 2002). The finding that indicates peritraumatic dissociation is predictive of posttraumatic stress symptoms has implications for intervention strategies to disrupt the continuation from peritraumatic dissociation into persistent dissociation. Grounding and emotion regulation strategies may help individuals to limit the use of dissociation, and the subsequent increase in trauma symptoms associated with avoidance. The two should be utilised together, so that the individual's level of arousal is kept to an optimal level. Grounding techniques, such as feeling one's feet on the floor or stating how many months until their next birthday, are utilised when level of arousal is too high to keep the person in touch with reality. Keeping in touch with reality is important as it permits integration of fragmented memories (Kreidler, Zupancic, Bell, & Longo, 2000; Van der Kolk, Van der Hart, & Marmar, 1996). Emotional regulation techniques are intended to modulate arousal to a level where the individual is able to safely process what they are feeling. Strategies such as cognitive-behavioural and mentalization techniques could be utilized that develop an enhanced understanding of emotional reactions, which is required to control and regulate emotion (Bateman & Fonagy, 2003; Söderström & Skårderud, 2009). By using these techniques, dissociation would not be a necessary coping strategy as more adaptive problem solving strategies would be in place (Van der Kolk et al., 1996). Future research into the utilisation of emotion regulation strategies shortly after trauma could identify whether disrupting dissociation reduces posttraumatic stress symptoms.

This study also has implications for the allocation of resources following a large scale event such as the earthquake in this study. The sample was a highly distressed group of

people, and this highlights the need for the provision of support for these individuals. While substantial difficulties exist in establishing evidence for the support that should be provided shortly after a disaster (Bonanno et al., 2010; Hobfoll et al., 2007), some suggestions have been made. Following wide-spread disaster, empirical support has been found for five principles that should inform intervention and prevention efforts in the immediate and mid-term aftermath (Hobfoll et al., 2007). These include promoting a sense of safety, calming, a sense of self and community efficacy, connectedness, and hope. Evidence has also been found in support of screening individuals to identify those who are at risk of psychological difficulties and who would therefore benefit most from evidence-based treatment from one month post-trauma (Bonanno et al., 2010).

Strengths and Limitations

Strengths

The present study assessed difficulties experienced by individuals seeking treatment following exposure to a major earthquake. This enabled research on the relationship between peritraumatic dissociation and posttraumatic stress symptoms in response to a natural disaster, which has been typically limited to people exposed to relational and combat-related trauma. The findings in this study suggest a similar relationship between the variables across the trauma populations.

Another strength of this study was the short period of time that had elapsed between the earthquake and measurement of psychological difficulties. These experiences were measured from as little as two weeks after the event and up to eight weeks following the large scale unexpected event. Consequently, memory of reactions during the earthquake, such as peritraumatic dissociation, would not be as affected by the passage of time. This is important because with time, the memory of the event is thought to be increasingly influenced by the

psychological state of the individual at the time of assessment (Van der Velden & Wittmann, 2008). Therefore, the less time elapsed between trauma and assessment, the less biased the assessment responses are by present level of functioning.

Additionally, the present study assessed the predictive value of peritraumatic dissociation for symptoms of general anxiety as well as symptoms of PTSD. This path has received very little attention in previous research on peritraumatic dissociation, and the significant, albeit small, path found suggests that it is an area that should be explored further.

Limitations

With the measurement of psychological reactions enacted so quickly following the event, some methodological difficulties are present in this study.

Firstly, the study was cross-sectional rather than longitudinal, and observational without control over independent variables. This is both methodologically and ethically unavoidable in such a study, but limits the ability to establish whether causal relationships exist between variables rather than the predictive relationships that were established. Therefore, there may be additional psychological variables that explain the relationships that were observed.

The responses to the BTSI in help-seeking individuals were not compared to responses in other samples, either exposed to the earthquake or not. However, another study involving individuals from the community experiencing stress following the earthquake found similar elevations in depression and anxiety symptoms (J. Rucklidge, personal communication, February 15, 2012). Determining the psychological experiences in people not seeking treatment would give information regarding the severity of difficulties present in this study compared to the general population. This threatens the external validity of the

findings of this study, as it is not clear whether the results generalise to other groups of earthquake exposed individuals. No baseline information regarding participants' psychological difficulties prior to the earthquake existed. This limits the ability to determine whether some of the reactions, such as depression and anxiety were a result of earthquake exposure or whether they were pre-existing.

