Doctoral Thesis

The Relationship between Maladaptive Appraisals and Posttraumatic Stress Disorder: A Meta-Analysis

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Abstract

Background

Cognitive models of posttraumatic stress disorder (PTSD) suggest maladaptive appraisals about the self, the world and one's symptoms in the aftermath of trauma play a causal role in the aetiology of PTSD (e.g. Ehlers & Clark, 2000). The current meta-analysis aims to provide a thorough, quantitative examination of the relationship between maladaptive appraisals and PTSD.

Methods

A systematic search of relevant databases was conducted. Effect sizes and study characteristics were extracted from eligible studies and 20 per cent double coded for inter-rater reliability. A series of random-effects meta-analyses using Hedge's (1985) method were performed. Subgroup analyses, sensitivity analyses and assessment of publication bias were examined.

Results

Results showed a large effect size in the overall meta-analysis (r *= 0.53, 95% CI = 0.51-0.56, k = 147*). In studies using only the Posttraumatic Cognitions Inventory or Child Posttraumatic Cognitions Inventory, the effect size remained large (*r = 0.56; 95% CI = 0.53-0.59, k = 104*). In adults, maladaptive appraisals about the self had a very large effect size (*r = 0.61, 95% CI = 0.57-0.64, k = 66*), maladaptive appraisals about the world had a medium effect size (*r = 0.45, 95% CI = 0.41-0.49, k = 62*) and self-blame appraisals had a small-medium effect size (*r = 0.28, 95% CI = 0.24-0.33, k = 59*). In child/adolescent studies, there was no difference in effect size between appraisals of being a fragile person in a scary world or appraisals of permanent change (*r = 0.53, 95% CI = 0.43-0.62 and r = 0.59, 95% CI = 0.48-0.67*, respectively, *k = 12*). The effect size of the relationship between maladaptive appraisals and PTSD symptoms reduced at 12 months following trauma (2-4 months: $r = 0.53$, $k = 9$; 6 months: $r = 0.53$, $k = 13$; 12 months: $r = 0.32$, $k = 3$). All results were robust to sensitivity analyses and there was no evidence of publication bias.

Discussion

Findings underline the importance of maladaptive appraisals in the aetiology of PTSD and highlight the role of self appraisals in adults. Avenues for future research include more studies in child, multiple trauma and military populations and longer term follow up studies.

Keywords: Posttraumatic stress disorder, PTSD, appraisals, posttraumatic cognitions, negative beliefs, meta-analysis

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Introduction

1.1 Chapter Summary

This chapter introduces the background to the current study which is a meta-analysis of the strength of the relationship between maladaptive appraisals and PTSD symptoms in child and adult studies. The chapter begins with a description of PTSD, its risk factors, long term outcome and societal burden. This is followed by an overview of appraisal theories of emotion, and the role of appraisals in psychological distress. The different psychological models accounting for the development and maintenance of PTSD are discussed, with particular reference to the role of maladaptive cognitive appraisals. Evidence for the role of maladaptive appraisals in PTSD is provided and the role of appraisals in the treatment of PTSD is reviewed. The chapter concludes by presenting the rationale and research questions of the current study.

1.2 Posttraumatic Stress Disorder

1.2.1 Definition of PTSD and trauma. Posttraumatic stress disorder (PTSD) is a debilitating psychological disorder arising after the direct or indirect experience of a traumatic event. Symptoms of PTSD include involuntary re-experiencing of the traumatic event, known as “intrusions” (e.g. flashbacks, nightmares), changes in arousal (e.g. angry outbursts), avoidance of reminders of the traumatic event and negative alterations in cognitions and mood (e.g. negative emotions related to the trauma; American Psychiatric Association, 2013).

Events are considered to be traumatic if they involve direct or indirect exposure to “actual or threatened death, serious injury or sexual violence” (American Psychiatric Association, 2013). Events that are often described as “traumatic” in everyday discourse (e.g. divorce, losing a job) do not meet the definition of trauma required for a diagnosis of PTSD.

1.2.2 Diagnostic criteria for PTSD. In the latest revision of the Diagnostic and Statistical Manual for Mental Disorders (DSM-5), PTSD falls into a new category named, “trauma and stressor related disorders”. Under these guidelines, a diagnosis of PTSD is made when an individual meets the following criteria (American Psychiatric Association, 2013):

- Criterion A: The individual has experienced, witnessed or been indirectly exposed to event(s) involving actual or threatened death, serious injury or sexual violence, for example natural disaster, accidents, torture, rape, life threatening illness, assault.
- Criterion B: The individual suffers from symptoms of re-experiencing the traumatic event. This may take the form of nightmares, intrusive thoughts or flashbacks to the traumatic experience. The individual may be emotionally distressed or physically reactive following reminders about the trauma.
- Criterion C: The individual avoids reminders of the trauma, either physical reminders such as places linked to the trauma or thoughts and feelings related to the trauma.
- Criterion D: The individual has negative thoughts or feelings following the traumatic event. These might include an inability to remember key elements of the trauma, negative cognitions and assumptions about themselves or the world, blaming themselves for the trauma, negative affect, isolation and decreased interest in their usual activities.

- Criterion E: Individuals exhibit heightened arousal and reactivity following the trauma, such as irritability, aggression, risky or destructive behaviour, difficulty concentrating, poor sleep, a heightened startle reaction and hypervigilance.
- Criterion F: Symptoms are present for at least 1 month.
- Criterion G: Symptoms result in significant functional impairment in social or occupational participation and are a cause of distress for the individual.
- Criterion H: Symptoms are not due to medication, illness or substance use.

Of particular relevance to the current thesis is the addition of “negative thoughts and assumptions about oneself and the world” to criterion D of DSM-5. This criterion was not included in the prior edition, DSM-IV (American Psychiatric Association, 2000). Negative thoughts and assumptions about oneself and the world are the maladaptive appraisals that are the focus of the current study. Their addition to diagnostic criteria highlights their importance in the diagnosis of PTSD and reflects the large evidence base for their role in the development and maintenance of the disorder (see Section 1.5 for a review of this evidence).

1.2.3 Acute stress disorder. Acute stress disorder (ASD) describes acute stress reactions in the first month following trauma. DSM-5 criteria for ASD are similar to those of PTSD (American Psychiatric Association, 2013), in that the individual must have been exposed to a Criterion A trauma and suffer from at least nine symptoms of PTSD including re-experiencing and avoidance. These symptoms must be present for at least three days to one month following the trauma. If symptoms are still present at one month, then a diagnosis of PTSD can be considered. The majority of adults with a diagnosis of ASD will go on to develop PTSD, however, not everyone with PTSD is diagnosed with ASD beforehand. In fact, most people with PTSD have *not* initially displayed ASD, i.e. ASD is not a prerequisite for PTSD (Bryant, 2011). The stated aim of an ASD diagnosis in DSM-5 is therefore not to predict who will go on to develop PTSD, rather to identify and describe severe stress reactions in the first month following trauma (Bryant, Friedman, Spiegel, Ursano, & Strain, 2011).

1.2.4 Assessment tools for PTSD. PTSD symptoms can be assessed using standardised interviews or self-report questionnaires. The ‘gold standard’ assessment tool in adults is considered to be the Clinician Administered PTSD Scale, or CAPS (Weathers, Blake, et al., 2013). This is a structured interview which is capable of providing a categorical diagnosis as well as a severity score for PTSD symptoms. Assessment in children and young people can be done with the Clinician Administered PTSD Scale for Children and Adolescents, or CAPS-CA (Pynoos et al., 2015) or the UCLA Child/Adolescent PTSD Reaction Index for DSM-5 (Steinberg, Brymer, Decker, & Pynoos, 2004).

Commonly used and well-validated self-report assessments for PTSD in adults include the Impact of Event Scale-Revised (Weiss & Marmar, 1996) and the Posttraumatic Diagnostic Scale, PDS (Foa, 1996; Foa, Cashman, Jaycox, & Perry, 1997) which both relate to DSM-IV criteria. The PTSD Checklist for DSM-5 (PCL-5) is a self-report assessment that can be used to provide a provisional PTSD diagnosis according to DSM-5 (Weathers, Litz, et al., 2013). In children and adolescents, self-report assessments include the Child PTSD Symptom Scale (CPSS) which is the child version of the PDS (Foa, Johnson, Feeny, & Treadwell, 2001).

1.2.5 Epidemiology. Traumatic events are common, with 60-90% of individuals being exposed to at least one traumatic event during their lifetime (de Vries & Olff, 2009; Kawakami, Tsuchiya, Umeda, Koenen, & Kessler, 2014; Kilpatrick et al., 2013; Norris, 1992). As might be expected, rates of trauma exposure vary according to population, with prevalence for trauma exposure being higher in refugee populations (Sack et al., 1994), military veterans (Schlenger et al., 1992) and countries exposed to war or mass violence (de Jong et al., 2001).

Despite a high prevalence of exposure to trauma, not everyone goes on to develop PTSD. Most individuals experience some symptoms of PTSD in the aftermath of trauma but recover without intervention within six months (Foa & Riggs, 1995; Hiller et al., 2016). Studies estimate the lifetime prevalence of PTSD in adults to vary between 1.3% and 8.3 % (Kawakami et al., 2014; Kilpatrick et al., 2013; Perkonigg, Kessler, Storz, & Wittchen, 2000). Lifetime prevalence rates in children and adolescents are estimated to be between 5% and 15.9% (Alisic et al., 2014; Merikangas et al., 2010). Prevalence rates of PTSD also vary according to the population being studied. The prevalence rate of PTSD is considerably higher in areas where natural disasters are common (Galea, Nandi, & Vlahov, 2005), in countries at war or with a history of conflict (de Jong et al., 2001; Pham, Weinstein, & Longman, 2004), in refugee populations (Sack et al., 1994), emergency workers (National Institute for Health and Clinical Excellence, NICE, 2005) and in military veterans (Schlenger et al., 1992). This reinforces what one might intuitively expect: that the greater the trauma exposure, the more likely it is an individual will develop PTSD (Johnson & Thompson, 2008; Yule, 1999).

1.2.6 Co-morbidity. PTSD is highly co-morbid with other mental health disorders and physical health issues (Yule, 1999). In terms of physical health, PTSD is associated with an increased prevalence of arthritis, cancer, neurological symptoms, gastrointestinal diseases, cardiovascular diseases and respiratory diseases (Pacella, Hruska, & Delahanty, 2013; Qureshi, Pyne, Magruder, Schulz, & Kunik, 2009). Higher frequency and severity of pain is also found in individuals with PTSD (Pacella et al., 2013). Biologically, the reason for this may be explained by changes in the immune system as a consequence of the chronic stress associated with PTSD (Altemus, Dhabhar, & Yang, 2006). Alternatively, the association of PTSD with cancer may be as a result of cancer and the treatment for cancer being considered Criterion A traumatic events themselves (Brown, Madan-Swain, & Lambert, 2003; Kangas, Henry, & Bryant, 2005).

In terms of mental health, there is a strong link between PTSD and other psychiatric disorders, with 88% of men with PTSD having at least one co-morbid mental health condition (Brown, Campbell, Lehman, Grisham, & Mancill, 2001). The most frequent co-morbid mental health disorders are depression, anxiety disorders and substance use disorder (Brown et al., 2001; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). The development of PTSD has been found to precede the development of other mental health problems (Brown et al., 2001). Other research has suggested that trauma might act as a precipitating factor for both depression and PTSD (Bleich, Koslowsky, Dolev, & Lerer, 1997). As might be expected, comorbidity is associated with worse functioning and increased symptom severity (Shalev et al., 1998).

1.2.7 Risk factors for the development of PTSD. Considerable research has focused on specific risk factors for the development of PTSD following trauma exposure. These can be categorised into pre-traumatic, peri-traumatic and post-traumatic risk factors (Brewin, Andrews & Valentine., 2000).

Pre-traumatic risk factors are those that are in evidence prior to the traumatic event occurring. Females are at a higher risk of developing PTSD following trauma than males in both adult and child populations (Alisic et al., 2014; de Vries & Olff, 2009; Perkonigg et al., 2000; Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993). Low cognitive ability prior to trauma and a previous history of psychopathology in the individual or family are also risk factors for the development of PTSD (Betts, Williams, Najman, Bor, & Alati, 2012; Breslau, Chen, & Luo, 2013; Inslicht et al., 2010; Koenen et al., 2008). Childhood abuse and a low level of education have been found to predict PTSD (Brewin et al., 2000). Psychological processes predicting PTSD include pre-trauma cognitive style, particularly rumination about stressful events (Wild et al., 2016), as well as low self-efficacy and high hostility prior to trauma (Heinrichs et al., 2005).

Peri-traumatic risk factors are those that are present at the time of the traumatic event. Different categories of traumatic event have been associated with different prevalence rates of PTSD. The highest prevalence of PTSD occurs following acts of intentional interpersonal trauma, particularly rape and combat exposure (Creamer, Burgess, & McFarlane, 2001; Kessler et al., 1995). High rates of PTSD are also associated with physical assault, kidnap and torture, with lower rates following natural disasters and fire (Kessler et al., 1995). Trauma severity and particularly the level of threat to life is also a risk factor for PTSD (Brewin et al., 2000; Cox, Kenardy, & Hendrikz, 2008; Ozer, Best, Lipsey, & Weiss, 2003;

Schnurr, C. A. Lunney, & A. Sengupta, 2004; Trickey, Siddaway, Meiser-Stedman, Serpell, & Field, 2012). Research has shown that dissociation at the time of the traumatic event is a significant risk factor (Ehlers, Mayou, & Bryant, 1998; Ozer et al., 2003). Confusion and mental defeat at the time of trauma are also related to the development of PTSD (Dunmore, Clark, & Ehlers, 2001; Ehlers, Maercker, & Boos, 2000). Individuals who are younger in age at the time of the traumatic event have also been found to be at increased risk of developing PTSD in some populations (Brewin et al., 2000).

Post-traumatic risk factors include a lack of social support (Brewin et al., 2000; Dalgleish, Joseph, Thrasher, Tranah, & Yule, 1996) and life stress following the trauma (Brewin et al., 2000). Feelings of anger, guilt and shame following trauma are also linked to the development of PTSD (Andrews, Brewin, Rose, & Kirk, 2000; Ozer et al., 2003). Cognitive risk factors in the post-trauma period have also been investigated. Rumination about trauma memories and thought suppression have been linked to the development of PTSD (Trickey et al., 2012; Wild et al., 2016). Maladaptive appraisals in the aftermath of trauma are also extremely important. Negative appraisals of the self, world and others as well as appraisals of self-blame are strongly related to PTSD symptoms in adults and children (Agar, Kennedy, & King, 2006; Bryant, Salmon, Sinclair, & Davidson, 2007; Dunmore et al., 2001; Ehlers & Clark, 2000; Ehlers et al., 1998; Foa, Ehlers, Clark, Tolin, & Orsillo, 1999; Meiser-Stedman, Dalgleish, E. Glucksman, Yule, & Smith, 2009; Ullman, Filipas, Townsend, & Starzynski, 2007). This research is discussed in detail in Section 1.5.

Two meta-analyses of risk factors for the development of PTSD in adults have found that pre-traumatic risk factors had smaller effect sizes (smaller than r =

0.20) than peri-traumatic (r = 0.23 - 0.35) or post-traumatic risk factors (0.29 - 0.40; (Brewin et al., 2000; Ozer et al., 2003). Each risk factor accounted for relatively little variance in PTSD and the effect size varied depending on the population being studied (e.g. military versus civilian samples). Methodological factors, e.g. prospective versus retrospective study design influenced the effect sizes seen. Meta-analyses conducted in child and adolescent studies also found the largest effect sizes were found for peri-traumatic and post-traumatic risk factors (Cox et al., 2008; Trickey et al., 2012) suggesting factors at the time of trauma and in the aftermath of trauma are perhaps more significant than factors prior to trauma.

1.2.8 Long term outcome and socio-economic costs. PTSD symptoms are persistent, with around one third of individuals with PTSD experiencing symptoms several times a week ten years after the trauma (Kessler et al., 1995). When the impact of PTSD symptoms and co-occurring physical and mental health difficulties are considered, it is unsurprising that PTSD is hugely disabling to a person's functioning and participation in society (Kessler et al., 2009). Individuals with PTSD report more days off work, worse sleep, greater burn-out and more weight gain (Wild et al., 2016). Health related quality of life ratings are substantially lower in those with PTSD (Haagsma et al., 2012; Wild et al., 2016) and PTSD is associated with greater use of medical services (Yule, 1999). Relationships with other people also suffer. A sense of alienation from others and difficulties with social relationships not only affect those with PTSD but also their friends and family (Beck, Grant, Clapp, & Palyo, 2009). These difficulties shed some light on the finding that the prevalence of suicide attempts in individuals with PTSD is substantially higher than in the general population or indeed compared to individuals with other types of psychological disorder (Davidson, Hughes, Blazer, & George, 1991).

Given the enormous impact on functioning and participation in the workplace, it is unsurprising that PTSD presents an "enormous economic burden" to society (National Institute for Health and Clinical Excellence, NICE, 2005). A recent study in Northern Ireland found the direct and indirect cost of PTSD to be £172 million in 2008 (Ferry et al., 2015). In the UK as a whole, costs to the National Health Service of stress related disorders including PTSD was estimated to be up to £5.6 billion per year in 1994, and is likely to be considerably higher now (Holmes, 1994).

1.2.9 Psychological processes associated with PTSD. Several psychological processes are affected in individuals with PTSD (Brewin & Holmes, 2003). Firstly, different components of memory are disturbed (Brewin, 2011). In terms of memory capacity, impaired extinction learning (decreased responding to a conditioned stimulus after the stimulus is presented without reinforcement), poorer working memory and poor verbal memory has been found in PTSD. With respect to memory of the traumatic event, research has shown increased involuntary sensory-based memories, experienced as "reliving" the trauma as if it were in the present. Despite this, those with PTSD struggle to consciously describe the event, and voluntary memories remain disorganized and fragmented in nature. Negative interpretations of intrusive memories, mental suppression of memories and difficulty in recalling autobiographical memories have all been associated with PTSD (Brewin, 2011).

PTSD has been associated with changes in attention, though the evidence is inconsistent. For example, individuals with PTSD have an attentional bias to threat or trauma related information in some studies (Brewin, 2011; Buckley, Blanchard, & Neill, 2000; Iacoviello et al., 2014).

Dissociation is a term used to describe a sense of emotional numbing, a sense that you are outside of your body looking in, that you are somehow not yourself (depersonalisation) or that things are not real (derealisation). Dissociation is common during traumatic events, and its presence shortly after trauma has been shown to predict PTSD (Ehlers et al., 1998; Shalev, Peri, Canetti, & Schreiber, 1996).

Cognitively, much evidence shows that thought suppression and avoidance of traumatic memories is linked to greater PTSD symptoms (Ehlers et al., 1998; Trickey et al., 2012). Emotional responses during and after trauma are also important to consider in psychological models of PTSD. Anger, shame, helplessness, fear, and mental defeat are all associated with PTSD (Andrews et al., 2000; Beck et al., 2011; Ehlers et al., 2000; Leskela, Dieperink, & Thuras, 2002). These emotions may be a direct result of the outcomes of trauma (e.g. death of a loved one), however, others may depend on a level of cognitive appraisal (e.g. about the impact of the trauma on one’s future or identity).

Prior to discussing the role of cognitive appraisal in PTSD in more depth, the next Section will define what is meant by appraisal and will introduce the role of appraisals in normal emotions and in psychological distress.

1.3 Appraisals and Emotion

Before examining the role of maladaptive appraisals in PTSD, it is helpful first to have an understanding of what is meant by the term *appraisal*. The aim of this Section is therefore to define appraisals and to introduce their role in normal emotional processing and psychological distress.

1.3.1 Definition of appraisals. Appraisals have come to be central components of many theoretical models of emotion, stress and psychological disorders. The way a person *appraises* a situation influences the emotions the person feels in that situation. *Cognitive appraisal* means the way an individual construes a situation and what the subjective meaning is for that person. Appraisal “requires mental activity involving judgement, discrimination, and choice of activity, based largely on past experience” (Grinker & Speigel, 1945, p122).

1.3.2 Early theories of emotion. Very early theories of emotion did not include a role for appraisals in the experience of emotion. In fact, early theories proposed that emotions were the direct experiences of bodily sensations that occurred in response to external stimuli (James, 1884). The well-documented example of running away from a bear in the woods illustrates this point of view: we do not run away because we feel the emotion of fear; rather the direct perception of the bear causes us to run away and the bodily changes that occur as a result of running (sweating, increased heart rate) are experienced as the emotion of fear. James and Lange (1922) felt that each emotion was specified by a unique physical sensation, and did not believe any specific area(s) of the brain were involved with emotion perception (Power & Dalgliesh, 2008). We now know that this is not correct. Much research has indicated the amygdala, pre-frontal cortex, anterior cingulate cortex and hypothalamus in the processing of emotions (Dalgleish, 2004b). Multiple routes to the generation of emotion are now understood to be at play, some automatic, others involving cognitive appraisal of the situation (Dalgleish, 2004b).

1.3.3 Appraisal theories of emotion. It was Aristotle that first proposed a cognitive component to emotions: that emotions require both appraisal and physiological change (Power & Dalgliesh, 2008). In the bear example, according to

Aristotle, we would appraise the bear as dangerous and the consequence of this appraisal would be the emotion of fear. Our action based on this emotion would be to run away.

Early psychological theories that involved appraisal include those of Schachter and Singer (1962). They suggested that the experience of emotion involved some cognitive *interpretation* of physiological arousal. They believed the same state of physiological arousal could be experienced as a different emotion (joy, jealousy, anger) depending on the interpretation the person made of the situation. A person's interpretation could be based not only on prior experience but also on external cues which could be provided by other people. In their seminal experiment, physiological arousal was induced in participants using adrenaline before they spent time with stooges who behaved in different ways (e.g. euphoric). In some conditions, the emotion felt by the participants was influenced by the behaviour and emotional state of the stooges. Although the results were not clear cut and did not provide thoroughly convincing evidence for a single physiological arousal system, this theory was important in demonstrating the influence of social factors in the experience of emotions (Power & Dalgliesh, 2008b). However this theory provided only a simplistic role for appraisals in the labelling of physiological arousal. More recent theories have given appraisals more of a leading role in the experience of emotion.

More nuanced appraisal theories suggested that cognitive interpretations involved the relationship of the situation to the person's ongoing goals. Mandler (1984) thought that physiological arousal came from a perceived interruption of an ongoing goal. These goals may stem from schema-based expectations. For example a spouse forgetting a wedding anniversary fails to fulfil an important schema-based expectation that spouses should remember significant occasions and thus results in negative emotions. This theory differs to that of Schachter and Singer (1962) in that the cognitive interpretation *precedes* the physiological arousal. However, both theories suggest only one type of autonomic arousal, and it is now understood that no single state of arousal underlies all emotions, rather distinct physiological states are linked with different groups of emotions (Power & Dalgliesh, 2008).

Weiner's attribution theory of emotion (Weiner, 1985) offered two routes to emotional experience. The first route was an "attribution independent" route, in which emotions are triggered automatically. The second was an "outcome dependent" route, which depended on a person's attributions of a situation. The type of attributions an individual made to account for their success or failure determined the emotions felt. Aspects of the attribution thought to be important were whether the factors related to success or failure were internal or external to the person, controllable or uncontrollable, stable or unstable. For example, if a success is attributed to internal, stable characteristics of the self, the person feels pride; if failure is attributed to such characteristics the individual feels guilt. This theory has been applied beyond the field of achievement into the realm of emotions, however, it was not developed as a specific theory of emotions. The association between emotions and different types of attribution is probabilistic (e.g. an attribution of lack of effort for failure could be associated with guilt, but could also be associated with self-anger, disappointment or self-pity (Power & Dalgliesh, 2008).

1.3.3.1 Lazarus and Folkman's stress, appraisal and coping model. In their model of stress and coping, Lazarus and Folkman (1984) define cognitive appraisal as one's individual idiosyncratic evaluation of a stressful situation relevant to one's psychological wellbeing. Their theory has been one of the most influential in highlighting the role of the appraisal process in emotion. They identify two types of appraisal (Lazarus & Folkman, 1984). Primary appraisals are those in which the person evaluates what, if anything, is at stake in any particular situation, i.e. what is the significance to the person's wellbeing. A situation can be appraised as irrelevant, benign-positive or stressful. Such appraisals are based on individual values, prior experiences and beliefs about themselves and the world. What one person feels is stressful, another may appraise as benign-positive. Of course, many situations are complex and involve complex appraisals and complex emotions. For example, being promoted at work can be appraised as positive but also as a challenge with some risks attached.

Secondary appraisals refer to a person's judgement about their ability to cope or manage the stressful situation, to minimise the risks identified during the primary appraisal process. For example, an individual may evaluate the different coping strategies available to them, such as changing the situation, accepting the situation or asking for help. A person's judgement on their ability to cope will affect how stressful the person appraises the situation to be. A distinction has been made between problem-focused coping and emotion-focused coping strategies. Problem focused coping is used when the situation is appraised as changeable- the person tries to change the situation that is causing distress. Emotion focused coping involves internal strategies in response to an unchangeable situation. A good example of emotion focused coping is the strategy of rumination, which seems to be associated with higher rates of depression (Nolen-Hoeksema, 2002).

In their update to this theory (Lazarus, 2001), Lazarus suggests that there are three types of primary appraisal: goal relevance (how relevant is the situation to the person's individual goals), goal congruency (is the situation blocking or enabling the goal) and ego involvement (the extent to which the situation has implications for the person's self-esteem, values and life goals). Secondary appraisal consists of an assessment of coping resources, expectations for the future and the degree of blame versus credit for the situation.

Both primary and secondary appraisals link to the emotion felt. Benign-positive appraisals will lead to feelings of happiness, contentment or calm, whereas stressful appraisals will lead to emotions such as fear or sadness. The more negative the appraisal, the more negative the emotion (Ellsworth & Scherer, 2003). In the case of anger, the situation must be relevant to the person's goals but incongruent or blocking the person's goal. There must be involvement of the ego, and a secondary appraisal of blame. If someone else is to blame then anger is directed externally, if the individual is to blame then the anger will be directed towards the self.

1.3.3.2 Oatley & Johnson-Laird's appraisal theory. Oatley and Johson-Laird (1987) proposed that one important role for emotions was to enable the individual to prioritise multiple goals and plans. They felt this happened via two routes. Firstly, the "emotion signal" sets the system that monitors goals and plans into a particular mode (this is analogous to physiological arousal and has no internal cognitive representation). Secondly, the "propositional system" does have an internal structure and is the cognitive interpretation of the situation. They emphasised the existence of at least five basic emotions (happiness, sadness, fear, anger and disgust) from which all other emotions were derived. They believed that each emotion was based on only one of the basic emotions, and that each emotion was linked to goals and plans (e.g. happiness occurs when goals are achieved, sadness is felt when a goal or plan has failed, anxiety relates to a goal being threatened and so on). Subsequent research has found that in fact complex emotions can be derived from more than one basic emotion (Power & Dalgliesh, 2008). Also there are numerous examples where emotion is felt because of what might have happened, rather than what actually happened (e.g. fear at nearly falling down the stairs) or because of another person's emotions (laughing is contagious), nightmares, memories of emotional experiences and so forth. More complex and nuanced theories of emotions are therefore needed.

1.3.4 The SPAARS model. The SPAARS model (Schematic Propositional Analogue and Associative Representational Systems model; Dalgleish, 2004; Dalgliesh, 1999; Power & Dalgliesh, 2008) is a more recent functional theory of emotions that has built and expanded upon earlier theories. Under this model, emotions are considered to be tools used by the cognitive system to solve problems with respect to an individual's values and goals. The model has four levels where information can be represented. The analogical representational system stores information and memories in terms of sensory information (sights, sounds, smells associated with a memory). The propositional representation system stores information verbally, and includes information about beliefs, ideas and concepts. It stores semantic facts about the world and memories of events in a person's life. Higher order representations such as schema or mental models which refer to broader conceptual understandings of the self and the world are held in "schematic models". Schematic models give the person their sense of self and provide meaning to experiences. Information can also be held in an associative representational system. This system is automatically activated and provides direct access to emotions. Emotions can be generated by this automatic route via the associative level (e.g. if someone was assaulted by someone in a red jumper, fear is automatically generated when they someone in a red jumper again). They can also be generated by an appraisal route, involving the schematic model. For example, fear is generated when a person appraises a situation as potentially threatening. What someone finds threatening depends on their deeply held belief systems, or schema. Thus in this model, appraisals are the judgements made about a situation and it's meaning in relation to the person's goals. For example, if information is appraised by the schematic model as a threat to the person's goals, then the emotion of fear is generated. The SPAARS model (Dalgleish, 2004; Dalgliesh, 1999; Power & Dalgliesh, 2008) has been applied to PTSD and further discussion of this theory will be presented in Section 1.4.5.

1.3.5 Appraisals in cognitive theories of psychological disorders. As well as playing a role in normal emotion, appraisals are also thought to be important in dysfunctional emotions. Cognitive models of psychological disorders have highlighted maladaptive appraisals and bias in cognitive appraisals as factors in the development of psychological distress. Beck's model of depression (Beck, 1976) suggests that dysfunctional schemata influence negative views of the self, the world and other people. Activation of these schemata produces negative automatic thoughts (e.g. "I am a failure"; "Other people are better than me"). Individuals with depression have a bias towards negative appraisals in a large number of situations, resulting in sadness and despair (Mehu & Scherer, 2015).

In anxiety disorders, cognitive models suggest appraisal biases towards overestimating threat and underestimating your own ability to deal with the threat result in unmanageable fear and anxiety (Salkovskis, Clark, & Gelder, 1996; (Salkovskis, 1985, Wells, 1997). For example, in panic disorder the appraisal of body sensations as being a sign of imminent catastrophe leads to anxiety and hypervigilance which is causal in the development of panic disorder (Salkovskis, Clark, & Gelder, 1996). In obsessive compulsive disorder, biased appraisals about being responsible for the occurrence of all negative events is linked with severe anxiety (Salkovskis, 1985). Posttraumatic stress disorder is no exception, and much research has explored the link between maladaptive appraisals and PTSD which is the focus of the current thesis.

The next section will critically appraise the different psychological models of PTSD. The role of appraisals will be highlighted in each model, prior to the empirical evidence for the role of maladaptive appraisals in PTSD being presented in section 1.5.

1.4 Psychological models of PTSD

Psychological theories of PTSD aim to account for the symptoms of PTSD, the psychological processes observed and why some people go on to develop PTSD following trauma whilst others do not. Their role is also to explain the range of reactions to traumatic stressors and offer insights into potential treatments for PTSD. This section describes the main psychological models of PTSD. The role of appraisals in each model will be reviewed.

1.4.1 Fear conditioning and information processing theories. Fear conditioning theories suggest that the processes of classical and operant conditioning account for the development and maintenance of PTSD symptoms. Building on Mowrer's two factor theory (Mowrer, 1960), Keane, Zimering & Caddell, (1985) proposed that neutral stimuli that were present at the time of the traumatic event become fearful stimuli through the process of classical conditioning. Any stimulus present in the environment at the time of trauma has the potential become a conditioned stimulus and acquire the fear-eliciting properties of the trauma itself. For example, the path where you were walking your dog when you got attacked becomes a conditioned stimulus; it is feared because of its association with the traumatic event. Operant conditioning is then thought to maintain PTSD. By avoiding being reminded of the traumatic event and by avoiding memories of the traumatic event, the person is rewarded by a decrease in anxiety in the short term. However, in the long term, fear of thinking about or being reminded of the trauma increases and PTSD symptoms are maintained.

Building on this conceptualisation, Lang (1979) proposed an information processing theory in which PTSD involves the permanent activation of a fear network. In this fear network, traumatic events are memorised through closely connected nodes. The traumatic memory consists of connections and associations between nodes representing sensory information about the trauma, emotional and physiological responses to trauma and the meaning associated with trauma (especially the degree of threat). This means that when the fear network is activated, the person experiences the same sensory, emotional and physiological reactions as they did during the trauma. In PTSD, the fear network is thought to be constantly activated, so that the individual functions in a constant state of fear that would have been advantageous during the traumatic event but is no longer functional after the event has passed (Brewin & Holmes, 2003).

Foa’s emotional processing theory built on these models (Foa & Rothbaum, 1998; Foa, Steketee, & Rothbaum, 1989). This theory incorporates a level of subjective meaning into the fear network and assumes that traumatic events violate a person’s basic concept of safety. According to emotional processing theory, the fear network consists of a person’s beliefs about threats present in the environment along with their emotional reactions to these threats. Traumatic events are thought to be represented in memory in a different way to everyday memories such that the connections between the emotions, behavioural and physiological response nodes associated with the trauma are much stronger than the connections made during everyday events. Activation of the fear network by triggering stimuli causes the information stored in the network to enter into consciousness and cause the intrusive symptoms of PTSD. It is thought that many stimuli can activate the fear network, and it has a low threshold for activation. Attempts to avoid activation of the fear network lead to avoidance symptoms seen in those with PTSD.

Early fear conditioning theories (Foa, Steketee, & Rothbaum, 1989; Keane et al., 1985; Lang, 1979; Mowrer, 1960) provided a helpful account of the fear and avoidance pattern seen after a traumatic event but they did not adequately address the other symptoms of PTSD, such as the disturbances in memory seen (Brewin & Holmes, 2003). Furthermore, they did not see a role for cognitive appraisals in PTSD. The expanded emotional processing model of Foa and Rothbaum (1998) offered a more adequate explanation of memory phenomena and did include a role for negative appraisals. They suggested that negative appraisals of one's reactions to trauma lead to increased feelings of incompetence. These appraisals might relate to events that occurred at the time of trauma, to trauma symptoms, to other people's responses or to an individual's ability to take part in usual daily activities in the aftermath of trauma. They felt these beliefs could interact with a person's schemas about themselves and the world to maintain PTSD symptomatology. Central to the development of chronic PTSD were thought to be rigid negative schemas of being an incompetent person in a dangerous world. Foa and Rothbaum (1998) suggested that such rigid beliefs were reinforced by traumatic events. Similarly, rigid beliefs that you are a competent person in an extremely safe world would become shattered after experiencing a traumatic event which you were unable to cope with. Individuals with more flexible schema would be less likely to develop PTSD. Overall, emotional processing theory has been very influential due to its ability to explain many of the important aspects of PTSD and how to address these in therapy.

1.4.2 Schema based models. Stress response theory was one of the earliest models of PTSD (Horowitz, 1986, 1997). Horowitz (1986) felt that people exposed to trauma have two responses: the first is outcry at the realization of the trauma; the second response is to try to integrate the information learned during the trauma into existing knowledge. Many individuals are unable to match their memories and experiences of trauma into their existing schema, or ways of representing meaning in the world. Psychological defence mechanisms such as avoidance and feelings of numbness and denial come into play to protect the individual from remembering the trauma and highlighting the discrepancy in the trauma and existing schema. However, the psychological need to assimilate the new information into existing understandings of the world means that the trauma memories break through into consciousness in the form of flashbacks, nightmares and intrusive memories. The individual fluctuates between a state of suppression of traumatic memories (protecting oneself) and attempts to bring the trauma to mind (to integrate new information with old understandings). Failure to integrate the trauma into existing schema about the self and the world leads to persistent PTSD symptoms as the information remains unresolved in active memory, continues to intrude and continues to be avoided. Whilst influential, this model does not explain why some people develop PTSD and others do not and cannot account for late onset PTSD. The nature of the schema structure is also not set out in any detail. In terms of appraisals, no explanation of their role is given in this model.

The cognitive appraisal model (Janoff-Bulman, 1992) in contrast places a large emphasis on a person’s beliefs about themselves and the world prior to the traumatic event. They suggest that internal models (or assumptive worlds) that guide people in their everyday lives are disrupted or "shattered" by the experience of a traumatic event. The assumptions thought to be significant in the development of PTSD are 1) the world is benevolent, 2) the world is meaningful, 3) the self is worthy and 4) the self is invulnerable. Traumatic events involving intense fear, danger and a feeling one is incompetent have the potential to shatter these deeply held assumptions. Shattered assumptions make it impossible for the person to live according to their previously held beliefs, and thus the symptoms of confusion, avoidance, and intrusions associated with PTSD arise. This theory gives a role to a person's beliefs and appraisals prior to the traumatic event, however, the level of these beliefs is unclear. Are they beliefs about the self and the world that are easily accessible and open to articulation, or do these assumptions refer to higher order schema or models of the self and the world that are less accessible to the conscious mind? No explanation is given as to the processes involved in shattering assumptions nor to where or how these assumptions are represented in memory (Dalgleish, 1999). Moreover, the fact that prior trauma is a *risk factor* for the development of PTSD is a problem for this theory. This theory would predict individuals with a prior history of trauma to have negative assumptions that had already been "shattered" (that the world is dangerous and the self is vulnerable) and as such would be less likely, not more likely, to develop PTSD (Brewin & Holmes, 2003; Dalgleish, 1999).

1.4.3 Memory based models. Dual representation theory is a model of PTSD in which a strong emphasis is placed on traumatic memories and how they are stored (Brewin, 2008; Brewin, Dalgleish, & Joseph, 1996; Brewin, Gregory, Lipton, & Burgess, 2010). In this model, two types of memory representation play a role in PTSD. The model suggests that there is enhanced encoding of traumatic memories in sensation-near representations and impaired encoding in contextualised representations. Sensation-near representation are primarily sensory in nature and have not been exposed to higher cognitive processing. As such they lack contextual information such as time and space meaning that activation of these representations is experienced as if the event is happening in the present time. These representations are assumed to be held in areas of the brain that are linked to action (e.g. the amygdala). Sensation-near representations are automatically activated by triggers in the environment and are directly connected to the emotions and physiological responses that were present at the time of the traumatic event. They are only activated on an involuntary basis, making them impossible to control with conscious effort.

In addition to enhanced encoding of traumatic memories in sensation-near representations, dual representation theory states that there is impaired encoding of traumatic memories in contextualised representations in people with PTSD. Contextualised representations have been consciously processed and are verbally accessible to the person. Personal meanings, contextual information about time and space and consequences of the traumatic event have all been processed consciously and links made with prior experiences. These representations are assumed to be processed in the ventral visual stream and medial temporal lobe, areas of the brain associated with higher order cognitive functions. They can be consciously or involuntarily activated. Poor contextualised representations of trauma in PTSD means that re-experiencing symptoms are dominant and conscious verbal representations of traumatic events are limited. Preferential encoding in sensation-near representations may be linked to dissociation at the time of trauma (Brewin, 2008) and adrenaline (Brewin et al., 1996); the unmanageable level of stress during trauma “switches off” areas of the brain associated with higher order cognitive functions. Re-encoding from sensation-near representations to contextualised representations fails to occur in PTSD due to cognitive avoidance, leading to persistent flashbacks, intrusive memories, nightmares and poor verbal memory for the trauma.

Dual response theory has been influential in the field of PTSD and can account for a significant amount of the psychological phenomena and symptoms of the disorder. It also has clear implications for treatment, implying that emotional processing of trauma memories without avoidance will enable the traumatic memories to be processed by higher cognitive functions and therefore move from sensation-near representations to contextualised representations, thus reducing symptoms. In terms of appraisals, dual response theory suggests that a person’s beliefs about themselves, the world and the future are held in contextualised representations (Brewin & Holmes, 2003). Positive representations about the self are thought to be blocked by the trauma, and negative representations of the self are thought to be reactivated, resulting in negative cognitions about the self arising (e.g. “I am weak”, “I am helpless”). Appraisals therefore do play a role in this theory but they are not central the model.

The landmark model (Berntsen & Rubin, 2007; Berntsen, Willert, & Rubin, 2003) is another theory of PTSD that is based on memory systems, however it contrasts directly with the ideas presented by dual representation theory. In this model, rather than memory storage being impaired by trauma, it is believed that the emotional arousal at the time of trauma actually improves autobiographical memory. It is argued that traumatic memories form multiple links to other memories and autobiographical knowledge about the self, and become central events by which an individual interprets future events. In PTSD, this means that highly negative events will govern a person's expectations about and meaning given to future experiences. The traumatic memory becomes a 'landmark' in the organisation of autobiographical memory by which all future experiences are interpreted; it becomes central to the person's identity. Research has shown a strong relationship between PTSD symptoms and the degree to which traumatic memories are seen to be central to a person's life story (Berntsen & Rubin, 2007; Berntsen et al., 2003). However, this model does not specify any role for maladaptive cognitive appraisals in PTSD. Moreover, it cannot account for the evidence that trauma memories are hard to access (Dalgleish, 2004a) and it does not provide detail regarding the precise nature of self-representation.

1.4.4 The cognitive model. The cognitive model described by Ehlers & Clark has had considerable influence both theoretically and clinically (Ehlers & Clark, 2000). In this model, disturbance in autobiographical memory, maladaptive appraisals and poor coping strategies create a sense of current threat that is central to the development and maintenance of PTSD. The model is illustrated in Figure 1.

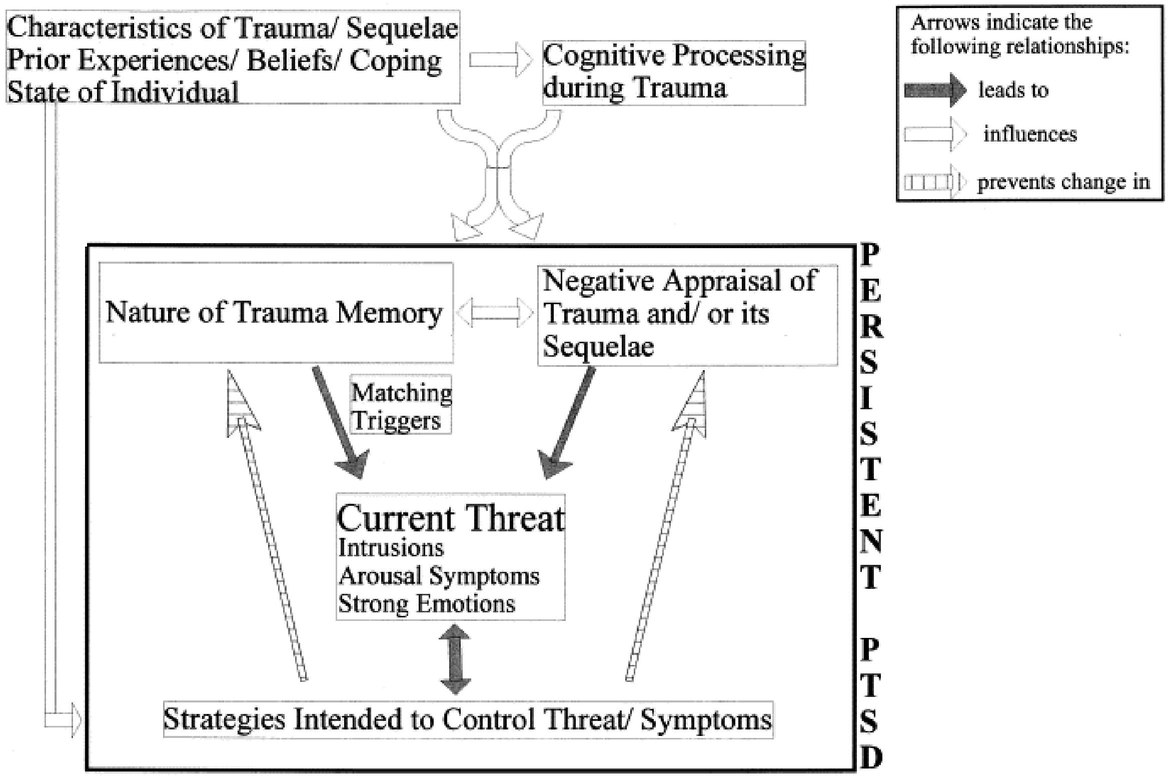

Figure 1. The cognitive model of PTSD. Reproduced from “A Cognitive Model of Posttraumatic Stress Disorder” (Ehlers & Clark, 2000).

Ehlers and Clark state that in PTSD the worst moments of trauma memories are incoherent and poorly integrated into autobiographical memory due to poor conceptual processing during the traumatic event. Trauma memories are inadequately integrated into their context, meaning that the memory is recalled in a disjointed and overgeneralised way. The memory has not been updated with information about what the person knows now (e.g. that the trauma is over and they are safe). Conscious recall of the memory is also impaired, whilst involuntary retrieval is strengthened. Memories are easily triggered by sensory cues such as sounds or smells and when triggered the memory is experienced as if it is happening in the present moment. This produces symptoms of reliving or flashbacks which are associated with the strong emotions that occurred at the time of the traumatic event.

At the same time as poorly contextualised trauma memories, Ehlers and Clark expanded on prior theories to identify a wide range of negative appraisals thought to be relevant in PTSD. They noticed different personal meanings or negative appraisals related to the traumatic event are important. People with PTSD have highly threatening personal meanings related to the trauma and its aftermath. Firstly, appraisals of overgeneralisation of danger “bad things always happen to me” or negative appraisals of their own actions during the traumatic event “I should have coped better/ done something different” result in negative emotions and a sense of fear. Appraisals of trauma sequelae are also felt to be central to a person’s emotions, such that PTSD symptoms are appraised as a sign they are “going crazy”, other people’s reactions are appraised as if “people think I am too weak to cope on my own” and the person’s future is appraised as “permanently changed” or the trauma has been a “life-shattering” experience. Strong negative emotions are linked in a meaningful way to these negative appraisals, for example, perceived external threat resulting from appraisals of danger (e.g., “I can’t trust anyone”) will lead to excessive fear. Appraisals of unfairness will lead to emotions of persistent anger. Negative appraisals of yourself or your actions (e.g. “it was my fault” or “I should have prevented it”) lead to feelings of guilt and shame. Appraisals of permanent change can lead to emotions of hopelessness or sadness.

Maladaptive behavioural strategies and cognitive processing styles are also indicated in the maintenance of PTSD symptoms in the cognitive model. Avoidance of trauma reminders, thought suppression, distraction, using safety behaviours, rumination or selective attention to threat cues are thought to prevent the individual challenging their maladaptive appraisals or processing their trauma memories.

1.4.5 The SPAARS model in PTSD. As outlined in Section 1.3.4., the SPAARS model (Power & Dalgliesh, 2008) is a model of emotional processing in which processing can occur at different levels. When applied to PTSD (Dalgleish, 1999; Power & Dalgliesh, 2008), the SPAARS model suggests that information about the traumatic event at the time of its occurrence is appraised by the schematic level as being threatening in respect of the person's goals (particularly the goal of survival and the goal of maintaining a sense of reality of how the world should be). This is experienced as intense fear. Simultaneously, sensory information in the environment at the time of trauma (smells, sights, sounds) are encoded by the analogical, propositional and schematic levels.

The information encoded during the traumatic event is not compatible with the person's existing schematic models of themselves and the world. This threatens the person's sense of self and reality. This incompatibility means trauma related information is poorly encoded into the person's existing representations; the information is not integrated with the person's schematic models of the self, world and other. This leads directly to the symptoms of PTSD. Intrusions occur because the schematic model continues to try and process the unintegrated information. The schematic model will continue to appraise the information as threatening, and thus the individual is in a continuous state of fear, with information related to the trauma intruding into consciousness. Chronic activation of the fear module results in a cognitive processing bias, such that cues in the environment related to the trauma are selectively processed. This increases the probability of intrusions. In addition to this, the SPAARS model suggests that links between the different aspects of the traumatic memory are much stronger than the links between the traumatic memory and existing memory structures as a result of the poor integration of the traumatic representations. This means that small parts of the traumatic memory are easily able to trigger flashbacks that involve the whole traumatic experience. The intrusive experiences are obviously highly aversive for the individual, resulting in a tendency to avoid reminders or thoughts of the traumatic event. A person with PTSD may also withdraw or even have psychogenic amnesia in response to intrusions.

Hyperarousal in the SPAARS model is explained by the constant activation of the fear module as a result of appraising the unintegrated trauma information as threatening, and also due to the multiple cues in the environment. Moreover, continually appraising the unintegrated information reduces the amount of cognitive resources available for processing other emotions in the schematic model. This can lead to irritability and anger.

Similar to emotional processing theory, the SPAARS model suggests that individuals who have overvalued schematic models of the world as safe and themselves as invulnerable are more likely to develop PTSD. Those with more flexible schematic models are less likely to develop PTSD as the information can more easily be integrated into their existing schema.

1.4.6 Summary. Psychological models of PTSD place their emphasis on different psychological processes, including memory, shattered assumptions, fear conditioning, emotional processing and cognitive appraisals. The model which places the greatest emphasis on maladaptive appraisals is the cognitive model (Ehlers & Clark, 2000), however the SPAARS model (Dalgleish, 1999) also places a strong emphasis on continuous appraisal of unintegrated trauma representations. Most models include some role for appraisals or personal meaning in the development and maintenance of PTSD. Commonalities amongst the theories with respect to appraisals seem to be beliefs that the world is a dangerous place and the self is incompetent or somehow to blame for the trauma. Negative appraisals about the meaning of trauma symptoms are also important, such that individuals with PTSD believe themselves to be going crazy or being permanently changed. The theoretical relevance of maladaptive appraisals in PTSD is therefore evident. The next section will turn to the empirical evidence supporting the existence of the relationship between maladaptive appraisals and PTSD.