Participants in this study completed the BTSI with different therapists. There may have been some inconsistencies with the administration. For example, not all participants had their age and gender recorded. This limited the ability to determine whether any gender differences existed in the relationships among the different psychological experiences. Further, more demographic details, such as ethnicity and living arrangements, could have been collected to evaluate any other differential effects and to provide a greater understanding of the sample that was studied.

The psychometric properties of the BTSI that this thesis was based on were not assessed extensively. This may have affected the results, for example, if the social isolation item was not a valid measure of this construct the interpretation that social isolation was not a predictor of, or predicted by, other psychological variables may be misleading. The reliability and validity of this screening questionnaire should be assessed further for use in the future.

Future Research Directions

The current study assessed the relationship between short-term psychological experiences following an earthquake. The long term effect of the earthquake on these psychological difficulties should also be explored to give a more complete understanding of these reactions. Longitudinal studies would be able to investigate the relationship between the severity of symptoms experienced in the short term and the likelihood of developing subsequent psychological disorders. This would help increase understanding of the nature of

potential causal influences that some variables may have, and may indicate other variables that are involved in predicting the occurrence of subsequent psychological experiences and outcomes.

Potential variables that mediate the relationship between predictor and outcome variables should be assessed in a natural disaster sample. For example, the role that persistent dissociation plays in the relationship between peritraumatic dissociation and trauma symptoms could be explored to enhance theoretical understanding of this relationship. Similarly, the ability of peritraumatic dissociation to predict general anxiety symptoms should be explored further given the lack of attention this relationship has received in the literature.

Finally, further investigation should determine appropriate intervention aimed at the predictor variables. As indicated previously, the potential preventative effect that this may have on subsequently developing other psychological difficulties should be researched to determine effective early intervention strategies following trauma exposure in those at high risk. Such investigations are crucial as it is important to validate post-disaster interventions to ensure they are beneficial to the individuals who receive them. The importance of such research is heightened by findings that Critical Incident Stress Debriefing (CISD), a common, immediate and brief intervention, is not effective in decreasing the likelihood of PTSD and in some cases has been found to increase this risk (for a review, see Bonanno et al., 2010).

Conclusion

Individual psychological reactions to traumatic events are common but heterogeneous, with some responding adaptively and others experiencing subsequent psychological difficulties. A multitude of different psychological difficulties have been associated with trauma exposure. Initial experience of some psychological symptoms is to be

expected, and so an important task is to distinguish those whose responses will enable them to carry on with life functionally from those who will develop psychological problems. This distinction is important to ensure appropriate support and intervention is provided to those who are most in need.

This thesis set out to explore how a major earthquake impacted on a group of individuals seeking help shortly after the event. It also aimed to explore the relationships between different common post trauma experiences that were assessed, in the hope of identifying whether the experience of some of these variables were predictive of experiencing others. This would indicate potential intervention targets.

The sample studied reported high levels of distress, particularly posttraumatic stress symptoms, indicating that substantial distress was experienced shortly after the earthquake. Two alternative models that were tested in path analysis converged to an identical model. As was expected, the model revealed that peritraumatic dissociation predicted posttraumatic stress symptoms and symptoms of general anxiety. Posttraumatic stress symptoms then went on to predict symptoms of depression and symptoms of anxiety. Depression and anxiety symptoms were also highly correlated. Against expectations, social isolation as it was measured in this study was not significantly related to any of the other psychological variables, suggesting that in the sample studied, social isolation did not play an important role in post trauma psychopathology.

The finding of substantial psychological difficulties in this study justifies allocating resources to the provision of psychological support for such individuals following a large scale natural disaster. It also justifies the utility of screening individuals early on, particularly for peritraumatic dissociation and posttraumatic stress symptoms, to establish whether they are at high risk of other difficulties and to identify individuals in need of appropriate

monitoring and intervention. Intervention aimed at the predictor variables should be investigated to determine whether disrupting maladaptive coping mechanisms beneficially impacts on subsequent psychopathology.

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APPENDICES

Appendix A. Brief Trauma Screening Interview

BRIEF TRAUMA SCREENING INTERVIEW

IDENTIFICATION CODE (Persons first & last initials & day & month of birth-eg. mb1308) _____	
AGE _____	
PHONE _____	EMAIL _____
TODAY'S DATE _____	TIMES ASSESSED WITH THIS MEASURE: 1 2 3 4 5
DO YOU CONSENT TO BEING CONTACTED IN THE FUTURE TO CHECK YOUR PROGRESS? YES NO	

The following questions are designed to be asked by a GP, clinician or health professional of people who may be distressed by the February 22nd earthquake and/or subsequent aftershocks. The questions are designed to help understand people's responses and reactions and identify those who might require more psychological support.