1.5 Maladaptive Appraisals and PTSD

Many studies have been carried out to explore the relationship between maladaptive appraisals (also referred to as negative beliefs or posttraumatic cognitions) and PTSD symptoms. These can be categorised into negative thoughts about the self, negative thoughts about the world and self-blame appraisals in the aftermath of trauma.

Negative appraisals about the self following the traumatic event may include, “I am a weak person”, “I am inadequate”, “I can’t stop bad things from happening to me” and “I won’t be able to handle it if I think about the trauma”. Negative appraisals about the world that occur in the aftermath of trauma include, “You can never know who will harm you”, “The world is a dangerous place” or “People can’t be trusted”. Self-blame appraisals following traumatic events include, “The event happened because of the way I acted”, “The event happened to me because of the sort of person I am” or, “Someone else would not have gotten into this situation”.

1.5.1 Measuring maladaptive appraisals. The PTSD literature has developed a few self-report measures to capture these posttraumatic maladaptive appraisals. Self-report scales are felt to be superior to interviews or direct questioning as they may avoid some of the understandable distress a person might feel when asked directly about difficult, possibly shame-inducing, appraisals (Beck, Jacobs-Lentz, Jones, Olsen, & Clapp, 2014). The different self-report scales assessing appraisals along with reliability and validity information are shown in Table 1. The most well-validated and widely used scale is the Posttraumatic Cognitions Inventory in adults (PTCI, Foa et al., 1999) and the Children's Posttraumatic Cognitions Inventory, or CPTCI, in children (Meiser-Stedman, Smith, et al., 2009). These measures form the main part of the current meta-analysis and therefore will be discussed in more detail in the coming section.

More generic measures of a person's appraisals of themselves, the world and others, such as Young's Schema Questionnaire (Schmidt, Joiner, Young & Telch, 1995), are rarely used in the PTSD literature. This is likely because items in such measures refer to *general* schemata from early years, rather than *specific* changes in appraisals following a traumatic event. Cognitive theorists who developed the PTCI (Foa et al., 1999) assume that the appraisals relevant to the development of PTSD are *specific* to that disorder, rather than *general* to psychological distress (Ehlers & Clark, 2000, Foa et al., 1999; Foa & Rothbaum, 1998). In the Ehlers and Clark (2000) model, interpretations of PTSD symptoms and sequalae serve to maintain anxiety and a sense of current threat, e.g. "Other's can see I am a victim"; "My personality has changed for the worse"; "I will never be able to lead a normal life again" (Ehlers & Clark, 2000). This is somewhat comparable to the specific appraisals related to bodily sensations in panic disorder (e.g. "My heart racing means I am going to die"; Clark, 1986). The appraisals are thought to be specific to PTSD, rather than relevant to anxiety more generally. Similarly, the emotional processing theory of PTSD (Foa & Riggs, 1993; Foa & Rothbaum, 1998) which was also used to develop the PTCI, would suggest that exaggerated posttraumatic appraisals that the outside world is *completely dangerous* and the self is *totally* incompetent, specifically drive the symptomatology of PTSD.

It could be argued that such appraisals are merely the context-specific manifestations of more “deeply held”, general schematic beliefs around the self or others, or pre-existing beliefs around anxiety. Some data do show that pre-trauma beliefs predict poor responses to subsequent trauma, for example Bryant and Guthrie (2005; 2007) found that pre-trauma appraisals predicted PTSD symptoms in trainee firefighters. Also, we know that prior trauma exposure (especially childhood sexual abuse) is a vulnerability factor for later PTSD (Brewin et al, 2000; Ozer et al., 2003). This suggests that general appraisals that may be present before the traumatic event are influential in the aetiology of PTSD. However, meta-analyses have shown prior trauma exposure is not a *large* risk factor for PTSD (Brewin et al, 2000; Ozer et al., 2003) suggesting it is unlikely that responses to a trauma in adulthood are completely dictated by appraisals in response to childhood stressors (e.g. you can have a happy childhood but then be crippled by a trauma in adulthood, with new, very negative beliefs). As such, and on the basis of cognitive theories of PTSD, measures of maladaptive appraisals specifically related to PTSD and its sequalae have been developed and dominate the literature. The most widely used measure is the PTCI and its development will be described next.

Two groups of theorists joined forces to develop the PTCI, and as such the measure is an amalgamation of items pertaining to both the cognitive model (Ehlers & Clark, 2000) and emotional processing theory (Foa & Rothbaum, 1998). The 114 item pool for the development of the questionnaire was developed by Foa, Clark & Ehlers on the basis of their two theories and from clinical interviews with PTSD victims (Foa et al., 1999). The initial items related to the following appraisal areas which covered both theoretical models: “general negative view of the self”, “perceived permanent change”, “alienation”, “hopelessness”, “negative interpretation of symptoms”, “self-trust”, “self-blame”, “trust in other people” and “unsafe world”. This is less than ideal, as many studies have used the PTCI as a measure to test Ehlers and Clark’s cognitive model. The item pool was not developed to operationalise this model alone, so the item pool does not properly reflect the cognitive model. Moreover, the items included in the model were chosen on the basis of statistical analysis, rather than on the basis of cognitive theory. Results from principal-components factor analysis suggested three factors: negative cognitions about the self; negative cognitions about the world and self-blame for the trauma. The item pool was reduced by the research team on the basis of creating diversity of items, applicability to different types of trauma and moderate correlation between items and the Posttraumatic Diagnosis Scale. On the positive side, the PTCI has good reliability and validity (see Table 1) and has been translated into many languages (e.g., Daie-Gabai, Aderka, Allon-Schindel., et al., 2011; Gulec, Kalafat, Boysan & Barut, 2015; Müller, Wessa, Rabe, et al., 2010; Su & Chen, 2008; van Emmerik, Schoorl, Emmelkamp, & Kamphuis, 2006), which perhaps explains the reliance of the literature on this measure above others.

A further criticism of the PTCI is that many of the items seem to be more general appraisals about the self and the world, rather than operationalising appraisals specifically in relation to PTSD, as the cognitive model would specify. Items such as “I am a weak person”; “I am inadequate”; “People are not what they seem” and “People can’t be trusted” could relate to depression or anxiety much more generally, and are not specific to posttraumatic stress. Whilst the instructions for the items request people to rate items based on their appraisals since the traumatic event (see Appendix Q), many individuals may not read such instructions and will look straight at the items which are not worded to reflect appraisals in the aftermath of trauma. Whilst some items do relate to trauma specific appraisals (e.g., “The event happened because of the way I acted”; “My life has been destroyed by the trauma”; “My reactions since the event show that I am a lousy coper”), these are the minority, rather than the majority of the items (9 out of 36 items). As such, the PTCI may not operationalise cognitive models of PTSD very well.

The current study also focuses on the child version of the PTCI, the CPTCI (Meiser-Stedman, Dalgleish, E. Glucksman, Yule, & Smith, 2009). This self-report measure of posttraumatic maladaptive appraisals in children and adolescents was derived from the adult PTCI with additional items deemed suitable for children inspired from the literature (e.g. Steil & Ehlers, 2000). Forty-one items were submitted to a principal components analysis which suggested a two factor solution. Twenty five items were retained and grouped into the following components: “permanent and disturbing change” (which included items such as, “My life has been destroyed by the frightening event”) and “fragile person in a scary world” (which included items such as, “I am a coward”). The CPTCI has good reliability and validity (see Table 1) and, like the PTCI, has been translated into several languages (de, Haan Petermann, Meiser-Stedman & Goldbeck, 2015; de Oliveira, Brunne, da Silva et al., 2014; Diehle, de Roos, Meiser-Stedman et al., 2015; Lobo, Brunnet, Ecker et al., 2015). It is the only measure specifically designed to assess posttraumatic maladaptive appraisals in children and adolescents. Compared to the PTCI on which it was based, more items in the CPTCI relate specifically to trauma appraisals (ten of 25 items; see Appendix R), however, there remain many that are generic negative appraisals. Again this measure may be less successful at operationalising the cognitive model of PTSD.

Whilst the PTCI and CPTCI are the most widely used measures of maladaptive appraisals in the literature, and by the nature of meta-analysis are the focus of the current thesis, it is worth commenting on other measures researchers have developed. A cluster of questionnaires have been developed specifically to measure cognitive appraisals in the aftermath of rape or sexual abuse. The Rape Attribution Questionnaire (Frazier, 2003), the Sexual Assault and Rape Appraisals measure (SARA; Fairbrother, 2003) and the Negative Appraisals of Sexual Abuse Scale (Spaccarelli, 1995) have been used in individual studies to explore the relationship between cognitive appraisal following sexual abuse and psychological distress, including PTSD. As might be expected, items in these questionnaires are much more specific to the trauma of rape/sexual abuse. To give an example, in her study of the role of appraisals in PTSD following sexual assault, Fairbrother (2003) developed the SARA, attempting to operationalise Ehlers & Clark's (2000) cognitive model. It contains five subscales to assess appraisals of the assault with respect to oneself, one's world, one's future, one's current PTSD symptoms, other people's reactions upon learning about the assault, and feelings of mental pollution. In comparison to the PTCI, this measure has many more specific items related to the trauma of rape, rather than more general negative appraisals (45 out of the 80 items are specific to the trauma). The wording of the items is more specific to PTSD, for example many items are similar in format to: "My chances of a happy relationship/marriage have changed for the worse because of the sexual assault/rape" and, "If I don't remain alert to signs of danger, the assault/rape may happen again." As such it could be argued that the SARA is more successful at operationalising the cognitive model than the PTCI. However, this measure has only been used in one study (Fairbrother, 2003), and the measure itself has not been published in a peer reviewed publication.

A further cluster of questionnaires have been developed to measure appraisals following a range of traumatic events. The World Assumptions Scale (WAS; Janoff-Bulman, 1989) attempts to operationalise the cognitive appraisal model (Janoff-Bulman, 1989), in which emphasis is placed on the “shattering” of a person’s internal models (or assumptive worlds) following trauma. As described in Section 1.4.2, the assumptions thought to be significant in the development of PTSD are 1) the world is benevolent, 2) the world is meaningful, 3) the self is worthy and 4) the self is invulnerable. The World Assumptions Scale operationalises these assumptions in statements to which the individual is asked to rate their agreement. Examples include, “By and large, good people get what they deserve in this world”; “Human nature is basically good”; “The course of our lives is largely determined by chance”; “If people took preventive actions, most misfortune could be avoided”. All the items on the World Assumptions Scale reflect general assumptions, rather than specific appraisals in the aftermath of trauma. Nevertheless, researchers have used this measure to assess change in assumptions following a traumatic event. Unfortunately, the measure has poor reliability and validity (Elklit, Shevlin, Solomon et al., 2007; Kaler, Frazier, Anders et al., 2008, see Table 1.1) so conclusions about the relationship between world assumptions and PTSD on the basis of this measure should be made with the limitations of the psychometrics of this measure in mind.

The Trauma Appraisals Questionnaire (DePrince, Zurbriggen, Chu & Smart, 2010) contains items that assess emotions, beliefs, and behaviours following trauma, importantly including items derived from interviews with trauma survivors. No particular theoretical model was specified as underpinning this measure and its items relate more to the experience of *emotions* during the traumatic event, rather than appraisals in the aftermath of trauma as defined by the cognitive model of Ehlers & Clark (2000). For example, items include “I felt angry”; “Anger gave me power”; “There was a huge void inside me”. Items in the self-blame subscale do seem to address appraisals in the aftermath of trauma, e.g. “If I were good enough, then this wouldn’t have happened to me”; “It’s my fault what happened”, but this is the only subscale that specifies appraisals as the personal meaning attributed to the trauma and its sequalae. The other subscales (betrayal, fear, alienation, anger and shame) relate more to the experience of *emotions* than cognitive *appraisal* as defined in Section 1.3.1.

The Trauma Relevant Assumptions Scale (TRAS; Buck, Kindt, Arntz, van den Hout & Schouten, 2008) was developed to assess the flexibility or rigidity of beliefs following trauma. The scale intends to operationalise Foa et al.’s (1999) model which postulates that rigid beliefs about the self and world makes a person more vulnerable to develop PTSD. In contrast, people with more flexible beliefs about the world (‘‘The world is *sometimes* safe and *sometimes* dangerous’’) will be more likely to recover successfully after a traumatic event. The items on the TRAS are based on the PTCI and the WAS however, the items have been reworded such that the beliefs are split into two rigid extremes, positive versus negative, on a visual analogue scale so that the flexibility of the belief can be assessed. For example, “the world is *always* dangerous” to “the world is *never* dangerous”. A rating at either extreme indicates a dysfunctionally rigid belief. Items relating specifically to trauma and its symptoms were removed, as the measure is intended to be used as a way to assess the change in flexibility of beliefs before and after a traumatic event. Including items that relate to the trauma would not make sense if measuring pre-trauma beliefs. As such, this measure is best considered as an attempt at operationalising emotional processing theory, in which the rigidity of belief, rather than the content of the belief is important in the aetiology of PTSD. Items reflect general beliefs and do not relate specifically to appraisals of trauma, and so this measure does not successfully operationalise appraisals specific to PTSD as outlined in the cognitive model (Ehlers & Clark, 2000). Items loaded onto two factors: assumptions about the self and assumptions about the world (Buck et al., 2008). The measure was found to have very good reliability and validity. However it has hardly been used in the literature so far (Buck et al., 2008).

The Personal Beliefs and Reactions Scale (Mechanic & Resick, 1999) remains unpublished and as such is not available for examination. It was used in the development of the PTCI (Foa et al., 1999). Further scales that were developed around the time of the PTCI and to a certain extent overlap with this measure, are the Intrusions Cognitions Questionnaire (Steil & Ehlers, 2000) and the Intepretation of PTSD Symptoms Inventory (Dunmore, Clark & Ehlers, 1999). These measures have not been published as they were superceded by the PTCI. They relate specifically to a person's appraisal of their PTSD symptoms (e.g. "My reactions since the assult mean that I must be losing my mind"). This means the items are specific to the disorder of PTSD as to have an appraisal of a symptom, you must actually have PTSD symptoms. However, there is an inevitable confound of looking at the relationship between such appraisals and the severity of PTSD symptoms, as you can only have appraisals of symptoms if you have PTSD. So the items are *specific* to

PTSD and therefore seem appropriate to operationalise the disorder, but they cannot tell us whether or not such appraisals *predict* PTSD symptoms.

The next section describes studies that have been carried out to examine the relationship between maladaptive appraisals and PTSD symptoms using the measures described here.

Table 1.1

Self-Report Questionnaires of Maladaptive Appraisals

Adult Self-Report Scales:-	**Abbr.**	**Reliability and Validity**
Posttraumatic Cognitions Inventory (Beck, Coffey, Palyo et al., 2004; Foa et al., 1999)	PTCI	Internal consistency=0.86-0.97; Test-retest=$0.74<r<0.89$; Convergent validity =$0.50<r<0.85$
World Assumptions Scale (Elklit, Shevlin, Solomon et al., 2007; Kaler, Frazier, Anders et al. , 2008; Janoff-Bulman, 1989)	WAS	Internal consistency=$0.40<\alpha<0.82$; Test-retest=$0.38<r<0.65$; Construct validity $r=0.14$
Personal Beliefs and Reactions Scale (Mechanic & Resick, 1999; Resick, Schnicke & Markaway, 1991)	PBRS	Internal consistency=$0.60<\alpha<0.79$
Trauma Relevant Assumptions Scale (Buck, Kindt, Arntz, van den Hout & Schouten, 2008)	TRAS	Internal consistency=$0.80<\alpha<0.91$; Test-retest=$0.73<r<0.87$; Convergent validity=$0.39<r<0.85$
Trauma Appraisal Questionnaire (DePrince, Zurbriggen, Chu & Smart, 2010)	TAQ	Internal consistency=$0.88<\alpha$-0.94; Test-retest=$0.73<r<0.88$
Intrusions Cognitions Questionnaire (Steil & Ehlers, 2000)	ICQ	Internal consistency $\alpha=0.86$
Interpretation of PTSD Symptoms Inventory (Dunmore, Clark & Ehlers, 1999)	IPSI	Internal consistency=$0.67<\alpha<0.93$
Rape Attribution Questionnaire (Frazier, 2003)	RAQ	Internal consistency $\alpha=0.87$; Test-retest=$0.64<r<0.79$
Sexual Assault and Rape Appraisals (Fairbrother, 2003)	SARA	Internal consistency=$0.83<\alpha<0.97$; Concurrent validity=$0.39<r<0.61$

Negative Appraisals of Sexual Abuse Scale (Spaccarelli, 1995)	NASAS	Internal consistency α=0.96; Concurrent validity r=0.29
Child Self-Report Scales:-		
Child Posttraumatic Cognitions Inventory (Meiser-Stedman, Smith et al, 2009)	CPTCI	Internal consistency=0.86<α<0.93; Test-retest=0.70<r<0.78; Convergent validity r= >0.50
Cognitive Triad Inventory for Children (Kaslow, Stark, Printz, Livingston & Ling Tsai, 1992)	CTIC	Internal consistency = 0.69<α<0.92; Concurrent validity=0.60<r<0.69

1.5.2 Maladaptive appraisals as a risk factor for PTSD. Maladaptive appraisals about the self, the world and self-blame have been shown in many studies to be risk factors for PTSD. Cross-Sectional studies have found measures of maladaptive appraisals such as the PTCI to correlate strongly with PTSD symptoms in child and adolescent populations (Diehle, de Roos, Meiser-Stedman, Boer, & Lindauer, 2015; Duffy et al., 2015; Ma et al., 2011; Meiser-Stedman et al., 2009) as well as adult populations (Ayers, Copland, & Dunmore, 2009; Duffy, Bolton, Gillespie, Ehlers, & Clark, 2013; Dunmore et al., 1999; Ehlers et al., 2000). This association has been demonstrated in military (Constans et al., 2012; Porter, Pope, Mayer, & Rauch, 2013) and civilian samples (Koo, Nguyen, Gilmore, Blayney, & Kaysen, 2014; Monson, Gradus, La Bash, Griffin, & Resick, 2009); in intentional (Beck, Jones, Reich, Woodward, & Cody, 2015; Cieslak et al., 2013) and unintentional trauma (Agar et al., 2006; Steil & Ehlers, 2000); in single event (Ayers et al., 2009; Ehring, Ehlers, & Glucksman, 2006; Kreis et al., 2011) or multiple event trauma (Koo et al., 2014) and across different categories of traumatic event from illness/injury (Ayers et al., 2009), road traffic accident (Ehlers et al., 1998; Tierens, Bal, Crombez, Loeys, et al., 2012), sexual abuse (Cieslak, Benight, & Caden Lehman, 2008), intimate partner violence (Ali, Dunmore, Clark, & Ehlers, 2002), disaster (Lommen, Sanders, Buck, & Arntz, 2009) and war (Palosaari, Punamäki, Diab, & Qouta, 2013).

Whilst cross-sectional studies can identify associations between maladaptive appraisals and PTSD, they are unable to answer questions about causality. Stronger evidence for a causal role of maladaptive appraisals in the aetiology of PTSD comes from prospective longitudinal studies. These studies measure potential predictor variables in the initial weeks after trauma exposure, and assess PTSD symptoms a few months (or years) later and as such can address questions about cause. Results from such studies have shown maladaptive appraisals to predict PTSD symptom severity and the maintenance of PTSD symptoms in adults (Dunmore et al., 2001; Ehring, Ehlers, & Glucksman, 2008; Ginzburg, 2004; Halligan, Michael, Clark, & Ehlers, 2003; Mayou, Ehlers, & Bryant, 2002; O'Donnell, Elliott, Wolfgang, & Creamer, 2007; Shahar, Noyman, Schnidel-Allon, & Gilboa-Schechtman, 2013) and children (Bryant et al., 2007; Nixon, Nehmy, et al., 2010).

Maladaptive appraisals have also been found to predict severity of acute stress reactions in the first four weeks after a traumatic event (Nixon & Bryant, 2005; Suliman, Troeman, Stein, & Seedat, 2013). This suggests that appraisals may be important in the initial stages following trauma, and could play a role in the development of posttraumatic stress reactions. Further evidence for this comes from research showing maladaptive appraisals predict PTSD symptoms over and above other risk factors such as acute PTSD symptoms (Freeman et al., 2013; O'Donnell et al., 2007). Evidence for their role in mediating the relationship between early stress symptoms and PTSD was provided by Meiser-Stedman et al. (2009) who found maladaptive appraisals mediated the relationship between initial posttraumatic stress symptoms and later posttraumatic stress symptoms. Other cognitive processes such as subjective threat at the time of trauma and memory processes were argued to be involved in the acute phase of PTSD, whilst maladaptive appraisals were argued to play a role in both the development and maintenance of the disorder.

Research has shown that the protective role of social support in the prevention of PTSD can be explained by its impact on reducing maladaptive appraisals in children (Hitchcock, Ellis, Williamson, & Nixon, 2015; Münzer, Ganser, & Goldbeck, 2017) and adults (Robinaugh et al., 2011). Again, this lends support to the argument that it is appraisals at the time of trauma that are important in the development of PTSD. Social support reduces the amount of negative appraisals following trauma, and as such is a protective factor against developing PTSD.

Further research has found the sex difference in PTSD may be partly related to an increased level of maladaptive appraisals in females (Christiansen & Hansen, 2015). These findings add further evidence to the argument that maladaptive appraisals are a key causal factor in PTSD.

Despite the strong evidence, there are a few conflicting results that have shown a limited role for maladaptive appraisals in the prediction of PTSD symptoms (Kangas et al., 2005; Nygaard & Heir, 2012). One study found that negative appraisals about the self and the world predicted a significant amount of variance in PTSD symptoms in the initial period following stroke but no additional variance in PTSD symptoms at 3 month follow up (Field, Norman, & Barton, 2008) indicating that there might be a different role for appraisals at different time points following trauma. Research has also questioned the specificity of maladaptive appraisals to PTSD, with studies showing negative appraisals are not only related to PTSD but also to depression and anxiety symptoms (Beck, Coffey, Palyo, Gudmundsdottir, Miller, & Colder, 2004; Davis et al., 2016). This is important, as most studies described here have used the PTCI or CPTCI, which as described in Section 1.5.1 have most items relating to *general* negative appraisals that could easily lead to depression and anxiety more generally. Specific appraisals related to PTSD are in the minority in these questionnaires and as such it is unsurprising that the measure relates to anxiety and depression more broadly.

The subtype of maladaptive appraisal appears to be an important consideration with respect to this field of research. Maladaptive appraisals about the self and the world seem to be more significant risk factors for PTSD than self-blame appraisals. For example, in survivors of a bank robbery, only negative appraisals about the self were significant risk factors for both ASD and PTSD severity (Hansen, Armour, Wittmann, Elklit, & Shevlin, 2014). Negative appraisals about the self and the world but not self-blame were related to PTSD symptoms in patients suffering from a stroke (Field et al., 2008). Similarly, in victims of community violence, self-blame was not a significant predictor of PTSD over and above acute stress in the weeks after trauma (Denson, Marshall, Schell, & Jaycox, 2007).

The measurement of appraisals may also play a role in the strength of the relationship found. For example, studies using the PTCI have found a significant relationship between maladaptive appraisals about the world and PTSD symptoms (Su & Chen, 2008b), but research using the WAS has not found a link between appraisals of an unjust world and PTSD (Owens & Chard, 2001). The self-blame subscale of the PBRS correlates significantly with PTSD severity (Owens, Pike, & Chard, 2001), but research using the PTCI has not found a relationship between self-blame and PTSD (Hansen et al., 2014).

1.5.3 Summary. The research evidence supporting the role of maladaptive appraisals in PTSD is fairly strong. Many studies show that maladaptive appraisals play a role in the development and maintenance of PTSD, which authors take as evidence in support of cognitive models of the disorder. Nevertheless, there is some conflicting evidence and it seems that appraisals about the self and the world are more significant risk factors than self-blame appraisals. Moreover, the measures used to assess maladaptive appraisals in the PTSD literature have considerable limitations. The principal measures in the literature, the PTCI and CPTCI do not operationalise the cognitive model of PTSD to great success. This is because their items are mostly generic negative appraisals that could relate to psychological distress much more broadly. Specific items relating to the appraisal of trauma and its sequalae are in the minority of items on these questionnaires. This means drawing conclusions in support of cognitive models based on measures that do not accurately operationalise these models is questionable.

The next section will turn to psychological treatments of PTSD. These will be briefly reviewed and the evidence for the role of reducing maladaptive appraisals in treatment will be presented. As appraisals play a role in PTSD and also modifiable, they are prime targets for psychological intervention.

1.6 Psychological Treatments for PTSD

Guidelines for the psychological treatment of PTSD recommend 8 - 12 sessions of trauma focused cognitive behavioural therapy (CBT) or eye movement desensitization and reprocessing therapy (EMDR) for the treatment of PTSD (National Institute for Health and Clinical Excellence, NICE, 2005). Early interventions such as debriefing following a traumatic event are not recommended, as these interventions may increase the risk of developing PTSD. Other psychological interventions such as prolonged exposure therapy, narrative exposure therapy and cognitive processing therapy also have some evidence for their effectiveness in treating PTSD (Schnyder & Cloitre, 2015). Commonalities underlying successful treatment seem to be psychoeducation, emotion regulation, coping skills, imaginal exposure, cognitive restructuring and/or meaning making and modifying memory processes (Schnyder et al., 2015).

1.6.1 EMDR. EMDR is based on an information processing model of psychopathology, which suggest symptoms of PTSD are a result of poorly encoded memories (Shapiro, 2014). The goal of EMDR is to process the distressing memories and thus reduce the symptoms of PTSD. Therapy sessions involve focusing on images, thoughts and feelings associated with the trauma memory whilst the therapist performs bilateral stimulation, either by moving their fingers side to side in front of the patient's eyes or by tapping on their shoulders. In contrast to cognitive models of PTSD, in EMDR negative appraisals such as "I am an unworthy person" are symptomatic of unprocessed memories. The bilateral stimulation paired with focusing on trauma memories, emotions and beliefs is thought to allow the person to adequately process the memories, improve adaptive cognitions and reduce distress (Shapiro & Laliotis, 2015). Reduction in PTSD symptoms have been shown after as little as 3 sessions of EMDR (Marcus, Marquis, & Sakai, 2004) and RCTs have found that EMDR is equivalent or superior to trauma focused CBT (Shapiro, 2014). The eye movements used in EMDR are thought to be active treatment components in therapy (Lee & Cuijpers, 2013), however this is controversial. The mechanisms underlying the success of EMDR may simply be that it is another form of exposure. How the eye movement component contributes to the treatment outcome is far from clear (Davidson & Parker, 2001; Seidler & Wagner, 2006).

1.6.2 Trauma focused CBT. Trauma focused CBT is strongly based on Ehlers and Clark cognitive model of PTSD described in Section 1.4.4. The aims are to modify negative appraisals of the trauma and its sequelae, to elaborate the trauma memories and to reduce maladaptive behavioural and cognitive strategies that serve to maintain the disorder. Treatment usually takes place over 12 sessions and involves psycho-education, cognitive restructuring to modify excessively negative appraisals, memory work involving imaginal reliving and in vivo exposure, work to drop dysfunctional coping strategies and relapse prevention (Ehlers & Wild, 2015). There is strong evidence for its effectiveness in the treatment of PTSD in both adults (Ehlers, Clark, et al., 2003; Ehlers et al., 2013) and children (Smith et al., 2013; Smith et al., 2007) and drop-out rates are low.

1.6.3 Evidence for the role of appraisals in the treatment of PTSD. Whilst addressing maladaptive appraisals is core to the treatment protocol in trauma focused CBT, appraisals are also addressed through different available treatments, including EMDR and prolonged exposure, albeit by different means. In fact, addressing maladaptive cognitive appraisals has been found to be an important active component of psychological therapies. Studies have found that modifying maladaptive appraisals leads to improvements following treatment (Bryant, Moulds, Guthrie, Dang, & Nixon, 2003; Owens, Chard, & Ann Cox, 2008), even in early intervention (Zoellner, Feeny, Eftekhari, & Foa, 2011). Importantly, findings have shown that changes in maladaptive appraisals precede and predict reduction in PTSD symptoms and not vice versa. This is the case in trauma focused CBT (Kleim et al., 2013), cognitive processing therapy (Schumm, Dickstein, Walter, Owens, & Chard, 2015) and prolonged exposure therapy (Zalta et al., 2014). Addressing maladaptive appraisals therefore seems key to successful treatment outcome, regardless of the intervention approach used. The findings lend further support to the crucial role played by maladaptive appraisals in the aetiology of PTSD. Regarding the subtype of appraisals, research has shown that modifying maladaptive appraisals about the self and the world may be particularly related to reduction in PTSD symptomatology (Karl, Rabe, Zöllner, Maercker, & Stopa, 2009; Kumpula et al., 2016), whereas reduction in self-blame appraisals does not lead to reductions in PTSD symptoms (Kumpula et al., 2016).

1.7 Rationale for the Current Study

To date no quantitative synthesis has been carried out to summarise the role of maladaptive appraisals in PTSD in adults and children. The current study will be the first meta-analysis to explore the nature of this relationship.

Given the theoretical importance of maladaptive appraisals in psychological models of PTSD, in particular the cognitive model (Ehlers & Clark, 2000), it is of interest to summarise the literature in this area to obtain a more accurate estimate of the effect size of the relationship between appraisals and PTSD symptoms. The seemingly crucial role played by the modification of appraisals in the treatment of PTSD (Kleim et al., 2013) and the recent addition of negative cognitions to diagnostic criteria for PTSD (American Psychiatric Association, 2013) underlines the clinical significance of this research.

Carrying out a meta-analysis will also enable further exploration of the factors that moderate the relationship between maladaptive appraisals and PTSD. Firstly, whether the study sample came from a child or adult population is important to consider. Studies have found appraisals to be related to PTSD symptoms in studies in children and adolescents (Bryant et al., 2007; Meiser-Stedman et al., 2009) as well as adults (Ehlers et al., 1998), however, the extent to which children are able to appraise a traumatic event will be influenced by their developmental stage and cognitive ability (Salmon & Bryant, 2002). In particular, a lack of knowledge and experience in young children will mean they have less detail in their schematic models about themselves and the world. This lack of detail about the causes and consequences of emotional events means young children may have fewer cognitive and emotional tools to appraise emotional events. Emotion regulation also develops across childhood, shifting from external sources such as parents, to self-initiated sources, with some ability to manage traumatic experiences emerging by aged 8 years (Salmon & Bryant, 2002). The development of abstract reasoning skills and increasing concerns about imaginary fears increases a child’s ability to worry as they reach middle childhood (Izard & Harris, 1995). Taken together, the evolution of PTSD may be very different in children (Meiser-Stedman, Smith, Glucksman, Yule, & Dalgleish, 2008) and it could be argued that young children may be somewhat protected from negative self-appraisal after traumatic events, in comparison to older children and adults (Salmon & Bryant, 2002). It is therefore important to explore the role of maladaptive appraisals in PTSD symptoms in children and adults, with the hypothesis that appraisals may be less strongly related to PTSD symptoms in child studies than adult studies.

Other factors that may moderate the relationship between maladaptive appraisals and PTSD symptoms are also of interest. The relationship between maladaptive appraisals and PTSD may vary according to context, in particular the type of traumatic event, the intentionality of the trauma, or whether or not the trauma was a single event or multiple event trauma. For example, individuals who have suffered sexual assaults have been shown to score more highly on the posttraumatic cognitions inventory (PTCI), a measure of maladaptive appraisals, than individuals involved in other traumatic events (Startup, Makgekgenene, & Webster, 2007).

Whether or not the sample was obtained from a military or civilian population may also moderate the effect size found between maladaptive appraisals and PTSD. Some studies have found negative views of the self were not related to PTSD in veterans (Brewin, Garnett, & Andrews, 2011) and previous risk factor meta-analyses have found military or civilian population moderated the effect size for some (but not all) risk factors (Brewin et al., 2000; Ozer et al., 2003).

Further methodological variables have also been found to influence effect size in previous meta-analyses of risk factors for PTSD (Brewin et al., 2000; Ozer et al., 2003; Trickey et al., 2012). For example, study design (cross-sectional or prospective), measures used (interview or self-report), time at which trauma was assessed all may influence the effect size and can be explored via the current meta-analysis.

A particular aim of the current study was to compare different subtypes of maladaptive appraisal and the relative strength of their relationship with PTSD. This may shed some light into which appraisals might be most significant risk factors for PTSD. This is theoretically and clinically important, given findings that maladaptive appraisals about the self and the world may be more important than self-blame appraisals (see Section 1.5.1.). The role of self-blame in PTSD is under debate as some studies show it to be related to higher levels of PTSD symptoms (Frazier, 2003), whilst other studies have found it to be related to lower PTSD symptoms (Startup et al., 2007). It is possible that self-blame is more important in survivors of sexual abuse (Frazier, 2003) and less important following accidental injury (Beck et al., 2004; O'Donnell et al., 2007). Other research suggests that behavioural self-blame (which is an assessment of your actions in relation to a trauma) is actually protective against psychological distress (Koss, Figueredo, & Prince, 2002) .The current meta-analysis will be able to explore the strength of the relationship of self-blame to PTSD symptoms across different types of traumatic event in an attempt to clarify this relationship.

In child and adolescent studies, Bryant et al (2007) found that the subscale of the CPTCI of being a fragile person in a scary world accounted for unique variance in posttraumatic stress symptoms in children and adolescents in a 6 month prospective study of appraisals and PTSD. Meiser-Stedman et al. (2009) found that appraisals of permanent and disturbing change were more important in predicting PTSD symptoms. The current meta-analysis will be able to compare the strength of the relationship between these different types of appraisal and PTSD symptoms across many studies and hopefully shed some light into these differences.

It is also important to explore the effect size of the relationship between maladaptive appraisals and PTSD symptoms at different time points following the trauma. Firstly, summarising the data for the relationship between maladaptive appraisals and acute stress symptoms in the acute phase in the first month following trauma will be important to evaluate the significance of appraisals in this time frame. Convincing evidence across multiple studies would imply appraisals play a role really early on in the development of PTSD. Secondly, examination of the effect size across time in prospective studies between appraisals in the first month following trauma and PTSD symptoms at various time intervals after the trauma (e.g. 3 months, 6 months and 1 year) will be a significant addition to the literature and enable the evaluation of any dissipation of the relationship over time.

1.8 Aims

The aim of the current study was to systematically appraise and summarise the literature on the relationship between maladaptive appraisals and symptoms of PTSD. Maladaptive appraisals were operationally defined as how you see yourself, the world or your symptoms in the aftermath of trauma. Due to the nature of the literature, it was not possible to explore the relationship between all measures of maladaptive appraisals (e.g. of depressive cognitions or interpersonal schemas). Rather the aim was to summarise the existing PTSD literature, which employs a narrow range of measures of maladaptive appraisals, principally the PTCI and CPTCI. Secondly, the aim was to explore theoretical, population and methodological influences on the effect size, to explore the relationship of different measures of appraisals that are in the PTSD literature and different subtypes of maladaptive appraisal (self, world and self-blame) with PTSD symptoms, and to explore the change in the strength of the relationship across time.

1.9 Research Questions

In line with the aims presented in Section 1.8, the following research questions were addressed:

1. What is the strength of the relationship between measures of maladaptive appraisals used in the PTSD literature and PTSD symptoms?
2. What factors moderate the effect size observed?
3. Is there a difference between the effect sizes for the relationship of subtypes of maladaptive appraisal as measured using the PTCI and CPTCI (self, world and self-blame appraisals in adults; fragile person in a scary world and permanent change appraisals in children/adolescents) and PTSD symptoms?

Methods

1.10 Introduction

This chapter outlines the methods used to answer the research questions described in Section 1.9. Firstly, the methodology for the literature search and screening process is described. This covers the search terms, eligibility criteria and screening methods used to select studies to include in the meta-analysis. This is followed by a description of the procedures used to extract data, assess study quality and calculate effect sizes. Finally, the chapter provides an account of the methodology used in the meta-analyses, along with the rationale for the techniques employed.

1.11 Registration of Research

The current meta-analysis was prospectively registered with PROSPERO on 14th September 2015. PROSPERO is an international database of systematic reviews in health and social care and registration serves to provide transparency in the review process and to avoid unplanned duplication of systematic reviews (see http://www.crd.york.ac.uk/PROSPERO/). The registration number for this trial was CRD42015026224 and a copy of the entry is given in Appendix A.

1.12 Search Strategy

1.12.1 Database search. Studies were selected following a systematic search for relevant publications dating from 1980 (when PTSD was first introduced in the DSM). The following psychological and medical literature databases were searched: PsycINFO, MEDLINE, CINAHL and PILOTS (Published International Literature on Traumatic Stress; US Department of Veterans Affairs, 2015). Databases were searched individually because each database differs in its use of terms and search tools therefore combining databases in a single search may result in the loss of potentially relevant articles (Higgins & Green, 2008). Initial searches were conducted on 9th November 2015 and the search was repeated on a weekly basis using a Search Alert with the last date searched being the 30th March 2016. See Appendix B for a sample of the search output. A citation search on Web of Science was carried out for the PTCI and CPTCI. The Journal of Traumatic Stress was also searched to identify further relevant literature.

1.12.2 Search terms. Experimental studies that reported on the relationship between cognitive appraisals and PTSD were sought by combining the search terms outlined in Table 2. Terms were truncated to ensure that all variant word endings were identified. Search terms were limited to include only quantitative research published in English.

1.12.3 Additional search terms. After the initial search was carried out, it was felt that the following search terms would also be informative: "negative belief*", "posttraumatic cognition*" and "misappraisal*". These searches were run in January 2017, after the registration of the research in PROSPERO. The appraisal terms shown in Table 2.1 were replaced with the additional terms.

Table 2.1

Search Terms

Target Population[1]	PTSD OR Posttraumatic stress OR Post-traumatic stress OR Post traumatic stress OR traumatic neurosis
Appraisal terms[2]	Cognitive appraisal* OR appraisal* OR negative cognition*
Combined Terms	1 AND 2

1.12.4 Ancestry method. Review articles and book chapters identified in the initial search were screened, and if the abstract was deemed relevant to this study (i.e. they covered information about cognitive appraisals and PTSD symptoms), their reference Sections were searched for additional articles. The reference sections of articles included in the meta-analysis were also examined for further relevant studies.

1.12.5 Grey literature search. Various strategies were used to identify unpublished or "grey" literature in order to minimise the impact of publication bias on the results of the meta-analysis. This included searching the grey literature database, opengrey (http://www.opengrey.eu/) which includes research reports, doctoral dissertations and conference papers; searching Dissertation Abstracts International and searching the British Library e-theses Online Service. The PILOTS database also includes dissertations and non-peer reviewed publications so was a further source of grey literature.

1.12.6 Author contact. Researchers who were first authors on two or more studies included in the meta-analysis were contacted via email to request any unpublished data. The following researchers were contacted: Professor Beck; Professor R. Bryant; Dr. M. Duffy; Dr. E. Dunmore; Dr. A. Ehlers; Dr. T. Ehring; Dr. A. Horsch; Dr. M. Kangas; Dr. H. Kaur (via co-author, Professor C. Kearney); Dr. Meiser-Stedman (personal communication); Professor R. Nixon; Dr. T. O'Hare; Professor E. Palosaari; Professor P. Stallard; Dr. S. Suliman and Dr. M. Tierens. Dr. Meiser-Stedman provided unpublished data. Professors Kearney and Palosaari provided data which extended and overlapped with papers they had published. This was classed as unpublished data. No other researchers provided further data for analysis.

1.13 Eligibility Screening

All references were imported into the referencing software EndNote, and duplicate titles were removed. The remaining studies were screened using the eligibility criteria outlined in Section 2.4.1 below.

1.13.1 Eligibility criteria. The following inclusion and exclusion criteria were applied to the studies identified in the literature search.

1.13.1.1 Inclusion criteria. To be included in the analysis, studies were required to meet all of the following inclusion criteria:

- Includes participants who have been exposed to a single event trauma (e.g. road traffic accident) or multi-event trauma (e.g. domestic violence) sufficient to meet Criterion A in the DSM-5 diagnostic criteria for PTSD (American Psychiatric Association, 2015).
- Includes a measure of PTSD that considers intrusions, avoidance and hyperarousal or a measure of Acute Stress Disorder, which demonstrates adequate reliability and validity via publication of their psychometric properties in a peer reviewed journal. Studies reporting continuous data (i.e. PTSD severity) or diagnostic status were included.
- Include a measure of maladaptive appraisals, operationally defined as how you see yourself, the world or your symptoms in the aftermath of trauma.

1.13.1.2 Exclusion criteria. The following exclusion criteria were applied:

- Review article, case study, qualitative study or book chapter.
- Treatment trial or sample involving only those who have a PTSD diagnosis. This was because the variability in PTSD severity would be reduced in samples that only contained individuals with PTSD. This would influence the

size of the correlation between appraisals and PTSD symptoms following trauma.

- Not published in English.
- Dissertation abstract that does not give sample size and effect size and unable to access the full dissertation after contacting authors.
- Measures only the appraisal of threat to life during the traumatic event. This has been addressed in previous meta-analyses (Cox et al., 2008; Ellis, 2010; Ozer et al., 2003; Trickey et al., 2012).
- Measures appraisals prior to trauma or at the time of trauma rather than in the aftermath of trauma (e.g. appraisal of treatment, appraisal of the traumatic experience as it was happening).
- Measures coping self-efficacy or appraisal of ability to cope with the practical demands of life after trauma.
- Data set previously included in another study. Estimates will be taken from the peer reviewed journal article or the largest sample where more than one study or dissertation uses the same data set.
- Study does not provide an effect size, nor sufficient data to calculate an effect size even after contacting authors.
- Data from individuals with PTSD is combined with data of individuals with other diagnoses (e.g. depression).
- Participants also have a traumatic brain injury.

1.13.2 Screening method. At the first stage of screening, titles and abstracts of the studies were reviewed by myself, Gina Gomez de la Cuesta (GG). Those not meeting eligibility criteria were excluded. A research associate, Suzanne Schweizer (SS), reviewed all excluded abstracts to ensure they did not meet criteria for inclusion. Disagreement occurred for 25 studies. These studies were included and put through to the next stage of screening for more in depth assessment of eligibility.

At the second stage of screening, the full text of eligible studies was reviewed by both GG and SS to assess whether they met inclusion and exclusion criteria. Where disagreements occurred a final decision about inclusion was made by primary supervisor, Richard Meiser-Stedman (RMS).

1.14 Data Extraction

Information was extracted and coded from each study meeting eligibility criteria using predesigned data extraction forms for cross-sectional, prospective and between groups studies (see Appendices C, D and E for copies of these forms). Twenty percent of studies were double coded by a research assistant to calculate inter-rater reliability.

1.14.1 Non effect size data. A unique identification number was assigned to each study and a range of descriptive data was extracted to facilitate data synthesis. Excluding effect size data and quality appraisal information, the following data were extracted:

- First author
- Journal name
- Year of publication
- Sample information (if the same study provides data for more than one sample)
- Country of origin
- Type of report (e.g. peer reviewed, dissertation, unpublished)
- Child/adult study
- Population (civilian, military or mixed)

- Study design (cross-Sectional, prospective, between groups)
- Recruitment source (e.g. emergency department, community)
- Trauma type (road traffic accident, illness or injury, combat, war exposure, natural or human disaster, sexual abuse, interpersonal violence, mixture)
- Single or multiple event trauma
- Intentional or unintentional trauma
- Name of PTSD measure used
- Administration of PTSD measure (interview or self-report)
- Type of PTSD score (continuous or diagnostic status)
- Maladaptive appraisal measure name
- Appraisal measure administration (interview or self-report)
- Appraisal measure type (validated questionnaire, unvalidated questionnaire, unvalidated single item(s))
- Sample size
- % participation rate
- Mean age of sample
- Age range/ standard deviation
- Percentage male
- Percentage Caucasian
- Percentage black minority ethnic groups
- Time PTSD assessed (0-1 month after trauma / >1 month after trauma)
- Time follow up assessments taken (for prospective studies only)

1.14.2 Extraction of effect size data. Pearson's zero order correlation coefficient (r) was the primary estimate of effect size in the current study. This estimates the strength of the relationship between two variables. A value of r of plus or minus 1 means there is a perfect association between the variables. An r of 0 means there is no relationship. An r of 0.10 is thought to represent a small association; an r of .30 or over represents a moderate association; and an r of .50 or larger is considered a large correlation (Cohen, 1988). Most studies included in the current meta-analysis reported zero order correlations between a continuous measure of maladaptive appraisals and a continuous measure of PTSD symptoms. In these cases the value of r was extracted directly. The inter-correlations between the subscales were also extracted where reported.

Other studies reported different measures of effect size, such as the odds ratio, or raw data from which an effect size could be calculated (for example, a between groups design reporting the mean maladaptive appraisal scores for PTSD and no PTSD groups). These data were extracted and used to calculate an effect size for use in the meta-analysis. The next section describes how the effect sizes were calculated.

1.15 Calculating effect sizes

The primary effect size to be used in the current meta-analysis was the zero order correlation co-efficient, r. As described previously, some studies did not report zero order correlations, so it was necessary to calculate r from the data extracted from the studies. The software Comprehensive Meta-Analysis (CMA), Version 3, was used for all calculations and details of the calculations are described in the next Sections.

1.15.1 Cohen's d to r. Several studies used a between groups design and reported mean appraisal scores for PTSD and no PTSD groups. Here, the means and standard deviations of the appraisal scores along with the sample size of each group were used to calculate Cohen's d. Cohen's d is the standardized mean difference between two groups (Cohen, 1988). Cohen's d can be converted to r using the formula below (Borenstein, Hedges, Higgins, & Rothstein, 2009):

$$r = d\frac{d}{\sqrt{d^2} + a}$$

Where a is a correction factor for cases where $n^1 \neq n^2$:

$$a = \frac{(n1 + n2)2}{n1n2}$$

1.15.2 Odds ratio to r. A minority of studies reported odds ratios or raw data from which odds ratios could be calculated. In these cases the log odds ratio was converted to Cohen's d using the following formula from Borenstein et al. (2009). Cohen's d was then converted to r as described in Section 2.6.1.

$$d = LogOddsRatio\ x\ \frac{\sqrt{3}}{\pi}$$

1.15.3 Estimating effect size from test statistics. Where no effect size data or suitable raw data were reported, an estimate of r was calculated from test statistics as follows (Rosnow, Rosenthal, & Rubin, 2000):

For t statistic: $r = \sqrt{(t^2/(t^2 + df))}$

1.15.4 Estimating r from Beta. Some studies reported data from regression analyses, exploring whether or not maladaptive appraisals predicted the severity of PTSD symptoms. A few such studies failed to report the zero order correlations relevant to the regression analysis. In the first instance, authors were contacted to request the zero order correlations. If they were unable to provide these or did not respond, then the standardized regression coefficient (beta or β) was used as an estimate of effect size.

In univariate regression (i.e. a single predictor variable), β is equivalent to r, and so this value was used directly as a substitute for r and used in the meta-analysis. In multivariate regression, the formula below was used to estimate r from β when the value of β was between -0.50 and + 0.50.

$$r = \beta + 0.5\gamma$$

In this formula $\gamma = 1$ when β is non-negative and $\gamma = 0$ when β is negative (Peterson & Brown, 2005). A sensitivity analysis was carried out to examine the impact of including β values in the meta-analysis (see Section 2.8.4).

1.15.5 Missing effect size data. Missing effect size data is problematic for meta-analysis as it introduces bias. The severity of this bias on the validity of conclusions drawn depends on the extent to which the missing effect sizes differ systematically from those that are included. If the data are missing completely at random, then missing data will introduce minimal bias. However, if data are missing for systematic reasons (e.g. not reported due to lack of statistical significance), then excluding studies on the basis of missing effect size data introduces bias (Piggott, 2009). The reason for missing effect size data is usually unclear, so every effort was made to access effect size data.

If insufficient data was given to calculate an effect size, the authors were contacted to request further information. If authors were unable to provide the relevant information or did not respond within 2 weeks of being contacted then the study was excluded from the meta-analysis. If data pertaining to study characteristics were missing, then the studies were not included in the analysis.

1.15.6 Multiple effect sizes from the same study. Several studies reported multiple effect sizes from the same participants for the relationship between maladaptive appraisals and PTSD symptoms. This was for several reasons. Firstly, most of the measures of appraisals had several subscales or multiple items. Some authors only reported total scores for the measure, others reported only the subscale scores and others reported both the subscale scores and the total scores. Only one effect size per study is permitted in meta-analysis as meta-analysis assumes that data points are independent (Borenstein et al., 2009). Including multiple data-points from the same dataset would violate this assumption and as such would introduce bias. Multivariate meta-analysis (e.g., multi-level modelling) provides one solution to this problem (Borenstein, 2009; Cheung & Chan, 2004). Here, the interdependence of the measures can be taken into account in the statistical analysis. However, most meta-analysis programmes, including CMA, do not offer an option to perform such analyses. Also, in the current meta-analysis, there was inconsistency between the studies with regards which data were reported (some reported only one subscale of the PTCI; others reported two; others all three). Therefore, multi-level modelling was not possible. To include as many studies as possible for each subscale and to ensure independence of data-points, the following rules and methods were used to deal with studies reporting multiple effect sizes.

1.15.6.1 Studies reporting both subscale scores and total scores. The effect size data for the total scores of appraisal scales were used in the meta-analysis where they were reported. If studies reported effect sizes for the subscale scores as well as the total scores, then only the effect size for the total score was used in the main analysis.

1.15.6.2 Combining effect sizes from multiple subscales or items. When studies reported effect sizes for multiple subscales or multiple items without the total score, then these effect sizes were combined for use in the main analysis.

Microsoft Excel was used to perform these calculations. These were calculated as described below.

1.15.6.3 Combining r values. When multiple r values were extracted for a given study, the values were combined to provide a single effect size for use in the main meta-analysis. Firstly, the r values were transformed to Fisher's Z values using the equation below (Borenstein et al., 2009):

$$z = 0.5 \, x \ln\left(\frac{1+r}{1-r}\right)$$

Subsequently, the weighted mean of the Fisher's z values was calculated, with each Fisher's z score being weighted by the number of items in the subscale of the particular maladaptive appraisal measure. This is because the accuracy of the measure will be dependent upon the number of items in the scale; the more items in the scale, the more accurate the estimate (Wells & Wollack, 2003). The weighted mean of the Fisher's z scores was then transformed back into an r value for use in the meta-analysis, using the equation below (Borenstein et al., 2009).

$$r = \frac{e^{2z} - 1}{e^{2z} + 1}$$

1.15.6.4 Combining Cohen's d values. For studies reporting the means and standard deviations for subscale scores of a maladaptive appraisal measure in a PTSD and no-PTSD group, multiple values of Cohen's d were combined. Here, the weighted mean of the Cohen's d values was calculated, weighted by the number of items in the subscale. Due to the fact that the subscales were related to each other and not independent, the inter-correlations between the subscales were taken into account in the calculation, using the methods outlined in Rosenthal & Rubin (1986). The inter-correlation between the subscales extracted from each individual study were used in this calculation. Where no inter-correlations were reported, the mean value of the inter-correlations reported from other studies using that particular measure was used. Where this information was not available, the mean of the inter-correlations from all studies was used. The weighted mean of Cohen's d taking account of the inter-correlations between subscales was then converted to r for use in the meta-analysis, using the formula described in Section 2.6.1.

1.15.6.5 Combining other data formats. One study reported raw data that could be used to calculate the odds ratio for multiple single items. In this case, the exponential Log Odds Ratio value for each item was calculated. The mean of these values was the converted to r for use in the analysis as described in Borenstein, 2009.

A further study reported t-test statistics. In this case, the formula shown in Section 2.6.3 was used to calculate the r values and these were combined using the methods described in Section 2.6.6.3.

1.15.7 Effect sizes from multiple time points. Multiple effect sizes were extracted for prospective studies. In these cases, the effect size reported for the first concurrent time point was extracted for use in the main meta-analysis of overall effect size. If no concurrent data were available, then the first prospective time point was used in the main meta-analysis. Further exploration of prospective studies was carried out to examine the change in the relationship between maladaptive appraisals and PTSD over time. This is described in Section 2.8.8.

1.16 Quality Assessment Framework

The methodological rigor with which studies are carried out influences the accuracy of the conclusions which can be drawn. Different study designs affect study validity along one or more dimensions (Shadish, Cook, & Campbell, 2002). Therefore the methodological quality of studies included in any meta-analysis has to be carefully considered (Valentine, 2009). In the current meta-analysis, two approaches to addressing study quality were used. Firstly, a priori inclusion and exclusion criteria were applied, such that studies using measures of PTSD that were not valid or reliable were excluded during the screening phase (see Section 2.4 for eligibility criteria). Secondly, each study was subject to a methodological quality appraisal assessment which is described in the following section.

1.16.1 Assessment of methodological quality. Many quality appraisal assessment frameworks exist to assist in the objective judgement of study quality. However, most of these are designed for assessing biases related to the causal effects of an intervention in randomised controlled trials. The current study included non-therapeutic cross-Sectional or prospective studies looking at the risk factors for PTSD. No individual quality assessment scales were found to be recommended in the literature for use with these study designs (Jarde, Losilla, & Vives, 2012). A quality assessment tool was therefore developed specifically for the purpose of the current meta-analysis.

In developing the assessment tool, existing checklists were reviewed and the elements relevant to the current study were adapted for inclusion. These checklists included the Quality Appraisal Checklist for Studies Reporting Correlations and Associations (NICE, 2012), the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement (Von Elm et al., 2007), the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies (National Heart Lung and Blood Institute, 2014) and other relevant critical appraisal tools published in the literature (Hoy et al., 2012; Loney, Chambers, Bennett, Roberts, & Stratford, 1998; Munn, Moola, Riitano, & Lisy, 2014; Sanderson, Tatt, & Higgins, 2007; Shamliyan et al., 2011; Tooth, Ware, Bain, Purdie, & Dobson, 2005).

Threats to internal and external validity relevant to the studies in the current meta-analysis were considered to be: the representativeness of the sample; appropriate recruitment and sampling methods; non-response bias and drop-out rates and the reliability of measures used to assess maladaptive appraisals. Questions developed to judge quality were included in the data extraction forms, and included the questions shown in Table 2.2 below:

Table 2.2

Quality Assessment Framework

1.2.1	Was the study population clearly specified and defined?	e.g. clear description of location, gender, ethnicity & other demographics	Y (low risk) N (high risk) Unclear N/A
1.2.2	Was sampling carried out appropriate to the study design, such that the likelihood of sampling bias was minimised as far as possible?	e.g. Low risk = invite sequential emergency department admissions to participate, or random sampling of individuals exposed to traumatic event e.g. High risk = convenience sampling, self-referral to study	Y (low risk) N (high risk) Unclear N/A
1.2.3	Was the likelihood of non-response bias minimised as far as possible? E.g. was the response rate at least 40% OR was an analysis performed that showed no significant difference in relevant demographic characteristics between responders and non-responders?		Y (low risk) N (high risk) Unclear N/A
1.2.4	For prospective studies only: was loss to follow-up 20% or less?		Y (low risk) N (high risk) Unclear N/A
1.2.5	Was the maladaptive appraisal measure used reliable? i.e. internal consistency (Cronbach's alpha) is at least 0.7 (either reported in the paper, or the measure has adequate IC reported in other peer reviewed papers)	If maladaptive appraisals assessed with just a single item question, then score N (high risk) If no internal consistency given, score N (high risk)	Y (low risk) N (high risk) Unclear N/A

Each study was given a rating low, medium or high quality based on the number of questions answered as being “low risk”. Studies were judged to be of high quality if they scored “low risk” on 4 or 5 items; medium quality if they scored “low risk” on 2 or 3 items; and low quality if they scored “low risk” on 0 or 1 of the items in the questionnaire above. Quality assessment was carried out by GG, and 20% of studies were double-coded by research associate, SS. Inter-rater reliability was calculated.

1.17 Data Synthesis

Meta-analysis was used to examine the relationship between maladaptive appraisals and PTSD symptoms using the software Comprehensive Meta-Analysis (Borenstein, Hedges, Higgins, & Rothstein, 2006). CMA uses

Hedges’ method (Hedges & Olkin, 1985) was used to calculate an estimate of population effect size. In this method, each effect size is weighted by a value reflecting the within study variance (V = 1/n - 3 where n is the sample size) and the between study variance (τ^2 = Q - df/C). These values were calculated using CMA, following the method outlined in Borenstein et al. (2009). R values extracted or calculated from the individual studies were transformed into a Fisher’s Z score for use in the analysis and then transformed back to the Pearson correlation (r) for interpretation.

Separate meta-analyses were carried out to address the research questions outlined in Section 1.9. Each separate meta-analyses followed the methods outlined in Sections 2.8.1-2.8.8.

1.17.1 Model. Two models can be employed in meta-analysis: a fixed effects model or a random effects model (Borenstein et al., 2009; Hedges & Vevea, 1998). A fixed effects model should only be used if all the studies included in the meta-analysis are identical; that is, the model assumes the true effect size underlying the different studies is the same. In contrast, a random effects model assumes the true effect sizes underlying different studies will vary. Due to the large variation in study and participant characteristics, and the fact that previous meta-analysis of risk factors in PTSD have shown large variation (Brewin et al., 2000; Ozer et al., 2003; Trickey et al., 2012), a significant amount of variation in the true effect size was anticipated in the current study. Moreover, it was intended that the conclusions of the current meta-analysis be applicable to the wider population, not just to the set of studies included in the analysis. Only results from a random effects model can be generalised beyond the studies included in the meta-analysis. For these reasons, and following recommendations for meta-analyses in mental health research (Cuijpers, 2016), a random effects model was employed in all the analyses described in the Sections that follow. Forest plots were used to visually present the data.

1.17.2 Heterogeneity. As explained in Section 2.8.1, a random effects meta-analysis was employed due to anticipated variation in the true effect sizes underlying each study. Studies varied due to clinical factors (e.g., age, type of trauma, location) and methodological factors (e.g. recruitment method, measures), therefore it was thought that a large amount of variation in true effect size would exist.

In order to describe the variation between the studies, estimates of heterogeneity were calculated. Heterogeneity refers to the variation in true effect sizes rather than the variation that occurs due to chance. Two estimates of heterogeneity were of interest. Firstly, the Q statistic was calculated using CMA. Q represents the ratio of the observed variation to the within study error. If Q is significant ($p<0.05$), then this is evidence that the true effects do vary (i.e. the variation is not purely down to random error). However, the Q statistic cannot estimate the *amount* of variation, only the significance of the variation. For this reason, the I^2 statistic was also calculated using CMA. I^2 gives a percentage of the variation across studies that is due to heterogeneity rather than chance or error. In this regard, I^2 can quantify the amount of heterogeneity in a meta-analysis (Higgins & Thompson, 2002). The degree of heterogeneity was classified according to the following criteria: “low” (25%), “medium” (50%) and “large” (75%) (Higgins, Thompson, Deeks, & Altman, 2003).

1.17.3 Subgroup analysis. The impact of variables that could moderate the effect size was explored using subgroup analysis in random effects meta-analyses using CMA. The following subgroup analyses were planned in order to address the research questions outlined in Section 1.9, providing there were at least 2 studies in each subgroup (Cuijpers, 2016):

- Methodological moderating variables included: Study design (cross-Sectional or longitudinal); publication status (peer reviewed publication or unpublished data or dissertation); measure of PTSD (dichotomous or continuous); administration of PTSD measure (questionnaire or interview); measure of maladaptive appraisals (validated questionnaire, un-validated questionnaire or un-validated single item(s)); administration of appraisal questionnaire (interview or self-report); appraisal measure (PTCI, WAS, PBRS, TAQ, CPTCI); time PTSD symptoms measured (0-1 months following trauma, i.e. acute symptoms; > 1 month following trauma, i.e. PTSD symptoms)
- Study population variables included: civilian versus military sample and age of population (child/adolescent or adult)

- Characteristics of trauma subgroup analyses included: trauma type (accident or injury; combat exposure; natural or human disaster; sexual abuse or interpersonal violence); single trauma (e.g. road traffic accident) vs multiple trauma (e.g. domestic abuse); intentional trauma (e.g. violent attack) vs unintentional trauma (e.g. earthquake).

1.17.4 Sensitivity analysis. Sensitivity analyses were conducted to establish whether the findings were influenced by the decisions made in the process of obtaining them (Borenstein et al., 2009). Random effects meta-analyses were carried out to assess the impact of excluding studies in which the beta value was imputed in place of r (see Section 2.6.4). Further sensitivity analysis was performed to assess the impact of including studies that were judged as low quality in the quality assessment process.

Studies whose 95% confidence interval did not overlap with the 95% confidence interval of the pooled effect size was considered to be outliers (Cuijpers, 2016). These studies were removed and the meta-analysis was repeated to assess the influence of these studies on the effect size.

1.17.5 Publication bias. Publication bias is the term used to describe the fact that not all studies that are carried out achieve published status. Those with statistically significant results are more likely to be published than those with non-significant results, known as the “file drawer” problem (Robert Rosenthal, 1979). This is problematic for meta-analysis as the aim is to integrate effect sizes from all studies. If studies with negative effects or small effects fail to get published, then meta-analysis of published studies will result in an over-estimate of the true effect size (Cuijpers, 2016). Examination of potential publication bias is therefore of considerable importance.

Funnel plots were used to graphically explore publication bias in the current meta-analysis. Funnel plots are scatterplots which display effect size against sample size (Greenhouse & Iyengar, 2009). A skewed, asymmetrical plot is an indication of publication bias (for example, there may be a lack of small or negative effect sizes, skewing the scatterplot). The funnel plots were visually examined, and Egger's test of the intercept was used to test whether the plots were symmetrical (Egger, Davey Smith, Schneider, & Minder, 1997). If the plot is asymmetrical then the test is significant and it can be concluded that there is significant publication bias. Duval and Tweedie's trim and fill method was used as a further assessment of publication bias (Duval & Tweedie, 2000). Here, the number of missing studies is estimated, the missing studies are "imputed" and a new estimate of effect size is given, taking into account the missing studies.

To estimate the possible influence of publication bias on the findings, the fail-safe N method was used. The fail-safe N is the minimum number of additional studies with conflicting evidence that would be needed to overturn the conclusion reached in the meta-analysis (Ellis, 2010). The higher the fail-safe N, the more confidence one can have in the conclusions drawn, and it should be higher than 5k + 10 (where k is the number of studies included in the meta-analysis; Rosenthal, 1979).

1.17.6 Meta-analysis of studies using the PTCI or CPTCI only. The results of the subgroup analyses showed a significant amount of heterogeneity was accounted for by the measure of maladaptive appraisals. This meant that other subgroup analysis results were influenced by appraisal measure type. In order to explore subgroup analyses without the confound of maladaptive appraisal measure blurring the results, the overall meta-analysis was repeated for studies using the PTCI or CPTCI only. These measures were selected as they are well-validated measures of maladaptive appraisals and as such were felt to be the most accurate measure of this construct (Foa et al., 1999; Meiser-Stedman, Smith, et al., 2009). The overall analysis, subgroup analysis, sensitivity analysis and publication bias analysis was repeated as described in Sections 2.8.1 - 2.8.5.

1.17.7 Meta-analysis of subtypes of maladaptive appraisal. As well as looking at maladaptive appraisals as a whole, it was of interest to explore different subtypes of maladaptive appraisal, namely, appraisals about the self (e.g., "I am going crazy"; "I have permanently changed for the worse"), appraisals about the world (e.g., ""the world is a dangerous place"; "you can never know who will harm you") and self-blame appraisals (e.g., "there is something about me that made the event happen"; "someone else would not have gotten into this situation"). In order to do this, five separate random effects meta-analyses were carried out on studies that reported effect sizes for the PTCI subscales of self, world and self-blame in adults, or the CPTCI subscales of fragile person/scary world and permanent/disturbing change in children. Methods used were the same as has been outlined in Section 2.8.1. Heterogeneity, subgroup analyses, sensitivity analysis and publication bias were explored in each analysis, as described in Sections 2.8.2 - 2.8.5.

1.17.8 Meta-analysis of effect size change across time. It was of interest to explore whether the relationship between maladaptive appraisals and PTSD symptoms changed over time so a separate meta-analysis was carried out on prospective studies only. Studies were included in this analysis if they assessed maladaptive appraisals within one month of the traumatic event, and reported PTSD symptoms at one or more of the following time-points: 2, 3 or 4 months after trauma; 6 months after trauma or 12 months after trauma, as long as there was at least one month between assessment of appraisals and assessment of trauma. Some studies reported multiple effect sizes at each time point. In these cases a single effect size was derived for use in the meta-analyses, following the methods described in Section 2.6.6.

Some studies reported data at more than one follow-up time. Given that only one effect size can be extracted from each study (Borenstein et al., 2009), the decision was made to carry out two types of analysis. The first was to perform three separate random effects meta-analyses at each of the time points. This enabled all studies to be included but precluded subgroup analysis of time points. In the second analysis, the decision was made to include only one effect size from each study in order to statistically compare time in a subgroup analysis. The decision was made to include only the effect size from the longest follow-up time point for each study. For example, in studies reporting follow up data at 2 - 4 months and 1 year, the 1 year effect size was used. In studies with follow-up data at 2 - 4 months and 6 months, the 6 months effect size was used. A subgroup analysis was then performed using CMA to statistically compare effect sizes across the three time points.

The subgroup comparisons between prospective and cross-sectional studies that were described in Section 2.8.1 - 2.8.6 were limited due to the decision making process with respect to the inclusion of only one effect size per study. In prospective studies, for the overall analyses, the decision was made to only include the effect size from the first concurrent time point, or the first prospective time point when the concurrent data was not available (see Section 2.6.7). This meant the data from prospective studies was limited in these analysis and more cross-sectional data was included than prospective data. For this reason, a further analysis was carried out in order to examine the difference between cross sectional and prospective studies. In this analysis, the prospective studies that provided appraisal scores within one month of trauma and a follow up at least 2 months after trauma were compared with studies that only provided cross-sectional data. For the prospective studies, the effect size from the longest follow-up time point was used in the analysis.

1.17.9 Large versus small meta-analyses. Meta-analysis is a powerful tool for examining the consistency of findings across populations and identifying patterns among studies (Borenstein, et al., 2009). In the current study, the aim was to summarise a wide-ranging literature in order to explore patterns and to understand further the nature of the relationship between maladaptive appraisals and PTSD symptoms in the broadest sense. A large number of studies were discovered to meet eligibility criteria and were therefore included. The advantage of this was the opportunity to explore multiple variables that could moderate the effect size, such as measurement tool and type of trauma. Sufficient studies were available to have the statistical power to explore the relationship between these subgroups. However, a disadvantage of having so many studies is that the variation between the studies was high, simply by the fact that many studies were included from different locations, different populations, different measures and different traumas. The focus of the question in this large meta-analysis was therefore broad. Smaller, more focused meta-analyses may have the advantage of being able to answer specific questions. As the aim of the current study was to explore the nature of the relationship between maladaptive appraisals and PTSD symptoms across a broad population and explore moderators of effect size amongst several different variables, the decision was made to include all studies meeting eligibility criteria, rather than narrow down the eligibility criteria to reduce the number of studies included.

Results

1.18 Chapter Outline

This chapter provides a detailed account of the data collection and data analysis performed to address the research questions described in Section 1.9. It begins with the results of the literature search and screening, including inter-rater reliability for study inclusion. This is followed by a description of the study characteristics, including study quality. Results of the separate meta-analyses that were conducted to answer the research questions are presented in turn. The chapter ends with a summary of the findings.

1.19 Search Results

Overall, 2474 studies were identified using the search strategy described in Section 2.3. See Appendix B for an example of the search output. Of these records, 882 duplicates were removed and 1299 studies were excluded as it was clear from their titles or abstracts that they did not meet the inclusion criteria outlined in Section 2.4. Research assistant, SS, reviewed all abstracts excluded at this stage and disagreement occurred for 25 studies. These studies were included and put through to the next stage of screening. Two hundred and ninety three full text articles were reviewed by both GG and SS and independent decisions about inclusion were made. Disagreement occurred for 33 studies. In these cases, the final decision about inclusion or exclusion was made by last author RMS. Details of the full text studies reviewed with any reasons for exclusion are given in Appendix F.

Overall, 158 studies were excluded at this stage as they failed to meet inclusion criteria. Studies were excluded on the following grounds: no suitable measure of maladaptive appraisals (n = 48); participants had not experienced a Criterion A trauma (n = 27); no valid measure of PTSD (n = 22); sample made up of individuals with a diagnosis of PTSD without a no-PTSD comparison group (n = 16); full text dissertation was unavailable (n = 11); dataset duplicated in other study (n = 15); PTSD sample combined with patients with other diagnoses (n = 4); no effect size data available after contacting authors (n = 5); appraisals assessed pre-trauma (n = 2); not published in the English language (n = 4); participants had a traumatic brain injury (TBI; n = 1); review article (n = 2) and qualitative study (n = 1). This left 135 studies for inclusion in the overall meta-analysis. Three of the studies (Bryant & Guthrie, 2007; Nixon, Ellis, Nehmy, & Ball, 2010; Nixon, Nehmy, et al., 2010) had overlapping datasets for the overall analyses only. They were included in the analyses of prospective studies, because the overlap with Meiser-Stedman (Meiser-Stedman, Smith, et al., 2009) was no longer present due to the latter study only reporting cross-sectional data. A PRISMA diagram (Moher, Liberati, Tetzlaff, Altman, & The PRISMA Group, 2009) outlining these screening results is given in Figure 3.1.

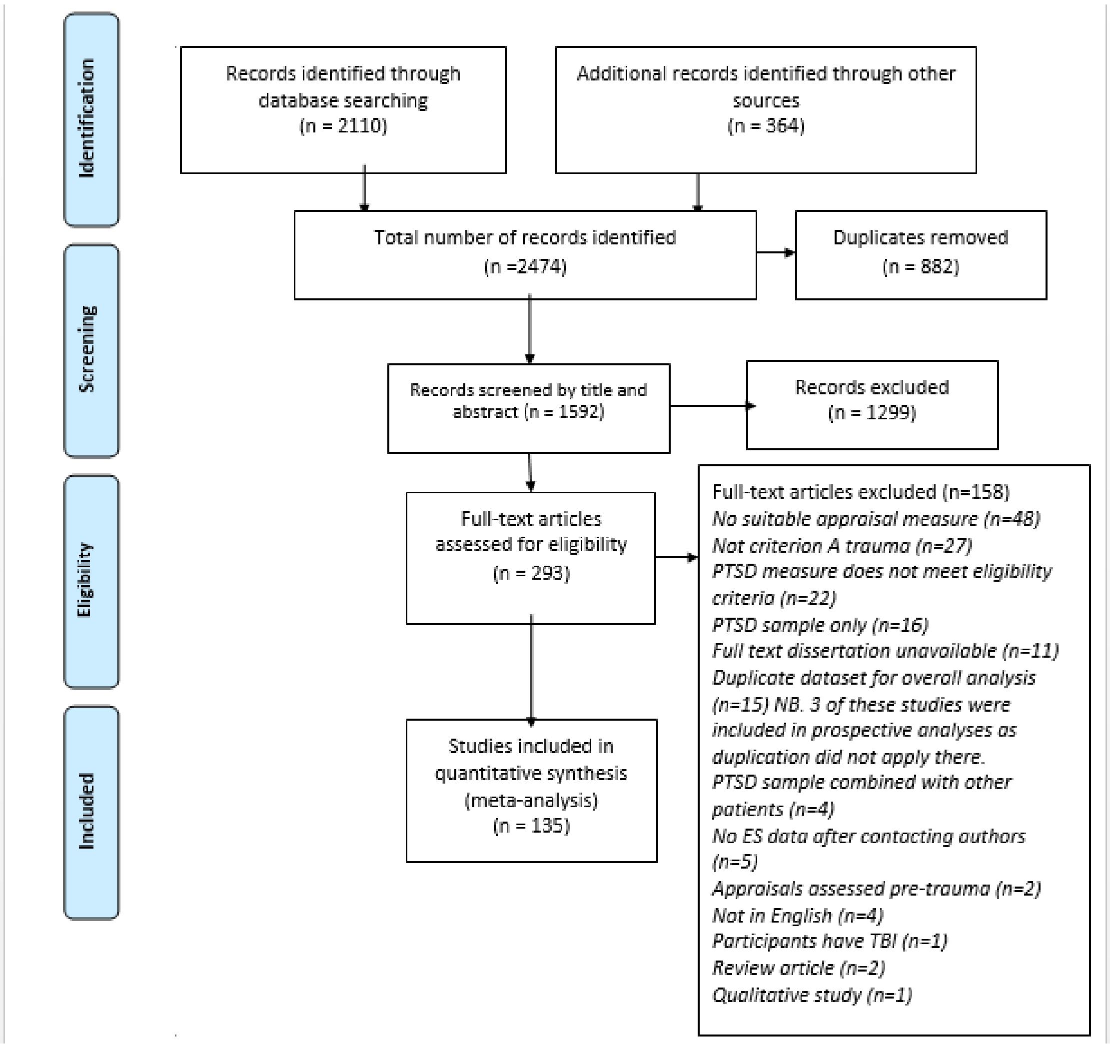

Figure 3.1. PRISMA diagram outlining results from study selection process.

1.20 Study Characteristics

A brief description of the studies included in the meta-analysis is given below. Of the 135 studies, 13 contributed data for more than one independent sample (29 samples from 13 studies). In some cases, it was clear from the papers or from author correspondence that more than one published study used the same sample. For most cases, the duplication was dealt with according to the predefined eligibility criteria described in Section 2.4, i.e. only the paper with the largest sample size was included. In one case, a second study (Mayou et al., 2002) reported follow-up data from a previously published study (Ehlers et al., 1998). These were considered as one sample, with the data being extracted from two published papers (Ehlers et al., 1998; Mayou et al., 2002). In two other cases, authors corresponded with respect to the duplicate datasets and provided a new, single dataset. This was the case for (Kaur & Kearney, 2015; Kaur & Kearney, 2013; Lemos-Miller & Kearney, 2006) and (Palosaari et al., 2013; Palosaari, Punamäki, Peltonen, Diab, & Qouta, 2015). With respect to the main analysis, there were therefore 147 independent effect sizes extracted from 135 studies. The total number of participants included in the meta-analysis was 29,812.

The characteristics of each study included in any of the analyses carried out in this thesis are shown in the tables that follow. The three studies that were included only in the prospective analyses are indicated by the letter *P*. Table 4 describes the characteristics of the sample, details of the trauma and study quality. Table 5 describes the study design, recruitment and assessment time points.

1.20.1 Inter-rater reliability for data extraction. Inter-rater reliability was calculated for data coding and data extraction for 20% of the studies. Agreement between SS and GG was 91%.

1.20.2 Types of Study and Study Design. Of the 147 independent samples included in the overall meta-analyses, 135 came from peer reviewed journal articles; 10 came from unpublished dissertations and 2 came from unpublished data.

Twenty one of the datasets employed a between-groups design; 97 used a cross-sectional correlational design and 29 used a prospective longitudinal design. Twenty-one prospective studies met criteria for the analysis of change in effect size over time (see Sections 2.8.8 and 3.7). Five studies provided data at 2-4 months follow-up only (Carper et al., 2015; Field et al., 2008; Salter, 2003; Shahar et al., 2013, Meiser-Stedman et al, unpublished); 11 studies provided data at 6 months follow-up only (Bryant et al., 2007; Christiansen & Hansen, 2015; Freeman et al., 2013; Hagenaars, van Minnen, & Hoogduin, 2007; Hansen et al., 2014; Hitchcock et al., 2015; Kangas et al., 2005; Kleim, Ehlers, & Glucksman, 2007; Kleim, Ehlers, & Glucksman, 2012; Nixon, Nehmy, et al., 2010; Noguchi, Nishi, Kim, Konishi, & Matsuoka, 2013); one study provided data at one year follow up only (Denson et al., 2007). Two studies provided data at 2 - 4 months and 6 months follow-up (Ehring et al., 2008; Nixon, Ellis, et al., 2010). Two samples from three studies provided data at 2 - 4 months and 1 year (Ehlers et al., 1998; Mayou et al., 2002; O'Donnell et al., 2007).

In terms of recruitment source, 47 samples were recruited from psychological or medical services; 43 samples were recruited from the community; 38 samples were recruited from other sources (e.g. newspaper adverts, flyers); 15 samples were recruited from the emergency department of hospitals and 3 samples were recruited from a mixture of sources. One study failed to report information on recruitment.

1.20.3 Measures. With respect to PTSD measures used, 38 studies used interview measures of PTSD; 109 studies employed self-report measures. Twenty five studies reported a categorical diagnosis of PTSD, whereas 122 reported a continuous measure of PTSD symptom severity.

Maladaptive appraisal measures used were principally the PTCI (90 studies). Others measures were the CPTCI (14 samples), the WAS (5 samples), the TAQ (4 samples), the PBRS (4 samples), the IPSI (3 samples). A further 20 studies used an un-named questionnaire or interview measure. The CITS, CTIC, ICQ, IPSI, RAQ, TRIBS, TRAS and SARA were each used in one study. Please see the key for Table 3.2 for the meanings of these abbreviations. Of these measures three studies used interviews, and 144 used self-report measures of maladaptive appraisals. Twenty three studies used un-validated measures of maladaptive appraisals, and 124 used validated measures.

1.20.4 Sample Characteristics. One hundred and twenty studies included in the meta-analysis came from an adult sample; 25 came from a child sample, and 2 included both children and adults.

With regards to the population, 139 datasets came from a civilian sample; 6 came from a military sample; 1 study contained a mixture and 1 was unknown.

Many countries were represented in the studies included in the meta-analysis. Most studies (42) came from the UK; 41 from the USA; 13 from Australia; 13 from Germany; 9 from Israel; 6 from the Netherlands; 4 from Canada; 2 from each of China, Denmark, South Africa, Sri Lanka and Taiwan and 1 each from Austria, Belgium, Iran, Italy, Japan, Korea, Norway, Palestine, Philippines, Switzerland, and Uganda (the total number of countries does not equal the total number of included studies, due to some studies samples coming from two different countries).

1.20.5 Trauma Characteristics. In respect of trauma, 66 studies involved participants exposed to a mixture of trauma types; 18 studies involved individuals who had experienced a road traffic accident; 16 studies included individuals who had been sexually abused; 10 studies involved individuals who had experienced natural or human disaster; 18 studies involved those who had suffered illness or injury; 9 studies involved participants who were exposed to non-sexual interpersonal violence; 6 were civilian participants exposed to war/displacement from a war zone and 4 studies included participants exposed to military combat.

These trauma types were also categorised as single or multiple traumas: 9 studies involved multiple traumas only; 65 studies involved single event trauma only, and 73 studies included participants exposed to a mixture of single and multiple event trauma.

Trauma type was further categorised into intentional and un-intentional trauma, as described in Section 2.5.1. Overall, the samples of 46 studies were categorised as having experienced intentional trauma; 44 samples were categorised as having experienced un-intentional trauma and 57 samples were exposed to a mixture of intentional and un-intentional trauma.

In terms of the time at which trauma symptoms were first assessed, 21 studies assessed trauma symptoms within 1 month of the trauma occurring; 79 studies assessed trauma 1 or more months following the trauma; 15 studies carried out trauma symptom assessments that overlapped both of these time points, and 32 studies failed to report information on time since trauma.

Table 3.1

Study Characteristics Part 1: Sample Characteristics, Study Quality and Description of Trauma

Study name	**Quality**	**Country**	**Type of report**	**N**	**Child/ Adult**	**Popul-ation**	**Mean Age (yrs)**	**% male**	**% cauc-asian**	**Particip-ation rate (%)**	**Trauma Type**	**Single/ Multiple trauma**	**Intentional/ Un-intentional**	**Time since trauma**
Abolghasemi, 2013	Low	IR	Peer	80	Adult	Mixture	40.6	56.3			Mix	Mult	Mix	> 1 mo
Agar, 2006	Med	UK	Peer	50	Adult	Civilian	38.9	86.0		94.0	Ill/Inj	Single	Un-Intent	> 1 mo
Ali, 2002	Med	UK	Peer	100	Adult	Civilian	38.3	50.0	94.5		IPV	Mix	Intent	> 1 mo
Allwood, 2014	Med	US	Peer	188	Child	Civilian	15.0	29.9	84.0	76.0	Mix	Mix	Mix	> 1 mo
Arikan, 2015	Med	UK	Peer	393	Adult	Civilian	20.3	15.0		67.0	Mix	Mix	Mix	
Ayers, 2009	High	UK	Peer	74	Adult	Civilian	62.0	76.0	91.0	51.0	Ill/Inj	Single	Un-Intent	both
Barton, 2013	Low	US	Peer	53	Adult	Civilian	34.1	0.0	72.3		Mix	Mix	Mix	> 1 mo
Beck, 2004	Med	US	Peer	112	Adult	Civilian	41.7	29.5	80.0		RTA	Single	Un-Intent	> 1 mo
Beck, 2015, s1	Med	US	Peer	301	Adult	Civilian	43.5	27.0	80.3		RTA	Single	Un-Intent	both
Beck, 2015, s2	Med	US	Peer	157	Adult	Civilian	36.8	0.0	54.8		IPV	Mix	Intent	both
Belsher, 2012	Med	US	Peer	39	Adult	Civilian	44.3	20.0	62.0		Mix	Mix	Mix	> 1 mo
Bennett, 2009	Med	US	Peer	295	Adult	Civilian	43.3	27.0	80.0		RTA	Single	Un-Intent	> 1 mo
Bolster, 2015, s1	Med	UK	Unpub Dis	73	Adult	Civilian		30.0	74.0		Mix	Mix	Mix	
Bolster, 2015, s2	Med	UK	Unpub Dis	158	Adult	Civilian		32.0	78.0		Mix	Mix	Mix	
Brewin, 2011	Med	UK	Peer	141	Adult	Military	36.5	95.0	96.0	51.0	Combat	Mix	Mix	> 1 mo
Bryant, 2007 *P*	Med	AU	Peer	76	Child	Civilian	9.9	66.0		32.0	Mix	Single	Un-Intent	< 1 mo
Buck, 2008	Low	NL	Peer	185	Adult	Civilian	35.6	40.0			Mix	Mix	Mix	> 1 mo
Buodo, 2012	Low	IT	Peer	43	Adult		37.4	97.7			Ill/Inj	Single	Un-Intent	> 1 mo
Campbell, 2007	Low	UK	Peer	41	Adult	Military	66.3	98.0			Combat	Mix	Intent	
Carek, 2010	Med	UK	Peer	51	Adult	Civilian	58.9	37.0	91.0	20.0	Ill/Inj	Single	Un-Intent	> 1 mo
Carper, 2015	Med	US	Peer	120	Adult	Civilian	32.0	0.0	63.0		SA	Mix	Intent	> 1 mo

Study name	Quality	Country	Type of report	N	Child/ Adult	Popul-ation	Mean Age (yrs)	% male	% cauc-asian	Particip-ation rate (%)	Trauma Type	Single/ Multiple trauma	Intentional/ Un-intentional	Time since trauma
Christiansen, 2015	High	DK	Peer	225	Adult	Civilian	42.0	73.3			IPV	Single	Intent	> 1 mo
Cieslak, 2008, s1	Med	US	Peer	66	Adult	Civilian	34.0	0.0	75.7		SA	Mix	Intent	> 1 mo
Cieslak, 2008, s2	Med	US	Peer	66	Adult	Civilian	34.0	0.0	75.7		SA	Mix	Intent	> 1 mo
Constans, 2012	Med	US	Peer	503	Adult	Military	53.8	100.0	48.0	54.0	Disaster	Single	Un-Intent	> 1 mo
Cromer, 2010	Med	US	Peer	168	Adult	Civilian	18.9		62.0	75.0	Mix	Mix	Mix	
Daie-Gabai, 2011	Low	IL	Peer	326	Adult	Civilian	35.3	45.4			Mix	Single	Mix	> 1 mo
Daigneault, 2006	Low	CA	Peer	103	Child	Civilian	14.6	0.0			SA	Mult	Intent	> 1 mo
De Haan, 2015	Low	DE	Peer	105	Child	Civilian	12.5	43.0			Mix	Mix	Mix	> 1 mo
Dekel, 2004	Med	IL	Peer	319	Adult	Military	24.2	100.0		69.0	War	Mult	Intent	> 1 mo
Denson, 2007	High	AU/US	Peer	333	Adult	Civilian	25.1	94.0	22.0	98.0	Ill/Inj	Single	Intent	< 1 mo
DePrince, 2011, s1	Med	US	Peer	98	Adult	Civilian	20.3	24.0	88.0		Mix	Mix	Mix	
DePrince, 2011, s2	Med	US	Peer	91	Adult	Civilian	30.5	0.0	67.0		Mix	Mix	Intent	
DePrince, 2011, s3	Med	US	Peer	236	Adult	Civilian	33.4	0.0	47.0		IPV	Mix	Intent	
Diehle, 2015	Med	NL	Peer	80	Child	Civilian	13.4	41.0			Mix	Mix	Mix	> 1 mo
Dorfel, 2008	Low	DE	Peer	44	Adult	Civilian	31.9	40.9			RTA	Single	Un-Intent	> 1 mo
Duffy, 2013	Low	UK	Peer	486	Adult	Civilian	41.9	37.2		10.0	Disaster	Single	Intent	> 1 mo
Duffy, 2015	Med	UK	Peer	2221	Child	Civilian	15.9	47.7		83.0	Disaster	Single	Intent	> 1 mo
Dunmore, 1999	Med	UK	Peer	92	Adult	Civilian	38.6	55.5			Mix	Mix	Intent	> 1 mo
Dunmore, 2001	Med	UK	Peer	57	Adult	Civilian	35.4	54.0	98.0		Mix	Mix	Intent	> 1 mo
D'Urso, 2014, s1	Med	UK	Unpub Dis	34	Child	Civilian	12.2	38.0		62.0	Ill/Inj	Single	Un-Intent	> 1 mo
D'Urso, 2014, s2	Med	UK	Unpub Dis	26	Child	Civilian	12.6	54.0		50.0	Ill/Inj	Single	Un-Intent	> 1 mo
Ehlers, 1998/Mayou 2002*	High	UK	Peer	888	Adult	Civilian	33.4	54.0		61.7	RTA	Single	Un-Intent	< 1 mo
Ehlers, 2000	Low	DE	Peer	81	Adult	Civilian	48.0	80.5			War	Mult	Intent	
Ehring, 2006	Low	UK	Peer	101	Adult	Civilian	35.0	56.4	76.3		RTA	Single	Un-Intent	> 1 mo
Ehring, 2008	High	UK	Peer	147	Adult	Civilian	35.2	66.7	68.7	72.0	RTA	Single	Un-Intent	< 1 mo

Study name	Quality	Country	Type of report	N	Child/ Adult	Popul-ation	Mean Age (yrs)	% male	% cauc-asian	Particip-ation rate (%)	Trauma Type	Single/ Multiple trauma	Intentional/ Un-intentional	Time since trauma
Ellis, 2009	Med	AU	Peer	97	Child	Civilian	12.1	63.0		65.0	Mix	Single	Mix	< 1 mo
Elsesser, 2007, s1	Low	DE	Peer	51	Adult	Civilian	40.7	49.0			Mix	Mix	Mix	> 1 mo
Elsesser, 2007, s2	Low	DE	Peer	38	Adult	Civilian	40.7	49.0			Mix	Mix	Mix	> 1 mo
Engelbrecht, 2014, s1	Med	UK	Peer	47	Adult	Civilian	33.9	30.0	0.0		Mix	Mix	Mix	> 1 mo
Engelbrecht, 2014, s2	Med	UK	Peer	48	Adult	Civilian	37.9	52.0	100.0		Mix	Mix	Mix	> 1 mo
Fairbrother, 2006	Med	CA	Peer	50	Adult	Civilian	24.5	0.0	78.0		SA	Mix	Intent	> 1 mo
Ferner, 2013	High	UK	Unpub Dis	43	Child	Civilian	13.5	48.8	23.3	59.0	Mix	Single	Mix	both
Field, 2008	High	UK	Peer	81	Adult	Civilian	71.2	53.0	91.0	90.0	Ill/Inj	Single	Un-Intent	< 1 mo
Foa, 1999	Med	US/UK	Peer	392	Adult	Civilian	29.0	31.0	70.0		Mix	Mix	Mix	both
Freeman et al, 2013	High	UK	Peer	94	Adult	Civilian	34.4	75.0	52.0	41.0	IPV	Single	Intent	>1mo
Gamache-Martin, 2013	Med	US	Peer	262	Adult	Civilian	20.4	31.0	82.0		Mix	Mix	Mix	> 1 mo
Gelkopf, 2013	High	IL	Peer	30	Adult	Civilian	42.6	70.0		76.3	Mix	Mix	Mix	> 1 mo
Ginzburg, 2004	High	IL	Peer	116	Adult	Civilian		77.0		80.0	Ill/Inj	Single	Un-Intent	> 1 mo
Gluck et al, 2016	Med	AT	Peer	97	Adult	Civilian	73.6	32.0			War	Mult	Mix	>1mo
Gonzalo, 2012	Med	UK	Peer	118	Adult	Civilian					Mix	Mix	Mix	
Gough, 2011 s1	Low	UK	Unpub Dis	49	Adult	Civilian		34.0	46.0		Mix	Mix	Mix	
Gough, 2011 s2	Low	UK	Unpub Dis	43	Adult	Civilian		34.0	46.0		Mix	Mix	Mix	
Hagenaars, 2007	Med	NL	Peer	32	Adult	Civilian	51.5	54.0		94.0	Disaster	Single	Un-Intent	< 1 mo
Halligan, 2003, s1	Med	UK	Peer	61	Adult	Civilian	37.5	62.8	88.6		Mix	Mix	Intent	> 1 mo
Halligan, 2003, s2	Med	UK	Peer	73	Adult	Civilian	40.2	44.5	92.5		Mix	Mix	Intent	both
Hansen, 2014	High	DK	Peer	450	Adult	Civilian	42.3	39.1		73.0	IPV	Single	Intent	< 1 mo
Hiskey, 2015	Med	UK	Peer	942	Adult	Civilian	30.0	19.0	72.0		Mix	Mix	Mix	
Hitchcock, 2015	High	AU	Peer	80	Child	Civilian	12.1	63.0		65.0	Mix	Single	Mix	> 1 mo
Horsch, 2012	Med	UK	Peer	57	Adult	Civilian	40.2	0.0	98.3	38.0	Ill/Inj	Mix	Un-Intent	> 1 mo
Horsch, 2015	Med	UK	Peer	46	Adult	Civilian	31.9	0.0	86.2	50.0	Ill/Inj	Single	Un-Intent	> 1 mo
Hyland, 2013	Low	UK	Peer	307	Adult	Civilian	38.2	67.7			Mix	Mix	Mix	> 1 mo
Jelinek, 2013	Med	DE	Peer	44	Adult	Civilian	70.9	33.8		54.0	War	Mult	Intent	> 1 mo

Study name	Quality	Country	Type of report	N	Child/ Adult	Popul- ation	Mean Age (yrs)	% male	% cauc- asian	Particip- ation rate (%)	Trauma Type	Single/ Multiple trauma	Intentional/ Un- intentional	Time since trauma
Jobson, 2009	Med	UK	Peer	106	Adult	Civilian	37.2	30.0		42.4	Mix	Mix	Mix	> 1 mo
Kangas, 2005	Med	AU	Peer	63	Adult	Civilian	60.1	72.0			Ill/Inj	Single	Un-Intent	> 1 mo
Kangas, 2007	Med	AU	Peer	82	Adult	Civilian	60.1	74.0		69.0	Ill/Inj	Single	Un-Intent	< 1 mo
Karl, 2009	Low	DE	Peer	78	Adult	Civilian	42.3	34.0			RTA	Single	Un-Intent	> 1 mo
Kearney et al, 2006,13,15*	Low	US	Peer/unpub	300	Child	Civilian	13.9				Mix	Mult	Intent	
Kleim, 2007	High	UK	Peer	205	Adult	Civilian	35.0	68.0	58.0	32.0	Mix	Single	Intent	< 1 mo
Kleim, 2012	High	UK	Peer	205	Adult	Civilian	35.1	67.0	60.0	33.0	Mix	Mix	Mix	>1mo
Kolts, 2004	Med	US	Peer	156	Adult	Civilian	24.0	33.0	81.4	82.0	Mix	Mix	Mix	
Koo, 2014	High	US	Peer	630	Adult	Civilian	20.4	0.0	82.0	92.0	SA	Mix	Intent	> 1 mo
Kreis, 2011	Med	NL	Peer	53	Adult	Civilian	58.0	60.0		33.0	Ill/Inj	Single	Un-Intent	> 1 mo
Lancaster, 2011	Med	US	Peer	405	Adult	Civilian	19.4	47.0	54.1		Mix	Mix	Mix	> 1 mo
Laposa, 2003	Med	CA	Peer	53	Adult	Civilian	36.5	10.0	57.0	67.0	Ill/Inj	Mult	Mix	
Littleton, 2012	Med	US	Peer	215	Adult	Civilian	19.5	0.0	86.2	59.0	IPV	Single	Intent	> 1 mo
Liu, 2015	Med	TW	Peer	285	Child	Civilian	13.5	43.9		80.1	Mix	Mix	Mix	> 1 mo
Lommen, 2009	Med	LK	Peer	113	Adult	Civilian	35.9	28.0		79.0	Disaster	Single	Un-Intent	> 1 mo
Ma, 2011	Med	CN	Peer	3208	Child	Civilian	13.8	47.9		88.0	Disaster	Single	Un-Intent	> 1 mo
Marshall, 2014	Med	US	Peer	64	Adult	Civilian	36.2	0.0	89.0		SA	Mix	Intent	
Matthews, 2009	Med	AU	Peer	69	Adult	Civilian	36.9	55.1		41.0	Mix	Single	Un-Intent	> 1 mo
Meiser-Stedman, 2009b, s2	Low	UK	Peer	133	Child	Civilian	12.8	68.0			Mix	Single	Mix	> 1 mo
Meiser-Stedman, 2009b, s3	Low	AU	Peer	179	Child	Civilian	11.4	62.2			Mix	Single	Un-Intent	< 1 mo
Meiser-Stedman, unpub	High	UK	Unpub	208	Child	Civilian	14.1	57.5	92.9	43.0	Mix	Single	Mix	< 1 mo
Monson, 2009	Med	US	Peer	58	Adult	Civilian	53.0	0.0	99.0		Disaster	Single	Un-Intent	> 1 mo
Moore, 2011 s1	Low	IL	Peer	14	Adult	Civilian	26.2	0.0			SA	Single	Intent	
Moore, 2011, s2	Low	IL	Peer	19	Adult	Military	26.2	28.4			Combat	Mix	Intent	

Study name	Quality	Country	Type of report	N	Child/ Adult	Popul- ation	Mean Age (yrs)	% male	% cauc- asian	Particip- ation rate (%)	Trauma Type	Single/ Multiple trauma	Intentional/ Un- intentional	Time since trauma
Moore, 2011, s3	Low	IL	Peer	23	Adult	Civilian	26.2	28.4			RTA	Single	Un-Intent	
Moore, 2011, s4	Low	IL	Peer	14	Adult	Civilian	26.2	28.4			Ill/Inj	Single	Un-Intent	
Morris, 2013	Low	US	Peer	40	Child	Civilian		55.0	82.5		Ill/Inj	Single	Un-Intent	< 1 mo
Moser, 2007	Low	US	Peer	379	Adult	Civilian		44.0	81.8		Mix	Mix	Mix	
Mueller, 2008	Low	CH	Peer	86	Adult	Civilian	46.1	40.6		35.5	Mix	Single	Intent	> 1 mo
Muller, 2010	Low	DE	Peer	403	Adult	Civilian	42.1	39.7			Mix	Mix	Mix	both
Nalipay & Mordeno, 2016	Med	PH	Peer	632	Both	Civilian	18.0	20.0			Disaster	Single	Un-Intent	
Nixon, 2005	Low	AU	Peer	59	Both	Civilian	32.6	62.7			Mix	Single	Mix	< 1 mo
Nixon, 2008	Low	AU	Peer	56	Adult	Civilian	37.4	66.5			Mix	Mix	Mix	< 1 mo
Nixon, Ellis et al 2010 *P*	High	AU	Peer	131	Child	Civilian		61.0	88.0	54.0	Mix	Single	Mix	< 1 mo
Nixon, Nehmy et al 2010 *P*	High	AU	Peer	48	Child	Civilian	11.8	69.0	88.0	66.0	Mix	Single	Mix	> 1 mo
Noguchi, 2013	Med	JP	Peer	96	Adult	Civilian	39.2	75.6		27.9	RTA	Single	Un-Intent	> 1 mo
Nygaard, 2012	Med	NO	Peer	574	Adult	Civilian	42.6	45.5		74.0	Disaster	Single	Un-Intent	> 1 mo
O'Donnell, 2007	Med	AU	Peer	253	Adult	Civilian	36.1	75.1			Ill/Inj	Single	Un-Intent	< 1 mo
O'Hare, 2015	High	US	Peer	242	Adult	Civilian	45.8	32.2	71.9	93.2	Mix	Mix	Intent	> 1 mo
Olatunji, 2008	Low	US	Peer	48	Adult	Civilian	19.5	0.0	90.0		SA	Mix	Intent	
Owens & Chard, 2001	Med	US	Peer	79	Adult	Civilian	32.3	0.0	82.0		SA	Mix	Intent	>1mo
Palosaari et al 2013, 2015 *	High	PS	Peer	240	Child	Civilian	11.4	50.0			War	Mix	Intent	> 1 mo
Park, 2012	Med	US	Peer	130	Adult	Civilian	18.7	39.2	87.7		Mix	Mix	Mix	both
Ponnamperuma, 2015	Med	LK	Peer	414	Child	Civilian	13.6	45.7		91.8	Mix	Mix	Mix	> 1 mo
Porter, 2013	Med	US	Peer	136	Adult	Military	51.5	93.3	85.5		Mix	Mix	Intent	> 1 mo
Regambal, 2015	Med	CA	Peer	181	Adult	Civilian		73.5	90.1	72.0	Mix	Single	Mix	
Reich, 2015	Med	US	Peer	79	Adult	Civilian	36.1	0.0	50.6		Mix	Mix	Intent	both
Robinaugh, 2011	High	US	Peer	100	Adult	Civilian	38.2	25.0	75.0	76.0	RTA	Single	Un-Intent	> 1 mo
Ross & Kearney, 2015	Med	US	Peer	360	Child	Civilian	13.8	40.0			IPV	Mix	Intent	>1mo
Salmon, 2007	Med	AU	Peer	76	Child	Civilian	10.5	66.0		32.0	Mix	Single	Un-Intent	< 1 mo
Salmond, 2011	Med	UK	Peer	50	Child	Civilian	13.5	50.0	40.0	28.0	Mix	Single	Mix	< 1 mo
Salter, 2003	Med	UK	Unpub Dis	77	Adult	Civilian	39.2	25.7	95.5	73.0	IPV	Single	Intent	< 1 mo
Sciancalepore & Motta, 2004	Med	US	Peer	123	Adult	Civilian	37.0	59.0	65.0		Disaster	Single	Intent	>1mo
Shahar, 2013	Med	IL	Peer	156	Adult	Civilian	35.9	57.1		77.2	Mix	Single	Mix	< 1 mo