- I am going to ask you some questions about reactions that people sometimes have after an event such as the recent earthquake.
- My questions are concerned with your personal reactions to the FEBRUARY 22ND earthquake and subsequent AFTERSHOCKS.
- Can you indicate whether or not you have experienced the following AT LEAST TWICE IN THE PAST WEEK
- If answer is YES, please rate: 0=A little bit; 1=Moderately; 2=Quite a lot; 3=Very much; 4=Extremely

	(At least TWICE in the past week)		Rating 0-4
	YES	NO	
1. Upsetting thoughts or memories about the event that have come into your mind against your will			
2. Upsetting dreams about the event			
3. Acting or feeling as though the event were happening again			
4. Feeling upset by reminders of the event			
5. Bodily reactions (such as fast heartbeat, stomach churning, sweatiness, dizziness) when reminded of the event			
6. Difficulty falling or staying asleep			
7. Irritability or outbursts of anger			
8. Difficulty concentrating			
9. Heightened awareness of potential dangers to yourself and others			
10. Being jumpy or being startled at something unexpected			

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A. Total score on items 1-10 ≥ 6: NO YES

Since the <u>earthquake</u> , how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly every day	Every-day
11. Feeling nervous, anxious or on edge	0	1	2	3	4
12. Not being able to stop or control worrying	0	1	2	3	4
13. Feeling afraid as if something awful might happen	0	1	2	3	4
14. Feeling down, depressed, or hopeless	0	1	2	3	4
15. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3	4
B. Mean score on items 11-15 \geq 2: NO YES					
Circle the choice that best describes your experiences and reactions <i>during and immediately after the earthquake or aftershocks.</i>	Not at all	Slightly	Some-what	Very	Extremely
16. Your sense of time changed – things seemed to be happening in slow motion.	0	1	2	3	4
17. What was happening seemed unreal, like you were in a dream or watching a movie or play.	0	1	2	3	4
18. You felt as though you were a spectator watching what was happening to you, as if floating above the scene or observing it as an outsider.	0	1	2	3	4
19. There were moments when your sense of your own body seemed distorted or changed. You felt disconnected from your own body, or that it was unusually large or small.	0	1	2	3	4
C. Mean score on items 16-19 \geq 3: NO YES					
Since the earthquake, while not under the influence of alcohol or drugs, to what degree have you:					
20. Heard voices or other noises that you suspect others don't hear or report hearing? 0 (Not at all) 1 (occasionally) 2 (sometimes) 3 (often) 4 (Constantly)					
20a. Have you experienced anything like this before?				YES	NO
D. Score on item 20 \geq 1 and "No" on 20a: NO YES					
21. Have you got people around that you can talk to about what you have experienced during and since the earthquake? 0 (Not at all) 1 (occasionally) 2 (sometimes) 3 (often) 4 (Constantly)					
E. Score on items 21 \leq 1: NO YES					
Please add the number of 'YES' responses for A-E. If 2 or more, follow-up with another appointment to check progress or consider referral.					

Appendix B. Upper South A Regional Ethics Approval

12 October 2011

Dr Sue Bagshaw
Canterbury Charity Hospital Trust
PO Box 20409
Christchurch, 8543

Dear Dr Bagshaw

Ethics ref: URA/11/EXP/050 (please quote in all correspondence)
Study title: Psychological Responses in People Who Sought Assistance at the Charity Hospital
Following the February 22nd Christchurch Earthquake
Investigators: Dr S Bagshaw, Dr M Dorahy, E Havell, Dr T Marshall, Dr P Bagshaw

The above study has been given ethical approval by the Chairperson of the Upper South A Regional Ethics Committee.

Approved Documents

Protocol

Brief trauma screening interview dated 16.03.2011

Final Report

The study is approved until **30 April 2012**. A final report is required at the end of the study and a report form to assist with this is available at <http://www.newhealth.govt.nz/ethicscommittees>. If the study will not be completed as advised, please forward a report form and an application for extension of ethical approval one month before the above date.

Amendments

It is also a condition of approval that the Committee is advised if the study does not commence, or is altered in any way, including all documentation eg advertisements, letters to prospective participants.

Please quote the above ethics committee reference number in all correspondence.
It should be noted that Ethics Committee approval does not imply any resource commitment or administrative facilitation by any healthcare provider within whose facility the research is to be carried out. The organisation may specify their own processes regarding notification or approval.