Study name	Quality	Country	Type of report	N	Child/ Adult	Popul-ation	Mean Age (yrs)	% male	% cauc-asian	Particip-ation rate (%)	Trauma Type	Single/ Multiple trauma	Intentional/ Un-intentional	Time since trauma
Shin, 2014	Med	KR	Peer	38	Adult	Civilian	29.1	0.0			SA	Mix	Intent	both
Ssenyonga, 2013	Med	UG	Peer	89	Adult	Civilian	21.1	37.1			War	Mix	Mix	
Stallard & Smith, 2007	Low	UK	Peer	75	Child	Civilian	14.1	49.3			RTA	Single	Un-Intent	> 1 mo
Stallard, 2003	Low	UK	Peer	97	Child	Civilian	14.6	53.6		43.0	RTA	Single	Un-Intent	> 1 mo
Startup, 2007	Med	AU	Peer	63	Adult	Civilian	37.7	24.4			Mix	Mix	Mix	> 1 mo
Steil, 2000, s1	Med	DE	Peer	159	Adult	Civilian	43.2	41.0	100.0	84.0	RTA	Single	Un-Intent	> 1 mo
Steil, 2000, s2	Med	DE	Peer	138	Adult	Civilian	41.5	72.0	100.0	66.0	RTA	Single	Un-Intent	> 1 mo
Su, 2008	Med	TW	Peer	240	Adult	Civilian	20.3				Mix	Mix	Mix	both
Suliman, 2013	Med	ZA	Peer	125	Adult	Civilian	32.3	56.8	14.5		RTA	Single	Un-Intent	< 1 mo
Suliman, 2014	Med	ZA	Peer	104	Adult	Civilian	33.1	56.5	55.7	95.0	RTA	Single	Un-Intent	> 1 mo
Tierens, 2012	Med	BE	Peer	684	Child	Civilian	14.8	56.5		81.0	RTA	Single	Un-Intent	both
Trautman, 2015	Med	DE	Peer	358	Adult	Civilian	28.7	100.0		57.9	Combat	Mult	Mix	
Tutus & Goldbeck, 2016	Med	DE	Peer	113	Adult	Civilian	41.2	19.0	81.0		Mix	Mix	Mix	both
Ullman, 2007	Med	US	Peer	1084	Adult	Civilian	32.5	0.0		90.0	SA	Mix	Intent	both
Van Buren & Weierich, 2015	Low	US	Peer	46	Adult	Civilian	22.1	0.0	48.0		SA	Mix	Intent	
Van Emmerick, 2006, s1	Low	NL	Peer	178	Adult	Civilian	39.4	33.5			Mix	Mix	Mix	
Van Emmerick, 2006, s2	Low	NL	Peer	158	Adult	Civilian	39.4	33.5			Mix	Mix	Mix	
Varkovitzky, 2013	Med	US	Unpub Dis	181	Adult	Civilian	19.5	0.0	68.0		SA	Mix	Intent	
Wenninger, 1998, s1	Med	US	Peer	43	Adult	Civilian	38.7	0.0		90.0	SA	Mix	Intent	> 1 mo
Wenninger, 1998, s2	Med	DE	Peer	35	Adult	Civilian	36.4	0.0		87.5	SA	Mix	Intent	> 1 mo
Whiting & Bryant, 2007	Low	AU	Peer	51	Adult	Civilian	31.1	31.0			Mix	Mix	Mix	> 1 mo
Wong, 2013	Med	US	Unpub Dis	70	Adult	Civilian	46.0	23.0	63.0		Mix	Mix	Mix	both
Woodward, 2015	Med	US	Peer	378	Adult	Civilian	40.1	0.0	67.8	88.0	Mix	Mix	Mix	

Key: SA = sexual abuse; RTA = road traffic accident; IPV = interpersonal violence; Ill/inj = illness/injury; *P* = prospective analyses only

Table 3.2

Study Characteristics Part 2: Study Design, Measures and Assessment Times

Study name	Recruitment source	Study Design	PTSD measure:- name	format	cat/cont	Appraisal measure:- name	format	validity	Follow-Ups:- Time 1	Time 2	Time 3	Time 4
Abolghasemi, 2013	Services	Betw Grp	CIDI	Int	Cat	PTCI	S-Rep	Valid				
Agar, 2006	Services	Cross-sec	PDS	S-Rep	Cat	PTCI	S-Rep	Valid				
Ali, 2002	mixture	Betw Grp	PSS-SR	S-Rep	Cat	Q'aire	S-Rep	Un-valid				
Allwood, 2014	Services	Cross-sec	K-SADS-PL	Int	Cont	CTIC	S-Rep	Valid				
Arikan, 2015	Community	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Ayers, 2009	Services	Cross-sec	PDS	S-Rep	Cont	Q'aire	S-Rep	Un-valid				
Barton, 2013	Services	Cross-sec	PCL-S	S-Rep	Cont	PTCI	S-Rep	Valid				
Beck, 2004	Other	Cross-sec	CAPS	Int	Cont	PTCI	S-Rep	Valid				
Beck, 2015, s1	Services	Cross-sec	CAPS	Int	Cont	PTCI	S-Rep	Valid				
Beck, 2015, s2	Community	Cross-sec	CAPS	Int	Cont	PTCI	S-Rep	Valid				
Belsher, 2012	Services	Cross-sec	PCL-C	S-Rep	Cont	PTCI	S-Rep	Valid				
Bennett, 2009	Services	Cross-sec	CAPS	Int	Cont	PTCI	S-Rep	Valid				
Bolster, 2015, s1	Other	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Bolster, 2015, s2	Other	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Brewin, 2011	Other	Cross-sec	SCID-V	Int	Cat	Interview	Int	Un-valid				
Bryant, 2007 *P*	ED	Prospec	UCLA PTSD-I	Int	Cont	cPTCI	S-Rep	Valid	w/in 1 mo	6 mo		
Buck, 2008	Other	Cross-sec	PDS	S-Rep	Cont	TRAS	S-Rep	Un-valid				
Buodo, 2012	Services	Cross-sec	PSS	S-Rep	Cont	PTCI	S-Rep	Valid				
Campbell, 2007	Other	Betw Grp	SPTSS	S-Rep	Cat	PTCI	S-Rep	Valid				
Carek, 2010	Services	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Carper, 2015	Mix	Prospec	PCL	S-Rep	Cont	PTCI	S-Rep	Valid	1 mo	4 mo		

Study name	Recruitment source	Study Design	PTSD measure:- name	format	cat/cont	Appraisal measure:- name	format	validity	Follow-Ups:- Time 1	Time 2	Time 3	Time 4
Christiansen, 2015	Other	Prospec	HTQ	S-Rep	Cont	PTCI	S-Rep	Valid				
Cieslak, 2008, s1	mix	Cross-sec	IES-R	S-Rep	Cont	PTCI	S-Rep	Valid				
Cieslak, 2008, s2	Other	Cross-sec	IES-R	S-Rep	Cont	PTCI	S-Rep	Valid				
Constans, 2012	Other	Cross-sec	SPRINT	Int	Cont	PTCI	S-Rep	Valid				
Cromer, 2010	Community	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Daie-Gabai, 2011	Other	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Daigneault, 2006		Cross-sec	TSCC	S-Rep	Cont	CITS	S-Rep	Valid				
De Haan, 2015	Services	Betw Grp	UCLA PTSD-I	S-Rep	Cont	cPTCI	S-Rep	Valid				
Dekel, 2004	Other	Cross-sec	PTSD-I	S-Rep	Cat	WAS	S-Rep	Valid				
Denson, 2007	ED	Prospec	PCL	S-Rep	Cont	Q'aire	S-Rep	Valid	5 days	12 mo		
DePrince, 2011, s1	Community	Cross-sec	RCMS	S-Rep	Cont	TAQ	S-Rep	Valid				
DePrince, 2011, s2	Community	Cross-sec	PDS	S-Rep	Cont	TAQ	S-Rep	Valid				
DePrince, 2011, s3	Other	Cross-sec	PDS	S-Rep	Cont	TAQ	S-Rep	Valid				
Diehle, 2015	Services	Cross-sec	CAPS-CA	Int	Cont	cPTCI	S-Rep	Valid				
Dorfel, 2008	Other	Cross-sec	CAPS	Int	Cont	PTCI	S-Rep	Valid				
Duffy, 2013	Community	Cross-sec	PDS	S-Rep	Cont	PTCI short	S-Rep	Un-valid				
Duffy, 2015	Community	Cross-sec	PDS	S-Rep	Cont	PTCI short	S-Rep	Un-valid				
Dunmore, 1999	Services	Betw Grp	PSS-SR	S-Rep	Cont	Q'aire	S-Rep	Un-valid				
Dunmore, 2001	Other	Prospec	PSS-SR	S-Rep	Cont	Q'aire	S-Rep	Valid	1-4mo	6 mo	9 mo	
D'Urso, 2014, s1	Services	Cross-sec	IES-R	S-Rep	Cont	cPTCI	S-Rep	Valid				
D'Urso, 2014, s2	Services	Cross-sec	IES-R	S-Rep	Cont	cPTCI	S-Rep	Valid				
Ehlers, 1998/Mayou 2002*	Services	Prospec	PSS	S-Rep	Cat	Q'aire	S-Rep	Valid	1-8 days	3 mo	1 yr	3 yrs
Ehlers, 2000	Other	Cross-sec	IES-R	S-Rep	Cont	Interview	Int	Un-valid				
Ehring, 2006	ED	Cross-sec	PDS	S-Rep	Cont	PTCI self	S-Rep	Valid				
Ehring, 2008	ED	Prospec	PDS	S-Rep	Cont	PTCI self	S-Rep	Valid	2 wks	1 mo	3 mo	6 mo

Study name	Recruitment source	Study Design	PTSD measure:- name	format	cat/cont	Appraisal measure:- name	format	validity	Follow-Ups:- Time 1	Time 2	Time 3	Time 4
Ellis, 2009	Services	Cross-sec	ASC-Kids	S-Rep	Cont	cPTCI	S-Rep	Valid				
Elsesser, 2007, s1	Other	Betw Grp	DIPS	Int	Cat	PTCI	S-Rep	Valid				
Elsesser, 2007, s2	Other	Betw Grp	ASDI	Int	Cont	PTCI	S-Rep	Valid				
Engelbrecht, 2014, s1	Community	Betw Grp	SCID	Int	Cat	PTCI	S-Rep	Valid				
Engelbrecht, 2014, s2	Community	Betw Grp	SCID	Int	Cat	PTCI	S-Rep	Valid				
Fairbrother, 2006	Other	Cross-sec	CAPS	Int	Cont	SARA	S-Rep	Valid				
Ferner, 2013	ED	Cross-sec	CPSS	S-Rep	Cont	cPTCI	S-Rep	Valid				
Field, 2008	Services	Prospec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid	0-1 day	3 mo		
Foa, 1999	Services	Cross-sec	PSS	S-Rep	Cont	PBRS	S-Rep	Valid				
Freeman et al, 2013	ED	Prospec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid	4-6wk	3mo	6mo	
Gamache-Martin, 2013	Community	Cross-sec	RCMS	S-Rep	Cont	TAQ	S-Rep	Valid				
Gelkopf, 2013	Services	Betw Grp	CAPS	S-Rep	Cat	PTCI	S-Rep	Valid				
Ginzburg, 2004	Services	Prospec	PTSD-I	S-Rep	Cat	WAS	S-Rep	Valid	3 days	7 mo		
Gluck et al, 2016	Community	Cross-sec	ETI	S-Rep	Cont	PTCI	S-Rep	Valid				
Gonzalo, 2012	Services	Betw Grp	SCID	Int	Cat	PTCI	S-Rep	Valid				
Gough, 2011 s1	Community	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Gough, 2011 s2	Community	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Hagenaars, 2007	Other	Prospec	PSS-SR	S-Rep	Cont	PTCI	S-Rep	Valid	20 days	6 mo		
Halligan, 2003, s1	Services	Betw Grp	PDS	S-Rep	Cont	IPSY	S-Rep	Valid				
Halligan, 2003, s2	Services	Prospec	PDS	S-Rep	Cont	IPSY	S-Rep	Valid	w/in 3 mo	6 mo	9 mo	12 mo
Hansen, 2014	Other	Prospec	ASDS	S-Rep	Cont	PTCI	S-Rep	Valid	1 wk	6 mo		
Hiskey, 2015	Other	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Hitchcock, 2015	Services	Prospec	CAPS-C	Int	Cont	cPTCI	S-Rep	Valid	6 mo			
Horsch, 2012	Services	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Horsch, 2015	Services	Prospec	SCID	Int	Cont	PTCI	S-Rep	Valid	3 mo	6 mo		
Hyland, 2013	Other	Betw Grp	PDS	S-Rep	Cat	TRIBS	S-Rep	Valid				
Jelinek, 2013	Other	Betw Grp	PDS	S-Rep	Cat	PTCI	S-Rep	Valid				

Study name	Recruitment source	Study Design	PTSD measure:- name	format	cat/cont	Appraisal measure:- name	format	validity	Follow-Ups:- Time 1	Time 2	Time 3	Time 4
Jobson, 2009	Other	Betw Grp	PDS	S-Rep	Cat	Interview	Int	Un-valid				
Kangas, 2005	Services	Prospec	CAPS	Int	Cat	PTCI	S-Rep	Valid	1 mo	6 mo		
Kangas, 2007	Services	Betw Grp	ASDI	Int	Cat	PTCI	S-Rep	Valid				
Karl, 2009	Other	Betw Grp	CAPS	Int	Cat	PTCI	S-Rep	Valid				
Kearney et al, 2006,13,15*	Community	Cross-sec	CPTSDI	Int	Cont	PTCI	S-Rep	Valid				
Kleim, 2007	ED	Prospec	SCID	Int	Cat	PTCI	S-Rep	Valid	4 wks	6 mo		
Kleim, 2012	ED	Prospec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid	2wk	6mo		
Kolts, 2004	Community	Cross-sec	MPSS-SR	S-Rep	Cont	PTCI	S-Rep	Valid				
Koo, 2014	Community	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Kreis, 2011	Services	Cross-sec	ZIL	S-Rep	Cont	PTCI	S-Rep	Valid				
Lancaster, 2011	Community	Cross-sec	PCL-S	S-Rep	Cont	PTCI	S-Rep	Valid				
Laposa, 2003	Services	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Littleton, 2012	Community	Prospec	PSS-SR	S-Rep	Cont	WAS	S-Rep	Valid	2 mo	1 yr		
Liu, 2015	Community	Cross-sec	UCLA PTSD-I	S-Rep	Cont	cPTCI	S-Rep	Valid				
Lommen, 2009	Community	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Ma, 2011	Community	Cross-sec	CRIES-13	S-Rep	Cont	PTCI	S-Rep	Valid				
Marshall, 2014	Other	Cross-sec	CAPS	Int	Cont	PTCI	S-Rep	Valid				
Matthews, 2009	Services	Cross-sec	PCL-C	S-Rep	Cont	PTCI	S-Rep	Valid				
Meiser-Stedman, 2009b, s2	Services	Cross-sec	CRIES-13	S-Rep	Cat	cPTCI	S-Rep	Valid				
Meiser-Stedman, 2009b, s3	Services	Cross-sec	CASQ & ASC	S-Rep	Cat	cPTCI	S-Rep	Valid				
Meiser-Stedman, unpub	ED	Prospec	CPSS	S-Rep	Cont	cPTCI	S-Rep	Valid	21 days	85 days		
Monson, 2009	Community	Cross-sec	NWSPM	S-Rep	Cont	WAS	S-Rep	Valid				
Moore, 2011 s1	Community	Cross-sec	PDS	S-Rep	Cont	Q'aire	S-Rep	Un-valid				
Moore, 2011, s2	Community	Cross-sec	PDS	S-Rep	Cont	Q'aire	S-Rep	Un-valid				

Study name	Recruitment source	Study Design	PTSD measure:- name	format	cat/cont	Appraisal measure:- name	format	validity	Follow-Ups:- Time 1	Time 2	Time 3	Time 4
Moore, 2011, s3	Community	Cross-sec	PDS	S-Rep	Cont	Q'aire	S-Rep	Un-valid				
Moore, 2011, s4	Community	Cross-sec	PDS	S-Rep	Cont	Q'aire	S-Rep	Un-valid				
Morris, 2013	ED	Cross-sec	IES-R	S-Rep	Cont	Q'aire	S-Rep	Un-valid				
Moser, 2007	Community	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Mueller, 2008	Other	Prospec	IES-R	S-Rep	Cont	PTCI	S-Rep	Valid	5 mo	11 mo		
Muller, 2010	Other	Cross-sec	IES-R	S-Rep	Cont	PTCI	S-Rep	Valid				
Nalipay & Mordeno, 2016	Community	Cross-sec	PCL	S-Rep	Cont	PTCI	S-Rep	Valid				
Nixon, 2005	Services	Cross-sec	ASDI	Int	Cont	PTCI	S-Rep	Valid				
Nixon, 2008	Other	Betw Grp	ASDI	Int	Cat	PTCI	S-Rep	Valid				
Nixon, Ellis et al 2010 *P*	ED	Prospec	CPSS	S-Rep	Cont	cPTCI	S-Rep	Valid	w/in 4 wks	3 mo	6 mo	
Nixon, Nehmy et al 2010 *P*	ED	Prospec	CPSS	S-Rep	Cont	cPTCI	S-Rep	Valid	4 wks	6 mo		
Noguchi, 2013	ED	Prospec	IES-R	S-Rep	Cont	PTCI	S-Rep	Valid	1 mo	6 mo		
Nygaard, 2012	Other	Prospec	IES-R	S-Rep	Cont	Q'aire	S-Rep	Un-valid	6 mo	2 yrs		
O'Donnell, 2007	Services	Prospec	CAPS	Int	Cont	PTCI	S-Rep	Valid	8 days	3 mo	12 mo	
O'Hare, 2015	Services	Cross-sec	PSDSSI	S-Rep	Cont	PTCI	S-Rep	Valid				
Olatunji, 2008	Community	Cross-sec	PPTS-R	S-Rep	Cont	PTCI	S-Rep	Valid				
Owens & Chard, 2001	Community	Cross-sec	CAPS	Int	Cont	PBRS & WAS	S-Rep	Valid				
Palosaari et al 2013, 2015 *	Community	Cross-sec	CRIES-13	S-Rep	Cont	cPTCI	S-Rep	Valid	3 mo	5 mo	11 mo	
Park, 2012	Community	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Ponnamperuma, 2015	Community	Cross-sec	UCLA PTSD-I	S-Rep	Cont	Q'aire	S-Rep	Un-valid				
Porter, 2013	Services	Cross-sec	CAPS	Int	Cont	PTCI	S-Rep	Valid				
Regambal, 2015	Community	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Reich, 2015	Community	Cross-sec	CAPS	Int	Cont	PTCI	S-Rep	Valid				
Robinaugh, 2011	Other	Prospec	PCL-S	S-Rep	Cont	PTCI	S-Rep	Valid	4 wks	10 wks	16 wks	
Ross & Kearney, 2015	Services	Cross-sec	CPTSDI	Int	Cont	PTCI	S-Rep	Valid				
Salmon, 2007	Services	Cross-sec	CASRQ	S-Rep	Cont	cPTCI	S-Rep	Valid				
Salmond, 2011	ED	Cross-sec	CPSS	S-Rep	Cont	cPTCI	S-Rep	Valid				
Salter, 2003	Services	Prospec	PSS-SR	S-Rep	Cont	IPSI	S-Rep	Un-valid	0-3 wks	58.3 days	121.0 days	
Sciancalepore & Motta, 2004	Community	Cross-sec	MPSS-SR	S-Rep	Cont	PTCI	S-Rep	Valid				
Shahar, 2013	ED	Prospec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid	2 wks	4 wks	12 wks	

Study name	Recruitment source	Study Design	PTSD measure:- name	format	cat/cont	Appraisal measure:- name	format	validity	Follow-Ups:- Time 1	Time 2	Time 3	Time 4
Shin, 2014	Services	Prospec	PSS-SR	S-Rep	Cont	PTCI	S-Rep	Valid	w/in 4 mo	1 mo later		
Ssenyonga, 2013	Community	Betw Grp	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Stallard & Smith, 2007	ED	Cross-sec	CAPS-C	Int	Cont	Q'aire	S-Rep	Un-valid				
Stallard, 2003	ED	Betw Grp	CAPS-C	Int	Cat	Interview	S-Rep	Un-valid				
Startup, 2007	Other	Betw Grp	PDS	S-Rep	Cat	PTCI	S-Rep	Valid				
Steil, 2000, s1	Other	Cross-sec	PSS	S-Rep	Cont	Q'aire	S-Rep	Un-valid				
Steil, 2000, s2	Other	Cross-sec	PSS	S-Rep	Cont	ICQ	S-Rep	Un-valid				
Su, 2008	Community	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Suliman, 2013	ED	Cross-sec	ASDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Suliman, 2014	Services	Prospec	CAPS	Int	Cont	PTCI	S-Rep	Valid	3 mo	6 mo		
Tierens, 2012	Community	Cross-sec	CRIES-13	S-Rep	Cont	Q'aire	S-Rep	Un-valid				
Trautman, 2015	Other	Prospec	PCL-C	S-Rep	Cont	PTCI	S-Rep	Un-valid				
Tutus & Goldbeck, 2016	Other	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Ullman, 2007	Community	Cross-sec	PDS	S-Rep	Cont	RAQ	S-Rep	Valid				
Van Buren & Weierich, 2015	Community	Cross-sec	PDS	S-Rep	Cont	PTCI	S-Rep	Valid				
Van Emmerick, 2006, s1	Services	Cross-sec	SCID/ MINI	Int	Cont	PTCI	S-Rep	Valid				
Van Emmerick, 2006, s2	Services	Cross-sec	SCID/ MINI	Int	Cont	PTCI	S-Rep	Valid				
Varkovitzky, 2013	Community	Cross-sec	PTSD-Q	S-Rep	Cont	PBRS	S-Rep	Valid				
Wenninger, 1998, s1	Other	Cross-sec	PSS-SR	S-Rep	Cont	PBRS	S-Rep	Valid				
Wenninger, 1998, s2	Other	Cross-sec	PSS-SR	S-Rep	Cont	PBRS	S-Rep	Valid				
Whiting & Bryant, 2007	Services	Cross-sec	CAPS	Int	Cont	PTCI	S-Rep	Valid				
Wong, 2013	Services	Cross-sec	PCL-C	S-Rep	Cont	PTCI	S-Rep	Valid				
Woodward, 2015	Community	Cross-sec	CAPS	Int	Cont	PTCI	S-Rep	Valid				

Key: *Study name: P* = prospective analyses only

Recruitment sources: ED = emergency department; Int = interview; S-Rep = self-report; Cat = categorical; Cont = continuous

PTSD/ASD measures: ASC-Kids = acute stress checklist for children; ASDI = acute stress disorder interview; CAPS = clinician administered PTSD Scale, CAPS-C = clinician administered PTSD scale for children; CASQ = child acute stress questionnaire; ASC = acute stress checklist; CASRQ = child acute stress reaction questionnaire; CIDI = composite international diagnostic interview; CPSS = child PTSD symptom scale; CPTSDI = children's posttraumatic stress disorder inventory; CRIES-13 = children's revised impact of events scale; ETI = Essen trauma inventory; HTQ = Harvard trauma questionnaire; IES-R = impact of events scale revised; K-SADS = Kiddie SADS; MPSS-SR = modified PTSD symptom scale self-report; NWSPM = national women's PTSD module; PCL = PTSD checklist; PCL-C = PTSD checklist civilian; PCL-S = PTSD checklist specific; PDS = Posttraumatic stress diagnostic scale; PPTS-R = Purdue PTSD scale revised; PSDSSI = PTSD symptom scale interview; PSS = posttraumatic symptoms scale; PSS-SR = posttraumatic symptoms scale self report; PTSD-I = posttraumatic stress disorder interview; PTSD-Q = posttraumatic stress disorder questionnaire; RCMS = revised civilian Mississippi scale for PTSD; SCID = structured clinical interview for DSM-IV; MINI = mini international neuropsychiatric interview; SPRINT = short purdue PTSD scale; SPTSS = screen for posttraumatic stress symptoms; TSCC = trauma symptoms checklist for children; UCLA PTSD-I = UCLA PTSD index for DSM-IV; ZIL = zelfinventaristatielijst posttraumatische stresstoornis (self inventory for PTSD).

Maladaptive appraisal measures: CPTCI = child posttraumatic cognitions inventory; CTIC = cognitive triad inventory for children; ICQ = intrusions cognitions questionnaire; IPSI = interpretation of PTSD symptoms inventory; PBRS = personal beliefs and reactions scale; PTCI = posttraumatic cognitions inventory; RAQ = rape appraisal questionnaire; SARA = sexual assault and rape appraisals; TAQ = trauma appraisal questionnaire; TRAS = trauma relevant assumptions scale; WAS = world assumptions scale

1.20.6 Study Quality. As described in Section 2.7, the methodological quality of each study was assessed using a quality appraisal checklist and 20% of studies were double coded by researcher SS. Inter-rater reliability for quality ratings were calculated. Percentage agreement for the individual items in the quality assessment checklist was 80%. Weighted Kappa was calculated for the overall quality rating given to each study (low, medium, high). Table 3.3 shows the agreement between GG and SS. The weighted Kappa statistic was 0.52, which is considered to be "moderate" agreement. Nineteen samples were rated as high quality, 90 studies were rated as medium quality and 38 studies were rated as low quality.

Table 3.3

Inter-Rater Reliability of Study Quality Ratings

		SS			
		low	med	high	*Total*
GG	low	**3**	4	0	*7*
	med	2	**16**	2	*20*
	high	0	0	**3**	*3*
	Total	*5*	*20*	*5*	*30*

1.21 Meta-Analysis of Overall Effect Size

One hundred and forty-seven independent effect sizes from 135 studies were combined in the meta-analysis to estimate the strength of the relationship between maladaptive appraisals and PTSD symptoms. A stem and leaf plot showing the effect sizes extracted is shown in Figure 3.2. The number to the left of the line shows the effect size to one decimal place. The numbers to the right of the line gives the second decimal place for each of the 147 effect sizes extracted. The mode of the distribution is 0.6, with a range of 0.04 to 0.90. The median effect size is 0.525. The data appears to be slightly skewed to the right with a few outlying large observations.

0.0	4
0.1	3 4 4 7 7 7 8
0.2	0 1 1 2 3 7 7 8 8 8
0.3	0 1 1 1 1 2 3 3 3 3 4 4 5 6 6 6 6 7 8 8 8 9
0.4	0 0 1 2 2 3 3 4 5 6 6 6 6 7 7 8 8 8 8 9 9
0.5	0 1 2 2 2 2 3 3 3 3 4 4 4 4 4 5 6 6 6 6 7 7 7 7 8 8 8 8 8 9 9 9 9
0.6	0 0 1 1 1 1 1 2 2 2 3 4 4 4 4 4 6 6 6 6 6 6 7 7 7 8 8 8 8 9 9 9 9 9 9 9
0.7	0 0 0 0 1 1 3 3 5 6 7 9 9 9
0.8	5 9
0.9	0

Figure 3.2. Stem-and-leaf plot of Pearson's correlations for pooled effect size. This shows each correlation used in the meta-analysis with the first decimal place on the left hand side of the line and the second decimal place on the right hand side of the line.

A random effects meta-analysis indicated a large overall effect size; *$r = 0.53$, 95% CI = 0.51 - 0.56, $z = 30.88$, $p<0.0001$*. Estimates of heterogeneity showed that there was a significant amount of variation across the studies: *$Q = 1382.31$, $df = 146$, $p<0.0001$*. The I^2 statistic showed that 89.44% of the variation was a result of true variance. The large value of I^2 indicated that further analyses should be carried out in order to explain the source of the variance.

It was not possible to create a meaningful Forest plot showing all the data, given the very large number of studies included in the meta-analysis. The contribution of each study to the overall effect size is therefore shown in Appendix G and summarised by the stem-and-leaf plot in Figure 3.

1.21.1 Subgroup analyses. Subgroup analyses were planned as described in Section 2.8.3. Results are given in Table 7 and shown graphically in Figure 3.3 and 3.4. Figure 3.3 shows the methodological influences on effect size and Figure 3.4 shows the influence of different trauma characteristics on effect size.

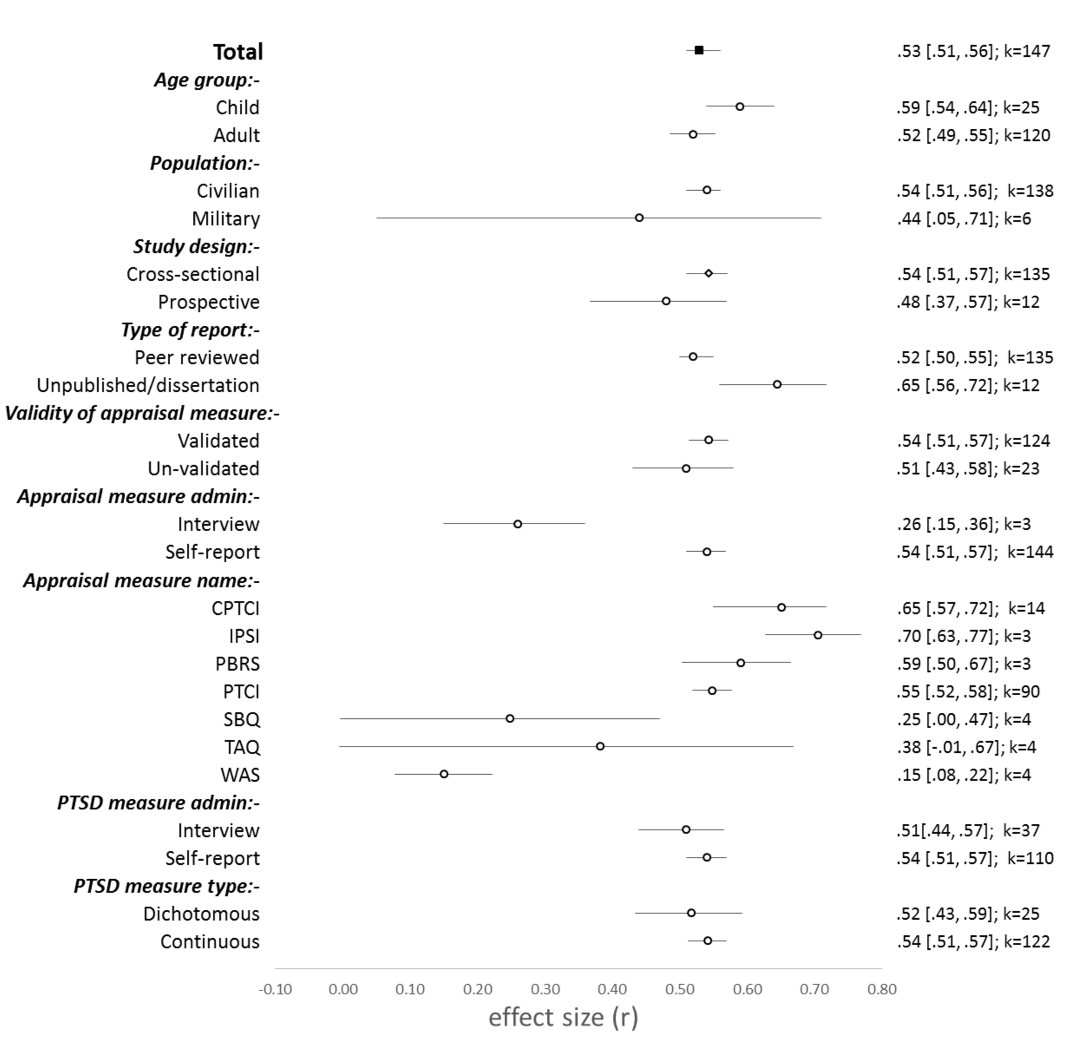

Figure 3.3. Forest plot to show the overall effect size and subgroup analyses relating to study methodology.

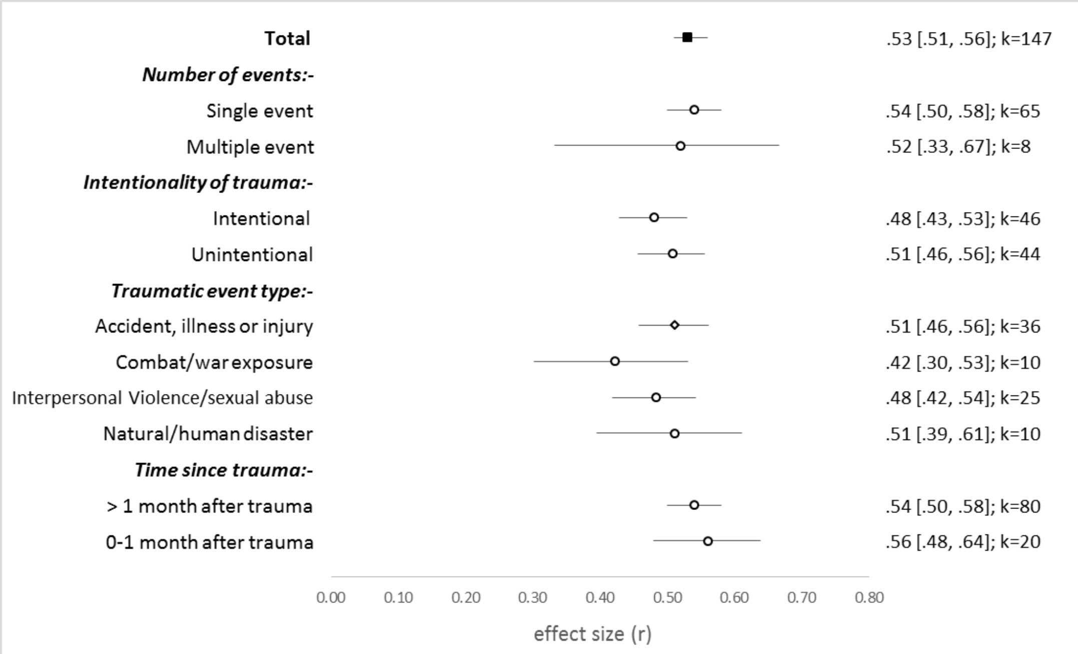

Figure 3.4. Forest plot to show the overall effect size and subgroup analyses exploring the influence of trauma characteristics.

There were no differences in effect size according to civilian or military population, validated or un-validated measure of appraisal, administration method of PTSD measure (self-report or interview), or whether the PTSD measure provided a continuous severity score or dichotomous diagnostic status.

There were no differences in effect size according to single or multiple event trauma, intentional or unintentional trauma, type of traumatic event or time at which trauma was assessed (0-1 month or >1 month after trauma).

A significant amount of heterogeneity was accounted for by whether or not the study was from a child or adult population. Child studies showed a significantly larger effect size than adult studies. Type of report also yielded significant results, with unpublished studies having a larger effect size than published studies.

The measure used to assess maladaptive appraisals also accounted for a significant amount of heterogeneity in the effect size, with interview measures having a significantly smaller effect size than self-report measures. The individual self-report measures also explained a significant amount of heterogeneity, with effect sizes varying from 0.15 on the WAS to 0.70 on the IPSI (see Table 3.4 for full details).

Table 3.4

Table of Results from Overall and Subgroup Meta-Analyses

	K	n	r	LL	UL	Z	p	Q	df	p	I^2
TOTAL OVERALL EFFECT SIZE	**147**	**29812**	**0.53**	**0.51**	**0.56**	**30.88**	**<0.0001**	***1382.37****	***146***	***<0.0001***	***89.44***
Age Group											
Child	25	9326	0.59	0.54	0.64	18.10	<0.0001				
Adult	120	19795	0.52	0.49	0.55	24.66	<0.0001				
Subgroup analysis								*5.73*	*1*	*<0.02*	
Population											
Civilian	138	28530	0.54	0.51	0.56	32.19	<0.0001				
Military	6	1159	0.44	0.05	0.71	2.19	0.028				
Subgroup analysis								*0.34*	*1*	*0.56*	
Data used											
Cross-sectional	135	26950	0.54	0.51	0.57	30.35	<0.0001				
Prospective	12	2862	0.48	0.37	0.57	7.58	<0.0001				
Subgroup analysis								*1.39*	*1*	*0.24*	
Type of report											
Peer reviewed	135	28550	0.52	0.50	0.55	29.47	<0.0001				
Unpublished/dissertation	12	1262	0.65	0.56	0.72	11.04	<0.0001				
Subgroup analysis								*6.63*	*1*	*0.01*	
Validity of appraisal measure											
Validated	124	23640	0.54	0.51	0.57	28.42	<0.0001				
Un-validated	23	6172	0.51	0.43	0.58	11.04	<0.0001				
Subgroup analysis								*0.66*	*1*	*0.42*	
Appraisal measure name											
CPTCI	14	1636	0.65	0.55	0.72	10.20	<0.0001				
IPSI	3	211	0.70	0.63	0.77	12.22	<0.0001				
PBRS	3	259	0.59	0.50	0.67	10.72	<0.0001				
PTCI	90	19800	0.55	0.52	0.58	29.51	<0.0001				
SBQ	4	70	0.25	0.00	0.47	1.93	0.05				
TAQ	4	687	0.38	-0.01	0.67	1.93	0.05				
WAS	4	708	0.15	0.08	0.22	4.00	<0.0001				
Subgroup analysis								*159.40*	*6*	*<0.0001*	
Appraisal measure admin.											
Interview	3	328	0.26	0.15	0.36	4.73	<0.0001				
Self-report	144	29484	0.54	0.51	0.57	31.09	<0.0001				
Subgroup analysis								*32.48*	*1*	*<0.0001*	
PTSD measure admin.											
Interview	37	5056	0.51	0.44	0.57	12.70	<0.0001				
Self-report	110	24756	0.54	0.51	0.57	28.09	<0.0001				
Subgroup analysis								*1.02*	*1*	*0.31*	
PTSD measure type											
Dichotomous	25	3442	0.52	0.43	0.59	10.36	<0.0001				
Continuous	122	26370	0.54	0.51	0.57	29.00	<0.0001				
Subgroup analysis								*0.21*	*1*	*0.64*	
Number of traumatic events											
Single event	65	15899	0.54	0.50	0.58	21.06	<0.0001				
Multiple event	8	1435	0.52	0.33	0.67	4.92	<0.0001				
Subgroup analysis								*0.07*	*1*	*0.79*	
Intentionality of trauma											
Intentional trauma	46	9910	0.48	0.43	0.53	15.81	<0.0001				
Unintentional trauma	44	10094	0.51	0.46	0.56	16.31	<0.0001				
Subgroup analysis								*0.66*	*1*	*0.42*	
Traumatic event type											
Accident, illness or injury	36	5036	0.51	0.46	0.56	15.87	<0.0001				
Combat/war exposure	10	1429	0.42	0.30	0.53	6.34	<0.0001				
Interpersonal Violence/sexual abu	25	4581	0.48	0.42	0.54	12.79	<0.0001				
Natural/human disaster	10	7950	0.51	0.39	0.61	7.57	<0.0001				
Subgroup analysis								*2.27*	*3*	*0.52*	
Time trauma symptoms measured											
> 1 month after trauma	80	16575	0.54	0.50	0.58	22.42	<0.0001				
0-1 month after trauma	20	3594	0.56	0.48	0.64	11.34	<0.0001				
Subgroup analysis								*0.31*	*1*	*0.58*	
Sensitivity analyses											
Beta co-efficient papers removed	141	28538	0.54	0.52	0.57	32.07	<0.0001	*1210.58**	*140*	*<0.0001*	*88.44*
Low quality studies removed	109	25240	0.52	0.49	0.55	25.87	<0.0001	*1175.78**	*108*	*<0.0001*	*90.82*
Outliers removed	96	16706	0.54	0.52	0.55	47.53	<0.0001	*176.73**	*95*	*<0.0001*	*46.24*

1.21.2 Sensitivity analyses. Fifty one studies were considered to be outliers as the 95% CI of the effect size did not overlap with the 95% CI of the pooled effect size (Cuijpers, 2016). When these studies were removed from the analysis, 96 studies remained (see Appendix H for list of studies excluded). The overall pooled effect size did not differ. Heterogeneity reduced, such that $Q = 176.73$, $df = 95$, $p<0.0001$; $I^2 = 46.24$ which is classed as "medium" (Higgins & Thompson, 2002).

A sensitivity analysis was carried out to explore the impact of including studies judged to be low quality (or at high risk of bias, see Section 2.7 for details of quality assessment). When 38 low quality studies were removed, the overall effect size remained large, with high levels of heterogeneity ($I^2 = 90.82$).

Further sensitivity analysis was carried out to evaluate the impact of imputing beta values when r values were not available (see Section 2.6). The effect size remained large ($r = 0.54$, *95% CI = 0.52 - 0.57*) when these 6 studies were removed. Heterogeneity remained large.

1.21.3 Publication bias. A Funnel Plot was used to visually inspect the data to assess publication bias (see Figure 3.5). Whilst data seem symmetrical, the plot shows that small studies with both small and large effect sizes are missing, suggesting that only larger studies have been published. Egger's test of the intercept showed there was no significant asymmetry, suggesting little publication bias in the current study ($t = 0.39$, $df = 145$, *two-tailed* $p = 0.70$). Duval and Tweedie's trim and fill method estimated 16 studies were missing to the right of the mean. If these studies were used to adjust the effect size, the overall effect size using a random effects model increased very slightly ($r = 0.57$, *95% CI = 0.54 - 0.59]*, $Q = 1982.20$). The fail-safe N (number of additional studies with conflicting evidence that would be needed to overturn the conclusion) was estimated as 5697. This is higher than the recommended 5k +10 (k = 147 in this meta-analysis, so 745 studies). Taken together, these findings suggest that some smaller studies may be missing (as evidenced by the funnel plot), however, it is likely that these missing studies would not change the overall effect size very dramatically (as evidenced by Duval & Tweedie's trim and fill and the fail safe N). We can therefore be relatively confident in our conclusions. In fact, given the increase in effect size using Duval and Tweedie's method and the subgroup analysis showing unpublished studies had a larger effect size than published studies any publication bias that may be influencing results is artificially *reducing* the effect size seen in this study.

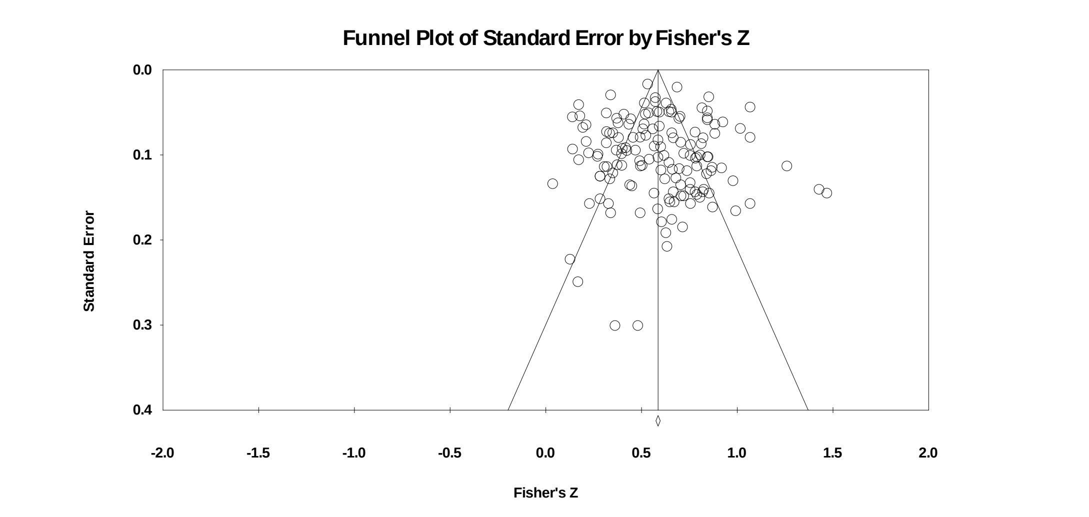

Figure 3.5. Funnel plot of standard error by Fisher's Z for overall effect size showing the symmetry of the data in relation to publication bias.

1.21.4 Summary of meta-analysis of appraisals and PTSD symptoms. In summary, results from the meta-analysis examining the relationship between maladaptive appraisals and PTSD symptoms showed a large effect size (*r = .53, 95% CI = 0.51 - 0.56*). The large amount of heterogeneity was partly explained by the age group (child studies having a larger effect size than adult studies), publication status (unpublished studies having a larger effect size than published studies), administration of the appraisal measure (self-report measures having a larger effect size than interview measures) and individual appraisal measure used. Results were robust to sensitivity analysis and there was no evidence of publication bias.

1.22 Meta-Analysis of Overall Effect Size Using PTCI/CPTCI only

Given the large amount of heterogeneity accounted for by measure of maladaptive appraisals, the meta-analysis was repeated with just the studies that used the PTCI and CPTCI. One hundred and four studies were included in this analysis. The effect sizes extracted from each study are shown in the stem-and-leaf plot in Figure 3.6. The mode of the distribution is 0.6, with a range of 0.23 to 0.90. The median effect size is 0.56. Data are slightly left skewed with a few outlying large observations.

0.2	3 8 8 8
0.3	0 1 1 2 3 3 3 4 4 6 6 6 6 7 8 8 9
0.4	0 0 1 2 3 3 4 6 6 6 7 7 8 8 8 8 9 9
0.5	1 2 2 3 3 3 4 4 4 4 6 6 6 6 7 7 7 7 8 9 9 9 9
0.6	0 0 1 1 1 1 2 2 2 4 4 4 4 6 6 6 6 6 7 7 7 8 8 8 8 9 9 9 9
0.7	0 0 0 1 1 6 7 9 9 9
0.8	5 9
0.9	0

Figure 3.6. Stem-and-leaf plot of Pearson's correlations for pooled effect size for PTCI/CPTCI studies only. This shows each correlation used in the meta-analysis with the first decimal place on the left hand side of the line and the second decimal place on the right hand side of the line.

Results showed a large effect size for the relationship between maladaptive appraisals measured using the PTCI or CPTCI and PTSD symptoms (*$r = 0.56$; 95% CI = 0.53 - 0.59*). Heterogeneity was high ($I^2 = 86.23$). It was not possible to create a meaningful Forest plot showing all the data, given the large number of studies included in the meta-analysis. The contribution of each study to the overall effect size is therefore shown in Appendix I.

1.22.1 Subgroup analyses. Subgroup analyses were planned as described in Section 2.8.3. Results are given in Table 8 and shown graphically in Figure 3.7 and 3.8. Figure 8 shows the methodological influences on effect size and Figure 9 shows the influence of different trauma characteristics on effect size.