Yours sincerely



Alieke Dierckx

Administrator
Upper South A Regional Ethics Committee
Uppersoutha_ethicscommittee@moh.govt.nz

Appendix C. University of Canterbury Ethics Approval

Ref: HEC 2011/97/LR

31 October 2011

Esma Havell
Department of Psychology
UNIVERSITY OF CANTERBURY

Dear Esma

Thank you for forwarding to the Human Ethics Committee a copy of the low risk application you have recently made for your research proposal “Psychological responses in people who sought assistance at the Charity Hospital following the February 22nd Christchurch earthquake”.

I am pleased to advise that this application has been reviewed and I confirm support of the Department’s approval for this project.

Please note that this approval is subject to the following:

- Please provide a copy of confidentiality agreement with the Charity Hospital for our records.

With best wishes for your project.

Yours sincerely

Michael Grimshaw
Chair
University of Canterbury Human Ethics Committee

Appendix D. Frequency Histograms

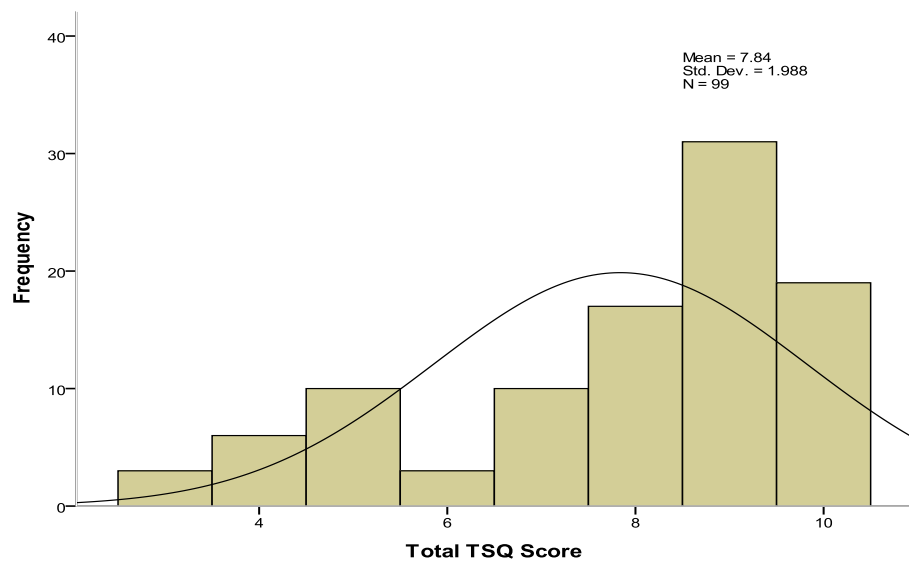


Figure D1. Distribution of TSQ Total Scores
TSQ = Trauma Screening Questionnaire.

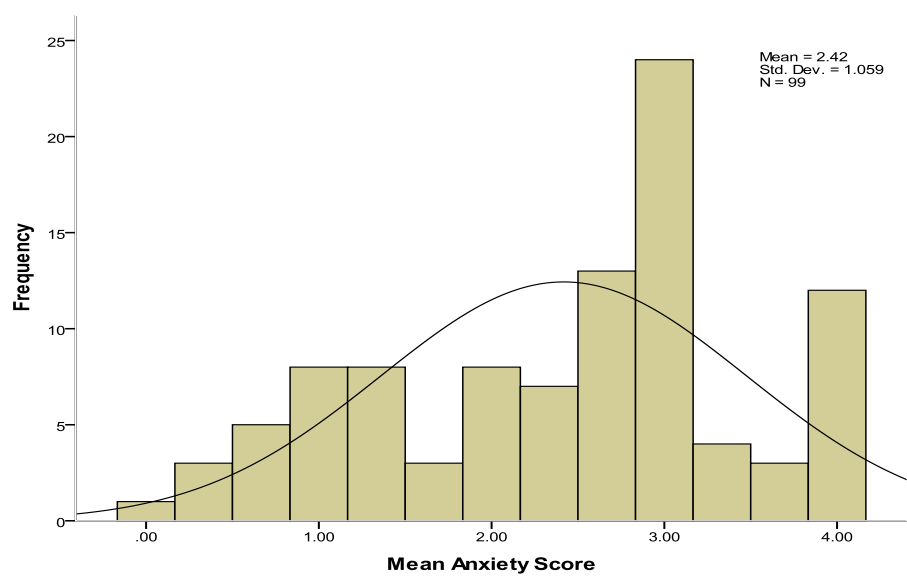


Figure D2. Distribution of Mean Anxiety Scores

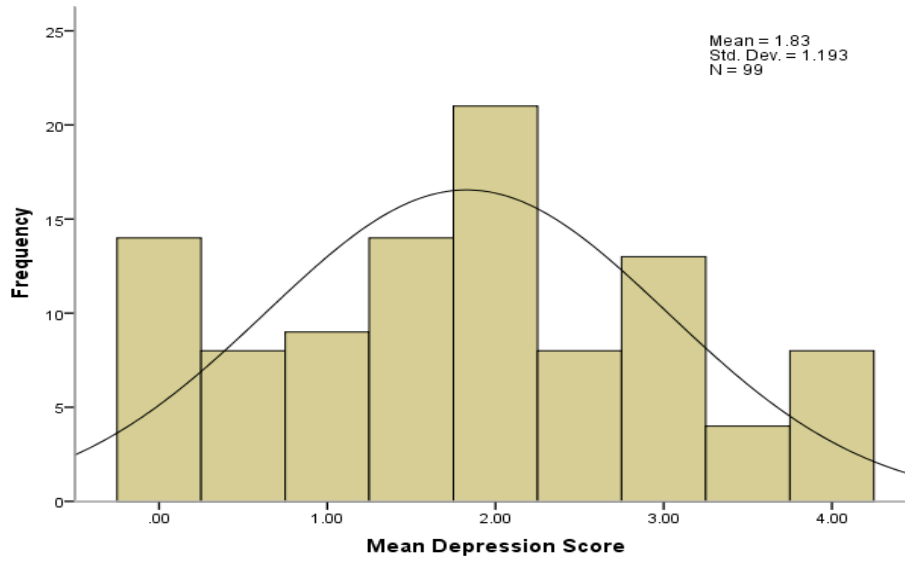


Figure D3. Distribution of Mean Depression Scores

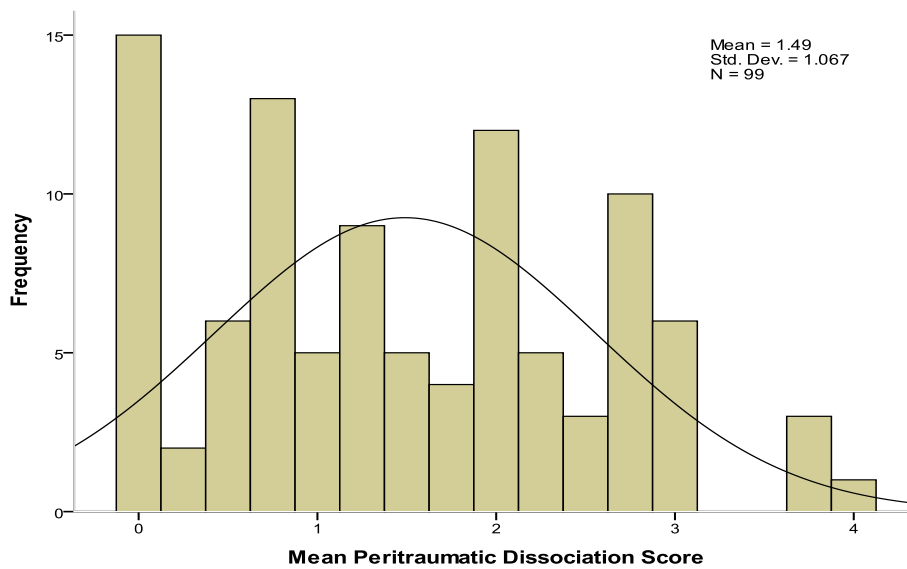


Figure D4. Distribution of Mean Peritraumatic Dissociation Scores

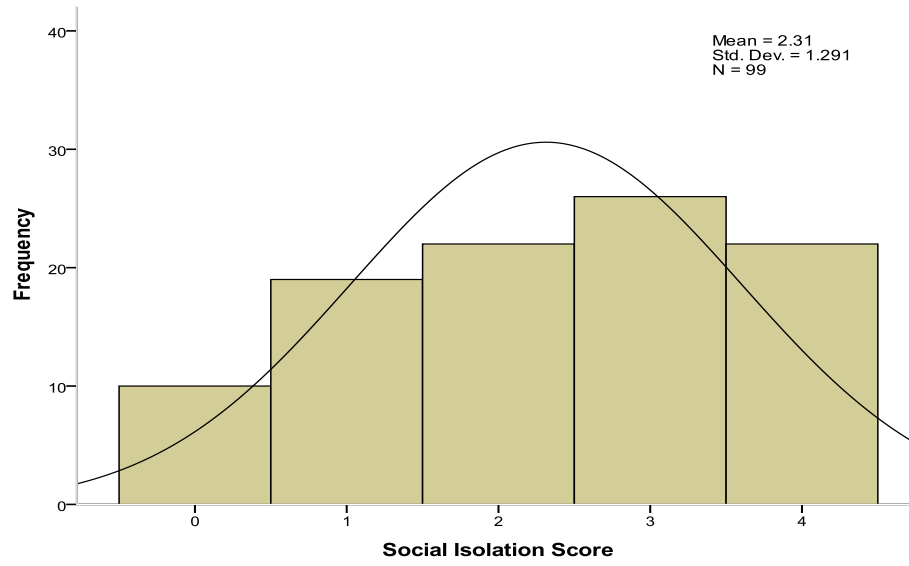


Figure D5. Distribution of Social Isolation Scores