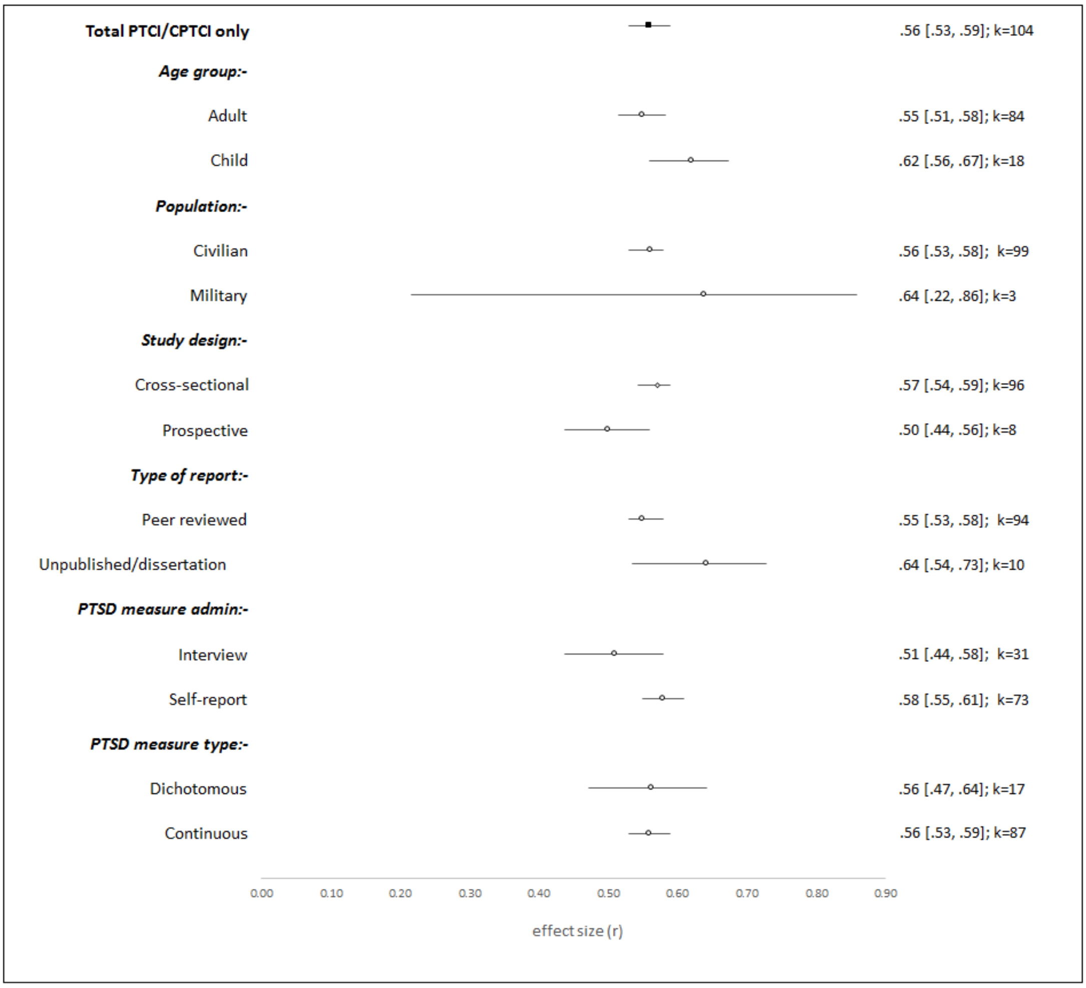

Figure 3.7. Forest plot showing subgroup analyses related to methodological and study characteristics for meta-analysis of PTCI/CPTCI studies only.

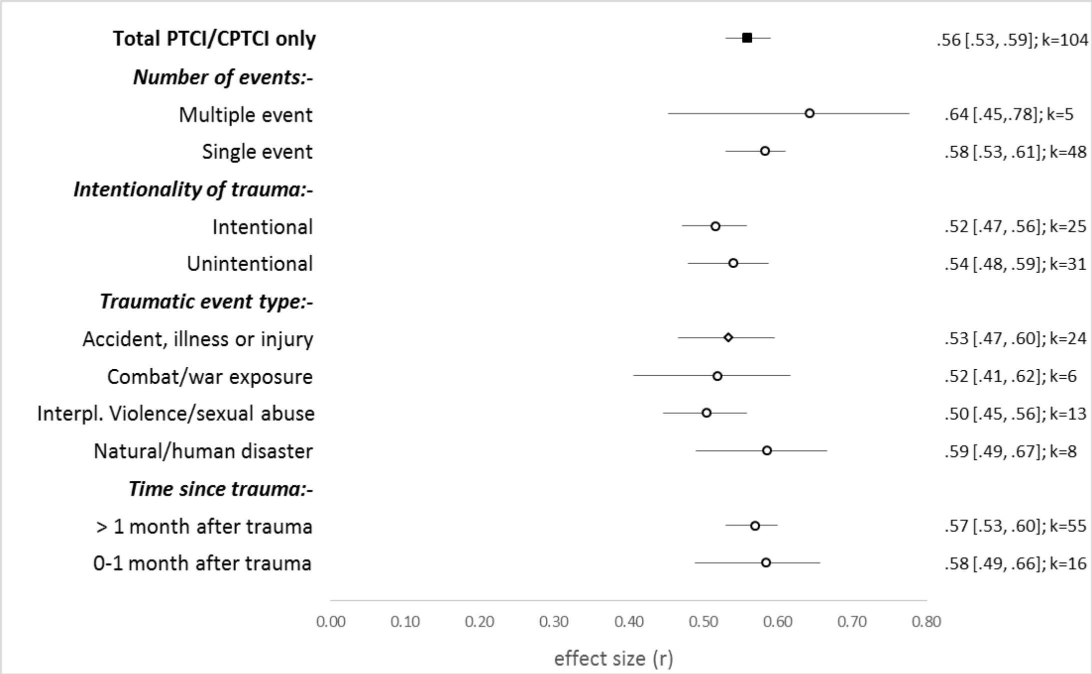

Figure 3.8. Forest plot showing subgroup analyses related to trauma characteristics for meta-analysis of PTCI/CPTCI studies only.

Results of subgroup analyses showed that the significant difference between child and adult studies remained, with child studies having a significantly larger effect size than adult studies (see Table 3.5). In contrast to the previous analyses involving all studies, there was no significant difference between published and unpublished studies. No other subgroup analyses were significant.

Table 3.5

Table of Subgroup Analysis and Sensitivity Analysis Results for PTCI and CPTCI Studies Only

	K	n	r	LL	UL	Z	p	Q	df	p	I^2
TOTAL CPTCI/PTCI ONLY	**104**	**21436**	**0.56**	**0.53**	**0.59**	**31.31**	**<0.0001**	**748.21***	**103**	**<0.0001**	**86.23**
Age Group											
Adult	84	13020	0.55	0.51	0.58	25.09	<0.0001				
Child	18	7725	0.62	0.56	0.67	16.14	<0.0001				
Subgroup analysis								*3.89*	*1*	*<0.049*	
Population											
Civilian	99	20633	0.56	0.53	0.58	32.84	<0.0001				
Military	3	680	0.64	0.22	0.86	2.77	0.028				
Subgroup analysis								*0.22*	*1*	*0.64*	
Data used											
Cross-sectional	96	20370	0.57	0.54	0.59	29.96	<0.0001				
Prospective	8	1066	0.50	0.44	0.56	7.91	<0.0001				
Subgroup analysis								*2.67*	*1*	*0.10*	
Type of report											
Peer reviewed	94	20432	0.55	0.53	0.58	30.23	<0.0001				
Unpublished/dissertation	10	1004	0.64	0.54	0.73	9.09	<0.0001				
Subgroup analysis								*2.57*	*1*	*0.12*	
PTSD measure administration											
Interview	31	4426	0.51	0.44	0.58	11.75	<0.0001				
Self-report	73	17010	0.58	0.55	0.61	30.54	<0.0001				
Subgroup analysis								*3.61*	*1*	*0.06*	
PTSD measure type											
Dichotomous	17	1368	0.56	0.47	0.64	10.05	<0.0001				
Continuous	87	20068	0.56	0.53	0.59	29.31	<0.0001				
Subgroup analysis								*0.00*	*1*	*0.99*	
Number of traumatic events											
Multiple event	5	835	0.64	0.45	0.78	5.44	<0.0001				
Single event	48	12320	0.58	0.53	0.61	21.53	<0.0001				
Subgroup analysis								*0.57*	*1*	*0.45*	
Intentionality of trauma											
Intentional trauma	25	6567	0.52	0.47	0.56	19.11	<0.0001				
Unintentional trauma	31	7154	0.54	0.48	0.59	14.50	<0.0001				
Subgroup analysis								*0.31*	*1*	*0.58*	
Traumatic event type											
Accident, illness or injury	24	2395	0.53	0.47	0.60	13.03	<0.0001				
Combat/war exposure	6	869	0.52	0.41	0.62	7.85	<0.0001				
Interpersonal Violence/sexual abuse	13	2364	0.50	0.45	0.56	14.55	<0.0001				
Natural/human disaster	8	7318	0.59	0.49	0.67	9.91	<0.0001				
Subgroup analysis								*2.28*	*3*	*0.52*	
Time trauma symptoms measured											
> 1 month after trauma	55	12601	0.57	0.53	0.60	24.03	<0.0001				
0-1 month after trauma	16	2256	0.58	0.49	0.66	10.57	<0.0001				
Subgroup analysis								*0.05*	*1*	*0.82*	
Sensitivity analyses											
Beta co-efficient papers removed	102	21161	0.56	0.54	0.59	31.16	<0.0001	732.60*	101	<0.0001	86.21
Low quality studies removed	77	17822	0.55	0.52	0.58	26.12	<0.0001	624.29*	76	<0.0001	87.83
Outliers removed	76	12157	0.56	0.53	0.58	40.94	<0.0001	158.12*	75	<0.0001	52.57

1.22.2 Sensitivity analysis. Twenty eight studies were considered to be outliers as their 95% CI did not overlap with the 95% CI of the pooled effect size. These studies are shown in Appendix J. When these outliers were removed from the analysis, the effect size remained large (see Table 8). Heterogeneity reduced to medium range levels (I^2 = *52.57*, see Table 8).

A sensitivity analysis was performed to evaluate the impact of studies judged to be low quality. When these 27 studies were removed, 77 studies remained. The effect size remained large (*r = 0.55; 95% CI = 0.52 - 0.58*), with high levels of heterogeneity (I^2 *= 87.83*, see Table 8).

Further sensitivity analysis was carried out to evaluate the impact of imputing beta values when r values were unavailable. When two such studies were removed, the effect size did not change (*r = 0.56, 95% CI = 0.54-0.59*), with heterogeneity remaining high (I^2 *= 86.21*, see Table 8).

1.22.3 Publication bias. A Funnel Plot was used to visually inspect the data to assess publication bias (see Figure 3.9) and showed minimal asymmetry. However, it shows that small studies with both small and large effect sizes are missing. Egger's test of the intercept confirmed there was no significant asymmetry, which suggests there is little publication bias (*t = 0.46, df = 102, two-tailed p = 0.65*). Duval and Tweedie's trim and fill method estimated 8 studies were missing to the right of the mean. If these studies were used to adjust the effect size, the overall effect size using a random effects model increased very slightly (*r = 0.58*, *95% CI = 0.55 - 0.61, Q = 867.48*). The fail-safe N (number of additional studies with conflicting evidence that would be needed to overturn the conclusion) was estimated as 3465. This is higher than the recommended 5k +10 (k = 104 in this meta-analysis, so 530 studies). Taken together, these tests suggest that small scale studies are not being published (as evidenced by the funnel plot), but that if they were to be published, the overall effect size is unlikely to differ significantly to that found here (as evidenced by Duval and Tweedie's adjustment and the fail safe N)..

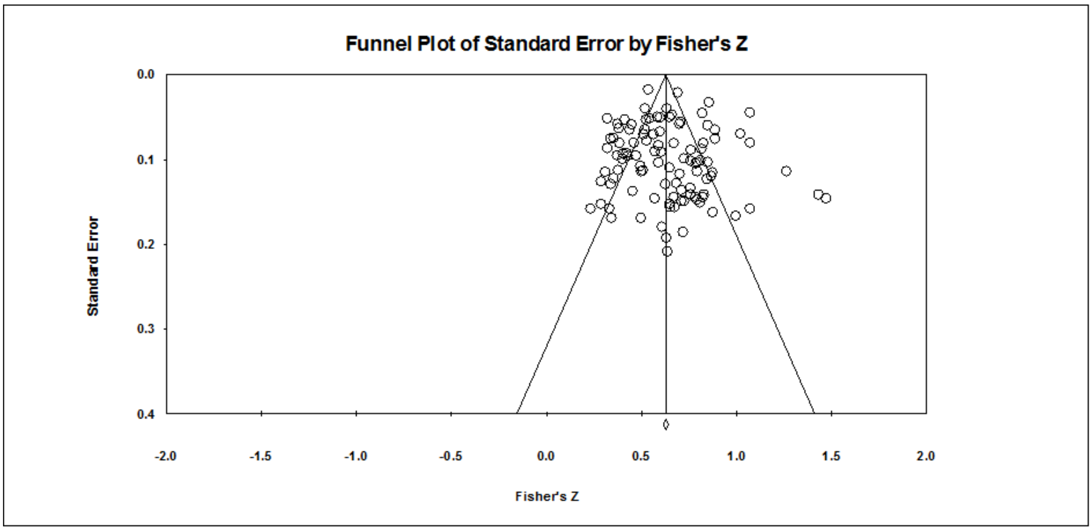

Figure 3.9. Funnel plot of effect sizes exploring publication bias for meta-analysis of appraisals measured using PTCI and CPTCI.

1.22.4 Summary of results for PTCI/CPTCI meta-analysis. In summary, results of a meta-analysis exploring the relationship between maladaptive appraisals measured using the PTCI or CPTCI showed a large effect size (*r = 0.56; 95% CI = 0.53 - 0.59*). The large amount of heterogeneity was partly accounted for by the population (child studies having a larger effect size than adult studies). Results were robust to sensitivity analysis and there was no evidence of publication bias.

1.23 Meta-Analysis of Subtypes of Maladaptive Appraisal

Separate meta-analyses were carried out for three subtypes of maladaptive appraisal in adults (self, world and self-blame) and two subtypes of maladaptive appraisal in children (fragile person in a scary world and permanent change). Results for each subtype of appraisal is presented followed by a comparison of the effect size between each type of appraisal.

1.23.1 Maladaptive appraisals about the self in adults. A separate meta-analysis was conducted on 66 adult studies which reported data on the PTCI self subscale in an adult population in order to explore the relationship between these specific types of appraisal about the self and PTSD symptoms. A stem-and-leaf plot is shown in Figure 3.10 to show the effect sizes extracted from the 66 studies. The mode of the distribution is 0.6, with the range of 0.29 to 0.89. The median effect size is 0.59. The distribution is relatively symmetrical suggesting a normal distribution. The contribution of each study to the analysis is given in Appendix K.

0.2	9
0.3	0 1 5 5
0.4	1 3 4 5 5 5 6 7 7
0.5	0 1 2 2 3 3 3 4 4 5 5 5 5 5 6 6 8 8 9
0.6	0 1 2 2 3 3 4 4 4 6 6 7 7 7 7 8 8 8 9 9
0.7	0 1 2 2 2 4 5 6 7 8 9
0.8	8 9

Figure 3.10. Stem-and-leaf plot of effect sizes for appraisals of the self in adults. This shows each correlation used in the meta-analysis with the first decimal place on the left hand side of the line and the second decimal place on the right hand side of the line.

A random effects meta-analysis showed a large effect size of *r = 0.61, 95% CI = 0.57 - 0.64*. Heterogeneity estimates showed significant heterogeneity, with the I^2 statistic showing that 84.90% of variance was down to true heterogeneity and not chance.

1.23.1.1 Subgroup analyses for appraisals about the self. Subgroup analyses were planned as described in Section 2.8.3. Results are given in Table 3.6 and shown graphically in the Forest plot in Figure 3.11. No subgroup analyses were significant.

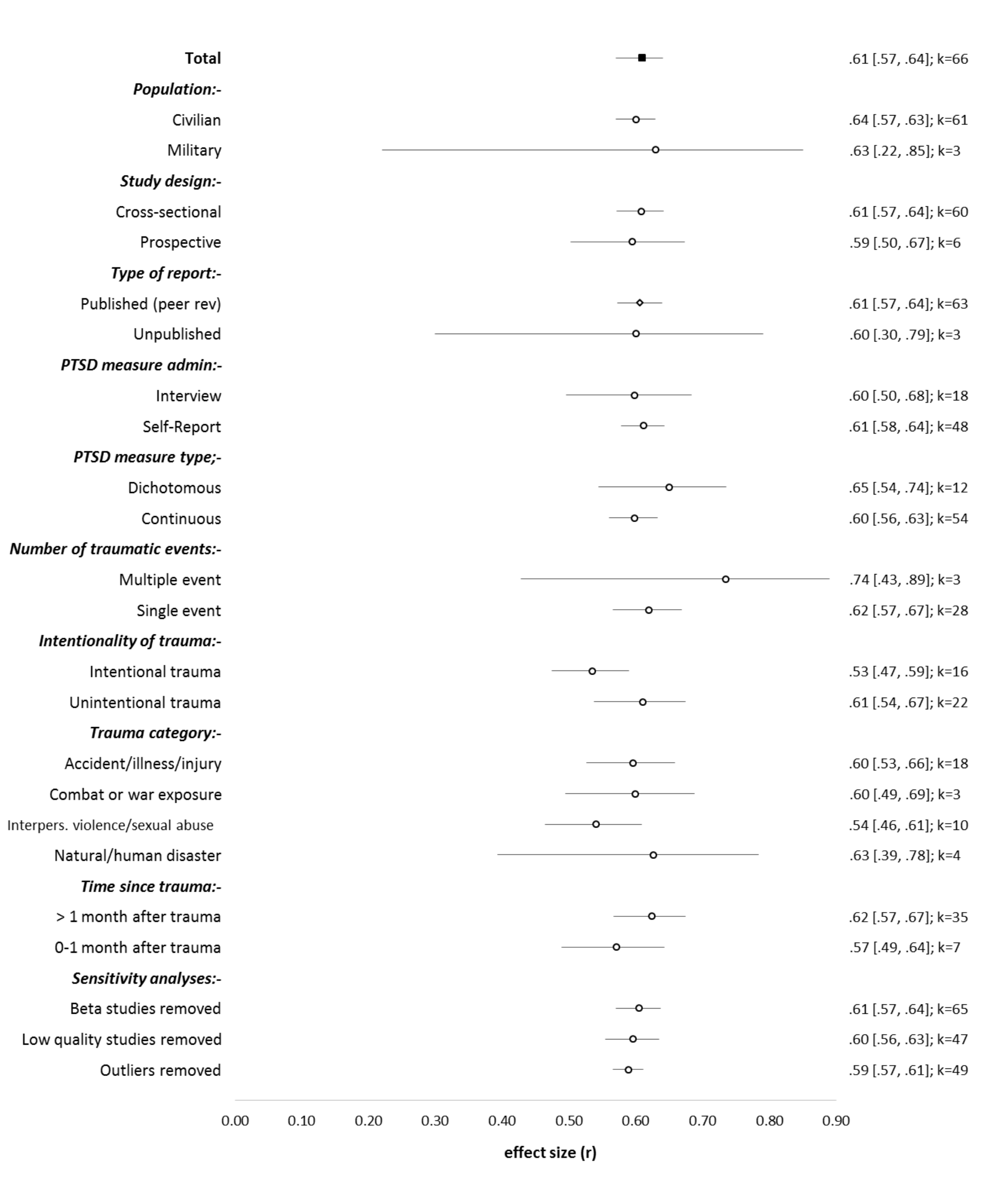

Figure 3.11. Forest plot for appraisals of the self, subgroup analyses and sensitivity analyses.

1.23.1.2 Sensitivity analysis for appraisals about the self. Seventeen studies were considered outliers and removed from the analysis given their 95% CI did not overlap with the 95% CI of the pooled effect size (see Appendix L for a list of outliers excluded from this analysis). Meta-analysis of the remaining 49 studies using a random effects model showed a similarly strong effect size. Heterogeneity reduced to a “low” level.

Sensitivity analysis exploring the impact of studies that were low quality showed that when 19 low quality studies were removed, the effect size remained large, with heterogeneity remaining high.

One study imputed beta in place of the r value. When this study was removed, the effect size did not change. Again, there was no change in heterogeneity which remained large.

Table 3.6

Results from Meta-Analysis of Maladaptive Appraisals of the Self in Adults Showing Subgroup Analyses and Sensitivity Analyses

	K	n	r	LL	UL	Z	p	Q	df	p	I^2
Total- SELF (adults)	66	10372	0.61	0.57	0.64	26.37	<0.0001	430.46*	65	<0.0001	84.90
Population											
Civilian	61	9569	0.60	0.57	0.63	29.38	<0.0001				
Military	3	680	0.63	0.22	0.85	2.77	0.006				
Subgroup analysis								*0.04*	*1*	*0.85*	
Type of data											
Cross Sectional	60	9633	0.61	0.57	0.64	24.62	<0.0001				
Prospective	6	739	0.59	0.50	0.67	10.24	<0.0001				
Subgroup analysis								*0.08*	*1*	*0.78*	
Type of report											
Published (peer rev)	63	10207	0.61	0.57	0.64	25.94	<0.0001				
Unpublished/dissertation	3	165	0.60	0.30	0.79	3.55	<0.0001				
Subgroup analysis								*0.00*	*1*	*0.97*	
PTSD measure administration											
Interview	18	2447	0.60	0.50	0.68	9.26	<0.0001				
Self-report	48	7925	0.61	0.58	0.64	27.54	<0.0001				
Subgroup analysis								*0.07*	*1*	*0.79*	
PTSD measure type											
Dichotomous	12	851	0.65	0.54	0.74	9.21	<0.0001				
Continuous	54	9521	0.60	0.56	0.63	24.36	<0.0001				
Subgroup analysis								*0.93*	*1*	*0.33*	
Number of traumatic events											
Multiple event	3	177	0.74	0.43	0.89	3.83	<0.0001				
Single event	28	4524	0.62	0.57	0.67	17.01	<0.0001				
Subgroup analysis								*0.74*	*1*	*0.39*	
Intentionality of trauma											
Intentional trauma	16	2064	0.53	0.47	0.59	14.45	<0.0001				
Unintentional trauma	22	3039	0.61	0.54	0.67	12.76	<0.0001				
Subgroup analysis								*2.64*	*1*	*0.10*	
Traumatic event type											
Accident/illness/injury	18	1743	0.60	0.53	0.66	13.12	<0.0001				
Combat or war exposure	3	174	0.60	0.49	0.69	9.03	<0.0001				
Interpersonal violence/sexual abuse	10	1310	0.54	0.46	0.61	11.59	<0.0001				
Natural/human disaster	4	1280	0.63	0.39	0.78	4.51	<0.0001				
Subgroup analysis								*1.78*	*3*	*0.62*	
Time trauma symptoms measured											
> 1 month after trauma	35	3885	0.62	0.57	0.67	16.35	<0.0001				
0-1 month after trauma	7	1265	0.57	0.49	0.64	11.14	<0.0001				
Subgroup analysis								*1.26*	*1*	*0.26*	
Sensitivity analyses											
Beta studies removed	65	10278	0.61	0.57	0.64	26.03	<0.0001	427.07*	64	<0.0001	85.01
Low quality studies removed	47	8082	0.60	0.56	0.63	21.89	<0.0001	327.29*	46	<0.0001	85.95
Outliers removed	49	6602	0.59	0.57	0.61	37.69	<0.0001	86.09*	48	<0.01	44.25

1.23.1.3 *Publication bias for appraisals about the self.* A Funnel Plot was used to visually inspect the data to assess publication bias (see Figure 3.12). The funnel plot is fairly symmetrical and funnel shaped, with perhaps a few studies missing that are small with small effect sizes.

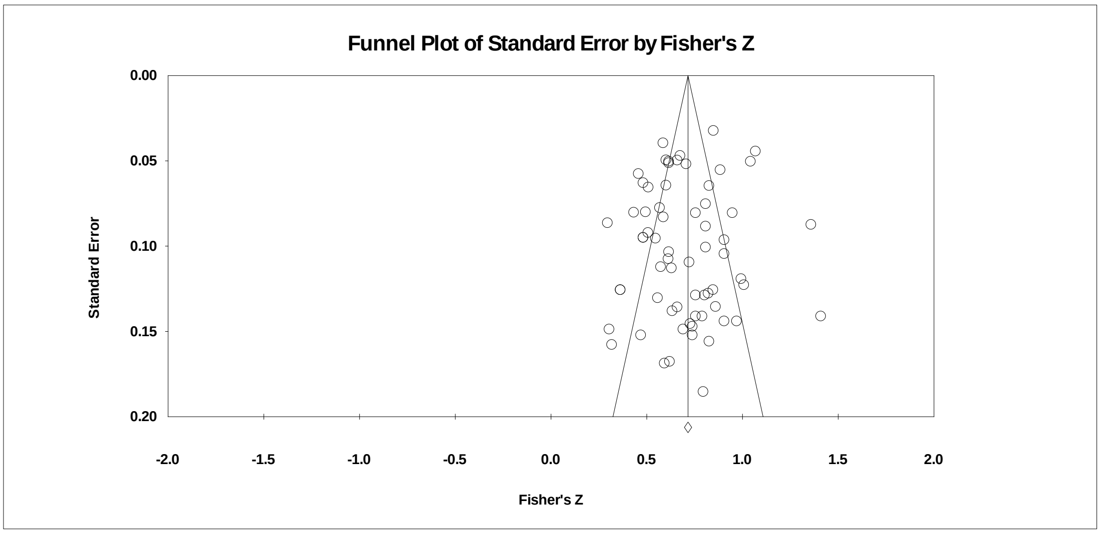

Figure 3.12. Funnel plot of effect sizes for appraisals about the self, exploring publication bias.

Egger's test of the intercept showed no significant asymmetry (t = 0.70, df = 64, two-tailed p = 0.49). Duval and Tweedie's trim and fill method estimated 11 studies were missing to the right of the mean. If these studies were used to adjust the effect size, the overall effect size using a random effects model increased slightly (*r = 0.64, 95% CI = 0.61 - 0.67, Q = 599.80*). The fail-safe N (number of additional studies with conflicting evidence that would be needed to overturn the conclusion) was estimated to be 3635. This is a very high number of studies, and far higher than the recommended 5k +10 (k = 66 in this meta-analysis so 340 studies). Taken together, these tests suggest that results are minimally affected by publication bias with perhaps only a few small scale studies with small effect sizes missing.

1.23.1.4 Summary of results for meta-analysis of adult appraisals about the self. Results from the meta-analysis examining the relationship between maladaptive appraisals about the self and PTSD symptoms in adults found a large effect size (*r = 0.61, 95% CI = 0.57 - 0.64*). The large amount of heterogeneity could not be explained by the selected subgroup analyses. Findings were robust to sensitivity analysis and there was no evidence of publication bias.

1.23.2 Maladaptive appraisals about the world in adults. Data from 62 studies were combined in a random effects meta-analysis to examine the strength of the relationship between maladaptive appraisals about the world (measured using the PTCI world subscale) and PTSD symptoms in adults. A stem-and-leaf plot in Figure 3.13 shows the effect sizes extracted. The mode of the distribution was 0.5, with a range of -0.05 to 0.73. The median effect size was 0.44. Data appear to be left skewed with a few outlying small observations.

Results of the meta-analysis showed a medium effect size of *r = 0.45, 95% CI = 0.41 - 0.49*. Heterogeneity estimates showed significant heterogeneity, the I^2 statistic showing that 78.39% of variance was down to true heterogeneity and not chance. Given the large number of studies, data pertaining to each individual study was not presented in a Forest plot. The contribution of each study to the overall effect size is given in Appendix M.

-0.0	5
0.0	0 9
0.1	3
0.2	4 6 7 7 8
0.3	1 1 2 2 4 5 5 7 7 8 8 8 8 9 9
0.4	0 0 2 2 3 3 4 4 6 7 8 9 9 9
0.5	1 2 2 3 3 3 4 4 4 4 4 6 8 8 9 9
0.6	4 5 6 8 9 9 9
0.7	3

Figure 3.13. Stem-and-Leaf plot showing effect sizes for appraisals about the world. This shows each correlation used in the meta-analysis with the first decimal place on the left hand side of the line and the second decimal place on the right hand side of the line.

1.23.2.1 Subgroup analyses for appraisals about the world. Subgroup analyses were carried out to examine the source of the heterogeneity in the effect size. Results are shown in the Forest plot in Figure 3.14 and in Table 10. Results showed a significant difference in the effect size reported by studies using self-report measures of PTSD symptoms versus interview measures of PTSD symptoms. Studies using self-report measures had a larger effect size (*r = 0.48, 95% CI = 0.44* - *0.52*) than studies using interview measures of PTSD (*r = 0.37, 95% CI = 0.29* - *0.43*; see Table 3.7). No other subgroup analyses were significant.

Table 3.7

Meta-Analysis Results, Subgroup Analyses and Sensitivity Analyses for World Appraisals in Adults

	K	n	r	LL	UL	Z	p	Q	df	p	I^2
Total- WORLD (adults)	62	9416	0.45	0.41	0.49	20.36	<0.0001	282.29*	61	<0.0001	78.39
Population											
Civilian	58	9116	0.46	0.43	0.50	21.71	<0.0001				
Military	2	177	0.51	0.01	0.80	1.99	<0.05				
Subgroup analysis								*0.04*	*1*	*0.84*	
Type of data											
Cross Sectional	57	8882	0.45	0.41	0.49	19.28	<0.0001				
Prospective	5	534	0.43	0.31	0.53	6.84	<0.0001				
Subgroup analysis								*0.25*	*1*	*0.62*	
Type of report											
Published (peer rev)	59	9251	0.45	0.41	0.49	20.15	<0.0001				
Unpublished/dissertation	3	165	0.51	0.13	0.76	2.53	0.01				
Subgroup analysis								*0.14*	*1*	*0.71*	
PTSD measure administration											
Interview	16	1739	0.37	0.29	0.43	9.34	<0.0001				
Self-report	46	7677	0.48	0.44	0.52	19.75	<0.0001				
Subgroup analysis								*8.00*	*1*	*<0.01*	
PTSD measure type											
Dichotomous	11	646	0.43	0.30	0.55	5.77	<0.0001				
Continuous	51	8770	0.46	0.42	0.49	19.59	<0.0001				
Subgroup analysis								*0.14*	*1*	*0.71*	
Number of traumatic events											
Multiple event	3	177	0.34	-0.07	0.65	1.62	0.1				
Single event	24	3568	0.43	0.38	0.48	13.69	<0.0001				
Subgroup analysis								*0.25*	*1*	*0.62*	
Intentionality of trauma											
Intentional trauma	15	1859	0.45	0.39	0.51	12.78	<0.0001				
Unintentional trauma	19	2288	0.41	0.34	0.47	10.54	<0.0001				
Subgroup analysis								*1.01*	*1*	*0.31*	
Traumatic event type											
Accident/illness/injury	16	1495	0.42	0.35	0.49	10.11	<0.0001				
Combat or war exposure	3	174	0.50	0.19	0.73	2.96	<0.005				
Interpersonal violence/sexual abuse	10	1310	0.44	0.37	0.51	10.86	<0.0001				
Natural/human disaster	3	777	0.28	0.10	0.44	3.02	<0.005				
Subgroup analysis								*3.70*	*3*	*0.30*	
Time trauma symptoms measured											
> 1 month after trauma	32	3076	0.44	0.38	0.49	13.49	<0.0001				
0-1 month after trauma	6	1118	0.41	0.31	0.50	7.33	<0.0001				
Subgroup analysis								*0.30*	*1*	*0.58*	
Sensitivity analyses											
Beta studies removed	61	9322	0.45	0.41	0.49	20.04	<0.0001	281.39*	60	<0.0001	*78.68*
Low quality studies removed	44	7227	0.46	0.41	0.50	17.68	<0.0001	207.43*	43	<0.0001	79.27
Outliers removed	51	7345	0.44	0.41	0.47	25.80	<0.0001	101.03*	50	<0.0001	50.51

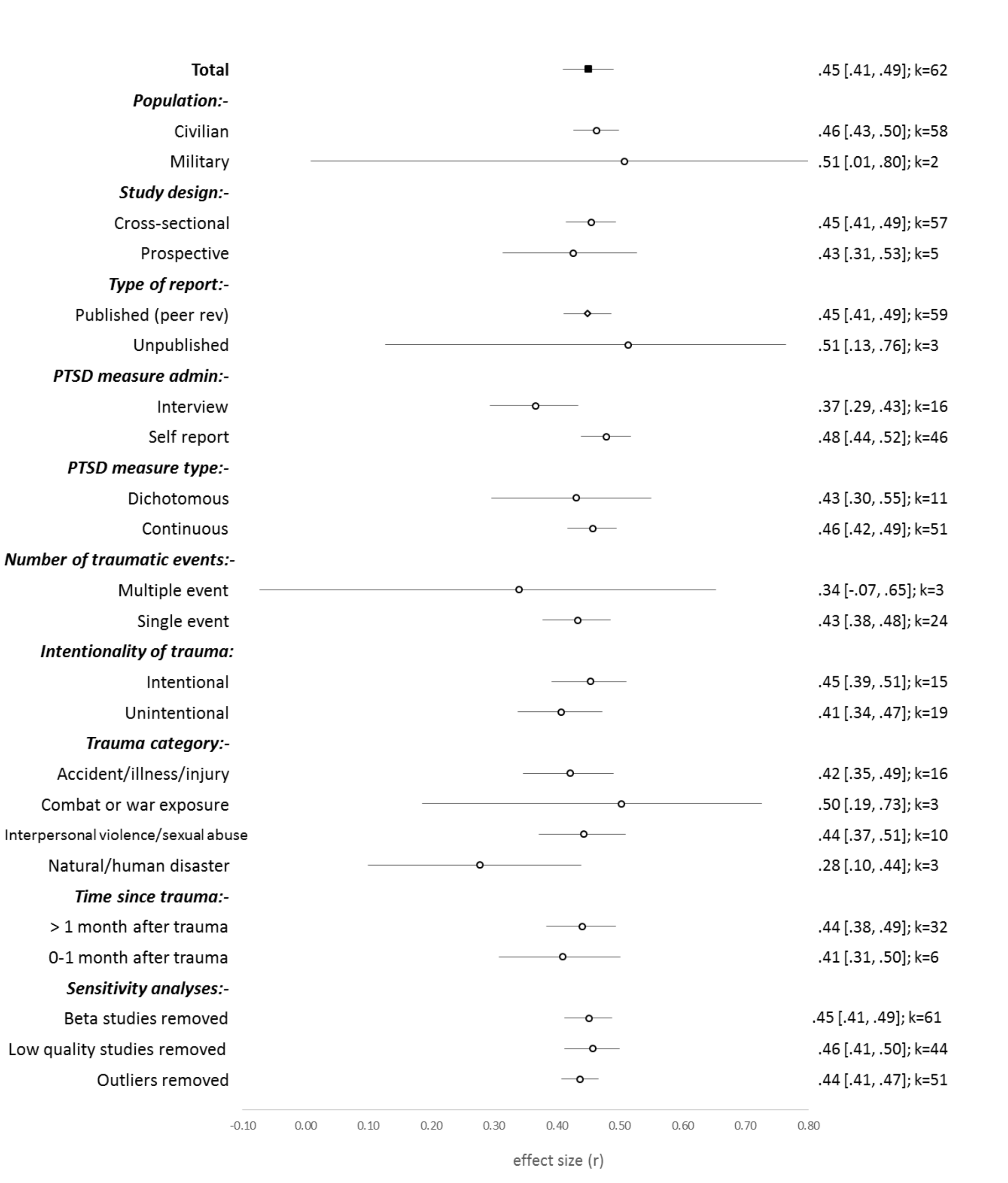

Figure 3.14. Forest plot showing effect size for adult appraisals about the world, subgroup analyses and sensitivity analyses.

1.23.2.2 Sensitivity analyses for appraisals about the world. A sensitivity analysis was performed to assess the impact of including studies judged as low quality (at high risk of bias). Eighteen low quality studies were removed and the meta-analysis was repeated with the remaining 44 studies. Results showed the effect size remained the same. Heterogeneity remained high.

Eleven studies whose 95% confidence intervals did not overlap with the 95% confidence interval of the pooled effect size were removed from the analysis (see Appendix N for a table of the outliers excluded from the analysis). The random effects meta-analysis was repeated with the remaining 51 studies. The effect size remained the same and heterogeneity reduced to "medium" levels.

One study imputed beta in place of the r value. When this study was removed in a further sensitivity analysis, the effect size remained unchanged. Heterogeneity remained high.

1.23.2.3 Publication bias for appraisals about the world. A Funnel plot was used to visually inspect the data to assess publication bias (see Figure 3.15). The plot is relatively symmetrical and funnel shaped, with perhaps some small scale studies with small and large effect sizes missing. Egger's test of the intercept showed no significant asymmetry ($t = 1.16, df = 60$, *two-tailed* $p = 0.25$). Duval and Tweedie's trim and fill method found no missing studies either side of the mean. The fail-safe N (number of additional studies with conflicting evidence that would be needed to overturn the conclusion) was estimated as 9942. This is a very high number of studies, and far higher than the recommended 5k +10 (k = 62 in this meta-analysis). Taken together, these tests suggest the results found are minimally affected by publication bias.

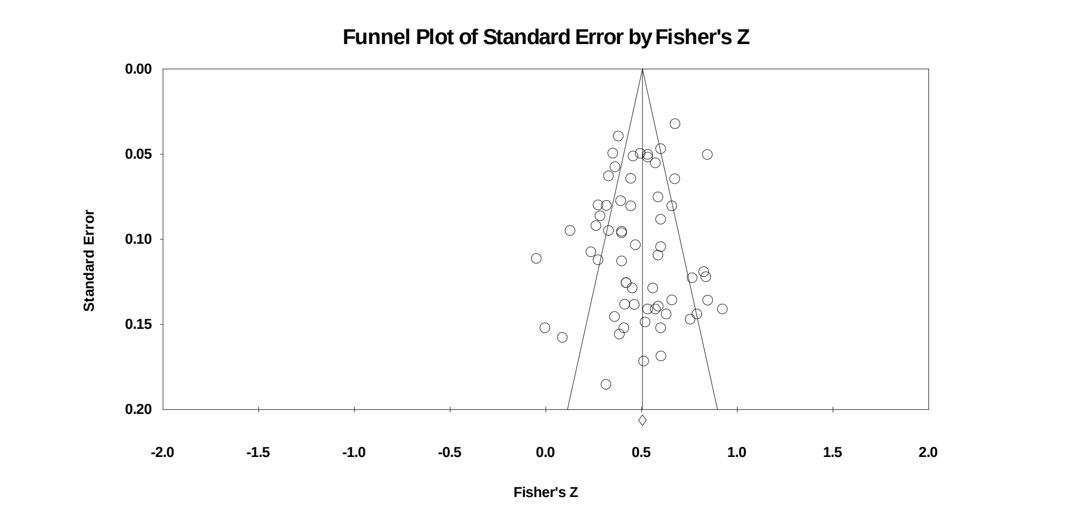

Figure 3.15. Funnel plot showing distribution of effect size by standard error for appraisals about the world in adults.

1.23.2.4 Summary of results of meta-analysis of maladaptive appraisals about the world. Results from the meta-analysis examining the strength of the relationship between maladaptive appraisals about the world and PTSD symptoms in adults showed a large effect size (*r = 0.45, 95% CI = 0.41 - 0.49*). Subgroup analysis found the measure of PTSD accounted for a significant amount of heterogeneity (self-report measures had larger effect sizes than interview measures). Findings were robust to the sensitivity analyses and there was no evidence of publication bias.

1.23.3 Self-blame appraisals in adults. Data from 59 studies were combined in a random effects meta-analysis to examine the strength of the relationship between maladaptive appraisals about self-blame (measured using the PTCI self-blame subscale) and PTSD symptoms in adults. Due to the large number of studies, a Forest plot was not presented. The contribution of each study to the overall effect size is given in Appendix O and a stem-and-leaf plot in Figure 3.16

shows the effect sizes extracted. Numbers to the left of the line show the effect size to the first decimal point. Numbers to the right of the line show the second decimal place for each of the 59 effect sizes extracted. The mode of the distribution is 0.2, with a range of -0.1 to 0.64. The median effect size is 0.265. The data seems relatively symmetrical suggesting data are normally distributed.

Results showed a small-medium pooled effect size (*r = 0.28, 95% CI = 0.24 - 0.33*). Heterogeneity estimates showed significant heterogeneity, the I^2 statistic showing that 79.31% of variance was down to true heterogeneity.

-0.1	0 0
-0.0	6 5
0.0	2 3 5
0.1	1 2 2 2 3 3 5 8 9
0.2	0 0 1 2 3 4 4 4 5 5 5 5 6 6 7 8 8
0.3	0 0 1 2 3 3 5 5 6 7 7 8 9
0.4	0 0 0 4 5 7 7 8
0.5	7
0.6	2 4 4 4

Figure 3.16. Stem-and-leaf plot showing effect sizes extracted for self-blame appraisals. This shows each correlation used in the meta-analysis with the first decimal place on the left hand side of the line and the second decimal place on the right hand side of the line.

1.23.3.1 Subgroup analyses for self-blame appraisals. Subgroup analyses were carried out to examine the source of the heterogeneity in the effect size. Results are shown in the Forest plot in Figure 3.17 and in Table 3.8. A significant difference was found between interview and self-report measures of PTSD symptoms. Results from studies using interview measures of PTSD had a smaller effect size than studies using self-report measures. The time in which trauma symptoms were assessed also explained a significant amount of heterogeneity in the overall effect size. Studies who measured trauma 0 - 1 month following the traumatic event reported lower effect sizes than studies measuring trauma >1 month after the traumatic event. All other subgroup analyses were non-significant.

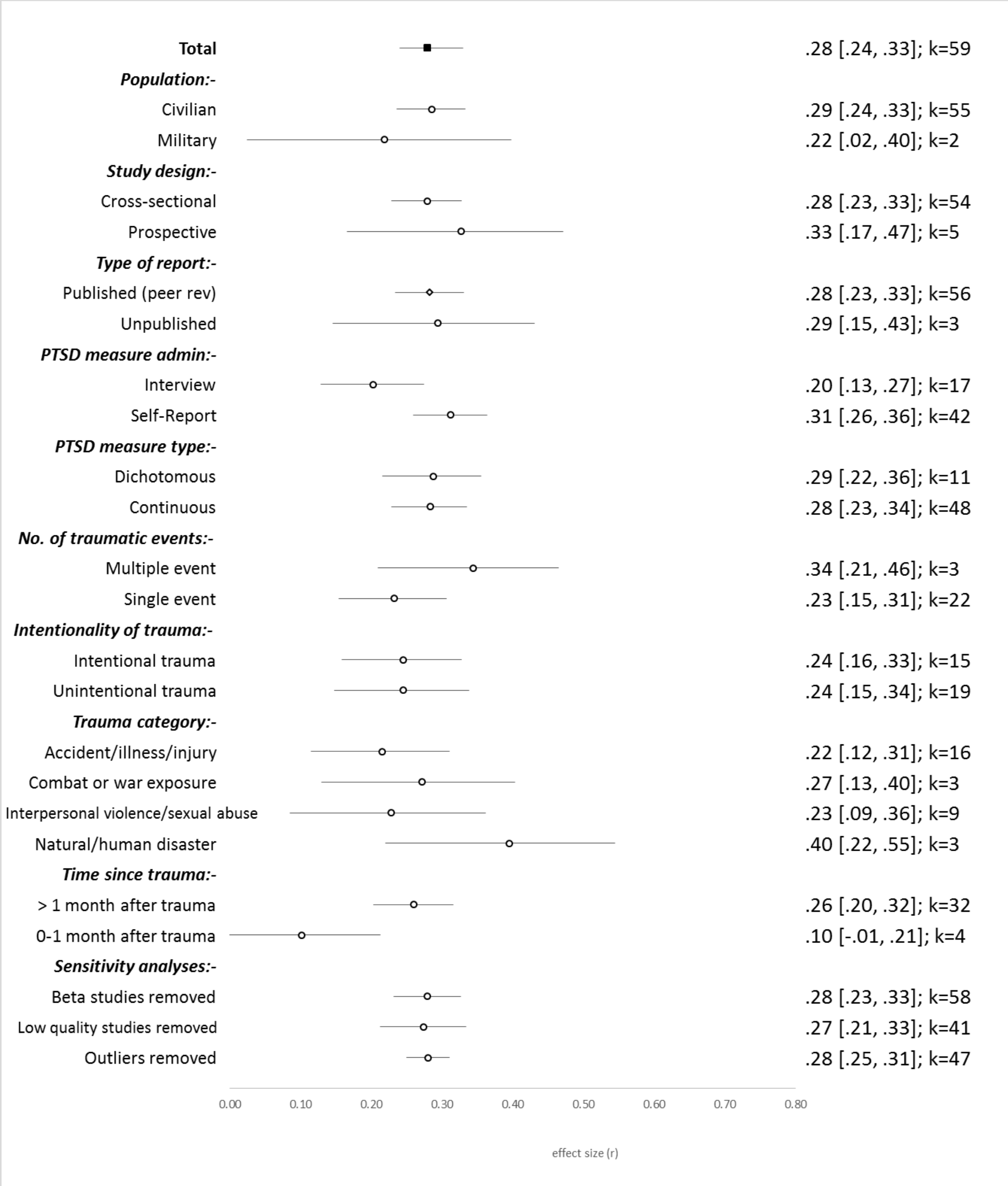

Figure 3.17. Forest plot showing pooled effect size, subgroup and sensitivity analysis for self-blame appraisals.

Table 3.8

Results of meta-analysis of the relationship between self-blame and PTSD symptoms showing subgroup and sensitivity analyses.

	K	n	r	LL	UL	Z	p	Q	df	p	I^2
Total- SELF BLAME (adults)	59	8366	0.28	0.24	0.33	11.24	<0.0001	282.29*	61	<0.0001	79.31
Population											
Civilian	55	8066	0.29	0.24	0.33	10.83	<0.0001				
Military	2	300	0.22	0.02	0.40	2.20	<0.05				
Subgroup analysis								*0.46*	*1*	*0.50*	
Type of data											
Cross Sectional	54	7832	0.28	0.23	0.33	10.44	<0.0001				
Prospective	5	534	0.33	0.17	0.47	3.87	<0.0001				
Subgroup analysis								*0.33*	*1*	*0.57*	
Type of report											
Published (peer rev)	56	8201	0.28	0.23	0.33	10.87	<0.0001				
Unpublished/dissertation	3	165	0.29	0.15	0.43	3.79	<0.0001				
Subgroup analysis								*0.02*	*1*	*0.89*	
PTSD measure administration											
Interview	17	1818	0.20	0.13	0.27	5.28	<0.0001				
Self-report	42	6548	0.31	0.26	0.36	10.92	<0.0001				
Subgroup analysis								*5.86*	*1*	*0.02*	
PTSD measure type											
Dichotomous	11	646	0.29	0.22	0.36	7.62	<0.0001				
Continuous	48	7720	0.28	0.23	0.34	9.88	<0.0001				
Subgroup analysis								*0.01*	*1*	*0.92*	
Number of traumatic events											
Multiple event	3	177	0.34	0.21	0.46	4.83	<0.0001				
Single event	22	2962	0.23	0.15	0.31	5.76	<0.0001				
Subgroup analysis								*2.08*	*1*	*0.15*	
Intentionality of trauma											
Intentional trauma	15	1488	0.24	0.16	0.33	5.44	<0.0001				
Unintentional trauma	19	2288	0.24	0.15	0.34	4.82	<0.0001				
Subgroup analysis								*0.00*	*1*	*1.00*	
Traumatic event type											
Accident/illness/injury	16	1495	0.22	0.12	0.31	4.16	<0.0001				
Combat or war exposure	3	174	0.27	0.13	0.40	3.69	<0.0001				
Interpersonal violence/sexual abuse	9	860	0.23	0.09	0.36	3.10	<0.05				
Natural/human disaster	3	777	0.40	0.22	0.55	4.23	<0.0001				
Subgroup analysis								*3.38*	*3*	*0.34*	
Time trauma symptoms measured											
> 1 month after trauma	32	3076	0.26	0.20	0.32	8.65	<0.0001				
0-1 month after trauma	4	512	0.10	-0.01	0.21	1.74	0.08				
Subgroup analysis								*6.24*	*1*	*0.01*	
Sensitivity analyses											
Beta studies removed	58	8272	0.28	0.23	0.33	11.00	<0.0001	276.02*	57	<0.0001	*79.35*
Low quality studies removed	41	6177	0.27	0.21	0.33	8.38	<0.0001	242.21*	40	<0.0001	83.49
Outliers removed	47	6295	0.28	0.25	0.31	17.25	<0.0001	65.61*	46	<0.05	29.88

1.23.3.2 Sensitivity analysis for self-blame appraisals. A sensitivity analysis was performed to assess the impact of including studies judged as low quality (at high risk of bias). Eighteen low quality studies were removed and the meta-analysis was repeated with the remaining 41 studies. Results showed the effect size to remain the same. Heterogeneity remained high.

Twelve studies whose 95% confidence intervals did not overlap with the 95% confidence interval of the pooled effect size were deemed to be outliers and excluded in a sensitivity analysis (see Appendix P for a list of the excluded studies). The random effects meta-analysis was repeated with the remaining 47 studies. The effect size remained similar and heterogeneity reduced to low levels.

One study imputed beta in place of the r value. When this study was excluded, the effect size was unchanged.