Appendix E. Path Analysis for Trimmed Models

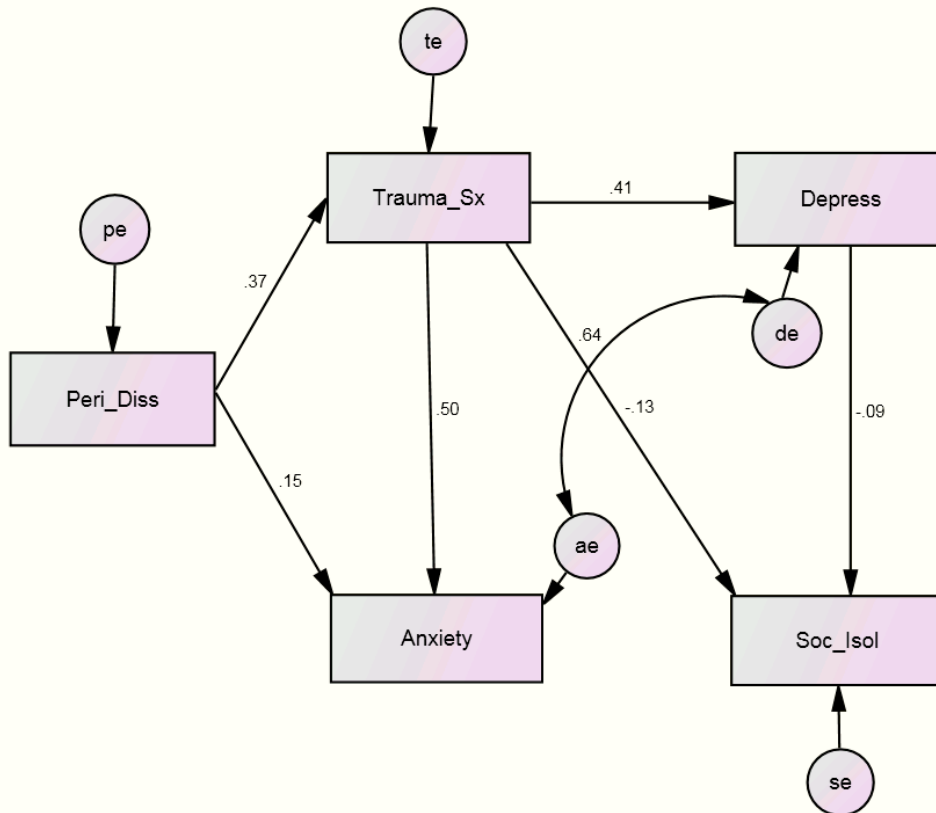


Figure E1. Model 1a

Peri_Diss = Peritraumatic Dissociation; Trauma_Sx = Total Trauma Symptoms; Depress = Depression; Soc_Isol = Social Isolation; pe = peritraumatic dissociation error term; te = trauma symptom error term; de = depression error term; ae = anxiety error term; se = social isolation error term.