1.23.3.3 Publication bias for self-blame appraisals. A Funnel Plot was used to visually inspect the data to assess publication bias (see Figure 3.18). The plot is relatively symmetrical, but perhaps a few small scale studies with small or large effect sizes are missing. Egger's test of the intercept showed there was no significant asymmetry, suggesting publication bias was not an issue (*$t = 0.93$, $df = 57$, two-tailed $p = 0.36$*). Duval and Tweedie's trim and fill method found 12 missing studies to the right of the mean. When these studies were used to adjust the effect size, the overall effect size using a random effects model increased (*$r = 0.34$, 95% CI = 0.30 - 0.39, $Q = 456.00$*). The fail-safe N (number of additional studies with conflicting evidence that would be needed to overturn the conclusion) was estimated as 9045. This is far higher than the recommended 5k +10 (k = 59 in this meta-analysis). Taken together, these tests suggests publication bias may be somewhat artificially decreasing effect size, but not to a significant level.

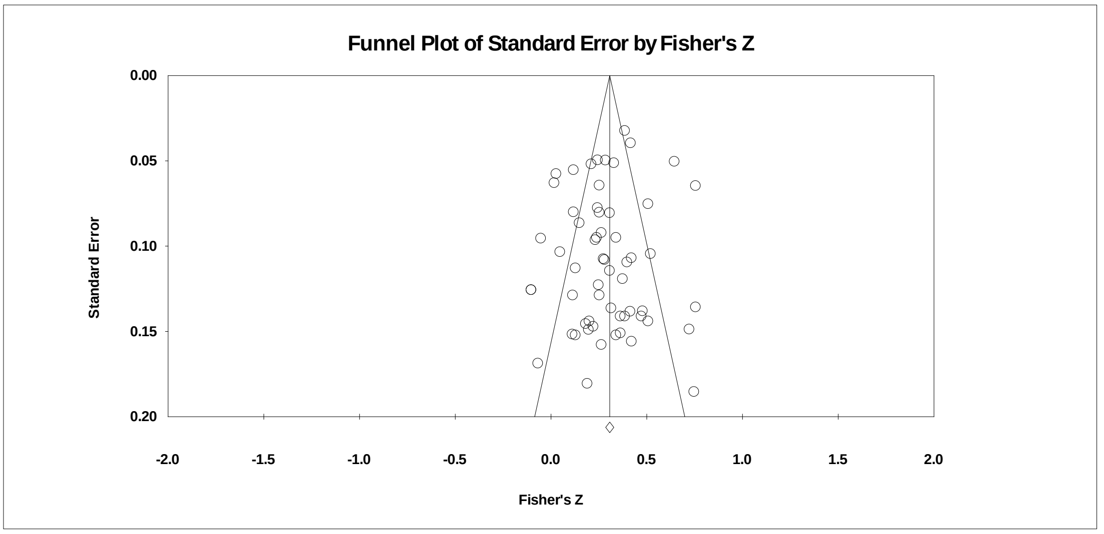

Figure 3.18. Funnel plot to explore publication bias for self-blame appraisal data.

1.23.3.4 Summary of results for self-blame appraisals meta-analysis. Results from the meta-analysis examining the strength of the relationship between self-blame appraisals and PTSD symptoms in adults showed a small to medium effect size (*r = 0.28, 95% CI = 0.24 - 0.33*). Subgroup analyses found a significant amount of heterogeneity was accounted for by the PTSD measure used (self-report measures having a larger effect size than interview measures) and the time since trauma (a smaller effect size was found for the acute stress phase 0 - 1 month following trauma than the chronic PTSD phase >1 month following trauma. Findings were robust to the sensitivity analyses and there was no significant publication bias.

1.23.1 Maladaptive appraisals about being a fragile person in a scary world in children. Data from 12 child/adolescent studies were combined in a random effects meta-analysis to examine the strength of the relationship between maladaptive appraisals about being a fragile person in a scary world (measured using the CPTCI fragile person/scary world subscale) and PTSD symptoms.

Results showed a large overall effect size of $r = 0.53$, *95% CI = 0.43 - 0.62*, $z = 8.63$, $p<0.0001$ (see Forest plot in Figure 3.19). Heterogeneity estimates showed significant heterogeneity ($Q = 69.84$, $df = 11$, $p<0.0001$), the I^2 statistic showing that 84.25% of variance was down to true heterogeneity, not chance.

First Author, Year	Appraisal Measure	Statistics for each study				
		Correlation	Lower limit	Upper limit	Z-Value	p-Value
De Haan, 2015	cPTCI Fragile person/Scary world	0.620	0.486	0.725	7.322	0.000
Diehle, 2015	cPTCI Fragile person/Scary world	0.630	0.476	0.746	6.506	0.000
D'Urso, unpub, S1	cPTCI Fragile person/Scary world	0.448	0.129	0.683	2.685	0.007
D'Urso, unpub, S2	cPTCI Fragile person/Scary world	0.469	0.100	0.725	2.440	0.015
Ferner, 2013	cPTCI Fragile person/Scary world	0.610	0.379	0.769	4.484	0.000
Hitchcock, 2015	cPTCI Fragile person/Scary world	0.271	0.066	0.454	2.578	0.010
Liu, 2015	cPTCI Fragile person/Scary world	0.590	0.509	0.661	11.380	0.000
Meiser-Stedman, 2009b S2	cPTCI Fragile person/Scary world	0.556	0.438	0.654	7.857	0.000
Meiser-Stedman, 2009b S3	cPTCI Fragile person/Scary world	0.307	0.172	0.430	4.342	0.000
Meiser-Stedman, unpubl	cPTCI Fragile person/Scary world	0.730	0.659	0.788	13.297	0.000
Palosaari 2013, 2015; Punamaki 2015	cPTCI Fragile person/Scary world	0.331	0.213	0.439	5.295	0.000
Salmon, 2007	cPTCI Fragile person/Scary world	0.650	0.497	0.764	6.624	0.000
		0.533	0.430	0.623	8.634	0.000

Correlation and 95% CI

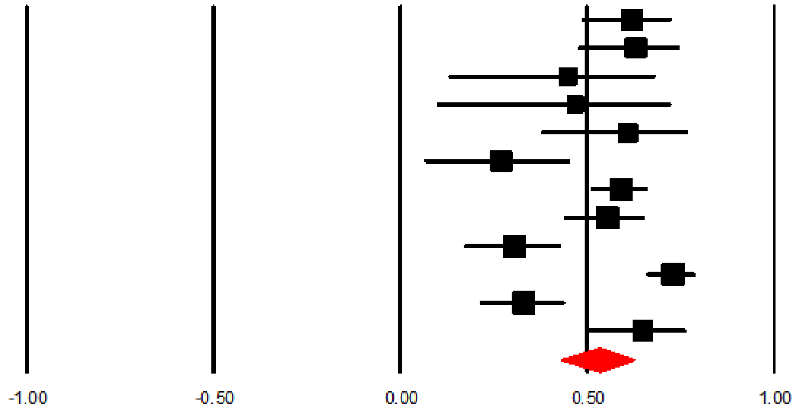

Figure 3.19. Forest plot to show meta-analysis results of CPTCI subscale "fragile person in a scary world" in children.

1.23.1.1 Subgroup analysis for fragile person/scary world. Subgroup analyses were carried out to examine the source of the heterogeneity in the effect size. Results are shown in the Forest plot in Figure 3.20 and in Table 3.9. Subgroup analyses were more limited due to the smaller number of studies in this meta-analysis. All studies were carried out using a civilian population, as might be expected in a child/adolescent sample, so this was not explored as a subgroup analysis. Only one study looked at intentional trauma, so it was not possible to explore differences between intentional and unintentional trauma. Only one study had extracted prospective data, so it was not possible to look at the effect of study design on outcome. No studies looked at multiple trauma, so it was not possible to examine the differences between single event and multiple event trauma. Most studies looked at children who had been exposed to a mixture of different types of traumatic events, so it was not possible to explore the influence of the subtype of traumatic event on effect size due to the small number of studies in each category. Results of all subgroup analyses were non-significant.

Table 3.9

Results of Meta-Analysis of Relationship between Appraisals of Being a Fragile Person in a Scary World and PTSD Symptoms in Children and Adolescents

	K	n	r	LL	UL	Z	p	Q	df	p	I2
Total- FRAGILE/SCARY child	12	1498	0.53	0.43	0.62	8.63	<0.0001	69.85*	11	<0.0001	84.25
Type of report											
Published (peer rev)	8	1187	0.50	0.39	0.60	7.64	<0.0001				
Unpublished/dissertation	4	311	0.60	0.43	0.74	5.66	<0.0001				
Subgroup analysis								*1.04*	*1*	*0.31*	
PTSD measure administration											
Self-report	10	1329	0.55	0.43	0.64	8.15	<0.0001				
Interview	2	169	0.47	0.05	0.75	2.19	0.03				
Subgroup analysis								*0.18*	*1*	*0.67*	
PTSD measure type											
Continuous	10	1186	0.55	0.44	0.65	8.06	<0.0001				
Dichotomous	2	312	0.44	0.16	0.65	3.04	<0.01				
Subgroup analysis								*0.79*	*1*	*0.38*	
Time trauma symptoms measured											
0-1 month after trauma	3	463	0.59	0.25	0.79	3.20	<0.01				
> 1 month after trauma	8	992	0.50	0.40	0.60	8.01	<0.0001				
Subgroup analysis								*0.29*	*1*	*0.59*	
Sensitivity analyses											
Low quality studies removed	9	1081	0.55	0.42	0.65	7.12	<0.0001	52.68*	8	<0.0001	84.81
Outliers removed	11	1290	0.51	0.41	0.59	9.04	<0.0001	42.81	10	<0.0001	76.64

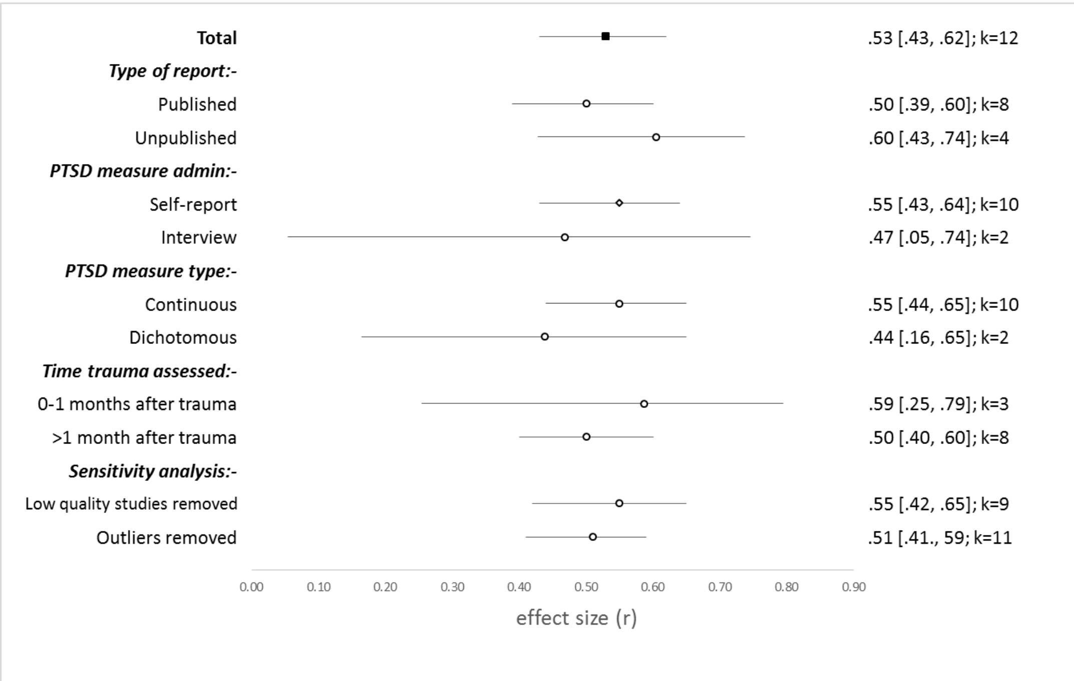

Figure 3.20. Forest plot showing overall effect size, subgroup and sensitivity analyses for fragile person/scary world appraisals in children and adolescents.

1.23.1.2 Sensitivity analysis for fragile person/scary world. A sensitivity analysis was performed to assess the impact of including studies judged as low quality (at high risk of bias). Three low quality studies were removed and the meta-analysis was repeated with the remaining nine studies. No significant increase was observed. Heterogeneity remained high.

One study whose 95% confidence intervals did not overlap with the 95% confidence interval of the pooled effect size was deemed to be an outlier and excluded in a sensitivity analysis (Meiser-Stedman et al., unpublished). The random effects meta-analysis was repeated with the remaining 11 studies. The effect size reduced by a tiny amount and heterogeneity remained high ($I^2 = 76.64$). No studies imputed beta in place of the r value so this sensitivity analysis was not performed.

1.23.1.3 Publication bias for fragile person/scary world. A Funnel Plot was used to visually inspect the data to assess publication bias (see Figure 3.21). The plot shows that small scale studies with small or large effect sizes are missing. Egger's test of the intercept showed there was no significant asymmetry, suggesting publication bias was not an issue (*$t = 0.07$, $df = 10$, two-tailed $p = 0.94$*). Duval and Tweedie's trim and fill method found no missing studies either side of the mean. The fail-safe N (number of additional studies with conflicting evidence that would be needed to overturn the conclusion) was estimated as 1445. This is far higher than the recommended 5k +10 (k = 12 in this meta-analysis, so 70 studies in this case). Taken together, these tests suggests small scale studies are not getting published, but that were these to be included, the effect size found is unlikely to change significantly from that found in the current study.

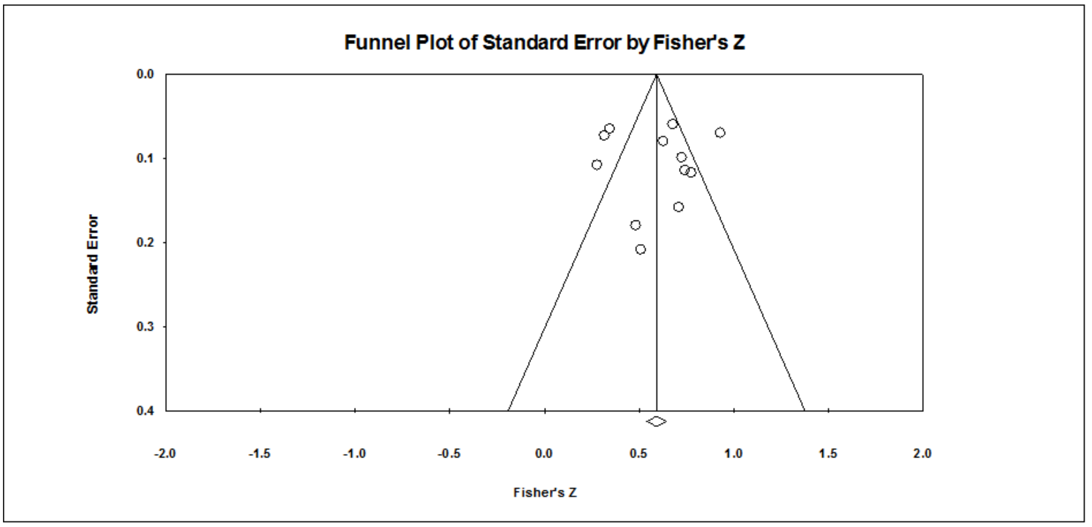

Figure 3.21. Funnel plot to explore publication bias for child/adolescent appraisals of being a fragile person in a scary world.

1.23.1.4 Summary of meta-analysis of fragile person/scary world appraisals. Results from the meta-analysis exploring the strength of the relationship between child and adolescent appraisals of being a fragile person in a scary world and PTSD symptoms found a large effect size ($r = 0.53$, *95% CI* $= 0.43 - 0.62$). Subgroup analyses were limited and non-significant. Results were robust to sensitivity analysis and there was no evidence of publication bias.

1.23.2 Meta-Analysis of Child/Adolescent Appraisals of Permanent and Disturbing Change. Data from 12 child studies were combined in a random effects meta-analysis to examine the strength of the relationship between maladaptive appraisals about being permanently changed following trauma (measured using the CPTCI permanent change subscale) and PTSD symptoms.

Results showed a large effect size of $r = 0.59$, *95% CI* $= 0.48 - 0.67$, $z = 9.06$, $p<0.0001$. Heterogeneity estimates showed significant heterogeneity ($Q = 82.46$, $df = 11$, $p<0.0001$), the I^2 statistic showing that 86.66% of variance was down to true heterogeneity, not chance. The Forest Plot in Figure 3.22 shows these results in more detail.

First Author, Year	Appraisal Measure	Correlation	Lower limit	Upper limit	Z-Value	p-Value
De Haan, 2015	cPTCI Permanent change	0.550	0.401	0.671	6.245	0.000
Diehle, 2015	cPTCI Permanent change	0.640	0.489	0.754	6.653	0.000
D'Urso, unpub, S1	cPTCI Permanent change	0.534	0.239	0.739	3.317	0.001
D'Urso, unpub, S2	cPTCI Permanent change	0.616	0.300	0.810	3.446	0.001
Ferner, 2013	cPTCI Permanent change	0.820	0.689	0.899	7.316	0.000
Hitchcock, 2015	cPTCI Permanent change	0.334	0.135	0.507	3.221	0.001
Liu, 2015	cPTCI Permanent change	0.620	0.543	0.687	12.175	0.000
Meiser-Stedman, 2009b S2	cPTCI Permanent change	0.700	0.616	0.768	11.504	0.000
Meiser-Stedman, 2009b S3	cPTCI Permanent change	0.306	0.172	0.430	4.339	0.000
Meiser-Stedman, unpubl	cPTCI Permanent change	0.750	0.684	0.804	13.931	0.000
Palosaari 2013, 2015; Punamaki 2015	cPTCI Permanent change	0.409	0.298	0.509	6.688	0.000
Salmon, 2007	cPTCI Permanent change	0.560	0.383	0.697	5.407	0.000
		0.586	0.482	0.673	9.055	0.000

Correlation and 95% CI

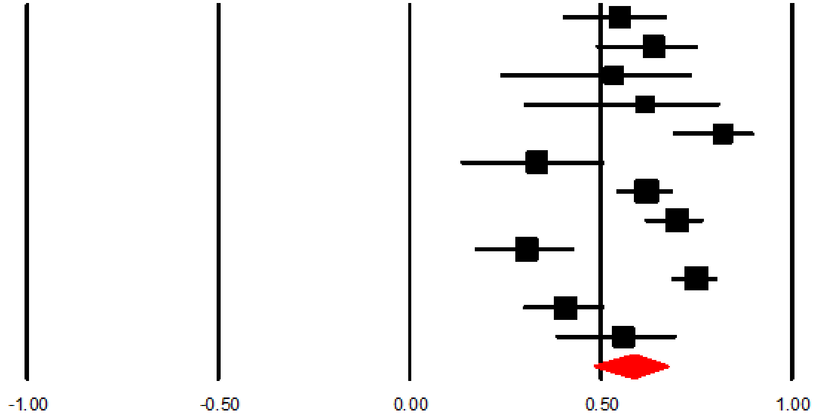

Figure 3.22. Forest plot showing random effects meta-analysis results for children's appraisals of permanent change and PTSD symptoms.

1.23.2.1 Subgroup analyses for permanent change appraisals.

Subgroup analyses were carried out to examine the source of the heterogeneity in the effect size. Results are shown in the Forest plot in Figure 3.23 and in Table 3.10. Subgroup analyses were more limited due to the smaller number of studies in this meta-analysis. All studies were carried out using a civilian population, as might be expected in a child/adolescent sample, so this was not explored as a subgroup analysis. Only one study looked at intentional trauma, so it was not possible to explore differences between intentional and unintentional trauma. Prospective data was only extracted from one study so it was not possible to explore study design in subgroup analysis. No studies looked at multiple trauma, so it was not possible to examine the differences between single event and multiple event trauma. Most studies looked at children who had been exposed to a mixture of different types of traumatic events, so it was not possible to explore the influence of the subtype of traumatic event on effect size due to the small number of studies in each category. Results subgroup analyses showed there was a significant difference between published (peer reviewed) studies and studies that were unpublished (raw data or dissertations), where unpublished studies showed a larger effect size than published studies.

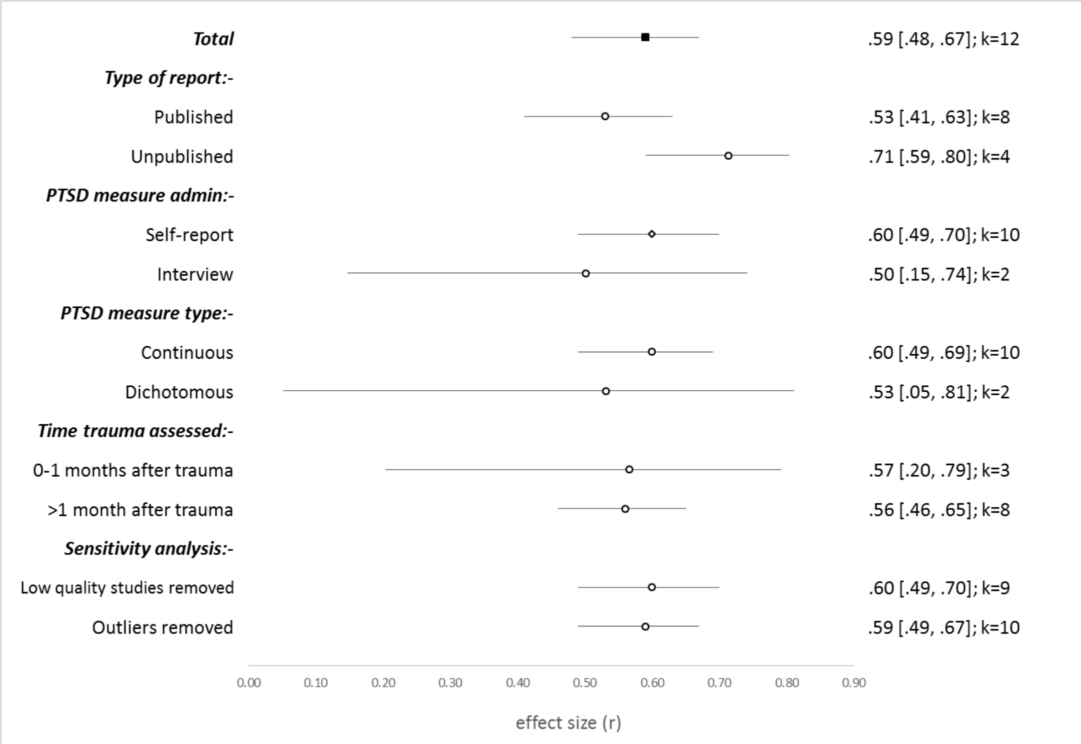

Figure 3.23. Forest plot showing subgroup and sensitivity analyses for children’s appraisals about permanent change.

Table 3.10

Results of subgroup and sensitivity analyses for the relationship between children's appraisals of permanent change and PTSD symptoms

	K	n	r	LL	UL	Z	p	Q	df	p	I^2
Total-PERMANENT CHANGE child	12	1498	0.59	0.48	0.67	9.06	<0.0001	82.46*	11	<0.0001	86.66
Type of report											
Published (peer rev)	8	1187	0.53	0.41	0.63	7.76	<0.0001				
Unpublished/dissertation	4	311	0.71	0.59	0.80	8.14	<0.0001				
Subgroup analysis								*5.33*	*1*	*0.02*	
PTSD measure administration											
Self-report	10	1329	0.60	0.49	0.70	8.45	<0.0001				
Interview	2	169	0.50	0.15	0.74	2.68	<0.01				
Subgroup analysis								*0.43*	*1*	*0.51*	
PTSD measure type											
Continuous	10	1186	0.60	0.49	0.69	9.01	<0.0001				
Dichotomous	2	312	0.53	0.05	0.81	2.15	<0.05				
Subgroup analysis								*0.12*	*1*	*0.73*	
Time trauma symptoms measured											
0-1 month after trauma	3	463	0.57	0.20	0.79	2.89	<0.01				
> 1 month after trauma	8	992	0.56	0.46	0.65	8.96	<0.0001				
Subgroup analysis								*0.00*	*1*	*0.97*	
Sensitivity analyses											
Low quality studies removed	9	1081	0.60	0.49	0.70	8.19	<0.0001	51.93*	8	<0.0001	84.59
Outliers removed	10	1276	0.59	0.49	0.67	9.68	<0.0001	49.26*	9	<0.0001	81.73

1.23.2.2 Sensitivity analysis for permanent change appraisals. A sensitivity analysis was performed to assess the impact of including studies judged as low quality (at high risk of bias). Three low quality studies were removed and the meta-analysis was repeated with the remaining nine studies. The effect size remained the same when these studies were removed (see Table 13). Heterogeneity remained high.

Two studies whose 95% confidence intervals did not overlap with the 95% confidence interval of the pooled effect size were deemed to be outliers and excluded in a sensitivity analysis (Ferner, 2013 & Meiser-Stedman et al., 2009, S3). The random effects meta-analysis was repeated with the remaining 10 studies. The effect size remained the same when these studies were removed and heterogeneity remained high ($I^2 = 81.73$, see Table 13). No studies imputed beta in place of the r value so this sensitivity analysis was not performed.

1.23.2.3 Publication bias for permanent change appraisals. A Funnel Plot was used to visually inspect the data to assess publication bias (see Figure 3.24). Again, the plot shows that small scale studies are missing. Egger's test of the intercept showed there was no significant asymmetry, suggesting publication bias was not an issue (*t = 0.28, df = 10, two-tailed p = 0.78*). Duval and Tweedie's trim and fill method found no missing studies either side of the mean. The fail-safe N (number of additional studies with conflicting evidence that would be needed to overturn the conclusion) was estimated as 1836. This is far higher than the recommended 5k +10 (k = 12 in this meta-analysis, which is 70 studies in this case). Taken together, these tests suggests small scale studies tend not to be published, but that were they to be published the effect size may not differ significantly from that reported here.

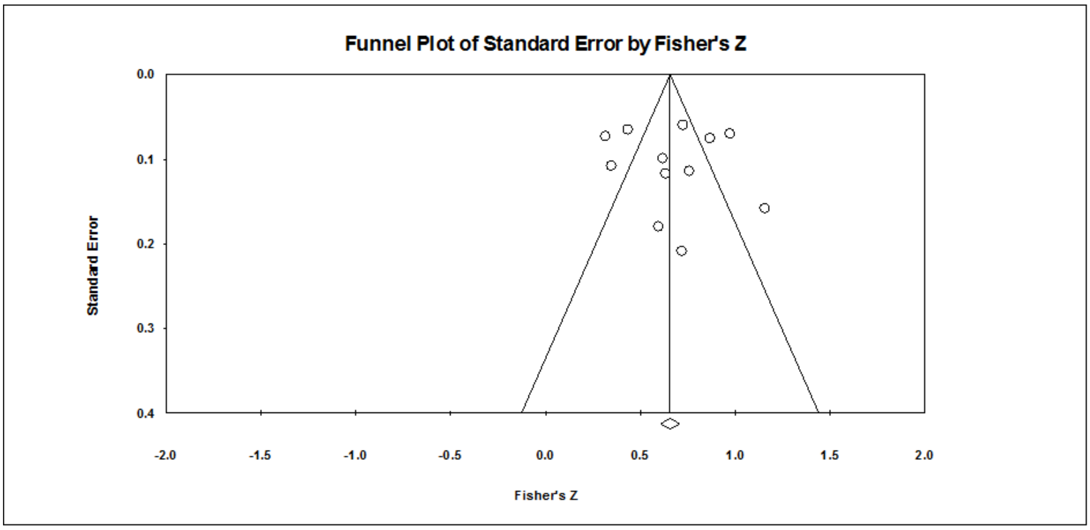

Figure 3.24. Funnel plot to explore publication bias for child/adolescent appraisals of permanent change.

1.23.2.4 Summary of meta-analysis results for permanent change. Results from the meta-analysis of the relationship between child and adolescent studies of permanent and disturbing change and PTSD symptoms showed a large effect size ($r = 0.59$, *95% CI* $= 0.48 - 0.67$). Subgroup analysis found publication status accounted for a significant amount of heterogeneity (unpublished studies having a larger effect size than published studies). Results were robust to the sensitivity analysis and there was no evidence of publication bias.

1.23.3 Comparing subtypes of maladaptive appraisal. As can be seen in the results described in Section 3.6, the effect size for the relationship between appraisals and PTSD symptoms varies depending on the subtype of maladaptive appraisal being assessed (self, world or self-blame in adults and fragile person/scary world or permanent change in children/adolescents). This difference is illustrated in Figure 3.25. It can be seen that in adults the strongest relationship between maladaptive appraisals and PTSD symptoms is found for appraisals about the self ($r = 0.60$), followed by appraisals about the world ($r = 0.47$), followed by self-blame appraisals ($r = 0.28$). It is not possible to carry out a subgroup analysis to statistically compare the effect size between these different subtypes of appraisal due to the fact that this would require extracting multiple effect sizes from the same study. However, it can be seen that the confidence intervals for the effect sizes do not overlap, suggesting that the difference between the subtypes of appraisal is significant.

In children and adolescents, the relationship between appraisals about permanent change and PTSD symptoms seems to be slightly larger than appraisals about being a fragile person in a scary world. However, the confidence intervals of the effect sizes overlap, suggesting that there is not a significant difference between these subtypes of appraisal.

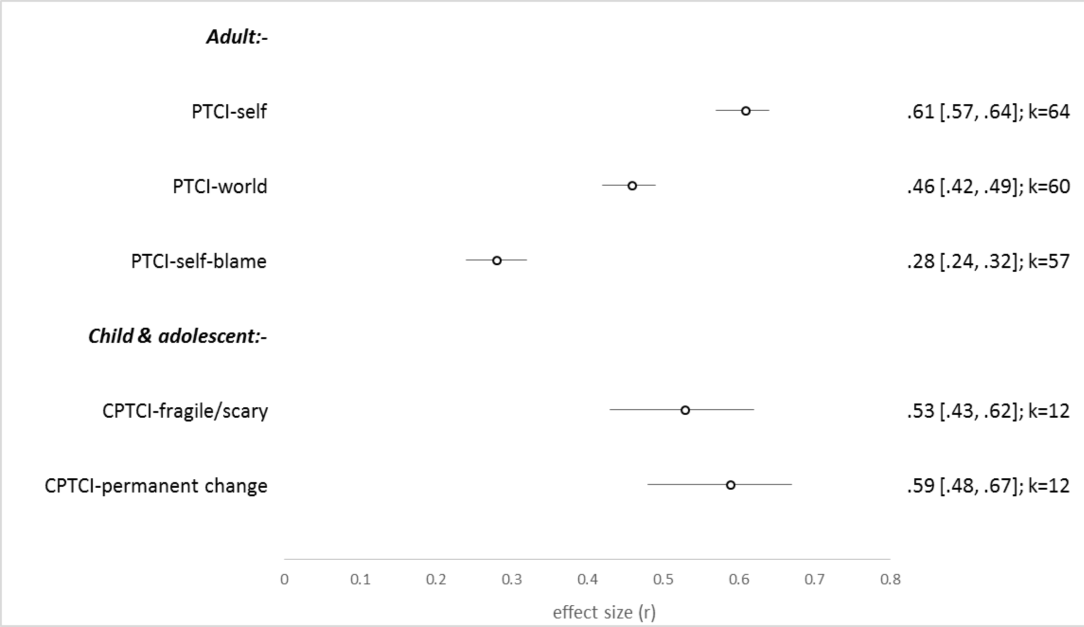

Figure 3.25. Forest plot showing effect sizes across different subtypes of maladaptive appraisal.

1.24 Meta-Analysis of Effect Size Change over Time

Separate random-effects meta-analyses were carried out on prospective studies to explore effect size at different time points following trauma (2 - 4 months, 6 months and 1 year). Methods for dealing with multiple effect sizes from the same study are described in Section 2.8.7.

1.24.1 Effect size at 2 - 4 months following trauma. A random effects meta-analysis of nine studies reporting prospective data about the correlation between maladaptive appraisals within one month of trauma and PTSD symptoms 2 - 4 months following trauma showed a large effect size ($r = 0.53$, *95% CI = 0.44 - 0.61), z = 9.73, p<0.0001*). There was significant heterogeneity (*Q = 45.45, df = 8, p<0.0001*), with the I^2 statistic showing heterogeneity to be "high" ($I^2 = 82.40$). These results are shown in the Forest plot in Figure 3.26.

First Author, Year	Appraisal Measure		Correlation	Lower limit	Upper limit	Z-Value	p-Value
Carper, 2015	PTCI Combined	2-4 months	0.400	0.238	0.540	4.582	0.000
Ehlers, 1998/May ou 2002	Neg interpretation of intrusions	2-4 months	0.520	0.470	0.566	17.146	0.000
Ehring, 2008	PTCI Self	2-4 months	0.570	0.439	0.677	7.211	0.000
Field, 2008	PTCI Combined	2-4 months	0.380	0.159	0.565	3.275	0.001
Meiser-Stedman, unpubl	cPTCI Total	2-4 months	0.730	0.659	0.788	13.297	0.000
Nixon, Ellis 2010	cPTCI Total	2-4 months	0.630	0.504	0.730	7.776	0.000
O'Donnell, 2007	PTCI Combined	2-4 months	0.340	0.223	0.448	5.440	0.000
Salter, 2003	Neg appraisal of symptoms	2-4 months	0.541	0.351	0.688	4.957	0.000
Shahar, 2013	PTCI Combined	2-4 months	0.540	0.413	0.646	7.199	0.000
			0.530	0.439	0.610	9.733	0.000

Statistics for each study

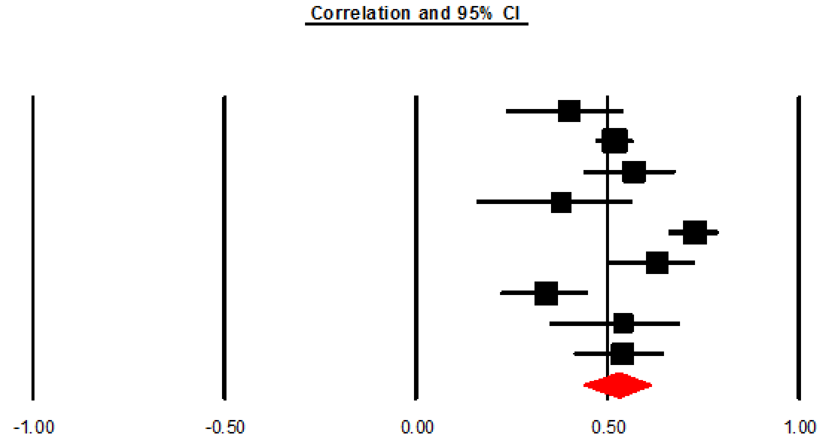

Figure 3.26. Forest plot showing effect size of the relationship between appraisals within 1 month of trauma and PTSD symptoms 2 - 4 months following trauma.

1.24.1.1 Sensitivity analysis, 2 - 4 month data. Meiser-Stedman and colleagues (unpublished) was an outlier; therefore a sensitivity analysis was run excluding this study. The resultant effect size *was* $r = 0.50$; *95% CI = 0.42 - 0.56*, $z = 11.77$, $p<.0001$. There was evidence of medium heterogeneity ($Q = 18.87$, $df = 7$, $p<.01$, $I^2 = 62.91$). No studies were judged as being low in quality

1.24.1.2 Publication bias, 2 - 4 month data. A Funnel Plot was used to visually inspect the data to assess publication bias (see Figure 3.27). The plot is relatively symmetrical but small scale studies appear to be missing. Egger's test of the intercept showed there was no significant asymmetry, suggesting publication bias was not an issue ($t = 0.07$, $df = 7$, *two-tailed* $p = 0.95$). Duval and Tweedie's trim and fill method found no missing studies either side of the mean. The fail-safe N (number of additional studies with conflicting evidence that would be needed to overturn the conclusion) was estimated as 1299. This is far higher than the recommended 5k +10 (k = 9 in this meta-analysis, giving 55 studies for this analysis). Taken together, these tests suggests that small scale studies are missing, but this publication bias is not significantly affecting the results.

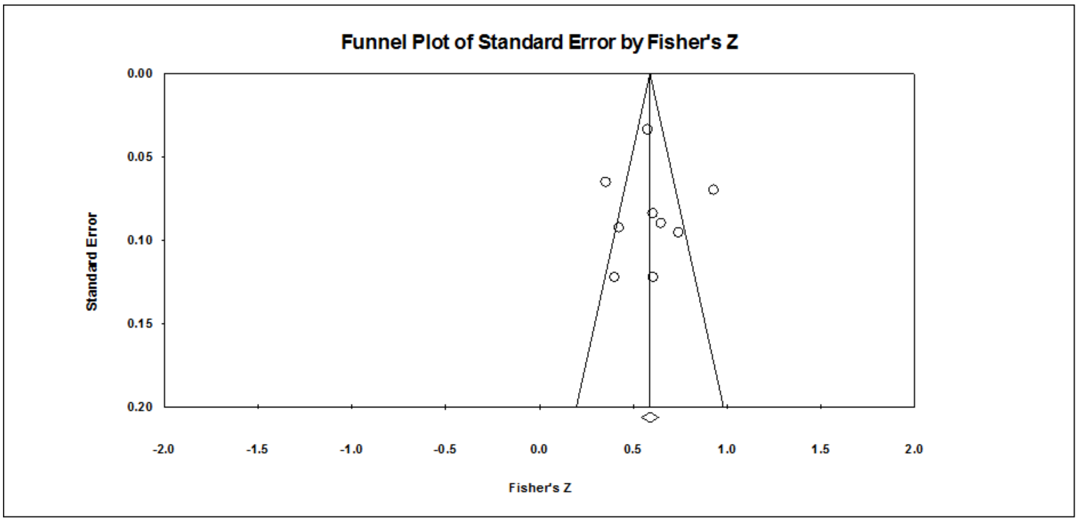

Figure 3.27. Funnel plot to explore publication bias for effect size 2 - 4 months following trauma.

1.24.2 Effect size at 6 months following trauma. A random effects meta-analysis of 13 studies reporting prospective data about the correlation between maladaptive appraisals within 1 month of trauma and PTSD symptoms 6 months following trauma showed a large effect size (*$r = 0.53$, 95% CI = 0.48 - 0.57), $z = 17.29$, $p<0.0001$*). There was significant heterogeneity (*$Q = 21.60$, $df = 12$, $p = 0.04$*), with the I^2 statistic showing heterogeneity to be “low” ($I^2 = 44.43$). These results are shown in the Forest plot in Figure 3.28.

	Appraisal Measure	Time point	Correlation	Lower limit	Upper limit	Z-Value	p-Value
Bryant, 2007	cPTCI Total	6 months	0.566	0.368	0.715	4.928	0.000
Christiansen, 2015	PTCI Combined	6 months	0.540	0.464	0.608	11.574	0.000
Ehring, 2008	PTCI Self	6 months	0.460	0.318	0.582	5.821	0.000
Freeman, 2013	PTCI Combined	6 months	0.660	0.528	0.761	7.563	0.000
Hagenaars, 2007	PTCI Total	6 months	0.616	0.340	0.794	3.869	0.000
Hansen, 2014	PTCI Combined	6 months	0.610	0.542	0.670	13.599	0.000
Hitchcock, 2015	cPTCI Total	6 months	0.316	0.115	0.492	3.034	0.002
Kangas, 2005	PTCI Combined	6 months	0.560	0.363	0.709	4.902	0.000
Kleim, 2007	PTCI Self	6 months	0.471	0.365	0.565	7.769	0.000
Kleim, 2012	PTCI Self	6 months	0.510	0.401	0.605	7.998	0.000
Nixon, Ellis 2010	cPTCI Total	6 months	0.401	0.213	0.561	3.985	0.000
Nixon, Nehmy 2010	cPTCI Total	6 months	0.600	0.381	0.755	4.650	0.000
Noguchi, 2013	PTCI Total	6 months	0.490	0.321	0.629	5.170	0.000
			0.525	0.475	0.571	17.285	0.000

Correlation and 95% CI

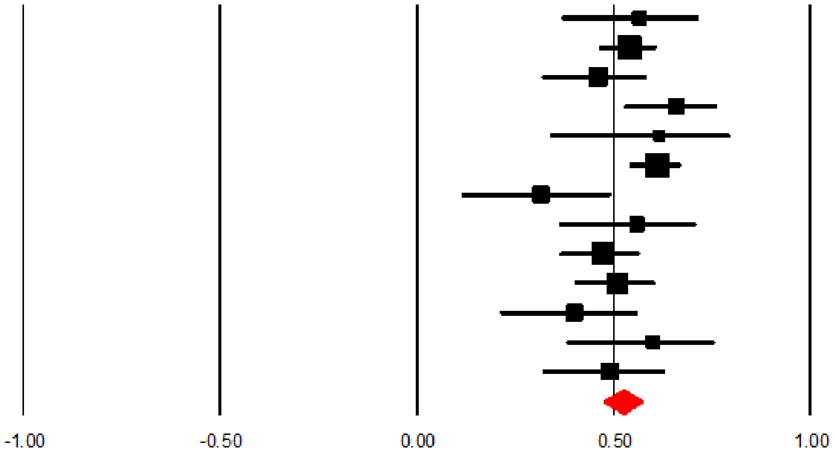

Figure 3.28. Forest plot showing effect size of the relationship between appraisals within 1 month of trauma and PTSD symptoms 6 months following trauma.

1.24.2.1 Sensitivity analysis, 6 month data. No outliers were identified and no studies were judged as being low in quality, therefore no sensitivity analyses were performed.

1.24.2.2 Publication bias, 6 month data. A Funnel Plot was used to visually inspect the data to assess publication bias (see Figure 3.29). The plot suggests that small scale studies with small effect sizes are missing. Egger's test of the intercept showed there was no significant asymmetry, suggesting publication bias was not an issue (*t = 0.44, df = 11, two-tailed p = 0.67*). Duval and Tweedie's trim and fill method found two missing studies to the left of the mean. When these two studies were added to correct the effect size, the resultant effect size was *r = 0.51 (95% CI = .46 - .56, Q = 28.13*). The fail-safe N (number of additional studies with conflicting evidence that would be needed to overturn the conclusion) was estimated as 1862. This is far higher than the recommended 5k +10 (k = 13 so 75 in this meta-analysis). Taken together, these tests suggest that small scale studies with small effect sizes are not being published, however, were they to be published, the effect size is not likely to change significantly from that reported by the current meta-analysis.

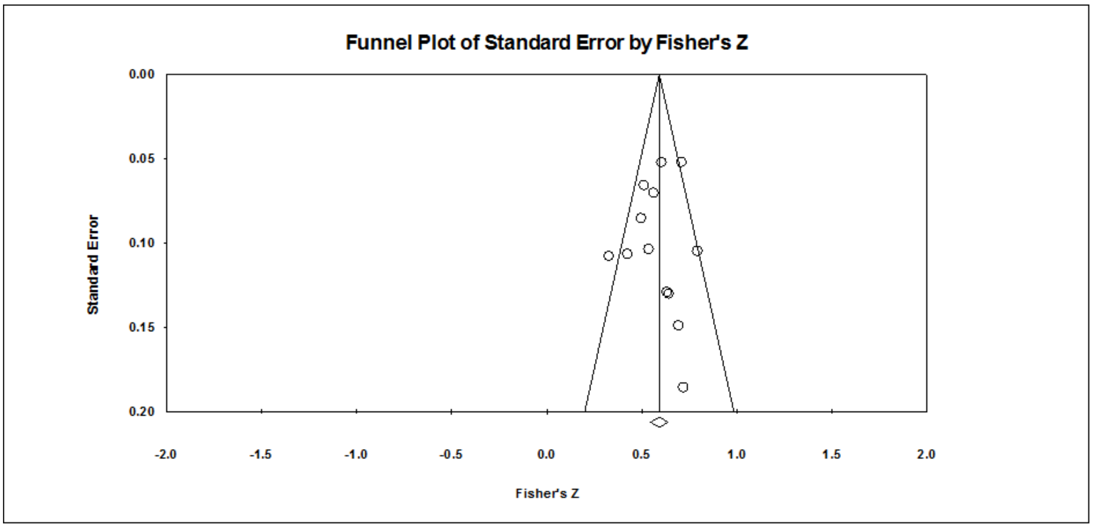

Figure 3.29. Funnel plot to explore publication bias for effect size 6 months following trauma.

1.24.3 Effect size at 12 months following trauma. A random effects meta-analysis of 3 studies reporting prospective data about the correlation between maladaptive appraisals within 1 month of trauma and PTSD symptoms 12 months following trauma showed a moderate effect size ($r = 0.32$, *95% CI = 0.13 - 0.48*, $z = 3.26$, $p<0.001$). There was significant heterogeneity ($Q = 22.51$, $df = 2$, $p<0.001$), with the I^2 statistic showing heterogeneity to be “high” ($I^2 = 91.11$). These results are shown in the Forest plot in Figure 3.30.

First Author, Year	Appraisal Measure	Time point	Statistics for each study				
			Correlation	Lower limit	Upper limit	Z-Value	p-Value
Derson, 2007	Self blame	1 year	0.180	0.074	0.282	3.306	0.001
Ehlers, 1998/Mayou 2002	Neg interpretation of intrusions	1 year	0.450	0.392	0.504	13.520	0.000
O'Donnell, 2007	PTCI Combined	1 year	0.300	0.172	0.418	4.475	0.000
			0.318	0.130	0.483	3.255	0.001

Correlation and 95% CI

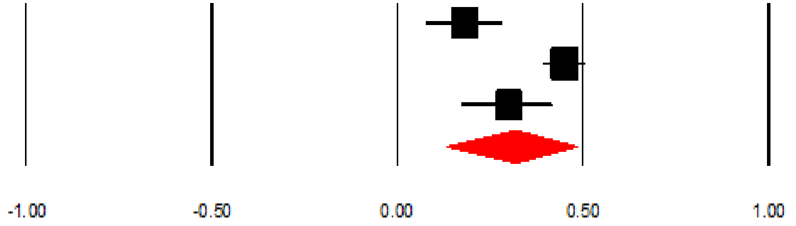

Figure 3.30. Forest plot showing effect size of the relationship between appraisals within 1 month of trauma and PTSD symptoms 12 months following trauma.

1.24.3.1 Sensitivity analysis, 12 month data. No outliers were identified and no studies were judged as being low in quality, therefore no sensitivity analyses were performed.

1.24.3.2 Publication bias, 12 month data. Only three studies were reported here, so using a funnel plot is of limited use in assessing publication bias as there are only three data points. Egger's test of the intercept showed there was no significant asymmetry, suggesting publication bias was not an issue (*$t = 1.30$, $df = 1$, two-tailed $p = 0.42$*). Duval and Tweedie's trim and fill method found no missing studies either side of the mean. The fail-safe N (number of additional studies with conflicting evidence that would be needed to overturn the conclusion) was estimated as 116. This is higher than the recommended 5k +10 (k = 3 in this meta-analysis). Taken together, these tests suggests publication bias is not significantly affecting the results.

1.24.3.3 Comparing time points. Figure 3.31 is a Forest plot showing the effect size found for each of the above meta-analyses. It can be seen that the effect size for the relationship between appraisals within 1 month of trauma and PTSD symptoms 2 - 4 months and 6 months following trauma is the same, whereas the effect size is slightly lower at 12 months following trauma. However, as the confidence intervals for the effect sizes at the three time points overlap, the difference is unlikely to be significant.

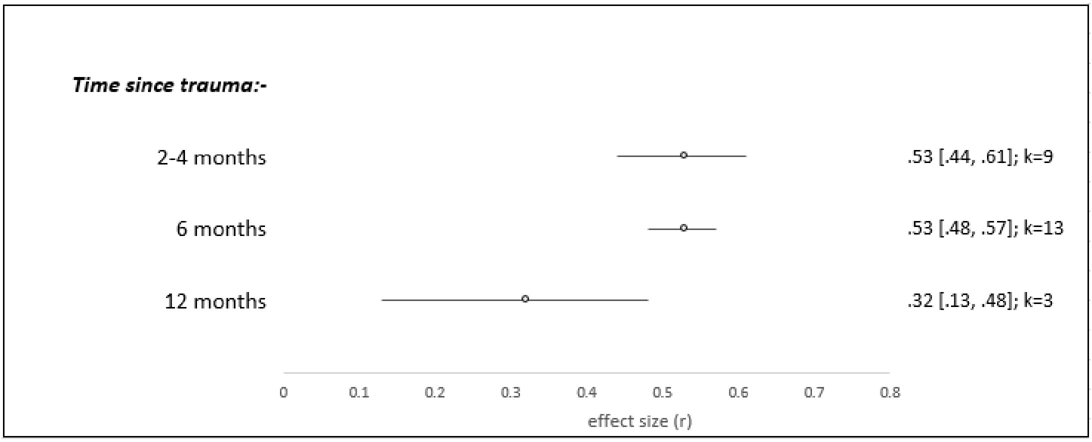

Figure 3.31. Forest plot showing effect size at 2 - 4 months, 6 months and 12 months since trauma.