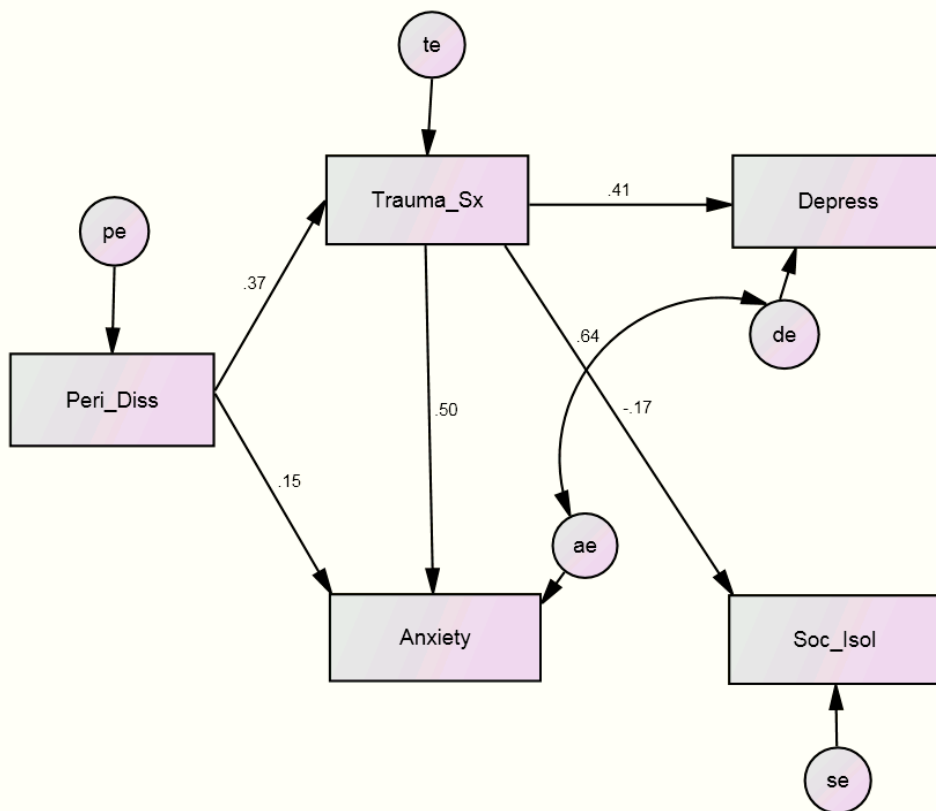


Figure E2. Model 1b

Peri_Diss = Peritraumatic Dissociation; Trauma_Sx = Total Trauma Symptoms; Depress = Depression; Soc_Isol = Social Isolation; pe = peritraumatic dissociation error term; te = trauma symptom error term; de = depression error term; ae = anxiety error term; se = social isolation error term.

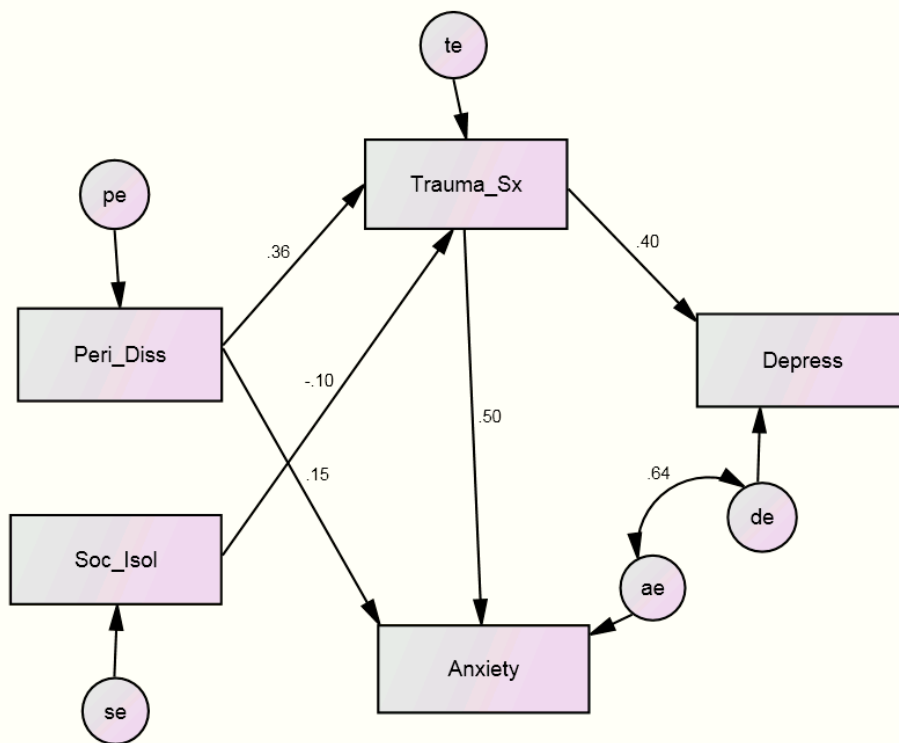


Figure E3. Model 2a

Peri_Diss = Peritraumatic Dissociation; Trauma_Sx = Total Trauma Symptoms; Depress = Depression; Soc_Isol = Social Isolation; pe = peritraumatic dissociation error term; te = trauma symptom error term; de = depression error term; ae = anxiety error term; se = social isolation error term.

Appendix F. Path Analysis with Social Isolation as a Predictor of Depression

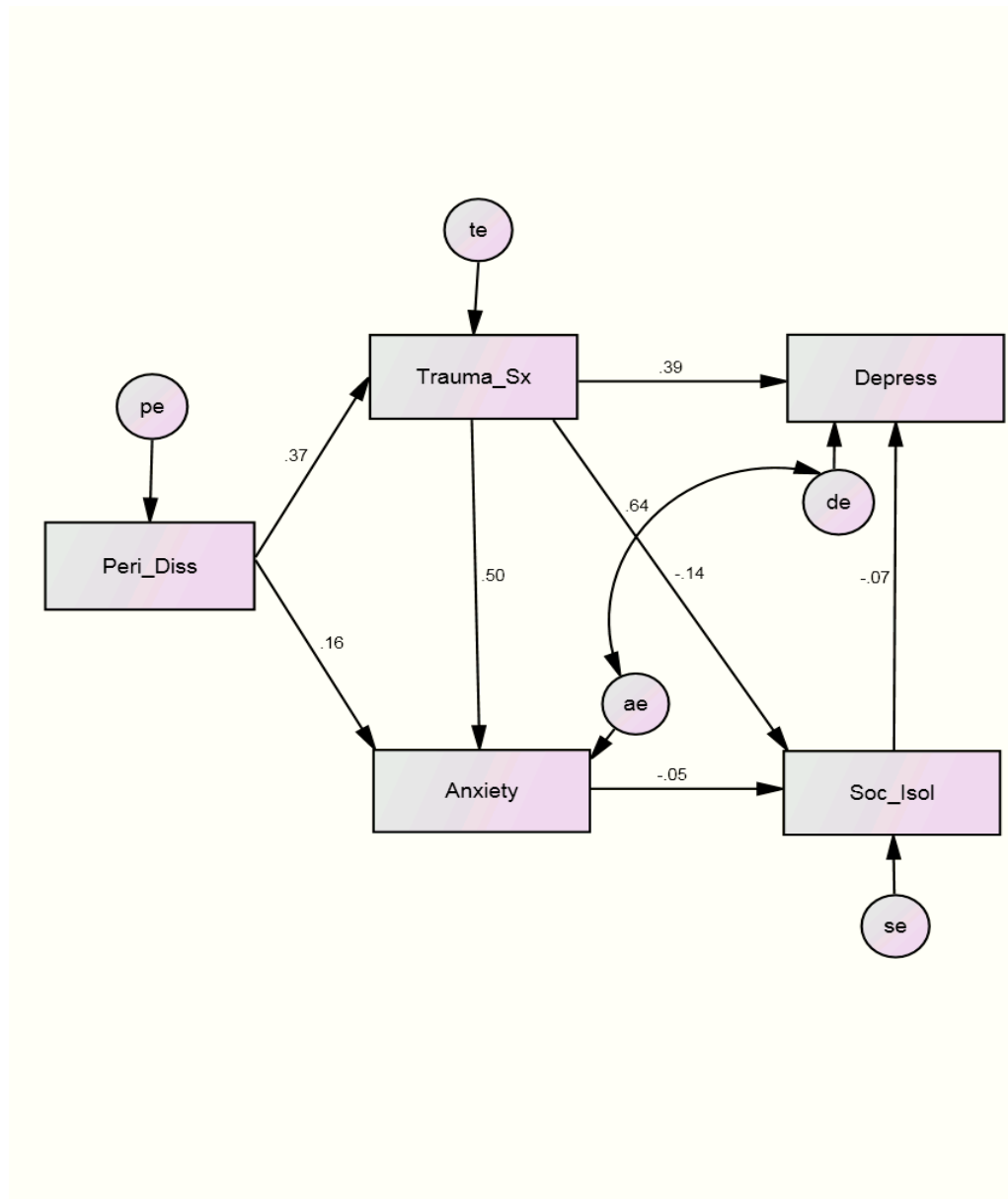


Figure F1. Model 1 with social isolation as a predictor of depression
 Peri_Diss = Peritraumatic Dissociation; Trauma_Sx = Total Trauma Symptoms; Depress = Depression; Soc_Isol = Social Isolation; pe = peritraumatic dissociation error term; te = trauma symptom error term; de = depression error term; ae = anxiety error term; se = social isolation error term.