1.24.4 Subgroup analysis for change in effect size over time. As described in Section 2.8.7, a further random effects meta-analysis was performed on prospective studies, but only extracting one effect size from each study (the effect size from the longest follow-up time). Twenty-one prospective studies were included. The overall effect size for these studies was large ($r = 0.50$, *95% CI* $= 0.43 - 0.56$; $z = 12.97$, $p<0.0001$), with a high degree of heterogeneity ($Q = 116.23$, $df = 20$, $p<.0001$, $I^2 = 82.79$). Subgroup analysis exploring time point as a moderator of effect size showed a trend towards a significant difference in effect size between time points ($Q = 5.34$, $df = 2$, $p = 0.055$). Figure 3.32 shows the results in a Forest plot. At 2 - 4 months, the effect size was $r = 0.54$ (*95% CI* $= 0.37 - 0.67$, $k = 5$). At 6 months the effect size was $r = 0.52$ (*95% CI* $= 0.48 - 0.57$, $k = 13$). At 12 months the effect size was $r = 0.32$ (*95% CI* $= 0.13 - 0.48$, $k = 3$). The 12 month data may have been skewed by one study (Denson et al., 2007) which only measured self-blame. From previous analysis, we know that self-blame has the weakest relationship with PTSD symptoms, as such the lower effect size found at 12 months may be down to that one self-blame study. When this study was removed from the analysis, the effect size at 12 months was *r = 0.38 (95% CI = 0.23-0.52*). Crucially, the effect sizes at the different time points overlapped, suggesting no significant drop in the strength of the relationship between appraisals and PTSD symptoms over time.

1.24.5 Comparison of prospective versus cross-sectional studies. Data from the 21 prospective studies were compared to the 118 studies that provided only cross-sectional data. Results showed that there was no significant difference between the effect sizes from cross-sectional versus prospective studies (*r = 0.55, 95% CI = 0.52* - *0.57* and *r = 0.50, 95% CI = 0.43* - *0.56*, respectively, *Q = 1.99, df = 1, p = 0.16*).

When only studies using the PTCI or CPTCI were included, 83 cross-sectional studies were compared to 18 prospective studies. Results showed no significant difference between the effect sizes from cross sectional versus prospective studies (*r = 0.57, 95% CI = 0.54* - *0.60* and *r = 0.52, 95% CI = 0.45* - *0.57*, respectively, *Q = 2.72, df = 1, p = 0.10*).

Group by Timepoint	First Author, Year	Appraisal Measure	Correlation	Lower limit	Upper limit	Z-Value	p-Value
			Statistics for each study				
1 (2-4 months)	Carper, 2015	PTCI Combined	0.400	0.238	0.540	4.582	0.000
1 (2-4 months)	Field, 2008	PTCI Combined	0.380	0.159	0.565	3.275	0.001
1 (2-4 months)	Meiser-Stedman, unpub	cPTCI Total	0.730	0.659	0.788	13.297	0.000
1 (2-4 months)	Salter, 2003	Neg appraisal of symptoms	0.541	0.351	0.688	4.957	0.000
1 (2-4 months)	Shahar, 2013	PTCI Combined	0.540	0.413	0.646	7.199	0.000
1 (2-4 months)			0.538	0.369	0.672	5.525	0.000
2 (6 months)	Bryant, 2007	cPTCI Total	0.566	0.368	0.715	4.928	0.000
2 (6 months)	Christiansen, 2015	PTCI Combined	0.540	0.464	0.608	11.574	0.000
2 (6 months)	Ehring, 2008	PTCI Self	0.460	0.318	0.582	5.821	0.000
2 (6 months)	Freeman, 2013	PTCI Combined	0.656	0.523	0.758	7.496	0.000
2 (6 months)	Hagenaars, 2007	PTCI Total	0.616	0.340	0.794	3.869	0.000
2 (6 months)	Hansen, 2014	PTCI Combined	0.610	0.542	0.670	13.599	0.000
2 (6 months)	Hitchcock, 2015	cPTCI Total	0.316	0.115	0.492	3.034	0.002
2 (6 months)	Kangas, 2005	PTCI Combined	0.560	0.363	0.709	4.902	0.000
2 (6 months)	Kleim, 2007	PTCI Self	0.471	0.365	0.565	7.769	0.000
2 (6 months)	Kleim, 2012	PTCI Self	0.510	0.401	0.605	7.998	0.000
2 (6 months)	Nixon, 2010	cPTCI Total	0.600	0.381	0.755	4.650	0.000
2 (6 months)	Nixon, 2010 b	cPTCI Total	0.401	0.213	0.561	3.985	0.000
2 (6 months)	Noguchi, 2013	PTCI Total	0.490	0.321	0.629	5.170	0.000
2 (6 months)			0.524	0.475	0.570	17.381	0.000
3 (12 months)	Denson, 2007	Self blame	0.180	0.074	0.282	3.306	0.001
3 (12 months)	Ehlers, 1998/Mayou 2002	Neg interpretation of intrusions	0.450	0.392	0.504	13.520	0.000
3 (12 months)	O'Donnell, 2007	PTCI Combined	0.300	0.172	0.418	4.475	0.000
3 (12 months)			0.318	0.130	0.483	3.255	0.001
Overall			0.508	0.463	0.551	18.369	0.000

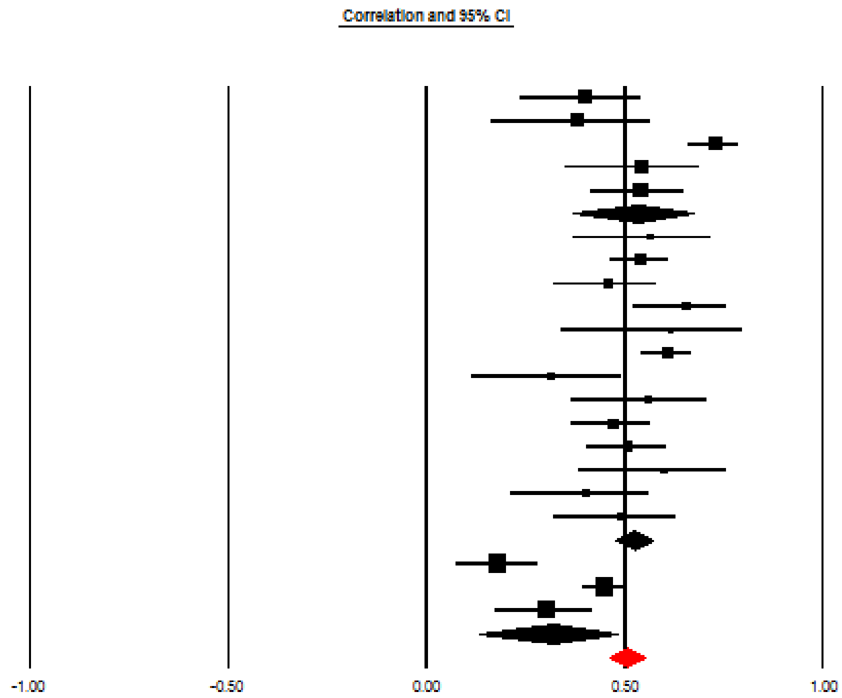

Figure 3.32. Subgroup analysis showing effect size of the relationship between maladaptive appraisals and PTSD symptoms over time.

Discussion

1.25 Summary of Results

The current meta-analysis aimed to summarise the literature on the relationship between measures of maladaptive appraisal used in the PTSD literature and PTSD symptoms. Answers to the principal research questions are given below.

1.25.1 What is the strength of the relationship between measures of maladaptive appraisals used in the PTSD literature and PTSD symptoms? Results from pooling 147 independent effect sizes from 135 studies showed the effect size of the relationship between maladaptive appraisals and PTSD to be moderate to large (Cohen, 1988) with tight confidence intervals (*r = 0.53, 95% CI = 0.51 - 0.56*). The meta-analysis was repeated to include only the studies that used the PTCI or CPTCI to measure maladaptive appraisals. Results from this meta-analysis of 104 independent effect sizes found that the effect size for the relationship between maladaptive appraisals and PTSD symptoms remained similar (*r = 0.56; 95% CI = 0.53 - 0.59*).

1.25.2 What factors moderate the effect size observed? For the overall meta-analysis, results showed child studies had a significantly larger effect size than adult studies and unpublished studies had a significantly larger effect size than published studies, though all aggregated effect sizes were still large. The specific instrument used to measure maladaptive appraisals accounted for a significant amount of heterogeneity. Interview measures of maladaptive appraisals had a smaller effect size than self-report measures (a small rather than a large effect) and the effect size for the individual measurement instrument varied from *r=0.15* on the WAS to *r=0.70* on the IPSI.

For the PTCI/CPTCI only meta-analysis, child studies still had a significantly larger effect size than adult studies, but the difference between unpublished and published studies disappeared, perhaps reflecting that fact that most unpublished studies used the PTCI or CPTCI. No other subgroup analyses were significant.

Subgroup analyses exploring moderators of effect size for subtypes of maladaptive appraisal showed no significant moderators of the effect size of maladaptive appraisals about the self. For maladaptive appraisals about the world and self-blame appraisals, the administration of the measure of PTSD accounted for a significant amount of heterogeneity, with self-report measures having a larger effect size than interview measures. Time since trauma moderated the effect size in adult appraisals of self-blame, with a smaller effect size at 0 - 1 months following trauma and a larger effect size at >1 month following trauma.

In child and adolescent studies, subgroup analyses showed unpublished studies had a larger effect size than published studies in the permanent change subscale of the CPTCI only.

Further analysis was performed to explore the change in effect size for the relationship between maladaptive appraisals and PTSD symptoms over time in 21 prospective studies. Results showed a slight decrease in effect size 12 months after the trauma (2 - 4 months after trauma $r = 0.53$; 6 months after trauma $r = 0.53$; 12 months after trauma $r = 0.32$), which was approaching statistical significance, however only 3 studies reported 12 month follow-up data, limiting the generalisability of these findings.

For all analyses performed, results were robust to sensitivity analyses and there was minimal evidence of publication bias.

1.25.3 Is there a difference between the effect sizes for the relationship of subtypes of maladaptive appraisal as measured using the PTCI and CPTCI (self, world and self-blame appraisals in adults; fragile person in a scary world and permanent change appraisals in children/adolescents) and PTSD symptoms? Meta-analysis of 66 adult studies using the PTCI self subscale, found that the effect size for the relationship between maladaptive appraisals about the self and PTSD symptoms was moderate to large (*r = 0.61, 95% CI = 0.57 - 0.64*). In comparison, the effect size for the relationship between maladaptive appraisals about the world pooled across 62 studies was moderate (*r = 0.45, 95% CI = 0.41 - 0.49*). The effect size for self-blame appraisals across 59 studies was small to moderate (*r = 0.28, 95% CI = 0.24 - 0.33*). The confidence intervals of these effect sizes did not overlap, suggesting the difference between the effect sizes for different subtypes of maladaptive appraisal was statistically significant.

In child and adolescent studies, no significant difference between the effect sizes of appraisals of being a fragile person in a scary world or appraisals of permanent and disturbing change was found.

1.26 Strengths of the current study

This is the first meta-analysis summarising the literature on the relationship between maladaptive appraisals and PTSD symptoms. Maladaptive appraisals are a core component of Ehlers and Clark’s cognitive model of PTSD (2000) and significant components of other theoretical models of the disorder (Dalgleish, 1999; Foa et al., 1989). Persistent distorted cognitions about the cause or consequences of the trauma and persistent and exaggerated negative beliefs or expectations about oneself, others, or the world have also been added to DSM-5 criteria of PTSD.

Consolidating the wide-ranging literature in this area is therefore of theoretical and clinical relevance.

A significant strength of this meta-analysis was the large number of studies included; the evidence was summarised across 135 studies, 147 independent effect sizes and a total of 29,812 participants. There was sufficient power to explore the relationship between appraisals and PTSD across different subgroups, which has added to our understanding of the role of appraisals in PTSD in different populations, across different trauma characteristics, different methodologies, different subtypes of appraisal and different points in time.

Due to the large numbers of studies included, it was possible to explore the influence of the measurement tool used to assess maladaptive appraisals. Results showed the measurement tool explained a significant amount of heterogeneity in the effect size. This difference may have influenced further subgroup analyses. A strength of the current research was the ability to address this confound in subsequent subgroup analyses by repeating analyses with only the most well-validated measures of maladaptive appraisals, the PTCI and CPTCI.

A further strength of the current study was the minimal publication bias in evidence. This is relatively uncommon in the field of meta-analysis; estimates suggest approximately 50% of random effects meta-analyses will have at least some missing studies, with one fifth of these having significant publication biases that affect the conclusions drawn (Rothstein, Sutton, & Borenstein, 2005; Sutton, Duval, Tweedie, Abrams, & Jones, 2000). Reporting biases pose the greatest threat to the validity of findings in meta-analysis (Rothstein et al., 2005) and as such effort was made to gather grey literature and unpublished data during the search phase of the study. Some smaller scale studies were missing, as evidenced by the funnel plots, but tests such as Duval & Tweedie's trim and fill suggested that these missing studies were not significantly biasing the estimate of effect size in the current study. It is possible that bias may have been introduced by only including studies published in the English language, however, no evidence of reporting bias was found with graphical and statistical tests, suggesting we can be particularly confident in the findings. Perhaps Vevea and Woods' (2005) sensitivity analysis procedure, considered to be superior to other methods of publication bias estimation would have provided more accurate estimates of the impact of missing studies. This method is similar to Duval & Tweedie's trim and fill as it involves 'correcting' the population effect size estimate for publication bias using weights to model the process through which the likelihood of a study being published varies (based on a criterion such as the significance of a study). However, this was not available to use in the meta-analysis package used here (CMA). Future studies may wish to employ this method.

1.27 Limitations of the current study

It is important to note the significant limitations of the current study and interpret the discussions that follow in light of these. Firstly, as meta-analysis necessarily relies on the existing literature, the current study is limited by its reliance on the measurement tools employed to assess maladaptive appraisals in the PTSD literature. As mentioned in Section 1.5, the PTSD literature relies heavily on self-report measures to assess maladaptive appraisals, in particular the PTCI and CPTCI. The current study placed its emphasis on these measures due to their prevalence in the literature. The PTCI and CPTCI arguably do not operationalise the cognitive model of PTSD as outlined by Ehlers and Clark (2000). This model suggests that a person's appraisals about the traumatic event and the consequent impact on themselves and their symptoms cause a person to feel in a constant state of current threat, thus producing the symptoms of PTSD. The PTCI, intended to measure such appraisals, actually only contains a limited number of items that mention any role of trauma in the appraisal. For example, items such as, “If I think about the event, I will not be able to handle it” and, “My life has been destroyed by the trauma” do seem to operationalise the cognitive model as they specifically relate to appraisals around the trauma. Unfortunately, the majority of the items are worded in a much more general way, e.g., “I am a weak person” and, “The world is a dangerous place”. These more general appraisals could easily relate to depression, anxiety and more general psychological distress, rather than be specific to PTSD. As such, conclusions about the specificity of maladaptive appraisals to the development of PTSD are difficult to draw. This is especially the case given that some research has shown appraisals measured by the PTCI are linked to depression and anxiety as well as PTSD (e.g., Beck et al., 2004). Further research is necessary to develop measurement tools that operationalise maladaptive appraisals implicated in the cognitive model of PTSD, in order that their specific relationship to PTSD as compared to other psychological disorders can be explored.

Whilst the CPTCI does not use exactly the same item set as the PTCI and does have more items related specifically to trauma, it still has a high number of items that could be considered generic negative appraisals. Therefore this measure could also be improved by changing the wording of items to reflect posttraumatic appraisals. For both questionnaires, adding in some extra wording may be helpful. For example, the item, “The world is a dangerous place” could be rephrased to specify, “Since the trauma, I believe that the world is a dangerous place”. Fairbrother (2003) has done a good job of phrasing trauma specific appraisals in her questionnaire on appraisals following rape, the SARA. Perhaps similar work could be carried out to develop the PTCI and CPTCI to make the items more specific.

Tools to assess maladaptive appraisals used in the PTSD literature also vary considerably by their definition of appraisal. Whilst care was taken in the current study to only extract data relevant to our definition of appraisals (how you see yourself, the world and your symptoms in the aftermath of trauma), the wide range of theoretical underpinnings of the different measures is problematic for studies trying to ascertain the role of appraisals in PTSD. Again, focusing on measures of maladaptive appraisal that are developed on the grounds of a specific theory, and that successfully operationalise that theory, may reduce some of the variability between studies and make for more accurate conclusions about the nature of the relationship between maladaptive appraisals and PTSD symptoms.

A further important limitation of the current meta-analysis was the large amount of heterogeneity that was found. The I^2 statistic varied from 76 – 89 per cent, meaning the vast majority of the variability was down to true differences between the studies. Unfortunately, due to the meta-analytical package being used, the confidence intervals of the I^2 statistic could not be calculated. If the confidence intervals did not include zero, then we could be certain that there was true heterogeneity. As we do not know the values of the confidence interval, it is unclear how accurate the estimates of I^2 actually is.

Subgroup analyses revealed significant amounts of hetereogeneity could be explained by the variables hypothesised to be moderators. Results showed child studies had a significantly larger effect size than adult studies and unpublished studies had a significantly larger effect size than published studies, though all aggregated effect sizes were still large. The instrument used to measure maladaptive appraisals accounted for a significant amount of heterogeneity. Interview measures of maladaptive appraisals had a smaller effect size than self-report measures (a small rather than a large effect) and the effect size for the individual measurement instrument varied from r = 0.15 on the WAS to r = 0.70 on the IPSI. This finding reiterates the importance of work to develop accurate appraisal measures as a crucial area for future research.

Nevertheless, not all the heterogeneity could be explained by the subgroups identified a priori. It is likely that the large amount of heterogeneity is a result of the large number of studies included in the meta-analysis. Perhaps narrowing down the eligibility criteria would have resulted in a smaller number of studies and lower levels of heterogeneity. A more focused meta-analysis may have been able to draw more definite conclusions. However, it should be noted that the removal of outliers in the analysis reduced the levels of heterogeneity considerably, (I^2 ranging from 44-56 per cent, which is classed as medium) and the estimate of the effect size for the relationship between maladaptive appraisals and PTSD symptoms remained very similar when these outliers were removed.

Further analyses that could have been done to explore other sources of heterogeneity are gender (e.g. carrying out a meta-regression looking at % female as a moderating variable) and location of study (as a proxy for cultural differences in appraisal). The concept of appraisals has been developed in Western contexts, often with individual level traumas in mind. Future analyses could explore country of origin and religious factors as moderators of the relationship between appraisals and PTSD symptoms (Berzengi, Berzenji, Kadim, Mustafa, & Jobson, 2016). Another option could have been to re-examine the inclusion and exclusion criteria to make them narrower. Alternatively, a random sample of the studies meeting eligibility criteria could have been selected for analysis to reduce the overall number of studies and therefore the level of heterogeneity.

In exploring the change in effect size over time, the research was limited by the number of studies with longer-term follow-ups. Only three studies included a follow-up at 1 year following trauma. This limits the conclusions that can be drawn from this section of the research study and further longitudinal research would be beneficial.

A further limitation was the lack of reporting of information in some of the studies. Unfortunately, due to resource and time limitations it was not possible to contact authors to gather missing data that was not directly related to the effect size. Several studies failed to report the time since the traumatic event occurred that assessments were taken. Many studies grouped individuals who had experienced different types of trauma together. It is possible that different trauma types might be related to different types of appraisal. It may be helpful to look at this in future research.

The quality appraisal assessment only showed moderate inter-rater reliability. This means that judgements on quality may have been open to bias. In particular, the quality of the studies was difficult to judge due to the lack of reporting of some studies. It is therefore important for future research to improve quality of reporting. However, it is noteworthy that other risk-factor meta-analyses do not report study quality information at all (Brewin et al., 2000; Cox et al., 2007; Ozer et al., 2003; Trickey et al., 2012).

1.28 Comparison to Existing Risk Factor Meta-Analyses

It is of interest to compare the results of the current meta-analysis with the results of existing meta-analyses examining risk factors for PTSD.

1.28.1 Child and adolescent studies. Cox et al. (2008) carried out a meta-analysis of fourteen child and adolescent studies to explore risk factors for PTSD following accidental trauma. The age ranged from 5-18 years, and only prospective studies were included. The risk factors explored were gender, age, pre-trauma psychopathology, injury severity, threat to life, exposure to prior trauma, involvement of a family or friend in the trauma and post trauma parental distress. The largest effect sizes was found to be threat to life ($r = 0.38$) and parental distress at follow-up ($r = 0.41$).

Trickey et al explored 25 risk factors for PTSD in child and adolescent studies. Small to medium ($r = 0.1 - 0.3$) effect sizes were found for the following risk factors: time since trauma, younger age, race, media exposure, parent psychological problem, female gender, pre-trauma low self-esteem, low socio-economic status, low intelligence, life events, bereavement and trauma severity. Medium to large effect sizes ($r = 0.3 - 0.6$) were found for low social support, peri-trauma fear, perceived life threat, social withdrawal, comorbid psychological problem, poor family functioning, distraction and blaming others. Large effect sizes ($r > 0.6$) were found for PTSD at time 1 and thought suppression.

In the current study, the effect size for the relationship between maladaptive appraisals and PTSD symptoms in child and adolescent studies was $r = 0.59$. This is considerably larger than any of the risk factors in the Cox et al study, and comparable only to thought suppression and PTSD at time 1 in the Trickey et al study. Very recently, Mitchell, Brennan, Curran, Hanna & Dyer (2017) published a meta-analysis looking at maladaptive appraisals as risk factors for PTSD in child and adolescent studies. This study found a similar effect size to the current study ($r = 0.63$, 95% CI = 0.58 - 0.68), with respect to the relationship between measures of maladaptive appraisals in youth (e.g. the CPTCI) and symptoms of PTSD. However, this study omitted several studies included here (k = 11 vs k = 25). These findings reinforce the suggestion that maladaptive appraisals in the aftermath of trauma are one of the most significant risk factors to consider in the development of PTSD symptoms in children and adolescents.

1.28.2 Adult studies. Brewin et al., (2000) carried out a meta-analysis of 77 studies examining the following risk factors for PTSD: gender, age, socioeconomic status, lack of education, low intelligence, race, psychiatric history, childhood abuse, prior trauma, adverse childhood, family psychiatric history, trauma severity, lack of social support and life stress. All risk factors were statistically significant, and the effect sizes ranged from r = 0.05 (race) to r = 0.40 (social support). Ozer et al. (2003) carried out a similar meta-analysis across 68 studies, and explored prior trauma, prior adjustment, family history of psychopathology, perceived life threat, perceived support, peritraumatic emotions and peritraumatic dissociation as risk factors for PTSD. Results showed effect sizes varied from r = 0.17 (prior trauma, prior adjustment, family history of psychopathology) to r = 0.43 (peritraumatic dissociation). All the risk factors explored in these two studies had a lower effect size than the current study’s estimate of the relationship between maladaptive appraisals and PTSD symptoms in adults (r = 0.52, 95% CI = 0.49 - 0.55). This is further evidence for the relative importance of maladaptive appraisals as risk factors for PTSD.

1.28.3 Heterogeneity and moderators of effect size. Levels of heterogeneity in existing meta-analyses of risk factors of PTSD is high, and similar in degree to the current study (Brewin et al., 2000; Cox et al., 2008; Mitchell et al., 2017; Ozer et al., 2003; Trickey et al., 2012). Type of event, time since trauma, type of sample and method of assessment were significant moderators for the risk factors in the Ozer et al., (2003) meta-analysis. In the Brewin et al., (2000) meta-analysis, study design (prospective or retrospective), continuous or dichotomous measure of PTSD, military or civilian sample, gender, interview or self-report measure of PTSD and trauma occurring in childhood or adulthood were moderators. In the Trickey et al., (2012) meta-analysis, intentional versus unintentional trauma and group versus individual traumatic event were significant moderators of effect size in younger children.

In the current study, the following moderators of effect size were significant, depending on the individual analysis: child vs adult study, measure of maladaptive appraisal, interview/self-report measure of PTSD, publication status and time since trauma. Bringing these findings together with those of previous meta-analyses, it seems that moderators related to study design and measures used are important in most risk factor meta-analyses. However, beyond that there do not seem to be clear moderators of effect size that are consistent across different risk factors.

1.28.4 Publication bias. There was evidence of publication bias in Cox et al., (2007) in half of the risk factors examined and some evidence of publication bias in the Brewin, Ozer and Trickey meta-analyses. No evidence of publication bias was found in Mitchell et al., (2017) which focused exclusively on maladaptive appraisals. This is consistent with the current study which found minimal evidence of publication bias.

1.29 Theoretical Implications

The strength of the relationship between maladaptive appraisals and PTSD found in this study supports claims that such appraisals characterise PTSD. Ehlers and Clark’s model of PTSD (Ehlers & Clark, 2000) suggests that maladaptive appraisals about the trauma and its sequelae cause an individual to remain in a perpetual state of current threat. The appraisals in turn influence behaviours such as avoidance and thought suppression which maintain PTSD symptoms (Ehlers & Clark, 2000). Emotional processing theory and the SPAARS model emphasise negative appraisals in maintaining the emotional experience of fear in PTSD (Dalgleish, 1999; Foa & Riggs, 1995).

The current study has shown the relationship between maladaptive appraisals and symptoms of PTSD is present across different time points, from the earliest acute phase (0 - 1 months following the traumatic event) through the chronic phase (>1 month following the traumatic event) and remains statistically significant, albeit slightly reduced, 1 year following the traumatic event. This suggests that maladaptive appraisals may be relevant in the long term, not just the short term, i.e. they are unlikely to be epiphenomena of having high levels of post-traumatic stress. This evidence supports cognitive theory that highlight maldaptive appraisals typify PTSD (Ehlers & Clark, 2000; Meiser-Stedman et al., 2009).

However, the strong relationship between maladaptive appraisals and PTSD may raise the question of whether or not measures of maladaptive appraisals are simply proxy measures of PTSD symptoms. By measuring maladaptive appraisals, are we simply measuring PTSD? This is particularly pertinent given than negative cognitions are now part of the diagnostic criteria for the disorder. Indeed, some items on assessment tools of maladaptive appraisals relate to the interpretation of intrusions or reactions since the trauma. Individuals can only score highly on such items if they are experiencing such symptoms, i.e. they have PTSD. We may have a circular argument here whereby it is impossible to identify causality: PTSD is worse if you have more maladaptive appraisals, but maladaptive appraisals are symptoms of PTSD. The new diagnostic criteria used in DSM-5 are problematic for Ehlers and Clark’s (2000) cognitive model of PTSD. In their model, negative cognitions/maladaptive appraisals related to the trauma and its sequalae are thought to *drive* a sense of current threat that maintains PTSD symptoms. Now that DSM-5 has added such cognitions to the *symptoms* of PTSD, this part of the model is called into question. Of course, interpretation of one’s symptoms may serve to maintain the disorder, but you cannot explain the symptoms of a disorder by the presence of symptoms. Studies have explored appraisals measured prior to trauma, and found that pre-trauma maladaptive appraisals predicted PTSD following trauma (Bryant & Guthrie, 2005; Bryant & Guthrie, 2007). Also, prospective studies show maladaptive appraisals in the initial time period following trauma predict PTSD over and above initial PTSD symptoms (as assessed by DSM-IV; Freeman et al., 2013; Meiser-Stedman et al., 2009; O'Donnell et al., 2007). These findings are some evidence that such cognitions and appraisals are not just *symptoms* of PTSD, rather they may be *risk factors* for the development of PTSD. Further research is needed to try and explore further the question of whether negative cognitions/ maladaptive appraisals are symptoms or risk factors for PTSD. Carefully planned longitudinal studies with adequate measures of the construct of maladpative appraisals/negative cognitions which have been adequately defined and operationalised are needed. The current meta-analysis could only *describe* the relationship between maladaptive appraisals and PTSD as measured by the tools available in the literature. As previously discussed, these tools have their limitations and further research with adequate measures is necessary to explore whether or not maladaptive appraisals play a *causal* role in PTSD or not.

1.29.1 Subtypes of maladaptive appraisal and PTSD symptoms. This study has highlighted the different relationships between *subtypes* of appraisal and PTSD symptoms. Firstly, findings in relation to adult studies will be discussed. In adults, negative appraisals about the *self* were significantly more strongly related to PTSD symptoms than negative appraisals about the *world*, followed by appraisals of *self-blame*. This pattern fits in with the types of appraisal emphasised by theoretical models of PTSD. Emotional processing theory (Foa & Cahill, 2001) and the SPAARS model (Dalgleish, 1999, 2004a) emphasise appraisals of the self as incompetent and the world as dangerous as important in PTSD. The cognitive model (Ehlers & Clark, 2000) emphasises appraisals about symptoms of PTSD and overgeneralisation appraisals that exaggerate the probability of danger in the aetiology and maintenance of PTSD. Thus the findings of this study corroborate theoretical ideas about the importance of appraisals about the self and the world.

Cognitive models of PTSD (Ehlers & Clark, 2000) distinguish between a sense of current threat that is internally driven (due to the self being incompetent) or externally driven (due to the world being a dangerous place). The finding in the current meta-analysis that appraisals about the *self* have a particularly strong relationship to PTSD symptoms suggests that an *internally* focused sense of current threat (represented by maladaptive appraisals of the self) is more important than an *externally* focused sense of threat (represented by maladaptive appraisals of the world) in PTSD. This means that a person's appraisals of themselves and their symptoms are particularly crucial. In terms of symptoms, if a person appraises their symptoms (flashbacks, irritability, mood swings) as an indication that they have permanently changed for the worse, that they cannot trust themselves or that they are a weak person who is not in control of their mind, they are at particular risk of developing PTSD (Ehlers & Clark, 2000). Such appraisals relate to the self as being weak, vulnerable and without future. As such, the person feels in a state of current threat due to their own appraised incompetence to cope in the world. Thus the individual experiences negative emotions (fear, sadness anger). The more anxiety that is present, the more the person may engage in unhelpful coping strategies such as avoidance and thought suppression. Paradoxically, these serve to exacerbate a person's symptoms, thus reinforcing the person's appraisals that they are unable to cope, weak and permanently changed for the worse. This vicious cycle serves to maintain PTSD (Ehlers and Clark, 2000; O'Donnell et al., 2007).

Foa and Rothbaum (1998) suggest that appraisals about the self may have a hierarchical preference that drives other appraisal systems, and that appraisals about the self and the world interact with each other. For example, if a person appraises themselves as completely incompetent then the world is perceived as even more dangerous. Evidence from the current meta-analysis showing appraisals about the self to be particularly important in PTSD support the hierarchical nature of self representations and suggest that higher order representations (i.e. schematic models in the SPAARS model; Dalgliesh, 2004) about the self are dominant in the aetiology and maintenance of PTSD.

The importance of maladaptive appraisals about the self also fits with the literature describing the influence of trauma on a person's sense of self. Trauma can be a turning point for a person's sense of self (Brewin & Holmes, 2003; Tim Dalgleish & Power, 2004; Dunmore et al., 2001), bringing lasting structural changes in memory and self-concept (Evans, Ehlers, Mezey, & Clark, 2007; Hunter & Andrews, 2002; L. Jobson & O'Kearney, 2008). Individuals for whom trauma has become central to their identity and life story have more PTSD symptoms (Berntsen

& Rubin, 2007). Again, the findings from the current study showing the importance of negative appraisals about the self complement these ideas about changes in self-concept and self-identity in PTSD.

Despite the strong empirical evidence for the role of negative self appraisals in PTSD, the specificity of negative appraisals about the self has been called into question. Whilst some studies suggest appraisals are disorder specific (Ehring et al., 2006), other research has shown negative appraisals about the self predict depression as much as they predict PTSD (Kleim et al., 2012). The current meta-analysis did not assess the relationship of appraisals and depression. Further meta-analyses may wish to focus on subtypes of maladaptive appraisal in the different psychological disorders common after trauma (PTSD, depression, phobia). This would help to elucidate the specificity of different types of appraisals to different psychological disorders.

Although the relationship between self-blame and PTSD symptoms was significant, it was the subtype of appraisal with the weakest relationship with PTSD symptoms in the current study. Doubts have been raised about the validity of the self-blame subscale of the PTCI, with some research showing no relationship between self-blame symptoms and PTSD (Beck et al., 2004; Kolts, Robinson, & Tracy, 2004) using this measure. Furthermore, research has shown self-blame to be associated with *lower* levels of PTSD (Startup et al., 2007). One contribution to this disparity could be the different conceptualisations of self-blame. A distinction has been made between behavioural self-blame (attributing the cause of traumatic events to modifiable characteristics of oneself) and characterological self-blame (attributing the cause of events to something unchangeable about the self, e.g. your personality; Janoff-Bulman, 1992). Behavioural self-blame is thought to lead to less posttraumatic stress as it leads individuals to feel they have more control over events and therefore can change their actions to reduce their likelihood of experiencing traumatic events in the future (Janoff-Bulman, 1992; Startup et al., 2007). Characterological self-blame may lead to an increased risk of PTSD as it relates to aspects of the self that are less amenable to change, e.g. the personality. The self-blame subscale of the PTCI does not distinguish between behavioural and characterological components of self-blame. As such, it seems possible that the relative weakness of the association between self-blame as measured on the PTCI with PTSD symptoms could be accounted for by the fact that these subtypes of self-blame were mixed together. Another explanation for the weaker relationship could be that self-blame may be important in the aetiology of PTSD for some individuals but not others (whereas negative appraisals about the self are more of a universal risk factor). Further research is necessary to explore these ideas.

1.29.2 Maladaptive appraisals and PTSD symptoms in child and adolescent studies. Attention should be drawn to the strong relationship between maladaptive appraisals and PTSD symptoms in child and adolescent studies of PTSD. The relationship between appraisals and PTSD was stronger for child and adolescent studies than for adult studies. On one hand, this might seem surprising. PTSD may be manifested differently across different stages of childhood due to the many and uneven changes in functioning and cognitive development that occur during this time (Fletcher, 1996; Mash & Terdal, 1997; Meiser-Stedman et al., 2008; Salmon & Bryant, 2002). Children below the age of about 8 years may not be able to manage their thinking or regulate their emotions after a traumatic experience. The ability to appraise the significance of traumatic event and its sequelae in relation to their experience and knowledge about the world will also be different, depending on the age of the child. Children aged around 7 or 8 years may start to reflect on their thoughts and how they link to their feelings, and are more capable of appraising their own mental processes than younger children. By aged 10, children will start to conceptualise more complex emotions (Salmon & Bryant, 2002). The very strong relationship between children's appraisals and PTSD symptoms at first glance may therefore seem surprising. However, the age range of the participants in the studies included in this meta-analysis did not include very young children (the youngest mean age for the studies included in this meta-analysis was 9.9 years, the median age being 13.5 years). By this stage, children will have developed at least some complex cognitive and emotional capacity enabling them to appraise traumatic situations and their responses (Harris, 1994; Salmon & Bryant, 2002). The World Health Organisation define an adolescent as any person between the age of 10 and 19 and so rather than considering *child* and adolescent studies, really the current meta-analysis only explored *adolescent* studies. During adolescence, huge cognitive, emotional and social development is underway (Moshman, 1998). It is a developmental stage in which young people are struggling to make sense of themselves and the world (Christie & Viner, 2005). It is not surprising that the adolescent brain could struggle to make sense of a traumatic event and this in turn could have a significant impact on the development and maintenance of PTSD. Our findings support calls to pay particular care to adolescents, who are at a vulnerable developmental stage in terms of their mental health (British Psychological Society, 2015; NHS, 2014; Patel, Flisher, Hetrick, & McGorry;). Supporting adolescents to make sense of and recover from trauma is particularly important.

In the current study, only 12 studies looked at appraisals and PTSD symptoms in children/adolescents, limiting the generalisation of these findings. It will be important in future studies to explore the role of appraisals in different age groups and developmental stages, perhaps exploring cognitive and emotional abilities in relation to appraisals and PTSD symptoms. Further research on the role of parents in facilitating discussions about the trauma and helping the child to appraise traumatic events would also be informative.

Another factor that might contribute to the effect size found in the child and adolescent studies could be the measures used to assess appraisals. From subgroup analysis, it was clear that the measure of maladaptive appraisal accounted for a significant amount of heterogeneity in the effect size. The CPTCI was used in the majority of child studies and it may simply have measured a stronger relationship with PTSD symptoms than other assessments. This is not an unlikely explanation, as many of the items in the CPTCI relate to appraisals about the self and we know from the adult studies considered here that appraisals about the self show the strongest relationship with PTSD symptoms. Moreover, the CPTCI does not contain a self-blame scale, which we have seen from the adult studies has the weakest relationship with PTSD symptoms. This may therefore account for the larger effect size seen in child and adolescent studies.

In terms of the analysis exploring the subscales of the CPTCI, no difference was found between appraisals of being a fragile person in a scary world and appraisals of permanent change. This may again be down to the larger number of items relating to the self in the fragile person/scary world subscale, and perhaps future research could look at appraisals of the self in children by examining responses to items relating to the self and their relationship to PTSD symptoms.

1.30 Clinical Implications

The strong relationship found between maladaptive appraisals and PTSD symptoms across populations and types of trauma reinforces their role as a primary target for psychological intervention. Assessment and treatment of maladaptive appraisals should be a priority for clinicians working with children and adults with PTSD. The individual person's maladaptive appraisals should also be included in case formulation, particularly when using the cognitive model.

1.30.1 Subtypes of maladaptive appraisal. The current study found that maladaptive appraisals about the self had the strongest relationship with PTSD symptoms in adults, followed by maladaptive appraisals about the world then self-blame appraisals. This suggests the priority for treatment should be maladaptive appraisals about the *self*. Treatment such as trauma focused CBT (Ehlers & Wild, 2015) should focus on helping the person to recover a sense of him- or herself as a worthy person who is in control and who is not "damaged".

Maladaptive appraisals about the world are also important to address, but given their relationship to PTSD symptoms is not as strong as appraisals about the self, perhaps their priority is somewhat lower in treatment. Self-blame appraisals showed the weakest relationship with PTSD symptoms. This could be because they are not as important in the aetiology of PTSD as self or world appraisals, or it may be that they are important only for some people, or that characterological self-blame is only a risk factor. Further research needs to explore this.

In children and young people, maladaptive appraisals per se are important, with no difference between subtypes of appraisal. Given the strength of the relationship between appraisals and PTSD in child studies, maladaptive appraisals should have an equal or greater emphasis in treatments for children and adolescents with PTSD.

1.30.2 Trauma characteristics. It is interesting to comment on the fact that trauma characteristics did not moderate the effect size in any of the analyses. With respect to interpersonal trauma versus other types of trauma, and intentional versus unintentional trauma, it suggests that whilst these traumatic events may be extremely unpleasant, it is the wider effect from any trauma on a person's sense of self (that you are weak, vulnerable, not in control and permanently changed) that seems to drive PTSD; your trust in *others* being shattered following PTSD seems to be less significant than your trust in *yourself* being shattered. Therefore, building up a sense of yourself as capable and able to cope is particularly important for treatment, regardless of the traumatic experience the person may have gone through.

1.30.3 Complex trauma. Maladaptive appraisals of the self may be particularly important to address in individuals who have experienced multiple traumatic events (often described as complex trauma). The current study found that the relationship between maladaptive appraisals about the self and PTSD in those exposed to *multiple* trauma was especially strong ($r = 0.74$ in self vs $r = 0.34$ for both self-blame and world), though these findings are only preliminary given the very small number of studies on multiple trauma ($k = 3$). This makes intuitive sense, as maladaptive appraisals that one is incompetent, vulnerable and not in control seems to be more likely if multiple traumatic events have been experienced.

This finding supports the emphasis on negative self-concept in the new ICD-11 criteria for complex trauma which specifies appraisals about oneself as diminished, defeated or worthless in the diagnostic criteria (Cloitre, Garvert, Brewin, Bryant, & Maercker, 2013).

In terms of treatment for complex trauma, this finding suggests maladaptive appraisals about the self may be equally pertinent targets for treatment as the affect regulation training currently indicated by treatment models such as the STAIR model (Skills Training in Affective and Interpersonal Regulation; Cloitre, Koenen, Cohen, & Han, 2002).

1.30.4 Screening. The finding in this study that appraisals within one month of trauma are related to PTSD symptoms up to one year after the traumatic event suggests that appraisals may be something to include in screening for individuals who may be at risk of developing PTSD following a traumatic event. Future studies may wish to explore whether or not including appraisals in screening measures following trauma is clinically useful to identify individuals who are at risk of developing PTSD and offering early intervention. For children and young people, a short form of the CPTCI may be helpful to identify children with high levels of maladaptive appraisals. The CPTCI-S has good psychometric properties, and may be a useful clinical tool for this (McKinnon et al., 2016).

1.30.5 Measures. The current study found a significant amount of heterogeneity was explained by the measure used to assess maladaptive appraisals. The strongest relationship between maladaptive appraisals and PTSD symptoms was found for the Interpretation of PTSD Symptoms Inventory (Dunmore, Clark & Ehlers, 1999). Whilst it has good psychometric properties (see Table 1.1.), this scale has not been subject to a peer reviewed publication. It was a precursor to the PTCI and focuses primarily on the appraisal of *symptoms.* This measure is therefore likely to have the strongest relationship to PTSD due to the confound of only being able to score highly on this measure if you actually *have* symptoms of PTSD, i.e. it may be acting as a proxy measure for PTSD itself. Also, these items are more related to the *self*, which we know from the current study to have the strongest relationship to PTSD. No items relate to the world or to self-blame.

The lowest association between appraisals and PTSD symptoms was found for studies using the World Assumptions Scale (WAS; Janoff-Bulman, 1989). This scale has psychometric issues, such as poor test-retest reliability, poor construct validity and unstable factor structure (Elklit, Shevlin, Solomon & Dekel, 2007; Kaler, Frazier, Anders, Tashiro, Tomich, Tennen & Park, 2008). Therefore the apparent weak relationship between appraisals measured on the WAS and PTSD symptoms may be a result of the poor psychometric properties of the measure. Also, the WAS could arguably be measuring a slightly different construct, namely world *assumptions*, not appraisals. These assumptions may be held at the schema level of knowledge, rather than the more consciously available knowledge involved with making appraisals.

Given the significant amount of heterogeneity accounted for by measure of maladaptive appraisals, it is recommended that tools with sound psychometric properties be used for both clinical and research purposes if maladaptive appraisals are a construct of interest. Further measures should be developed that specify trauma specific appraisals as these may be more useful in clinical settings.

1.31 Suggestions for Future Research

The current study has highlighted several areas that may be fruitful areas of research in the future. Firstly, the current study has highlighted a reliance in the PTSD literature on the PTCI and CPTCI as measures of maladaptive appraisals. These measures are limited by the fact that their items do not operationalise maladaptive appraisals as specified by the cognitive model of PTSD. Further research into the development of these items to further specify appraisals relevant to

PTSD and the cognitive model would be of benefit. For example, Fairbrother (2003) used the cognitive model to develop the Sexual Abuse and Rape Appraisals (SARA) questionnaire. This measure has considerably more items labelling appraisals specifically related to the traumatic event and its impact. Perhaps further studies should endeavour to pursue similar lines of research in relation to a wider range of traumatic events. Consideration should also be given to more narrative measures of maladaptive appraisals, perhaps using interviews rather than self-report questionnaires. Further research is necessary to evaluate what measures are most suitable for operationalising maladaptive appraisals in the aftermath of trauma. This is especially important given their inclusion in the new DSM-5 diagnostic criteria.

More studies in children and adolescent populations are needed. There were no studies in this meta-analysis looking at very young children. Further research looking at the role of appraisals in the aetiology of PTSD at different ages and developmental stages will be essential to understand the application of cognitive models to young children, who may not have the meta-cognitive capacity to appraise traumatic events in the same way as adults and/ or may present their distress differently. Exploration of the role of parental appraisals and children's appraisals and how they interact with each other in the aetiology of PTSD in children would also be useful.

A limitation of the current study was the difficulty with looking at the relationship between maladaptive appraisals and PTSD at long term follow-up. Only 3 studies looked at PTSD symptoms 1 year following the trauma. Research efforts should therefore be focused at longer-term follow up of trauma survivors, even beyond the 1 year mark, to explore the role of appraisals at different time-points following trauma. Related to this is longitudinal research that looks at the causal role of appraisals in the aetiology and maintenance of PTSD. Promising research in this area have highlighted a dynamic role for appraisals in the development and maintenance of PTSD (O'Donnell et al., 2007) and further research could provide further evidence for the cognitive model of PTSD and the causative role of maladaptive appraisals.

More research needs to be done looking at appraisals in military samples as there were very few military studies included in the current meta-analysis. The military is a highly vulnerable population and it seems likely that appraisals of military personnel exposed to trauma in the context of military service would vary to those of civilians. In previous meta-analyses, military or civilian population has been a moderator of effect size for risk factors for PTSD (Brewin et al., 2000; Ozer et al., 2003). I

The current meta-analysis also highlighted a lack of studies exploring appraisals in multiple complex trauma populations. These individuals may have an especially damaged sense of self, and further research to explore this is essential, particularly given the role of appraisals of the self in new ICD-11 diagnostic criteria.

Future studies may wish to explore the role of self-blame in PTSD in more detail. It was not possible in this study to compare the relationship between behavioural self-blame and characterological self-blame and PTSD symptoms. Studies using more nuanced measures of self-blame than the PTCI would be informative in exploring the possible protective role of behavioural self-blame and the possible risk factor of characterological self-blame.

Given the importance of negative appraisals about the self in PTSD, it is of interest in future to explore the role of positive appraisals about the self following trauma. Emerging literature in positive psychology suggests that for some people, traumatic events can cause changes in the self that are positive and valued, otherwise known as “posttraumatic growth” (Tedeschi & Calhoun, 1996). Future studies could focus on the types of appraisal following trauma that link to posttraumatic growth instead of posttraumatic stress. Some research has emphasised appraisals of challenge are positively correlated with posttraumatic growth (Ogińska-Bulik & Kobylarczyk, 2016) and fewer negative appraisals about the self are correlated with posttraumatic growth (Barton, Boals, & Knowles, 2013). Greater understanding of such appraisals would have important implications for prevention and treatment of PTSD as well as for theoretical models of PTSD (Boals, Schuettler, & Southard-Dobbs, 2015).

Treatment studies were excluded from the current meta-analysis because those involved in treatment trials of PTSD would be positive for the disorder, and thus the variability in PTSD symptoms in the sample would have been lower. The current meta-analysis was concerned with the relationship between maladaptive appraisals and PTSD symptoms in individuals exposed to traumatic events. Thus there is scope for another meta-analysis of treatment studies that measured change in maladaptive appraisals during treatment. This research would increase the evidence for the role of modifying maladaptive appraisals in reducing PTSD symptoms and is therefore highly clinically significant.

1.32 Conclusion

The current study explored the relationship between maladaptive appraisals and PTSD symptoms. Results showed a very large effect size for this relationship that was robust to sensitivity analysis and publication bias. In adults, there was a clear difference between subtypes of maladaptive appraisal, with maladaptive appraisals about the self having the strongest relationship to PTSD symptoms, followed by appraisals about the world and self-blame. The relationship between maladaptive appraisals and PTSD was stronger in child studies than adult studies and the relationship remained significant (if slightly weaker) up to 1 year following trauma.

This study has highlighted several important patterns. Firstly, it has demonstrated that maladaptive appraisals, as measured by the instruments available in the PTSD literature, characterise posttraumatic stress disorder It has also shown that the PTSD field has come to rely on the PTCI and CPTCI to measure maladaptive appraisals. This is questionable, due to the fact that these measures do not operationalise the appraisals outlined in the cognitive model of the disorder very well, and are arguably too generic. There is a clear avenue for future research to develop superior measures of maladaptive appraisals that are specific to posttraumatic stress, and to explore the specificity of these appraisals in PTSD as opposed to other psychological disorders that may develop following a traumatic event.

The study also has clear clinical implications. Maladaptive appraisals should be important targets for intervention in children, young people and adults. Maladaptive appraisals about the self seem to be especially important in adults. This study has demonstrated that not all negative appraisals are equal. Negative appraisals about the *self* are more powerful and relevant to the experience of PTSD than appraisals about the *world* or *self-blame*. This shows that people with PTSD are not just more negative in general (otherwise they would be negative about everything), but that they are particularly more negative about *themselves*.

More longitudinal studies and more studies looking at appraisals in military samples and complex trauma populations are needed. Future meta-analyses could explore the specificity of maladaptive appraisals to PTSD symptoms in comparison with other emotional reactions following a traumatic event such as depression or phobia. It would also be useful to explore the role of modifying maladaptive appraisals in treatment and the role of positive appraisals linking to posttraumatic growth.

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Appendix A

PROSPERO Entry

PROSPERO International prospective register of systematic reviews

Review title and timescale

1 Review title
Give the working title of the review. This must be in English. Ideally it should state succinctly the interventions or exposures being reviewed and the associated health or social problem being addressed in the review.
A meta-analysis examining the relationship between maladaptive appraisals and symptoms of Posttraumatic Stress Disorder in children and adults

2 Original language title
For reviews in languages other than English, this field should be used to enter the title in the language of the review. This will be displayed together with the English language title.

3 Anticipated or actual start date
Give the date when the systematic review commenced, or is expected to commence.
21/09/2015

4 Anticipated completion date
Give the date by which the review is expected to be completed.
02/01/2017

5 Stage of review at time of this submission
Indicate the stage of progress of the review by ticking the relevant boxes. Reviews that have progressed beyond the point of completing data extraction at the time of initial registration are not eligible for inclusion in PROSPERO. This field should be updated when any amendments are made to a published record.

The review has not yet started ×

Review stage	Started	Completed
Preliminary searches	Yes	Yes
Piloting of the study selection process	Yes	Yes
Formal screening of search results against eligibility criteria	Yes	Yes
Data extraction	Yes	No
Risk of bias (quality) assessment	Yes	No
Data analysis	No	No

Provide any other relevant information about the stage of the review here.
Proposal passed DClinPsy assessment at University of East Anglia 1/9/2015.

Review team details

6 Named contact
The named contact acts as the guarantor for the accuracy of the information presented in the register record.
Gina Gomez de la Cuesta

7 Named contact email
Enter the electronic mail address of the named contact.
g.gomez-de-la-cuesta@uea.ac.uk

8 Named contact address
Enter the full postal address for the named contact.
University of East Anglia Norwich Research Park NR7

9 Named contact phone number
Enter the telephone number for the named contact, including international dialing code.
+44 (0)7739 396288

10 Organisational affiliation of the review
Full title of the organisational affiliations for this review, and website address if available. This field may be completed as 'None' if the review is not affiliated to any organisation.
University of East Anglia
Website address:
www.uea.ac.uk

11 Review team members and their organisational affiliations
Give the title, first name and last name of all members of the team working directly on the review. Give the organisational affiliations of each member of the review team.

Title	First name	Last name	Affiliation
Dr	Gina	Gomez de la Cuesta	University of East Anglia
Dr	Richard	Meiser-Stedman	University of East Anglia
Dr	Judith	Young	University of East Anglia
Dr	Susanne	Schweizer	University of Cambridge
Dr	Julia	Diehle	Kings College, London

12 Funding sources/sponsors
Give details of the individuals, organizations, groups or other legal entities who take responsibility for initiating, managing, sponsoring and/or financing the review. Any unique identification numbers assigned to the review by the individuals or bodies listed should be included.
University of East Anglia, Clinical Psychology Department (Med School)

13 Conflicts of interest
List any conditions that could lead to actual or perceived undue influence on judgements concerning the main topic investigated in the review.
Are there any actual or potential conflicts of interest?
None known

14 Collaborators
Give the name, affiliation and role of any individuals or organisations who are working on the review but who are not listed as review team members.

Title	First name	Last name	Organisation details

1 Review question(s)
5 State the question(s) to be addressed / review objectives. Please complete a separate box for each question.
1. What is the nature of the relationship between maladaptive appraisals and PTSD symptoms?
2. What theoretical, population and methodological variables moderate the effect size?
3. What is the relationship between subtypes of maladaptive appraisal and PTSD symptoms?

1 Searches
6 Give details of the sources to be searched, and any restrictions (e.g. language or publication period). The full search strategy is not required, but may be supplied as a link or attachment.
Studies will be selected following a systematic search for publications between 1980 (when PTSD was first introduced in the DSM) in the following psychological and medical literature databases: PsycINFO, MEDLINE and the National Center for PTSD research’s Published International Literature on Traumatic Stress (PILOTS) database (US Department of Veterans Affairs, 2015). The Journal of Traumatic Stress and citations of the PTCI and CPTCI will also be searched. Reference sections from review articles, book chapters and studies selected for inclusion will be searched for further studies. Key authors will be contacted via email to request any unpublished data relevant to the study. In addition, data from unpublished dissertations will be included if their abstracts include sufficient information about the effect size and sample size.

1 URL to search strategy
7 If you have one, give the link to your search strategy here. Alternatively you can e-mail this to PROSPERO and we will store and link to it.

I give permission for this file to be made publicly available
Yes

1 Condition or domain being studied
8 Give a short description of the disease, condition or healthcare domain being studied. This could include health and wellbeing outcomes.
Posttraumatic Stress Disorder. Maladaptive appraisals.

1 Participants/population
9 Give summary criteria for the participants or populations being studied by the review. The preferred format includes details of both inclusion and exclusion criteria.
• Studies include participants who have been exposed to a single event trauma (e.g. road traffic accident) or multi-event trauma (e.g. domestic violence) sufficient to meet Criterion A in the diagnostic criteria for PTSD (American Psychiatric Association, 2013). • Studies include a measure of PTSD that considers intrusions, avoidance and hyperarousal (there are currently no validated measures using revised DSM-5 criteria which include negative cognitions and mood) and demonstrates adequate reliability and validity via publication of their psychometric properties in a peer reviewed journal. Studies reporting continuous data and diagnostic status will both be included. • Studies include a measure of maladaptive appraisals, operationally defined as how you see yourself, the world or your symptoms in the aftermath of trauma.

2 Intervention(s), exposure(s)
0 Give full and clear descriptions of the nature of the interventions or the exposures to be reviewed
None

2 Comparator(s)/control
1 Where relevant, give details of the alternatives against which the main subject/topic of the review will be compared (e.g. another intervention or a non-exposed control group).
Not applicable

2 Types of study to be included
2 Give details of the study designs to be included in the review. If there are no restrictions on the types of study design eligible for inclusion, this should be stated.
Inclusion and Exclusion Criteria. To be included in the analysis, studies will have to meet the following inclusion criteria: • Includes participants who have been exposed to a single event trauma (e.g. road traffic accident) or multi-event trauma (e.g. domestic violence) sufficient to meet Criterion A in the DSM-5 diagnostic criteria for PTSD (American Psychiatric Association, 2015). • Includes a measure of PTSD that considers intrusions, avoidance and hyperarousal or a measure of Acute Stress Disorder, which demonstrates adequate reliability and validity via publication of their psychometric properties in a peer reviewed journal. Studies reporting continuous data and diagnostic status will both be included. • Include a measure of maladaptive appraisals, operationally defined as how you see yourself, the world or your symptoms in the aftermath of trauma. Studies will be excluded on the following grounds: • Review article, case study or book chapter. • Treatment trial or sample consisting only of treatment seeking individuals. • Not published in English. • Dissertation abstract that does not give sample size and effect size and unable to access the full dissertation after contacting authors. • The trauma is a psychotic episode. • Measures only the appraisal of threat to life during the traumatic event. This has been addressed in previous meta-analyses (Cox et al., 2008; Ellis, 2010; Ozer et al., 2003; Trickey et al., 2012). • Measures appraisals at the time of trauma rather than in the aftermath of trauma (e.g. appraisal of treatment, appraisal of the traumatic experience as it was happening). • Measures coping self-efficacy or appraisal of ability to cope with the practical demands of life after trauma. • Data set previously included in another study. Estimates will be taken from the peer reviewed journal article or the largest sample where more than one study or dissertation uses the same data set. • Study does not provide an effect size, nor sufficient data to calculate an effect size even after contacting authors. • The study sample consists entirely of individuals who filled the full diagnostic criteria for PTSD (e.g. treatment seeking-sample, part of treatment study with no comparison group without PTSD symptoms) • Data from individuals with PTSD is combined with data of individuals with other diagnoses (e.g. depression) • Participants also have a traumatic brain injury • The article only presented qualitative analyses

2 Context
3 Give summary details of the setting and other relevant characteristics which help define the inclusion or exclusion criteria.

2 Primary outcome(s)
4 Give the most important outcomes.
An effect size of the relationship between scores on measures of maladaptive cognitive appraisals (for example, measured by the Post Traumatic Cognitions Inventory) and Posttraumatic Stress symptoms (measures must considers intrusions, avoidance and hyperarousal and demonstrate adequate reliability and validity).
Give information on timing and effect measures, as appropriate.

2 Secondary outcomes
5 List any additional outcomes that will be addressed. If there are no secondary outcomes enter None.
None

Give information on timing and effect measures, as appropriate.

2 Data extraction (selection and coding)

6 Give the procedure for selecting studies for the review and extracting data, including the number of researchers involved and how discrepancies will be resolved. List the data to be extracted.

Selection of Studies: Studies will be selected following a systematic search for publications between 1980 (when PTSD was first introduced in the DSM) in the following psychological and medical literature databases: PsycINFO, MEDLINE and the National Center for PTSD research's Published International Literature on Traumatic Stress (PILOTS) database (US Department of Veterans Affairs, 2015). The Journal of Traumatic Stress and citations of the PTCI and CPTCI will also be searched. Reference sections from review articles, book chapters and studies selected for inclusion will be searched for further studies. Unpublished results: Results from meta-analyses can be affected by availability bias: missing crucial data by only including studies that are readily available. For example, statistically significant results are more likely to be reported by researchers and published by editors, leading to a publication bias and an artificial inflation of the effect size (small effects are less likely to achieve statistical significance and are therefore less likely to get published). Searching the PILOTS database will help to uncover grey literature (from articles and magazines) and go some way to mitigate against availability bias. In addition, data from unpublished dissertations will be included if their abstracts include sufficient information about the effect size and sample size. Unfortunately, it will be too time consuming to access full dissertations. Key authors will be contacted via email to request any unpublished data relevant to the study. Obtaining results from just a few unpublished studies will enable a calculation of the severity of the availability bias (Ellis, 2010; see methods). Search terms: Search terms will be as follows (all terms will be 'exploded' within the databases where possible to ensure inclusion of all relevant articles): 1. PTSD OR Posttraumatic stress OR Post-traumatic stress OR Post traumatic stress OR traumatic neurosis 2. Cognitive appraisal* OR appraisal* OR negative cognition* 3. Combine search terms 1 AND 2 Inclusion and exclusion criteria: To be included in the analysis, studies will have to meet the following inclusion criteria: • Includes participants who have been exposed to a single event trauma (e.g. road traffic accident) or multi-event trauma (e.g. domestic violence) sufficient to meet Criterion A in the diagnostic criteria for PTSD (American Psychiatric Association, 2013). • Include a measure of PTSD that considers intrusions, avoidance and hyperarousal (there are currently no validated measures using revised DSM-5 criteria which include negative cognitions and mood) and demonstrates adequate reliability and validity via publication of their psychometric properties in a peer reviewed journal. Studies reporting continuous data and diagnostic status will both be included. • Include a measure of maladaptive appraisals, operationally defined as how you see yourself, the world or your symptoms in the aftermath of trauma. Studies will be excluded on the following grounds: • They are review articles, case studies or book chapters. • They are treatment trials. • They are not published in English. • The dissertation abstract does not give sample size and effect size. • The trauma dealt with is a psychotic episode. • They measure only the appraisal of threat to life during the traumatic event. This has been addressed in previous meta-analyses (Cox et al., 2008; Ellis, 2010; Ozer et al., 2003; Trickey et al., 2012). • They include data sets previously included in another study. Estimates will be taken from the peer reviewed journal article or the largest sample where more than one study or dissertation uses the same data set. • They do not provide an effect size, nor sufficient data to calculate an effect size even after contacting authors. A preliminary search of PsycINFO found 264 abstracts, of which 72 were possible studies for inclusion based on the criteria outlined above, suggesting that this meta-analysis is feasible in the timescale for a doctoral thesis. The process of article selection will be mapped using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher, Liberati, Tetzlaff, & Altman, 2009). Abstracts will be screened by Gina Gomez using the inclusion and exclusion criteria outlined above. A voluntary research assistant who has been identified by Richard Meiser-Stedman will be asked to review all excluded abstracts to ensure decisions were consistent with inclusion/exclusion criteria. Full articles will then be screened by Gina Gomez and the volunteer research assistant. Inter-rater reliability will be calculated and where disagreements occur, a consensus meeting will be held to come to a decision about study inclusion. A table of studies included in the review will be produced and a list made of excluded studies and the reasons for their exclusion. The protocol for the meta-analysis will be submitted for publication in advance on PROSPERO, the International Prospective Register of Systematic Reviews (National Institute for Health Research & University of York, 2015). Study Quality: The influence of study quality will be assessed by examining the results of high quality and low quality studies separately. Study quality will be appraised using the NICE Quality Appraisal Checklist for Quantitative Studies Reporting Correlations and Associations (National Institute for Health and Care Excellence, 2012). This checklist enables the appraisal of internal and external validity of studies. The checklist will be completed by Gina Gomez and a subset of 20% of the papers will be double-coded by a research supervisor to assess inter-rater reliability. Coding of Studies and Data Extraction: All eligible studies will be coded for the following information: date of publication, country of origin, quality rating, sample size, mean age of sample, age range of sample; child/adolescent or adult sample, percentage male and female, type of trauma experienced (road traffic accident or injury; combat exposure; natural or human disaster; sexual abuse or interpersonal violence), single or multi-event trauma; intentional or unintentional trauma; study design (cross-sectional or longitudinal); time between trauma exposure and assessment of PTSD (0-1 months following trauma; > 1month following trauma), population (civilian or military); measure of PTSD; type of PTSD assessment (interview or self-report questionnaire); measure of maladaptive appraisal (validated questionnaire or other); effect size (r) of maladaptive appraisals (full measure); degrees of freedom. For studies using the PTCI, additional information will be coded as follows: effect size (r) of negative cognitions about the self, effect size (r) of negative cognitions about the world, effect size (r) of self-blame. For studies using the CPTCI additional information will be coded as follows: effect size (r) of permanent and disturbing change; effect size (r) of fragile person in a scary world. Data extraction will be cross-checked by a research supervisor for errors.

2 Risk of bias (quality) assessment
7 State whether and how risk of bias will be assessed, how the quality of individual studies will be assessed, and whether and how this will influence the planned synthesis.

Study Quality: The influence of study quality will be assessed by examining the results of high quality and low quality studies separately. Study quality will be appraised using a risk of bias assessment developed for use in this study.

Exploration of study quality and bias: To assess the effect of study quality, mean effect size estimates of high quality and low studies will be calculated separately and compared. To calculate the availability bias, mean estimates obtained from published and unpublished studies will be compared. In addition, a funnel plot will be drawn up, showing a scatter plot of the effect sizes from the individual studies included in the meta-analysis. If the funnel plot is skewed and asymmetrical then this indicates the presence of an availability bias. A “fail-safe N” calculation will also be performed. The fail-safe N is the minimum number of additional studies with conflicting evidence that would be needed to overturn the conclusion reached in the meta-analysis (Ellis, 2010). The higher the fail-safe N, the more confidence one can have in the conclusions drawn, and it should be higher than 5k + 10 (where k is the number of studies included in the meta-analysis; Rosenthal, 1979). If bias is detected, then Vevea & Woods’ (2005) method for correcting for publication bias will be used to correct the population effect size estimate using the statistical package R and the methods described by Field & Gillet (2010). If the population effect size estimate is unchanged after applying a severe selection bias model, then one can be confident the effect size estimate is not compromised by bias.

2 Strategy for data synthesis

8 Give the planned general approach to be used, for example whether the data to be used will be aggregate or at the level of individual participants, and whether a quantitative or narrative (descriptive) synthesis is planned. Where appropriate a brief outline of analytic approach should be given.

Effect sizes from each study will be tabulated and presented in a stem and leaf plot to illustrate the shape of the distribution, i.e. whether it is skewed or symmetrical, how many peaks it has and whether there are any outliers. A box plot will also be presented to assess the middle of the distribution, its spread and any outliers. If these show outliers, then “winsorising” will be used to reduce the influence of the outlier, but retain the data. Winsorising involves taking the next highest score to the outlier, and using that to replace the outlier in analysis (Ruppert, 2004). Hedges’ method (Hedges & Olkin, 1985) will be used to calculate an estimate of population effect size. In this method, each effect size is weighted by a value reflecting the within study variance ($V = 1/n-3$ where n is the sample size) and the between study variance ($T2= Q-df/C$). These values will be calculated following the method outlined in Borenstein et al. (2009). R values extracted or calculated from the individual studies will be transformed into a Fisher’s Z score for use in the analysis and then transformed back to the Pearson product moment correlation (r) for interpretation using the procedure outlined by Field & Gillet (2010). Results will give an estimate of the mean of the distribution of effect sizes, an estimate of the standard error, the variance of the distribution, a confidence interval for the mean effect size and a chi-squared test of homogeneity. The statistical significance of the effect size will also be calculated. A Forrest Plot will be presented showing the population effect size estimate, the 95% confidence interval of the mean (assessing the accuracy of the mean), and the prediction interval (assessing the actual variance of effect sizes).

2 Analysis of subgroups or subsets

9 Give any planned exploration of subgroups or subsets within the review. 'None planned' is a valid response if no subgroup analyses are planned.
The following study characteristics will be explored as moderators: Theoretical influences: • Trauma type (accident or injury; combat exposure; natural or human disaster; sexual abuse or interpersonal violence) • Single trauma (e.g. road traffic accident) vs multiple trauma (e.g. domestic abuse) • Intentional trauma (e.g. violent attack) vs unintentional trauma (e.g. earthquake) Population influences: • Study population (civilian versus military sample) • Age of population (child/adolescent or adult) Methodological influences: • Study design (cross-sectional or longitudinal) • Measure of PTSD (dichotomous or continuous) • Method of PTSD measure (questionnaire or interview) • Measure of maladaptive appraisals (validated questionnaire or likert scale rating of single item) • Time PTSD symptoms measured (0-1 months following trauma, i.e. acute symptoms; > 1 month following trauma, i.e. PTSD symptoms) A random effects meta-regression will be used to test the impact of the above moderator variables on the effect size. For the purposes of this study moderator variables will only be included in the meta-regression analysis if there are at least 10 studies assessing the variable in question (this is the rule of thumb recommended for multiple regression in primary studies as there are no current recommendations for meta-regression; Borenstein et al., 2009). Meta-regression has advantages over subgroup analysis as it focuses on the differences between subgroups rather than the effects in each subgroup separately (Thompson & Higgins, 2002). Following a random effects model will also take the residual heterogeneity not explained by the subgroups of the moderator variable into account. In the random effects meta-regression, studies will be weighted according to the variance within studies plus the variance between studies (in meta-regression, this is the dispersion of true effects for studies with the same value on the moderator variable). The meta-regression will be carried out following procedures outlined by Field & Gillet (2010). As there are 10 moderator variables, to guard against a Type I error (finding an effect when none exists) the Holm method will be used to adjust the level of significance (Holm, 1979). Research question 3: What is the relationship between subtypes of maladaptive appraisal and PTSD symptoms in youth and adults separately? Adult studies using the PTCI will be subject to three separate meta-analyses. Correlation co-efficients between PTSD symptoms and the three factors of the PTCI ('negative cognitions about the self'; 'negative cognitions about the world' and 'self-blame') will be extracted and used in separate meta- analyses using a random effects model as outlined for research question 1. This will give an estimate of the effect size of the relationship between each maladaptive appraisal subtype and PTSD symptoms. Child studies using the CPTCI will be subject to two separate meta-analyses of the factors 'permanent and disturbing change' and 'fragile person in a scary world'. An estimate of the effect size for these subtypes of maladaptive appraisal will be calculated using a random effects meta-analysis using the same methods as research question 1.

Review general information

3 Type and method of review
0 Select the type of review and the review method from the drop down list.
Epidemiologic, Systematic review

3 Language
1 Select the language(s) in which the review is being written and will be made available, from the drop down list. Use the control key to select more than one language.
English
Will a summary/abstract be made available in English?
Yes

3 Country
2 Select the country in which the review is being carried out from the drop down list. For multi-national collaborations select all the countries involved. Use the control key to select more than one country.
England

3 Other registration details
3 Give the name of any organisation where the systematic review title or protocol is registered together with any unique identification number assigned. If extracted data will be stored and made available through a repository such as the Systematic Review Data Repository (SRDR), details and a link should be included here.
This meta-analysis is part of Dr Gomez de la Cuesta's doctoral thesis for the doctorate in Clinical Psychology at the University of East Anglia and is therefore registered there.

3 Reference and/or URL for published protocol
4 Give the citation for the published protocol, if there is one.
Give the link to the published protocol, if there is one. This may be to an external site or to a protocol deposited with CRD in pdf format.
http://www.crd.york.ac.uk/PROSPEROFILES/26224_PROTOCOL_20150814.pdf
I give permission for this file to be made publicly available
No

3 Dissemination plans
5 Give brief details of plans for communicating essential messages from the review to the appropriate audiences.
Results will be submitted to a peer reviewed journal such as Clinical Psychology Review for publication and presented at relevant conferences if accepted. A summary of the findings will be made available to relevant services in East Anglia and PTSD support groups.
Do you intend to publish the review on completion?
Yes

3 Keywords
6 Give words or phrases that best describe the review. (One word per box, create a new box for each term)
Posttraumatic Stress Disorder
Cognitive appraisal
Maladaptive appraisal

3 Details of any existing review of the same topic by the same authors
7 Give details of earlier versions of the systematic review if an update of an existing review is being registered, including full bibliographic reference if possible.

3 Current review status
8 Review status should be updated when the review is completed and when it is published.
Ongoing

3 Any additional information
9 Provide any further information the review team consider relevant to the registration of the review.

4 Details of final report/publication(s)
0 This field should be left empty until details of the completed review are available.
Give the full citation for the final report or publication of the systematic review.
Give the URL where available.

Appendix B

Example Search Output

Search History:

1. PsycInfo; PTSD.ti,ab; 22669 results.

2. PsycInfo; exp POSTTRAUMATIC STRESS DISORDER/; 24617 results.

3. PsycInfo; (post AND traumatic AND stress).ti,ab; 8649 results.

4. PsycInfo; (posttraumatic AND stress).ti,ab; 21717 results.

5. PsycInfo; (post-traumatic AND stress).ti,ab; 8647 results.

6. PsycInfo; (traumatic AND neurosis).ti,ab; 479 results.

7. PsycInfo; exp TRAUMATIC NEUROSIS/; 304 results.

8. PsycInfo; (cognitive AND appraisal*).ti,ab; 4184 results.

9. PsycInfo; exp COGNITIVE APPRAISAL/; 1545 results.

10. PsycInfo; appraisal*.ti,ab; 20002 results.

11. PsycInfo; (negative AND cognition*).ti,ab; 5478 results.

12. PsycInfo; 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7; 34188 results.

13. PsycInfo; 8 OR 9 OR 10 OR 11; 25560 results.

14. PsycInfo; 12 AND 13; 609 results.

15. PsycInfo; 14 [Limit to: (Record type Conference Proceedings or Dissertation or Dissertation Abstract or Journal or Journal Article or Non-peer-reviewed Journal or Peer-reviewed Journal or Peer-reviewed Status-unknown) and (Language English)]; 526 results.

16. PsycInfo; 15 [Limit to: (Record type Conference Proceedings or Dissertation or Dissertation Abstract or Journal or Journal Article or Non-peer-reviewed Journal or Peer-reviewed Journal or Peer-reviewed Status-unknown) and (Methodology Empirical Study or Experimental Replication or Field Study or Followup Study or Interview or Longitudinal Study or Prospective Study or Quantitative Study or Retrospective Study or Treatment Outcome/Clinical Trial) and (Language English)]; 437 results.

Appendix C.

Data Extraction Form, Cross-Sectional Studies

Data Extraction Form Cross Sectional Studies

Complete this form for each study included in the meta-analysis.

Please note the following:

- Missing data to be coded 999; not applicable to be coded N/A; not known to be coded DK.

- Different sections of the form apply to different study designs. Please ensure the correct sections of the form are completed as follows:-
  Section 1: ALL studies
  Section 2: CROSS SECTIONAL studies only
  Section 3: PROSPECTIVE CORRELATIONAL studies only
  Section 4: BETWEEN-GROUPS studies only

- If a study includes data from different samples, please complete a separate data extraction form for each sample, and specify the sample ID (e.g. sample 1; sample 2) in the correct part of the form (section 1.8).

- If a study splits the sample into PTSD and non-PTSD groups but also reports correlations between PTSD severity and maladaptive appraisals, please report correlational data rather than between–groups data.

- If more than one PTSD/ASD measure has been used extract available effect size data in the following order of preference:
  1. PTSD/ASD measure is continuous and interview based
  2. PTSD/ASD measure is a continuous self-report
  3. PTSD/ASD measure is an interview that assigns a diagnostic status (e.g. PTSD group and non-PTSD group)
  4. PTSD/ASD measure is a self-report measure that assigns a diagnostic status (i.e. PTSD group and non-PTSD group)

	ITEM DESCRIPTOR	**POSSIBLE CODES**	**CODE/VALUE**
1	**Section 1: for all studies:-**		
1.1	**Section 1.1: Identifying information**		
1.1.1	Coder Initials	Text	

1.1.2	Date Coding Sheet completed	DD/MM/YYYY	
1.1.3	Double coded?		Yes No Initials of other rater:
1.1.4	Study ID no [also add to footer]	See spreadsheet of included studies for ID no.	
1.1.5	First Author	Text	
1.1.6	Journal name	Text or abbreviation	
1.1.7	Date of publication	YYYY	
1.1.8	Sample ID *(if a study includes data from more than one sample, specify the sample being reported on this form, e.g. Sample 1 data)*	Text	
1.1.9	Comments: Please add any comments here that might help with clarification, actions etc. e.g. contact author, details of correspondence, whether or not this has been double coded and by whom etc.	Text	

1.1.10	Check references for other relevant articles	Please review the reference section of the article to identify any new references that might be relevant to the study. All papers that have been reviewed so far can be found in the spreadsheet of included articles. If new ones that aren't on the spreadsheet are found, please write details here (author, date, journal, vol, pages).	Reference section scanned for new relevant papers? YES NO Relevant papers identified? YES NO Details of new references to review:
1.2	**Section 1.2 : Methodological quality**		
1.2.1	Was the study population clearly specified and defined?	e.g. clear description of location, gender, ethnicity & other demographics	Y (low risk) N (high risk) Unclear N/A
1.2.2	Was sampling carried out appropriate to the study design, such that the likelihood of sampling bias was minimised as far as possible?	e.g. Low risk = invite sequential emergency department admissions to participate, or random sampling of individuals exposed to traumatic event e.g. High risk = convenience sampling, self-referral to study	Y (low risk) N (high risk) Unclear N/A

1.2.3	Was the likelihood of non-response bias minimised as far as possible? E.g. was the response rate at least 40% OR was an analysis performed that showed no significant difference in relevant demographic characteristics between responders and non-responders?		Y (low risk) N (high risk) Unclear N/A
1.2.4	For prospective studies only: was loss to follow-up 20% or less?		Y (low risk) N (high risk) Unclear N/A
1.2.5	Was the maladaptive appraisal measure used reliable? i.e. internal consistency (Cronbach's alpha) is at least 0.7 (either reported in the paper, or the measure has adequate IC reported in other peer reviewed papers)	If maladaptive appraisals assessed with just a single item question, then score N (high risk) If no internal consistency given, score N (high risk)	Y (low risk) N (high risk) Unclear N/A
1.3	**Section 1.3 Study characteristics**		
1.3.1	Country of origin (*e.g. UK*)	Text	
1.3.2	Type of report	1 = peer reviewed journal article 2 = dissertation 3 = conference report 4 = unpublished data 5 = other (specify)	
1.3.3	Child/Adult study (*is the sample made up of adults or children)*	1 = Child <18yrs 2 = Adult ≥18yrs 3 = Children and adults together	

1.3..4	Population *(what type of people took part in the study)*	1 = civilian 2 = military 3 = mixture	
1.3.5	Study design (What types of study is it? NB: *please use the appropriate section of the form for each study design- see instructions on page 1*)	1 = cross-sectional → *complete section 2* 2 = prospective longitudinal → *complete section 3* 3 = between groups → *complete section 4*	
1.3.6	Recruitment source (*Where were participants recruited from? If different recruitment strategies were used for different subgroups please specify here)*	1 = emergency department 2 = psychological services or support services or other hospital settings (e.g. rehab, inpatient ward) 3. community (e.g. schools, community centres) 4. other (specify)	
1.3.7	Trauma type (*What was the nature of the traumatic event(s)?)*	1 = road traffic accident, 2 = illness or physical injury (*give details*) 3 = combat experience (army/military workers) 4 = war exposure (civilians living in war zone/ displaced due to war) 5 = natural or human disaster (*give details*) 6 = sexual abuse 7 = interpersonal violence 8 = mixture of traumas (*specify if known*)	
1.3.8	Single or multiple event trauma (*was the trauma a one-off event, or multiple events over time?)*	1 = single event 2 = multiple events 3 = mixture	

1.3.9	Intentional/un-intentional trauma (*Was the trauma unintended or done deliberately, e.g. road traffic accident is usually unintentional; sexual abuse is intentional)*	1 = intentional 2 = unintentional 3 = mixed	
1.4	**Section 1.4: PTSD/ ASD measures**		
1.4.1	PTSD/ASD measure used in effect size calculation (*state the name PTSD measure or ASD measure, see RULES on page 1 for decisions about which PTSD measure to extract)*	Text (measure name, first author and date)	
1.4.2	PTSD/ASD measure type *(How was the measure administered?)*	1 = interview 2 = self-report questionnaire	
1.4.3	PTSD/ASD measure continuous/categorical *(Is the measure continuous or discrete categories?)*	1 = continuous measure 2 = categorical diagnostic status	
1.5	**Section 1.5: Maladaptive appraisal measures:**		
1.5.1	Maladaptive appraisal measure name	Text	
1.5.2	Maladaptive appraisal measure administration *(How was the measure administered?)*	1 = interview 2 = self-report questionnaire	
1.5.3	Maladaptive appraisal measure type *(What type of measure is it? If it's a single item, or several single items, please give details of the questions asked)*	1 = validated questionnaire 2 = un-validated questionnaire 3 = un-validated single item(s) (give details)	Code: Details:
2	**Section 2: For cross-sectional studies only:-**		

2.1	Sample size (*How many people took part in the study?)*	Numeric	
2.2	% of those invited who participated in the study *(of those who were invited, how many agreed to take part?)*	Numeric	Number invited = Number agreed to participate = % participation =
2.3	Mean age of sample	Numeric	
2.4	Age range of sample or standard deviation of mean age	Numeric	Age range = S.D. =
2.5	Percentage Male	Numeric	
2.6	Ethnicity - % white	Numeric	
2.7	Ethnicity - % BME	Numeric	
2.8	Time PTSD/ASD measure taken (*how long after the traumatic event(s) were the PTSD/ASD measures taken) Please assign a code from the box on the right as well as providing the exact time point.*	1 = 0-1 months following trauma 2 = > 1month following trauma	Code = Specific time point =
2.9	Correlations between subscales	If there are subscales of maladaptive appraisal scores (e.g. PTCI subscales of self, world and self-blame) and the data is provided, please specify the correlations between each of the subscales. *E.g. self & world r = 0.25 ; self & self-blame r = 0.6 ; world and self-blame, r = 0.23*	

2.10	Effect size (r) data for total score between PTSD severity and Maladaptive appraisal measure total score (e.g. PTCI total score x PTSD/ASD severity total score) or single item score. *If no total score given, complete data for subscale scores below:*	Numeric or N/A if only subscales given	r =
2.11	Effect size (r) data for subscale scores (e.g. PTSD/ASD severity total score x PTCI self-blame subscale)	Numeric	PTCI self r = PTCI world r = PTCI self-blame r = cPTCI permanent change r = cPTCI fragile/scary r = Other subscales (specify):

Appendix D

Data Extraction Form, Prospective Studies

Data Extraction Form Prospective Studies

Complete this form for each study included in the meta-analysis.

Please note the following:

- Missing data to be coded 999; not applicable to be coded N/A; not known to be coded DK.

- Different sections of the form apply to different study designs. Please ensure the correct sections of the form are completed as follows:-
  Section 1: ALL studies
  Section 2: CROSS SECTIONAL studies only
  Section 3: PROSPECTIVE CORRELATIONAL studies only
  Section 4: BETWEEN-GROUPS studies only

- If a study includes data from different samples, please complete a separate data extraction form for each sample, and specify the sample ID (e.g. sample 1; sample 2) in the correct part of the form (section 1.8).

- If a study splits the sample into PTSD and non-PTSD groups but also reports correlations between PTSD severity and maladaptive appraisals, please report correlational data rather than between–groups data.

- If more than one PTSD/ASD measure has been used, extract available effect size data in the following order of preference:
  5. PTSD/ASD measure is continuous and interview based
  6. PTSD/ASD measure is a continuous self-report
  7. PTSD/ASD measure is an interview that assigns a diagnostic status (e.g. PTSD group and non-PTSD group)
  8. PTSD/ASD measure is a self-report measure that assigns a diagnostic status (i.e. PTSD group and non-PTSD group)

	ITEM DESCRIPTOR	**POSSIBLE CODES**	**CODE/VALUE**
1	**Section 1: for all studies:-**		
1.1	**Section 1.1: Identifying information**		
1.1.1	Coder Initials	Text	
1.1.2	Date Coding Sheet completed	DD/MM/YYYY	

1.1.3	Double coded?		Yes No Initials of other rater:
1.1.4	Study ID no [also add to footer]	See spreadsheet of included studies for ID no.	
1.1.5	First Author	Text	
1.1.6	Journal name	Text or abbreviation	
1.1.7	Date of publication	YYYY	
1.1.8	Sample ID *(if a study includes data from more than one sample, specify the sample being reported on this form, e.g. Sample 1 data)*	Text	
1.1.9	Comments: Please add any comments here that might help with clarification, actions etc e.g. contact author, details of correspondence, whether or not this has been double coded and by whom etc.	Text	

1.1.10	Check references for other relevant articles	Please review the reference section of the article to identify any new references that might be relevant to the study. All papers that have been reviewed so far can be found in the spreadsheet of included articles. If new ones that aren't on the spreadsheet are found, please write details here (author, date, journal, vol, pages).	Reference section scanned for new relevant papers? YES NO Relevant papers identified? YES NO Details of new references to review:
1.2	**Section 1.2 : Methodological quality**		
1.2.1	Was the study population clearly specified and defined?	e.g. clear description of location, gender, ethnicity & other demographics	Y (low risk) N (high risk) Unclear N/A
1.2.2	Was sampling carried out appropriate to the study design, such that the likelihood of sampling bias was minimised as far as possible?	e.g. Low risk = invite sequential emergency department admissions to participate, or random sampling of individuals exposed to traumatic event e.g. High risk = convenience sampling, self-referral to study	Y (low risk) N (high risk) Unclear N/A
1.2.3	Was the likelihood of non-response bias minimised as far as possible?	E.g. Low risk- the response rate at least 40% OR was an analysis performed that showed no significant difference in relevant demographic characteristics between responders and non-responders?	Y (low risk) N (high risk) Unclear N/A

1.2.4	For prospective studies only: was loss to follow-up 20% or less?		Y (low risk) N (high risk) Unclear N/A
1.2.5	Was the maladaptive appraisal measure used reliable? i.e. internal consistency (Cronbach's alpha) is at least 0.7 (either reported in the paper, or the measure has adequate IC reported in other peer reviewed papers)	If maladaptive appraisals assessed with just a single item question, then score N (high risk) If no internal consistency given, score N (high risk)	Y (low risk) N (high risk) Unclear N/A
1.3	**Section 1.3 Study characteristics**		
1.3.1	Country of origin (*e.g. UK*)	Text	
1.3.2	Type of report	1 = peer reviewed journal article 2 = dissertation 3 = conference report 4 = unpublished data 5 = other (specify)	
1.3.3	Child/Adult study (*is the sample made up of adults or children)*	1 = Child <18yrs 2 = Adult ≥18yrs	
1.3..4	Population *(what type of people took part in the study)*	1 = civilian 2 = military 3 = mixture	
1.3.5	Study design (What types of study is it? NB: *please use the appropriate section of the form for each study design- see instructions on page 1*)	1 = cross-sectional → *complete section 2* 2 = prospective longitudinal → *complete section 3* 3 = between groups → *complete section 4*	

1.3.6	Recruitment source (*Where were participants recruited from? If different recruitment strategies were used for different subgroups please specify here)*	1 = emergency department 2 = psychological services or support services or other hospital settings (e.g. rehab, inpatient ward) 3. community (e.g. schools, community centres) 4. other (specify)	
1.3.7	Trauma type (*What was the nature of the traumatic event(s)?)*	1 = road traffic accident, 2 = illness or physical injury (*give details*) 3 = combat experience (army/military workers) 4 = war exposure (civilians living in war zone/ displaced due to war) 5 = natural or human disaster (*give details*) 6 = sexual abuse 7 = interpersonal violence 8 = mixture of traumas (*specify if known*)	
1.3.8	Single or multiple event trauma (*was the trauma a one-off event, or multiple events over time?)*	1 = single event 2 = multiple events 3 = mixture	
1.3.9	Intentional/un-intentional trauma (*Was the trauma unintended or done deliberately, e.g. road traffic accident is usually unintentional; sexual abuse is intentional)*	1 = intentional 2 = unintentional 3 = mixed	
1.4	**Section 1.4: PTSD/ ASD measures**		

1.4.1	PTSD/ASD measure used in effect size calculation (*state the name PTSD measure or ASD measure, see RULES on page 1 for decisions about which PTSD measure to extract)*	Text (measure name, first author and date)	
1.4.2	PTSD/ASD measure type *(How was the measure administered?)*	1 = interview 2 = self-report questionnaire	
1.4.3	PTSD/ASD measure continuous/categorical *(Is the measure continuous or discrete categories?)*	1 = continuous measure 2 = categorical diagnostic status	
1.5	**Section 1.5: Maladaptive appraisal measures:**		
1.5.1	Maladaptive appraisal measure name	Text	
1.5.2	Maladaptive appraisal measure administration *(How was the measure administered?)*	1 = interview 2 = self-report questionnaire	
1.5.3	Maladaptive appraisal measure type *(What type of measure is it? If it's a single item, or several single items, please give details of the questions asked)*	1 = validated questionnaire 2 = un-validated questionnaire 3 = un-validated single item(s) (give details)	Code: Details:

3	**Section 3: for prospective studies only:**		
3.1	Section 3.1: prospective study characteristics		
	How many follow-ups were there in the study? (*Give the number of follow ups and the time since trauma when each of the assessments were taken, e.g. initial assessment 6 weeks following trauma, first follow-up 6 months following trauma; second follow up 1 year following trauma)*		Initial assessment: First follow-up: Second follow-up: Third follow-up:
3.1.1	Sample Size (*How many people took part in the study? Specify numbers at each follow-up time)*	Numeric	Initial assessment n = First follow-up n = Second follow-up n = Third follow-up n =
3.1.2	% of those invited who participated in the study at initial assessment/invitation	Numeric	
3.1.3	Mean age of sample at initial assessment	Numeric	
3.1.4	Age range of sample or standard deviation of mean age at initial assessment	Numeric	Age range = S.D. =
3.1.5	Percentage Male *(specify for each time point where possible)*	Numeric	Initial assessment n = First follow-up n = Second follow-up n = Third follow-up n =

3.1.6	Ethnicity - % white *(specify for each time point where possible)*	Numeric	Initial assessment n = First follow-up n = Second follow-up n = Third follow-up n =
3.1.7	Ethnicity - % BME *(specify for each time point where possible)*	Numeric	Initial assessment n = First follow-up n = Second follow-up n = Third follow-up n =
3.2	**Section 3.2: Prospective study effect size information:**		
3.2.1	Correlations between subscales	If there are subscales of maladaptive appraisal scores (e.g. PTCI subscales of self, world and self-blame) and the data is provided, please specify the correlations between each of the subscales. *E.g. self & world r = 0.25 ; self & self-blame r = 0.6 ; world and self-blame, r = 0.23*	
3.2.2	When was first assessment of PTSD/ ASD symptoms taken? *(provide code and exact timing)*	1 = 0-1 months following trauma 2 = > 1month following trauma	Code = Exact time since trauma =

3.2.3	Initial assessment correlations: *(correlations between appraisal measure(s) at initial assessment and PTSD/ASD symptoms at initial assessment)*	Numeric *(Give total score and subscale scores where appropriate)*	Name of PTSD measure used in correlations = Total score r = PTCI self r = PTCI world r = PTCI self-blame r = cPTCI permanent change r = cPTCI fragile/scary r = Other subscales (specify):
3.2.4	Correlations between appraisals at follow-up 1 and PTSD symptoms at follow-up 1.	Numeric (r) *(Give total score and subscale scores where appropriate)*	Name of PTSD measure used in correlations = Total score r = PTCI self r = PTCI world r = PTCI self-blame r = cPTCI permanent change r = cPTCI fragile/scary r = Other subscales (specify):

3.2.5	Correlations between appraisals at follow-up 2 and PTSD symptoms at follow-up 2.	Numeric (r) *(Give total score and subscale scores where appropriate)*	Name of PTSD measure used in correlations = Total score r = PTCI self r = PTCI world r = PTCI self-blame r = cPTCI permanent change r = cPTCI fragile/scary r = Other subscales (specify):
3.2.6	Correlations between appraisals at follow-up 3 and PTSD symptoms at follow-up 3.	Numeric (r) *(Give total score and subscale scores where appropriate)*	Name of PTSD measure used in correlations = Total score r = PTCI self r = PTCI world r = PTCI self-blame r = cPTCI permanent change r = cPTCI fragile/scary r = Other subscales (specify):

3.2.7	Correlation between appraisals at initial assessment and PTSD symptoms at follow-up 1	Numeric (r) *(Give total score and subscale scores where appropriate)*	Name of PTSD measure used in correlations = Total score r = PTCI self r = PTCI world r = PTCI self-blame r = cPTCI permanent change r = cPTCI fragile/scary r = Other subscales (specify):
3.2.8	Correlation between appraisals at initial assessment and PTSD symptoms at follow-up 2.	Numeric *(Give total score and subscale scores where appropriate)*	Name of PTSD measure used in correlations = Total score r = PTCI self r = PTCI world r = PTCI self-blame r = cPTCI permanent change r = cPTCI fragile/scary r = Other subscales (specify):

Appendix E

Data Extraction Form, Between Groups Studies

Data Extraction Form Between Groups Studies

Complete this form for each study included in the meta-analysis.

Please note the following:

- Missing data to be coded 999; not applicable to be coded N/A; not known to be coded DK.

- Different sections of the form apply to different study designs. Please ensure the correct sections of the form are completed as follows:-
  Section 1: ALL studies
  Section 2: CROSS SECTIONAL studies only
  Section 3: PROSPECTIVE CORRELATIONAL studies only
  Section 4: BETWEEN-GROUPS studies only

- If a study includes data from different samples, please complete a separate data extraction form for each sample, and specify the sample ID (e.g. sample 1; sample 2) in the correct part of the form (section 1.8).

- If a study splits the sample into PTSD and non-PTSD groups but also reports correlations between PTSD severity and maladaptive appraisals, please report correlational data rather than between–groups data.

- If more than one PTSD/ASD measure has been used, extract available effect size data in the following order of preference:
  9. PTSD/ASD measure is continuous and interview based
  10. PTSD/ASD measure is a continuous self-report
  11. PTSD/ASD measure is an interview that assigns a diagnostic status (e.g. PTSD group and non-PTSD group)
  12. PTSD/ASD measure is a self-report measure that assigns a diagnostic status (i.e. PTSD group and non-PTSD group)

	ITEM DESCRIPTOR	**POSSIBLE CODES**	**CODE/VALUE**
1	**Section 1: for all studies:-**		
1.1	**Section 1.1: Identifying information**		
1.1.1	Coder Initials	Text	

1.1.2	Date Coding Sheet completed	DD/MM/YYYY	
1.1.3	Double coded?		Yes No Initials of other rater:
1.1.4	Study ID no [also add to footer]	See spreadsheet of included studies for ID no.	
1.1.5	First Author	Text	
1.1.6	Journal name	Text or abbreviation	
1.1.7	Date of publication	YYYY	
1.1.8	Sample ID *(if a study includes data from more than one sample, specify the sample being reported on this form, e.g. Sample 1 data)*	Text	
1.1.9	Comments: Please add any comments here that might help with clarification, actions etc e.g. contact author, details of correspondence, whether or not this has been double coded and by whom etc.	Text	

1.1.10	Check references for other relevant articles	Please review the reference section of the article to identify any new references that might be relevant to the study. All papers that have been reviewed so far can be found in the spreadsheet of included articles. If new ones that aren't on the spreadsheet are found, please write details here (author, date, journal, vol, pages).	Reference section scanned for new relevant papers? YES NO Relevant papers identified? YES NO Details of new references to review:
1.2	**Section 1.2 : Methodological quality**		
1.2.1	Was the study population clearly specified and defined?	e.g. clear description of location, gender, ethnicity & other demographics	Y (low risk) N (high risk) Unclear N/A
1.2.2	Was sampling carried out appropriate to the study design, such that the likelihood of sampling bias was minimised as far as possible?	e.g. Low risk = invite sequential emergency department admissions to participate, or random sampling of individuals exposed to traumatic event e.g. High risk = convenience sampling, self-referral to study	Y (low risk) N (high risk) Unclear N/A

1.2.3	Was the likelihood of non-response bias minimised as far as possible? E.g. was the response rate at least 40% OR was an analysis performed that showed no significant difference in relevant demographic characteristics between responders and non-responders?		Y (low risk) N (high risk) Unclear N/A
1.2.4	For prospective studies only: was loss to follow-up 20% or less?		Y (low risk) N (high risk) Unclear N/A
1.2.5	Was the maladaptive appraisal measure used reliable? i.e. internal consistency (Cronbach’s alpha) is at least 0.7 (either reported in the paper, or the measure has adequate IC reported in other peer reviewed papers)	If maladaptive appraisals assessed with just a single item question, then score N (high risk) If no internal consistency given, score N (high risk)	Y (low risk) N (high risk) Unclear N/A
1.3	**Section 1.3 Study characteristics**		
1.3.1	Country of origin (*e.g. UK*)	Text	
1.3.2	Type of report	1 = peer reviewed journal article 2 = dissertation 3 = conference report 4 = unpublished data 5 = other (specify)	
1.3.3	Child/Adult study (*is the sample made up of adults or children)*	1 = Child <18yrs 2 = Adult ≥18yrs 3 = Children and adults together	

1.3..4	Population *(what type of people took part in the study)*	1 = civilian 2 = military 3 = mixture	
1.3.5	Study design (What types of study is it? NB: *please use the appropriate section of the form for each study design- see instructions on page 1*)	1 = cross-sectional → *complete section 2* 2 = prospective longitudinal → *complete section 3* 3 = between groups → *complete section 4*	
1.3.6	Recruitment source (*Where were participants recruited from? If different recruitment strategies were used for different subgroups please specify here)*	1 = emergency department 2 = psychological services or support services or other hospital settings (e.g. rehab, inpatient ward) 3. community (e.g. schools, community centres) 4. other (specify)	
1.3.7	Trauma type (*What was the nature of the traumatic event(s)?)*	1 = road traffic accident, 2 = illness or physical injury (*give details*) 3 = combat experience (army/military workers) 4 = war exposure (civilians living in war zone/ displaced due to war) 5 = natural or human disaster (*give details*) 6 = sexual abuse 7 = interpersonal violence 8 = mixture of traumas (*specify if known*)	
1.3.8	Single or multiple event trauma (*was the trauma a one-off event, or multiple events over time?)*	1 = single event 2 = multiple events 3 = mixture	

1.3.9	Intentional/un-intentional trauma (*Was the trauma unintended or done deliberately, e.g. road traffic accident is usually unintentional; sexual abuse is intentional)*	1 = intentional 2 = unintentional 3 = mixed	
1.4	**Section 1.4: PTSD/ ASD measures**		
1.4.1	PTSD/ASD measure used in effect size calculation (*state the name PTSD measure or ASD measure, see RULES on page 1 for decisions about which PTSD measure to extract)*	Text (measure name, first author and date)	
1.4.2	PTSD/ASD measure type *(How was the measure administered?)*	1 = interview 2 = self-report questionnaire	
1.4.3	PTSD/ASD measure continuous/categorical *(Is the measure continuous or discrete categories?)*	1 = continuous measure 2 = categorical diagnostic status	
1.5	**Section 1.5: Maladaptive appraisal measures:**		
1.5.1	Maladaptive appraisal measure name	Text	
1.5.2	Maladaptive appraisal measure administration *(How was the measure administered?)*	1 = interview 2 = self-report questionnaire	

1.5.3	Maladaptive appraisal measure type *(What type of measure is it? If it's a single item, or several single items, please give details of the questions asked)*	1 = validated questionnaire 2 = un-validated questionnaire 3 = un-validated single item(s) (give details)	Code: Details:
4	**Section 4.1: Data for between-groups studies only:-**		
4.1.1	Specify the nature of each group	Text	Group 1 = Group 2 = Group 3 =
4.1.2	Sample size (specify for each group)	Numeric	Group 1 (specify__________) n = Group 2 (specify__________) n = Group 3 (specify __________) n =
4.1.3	% of those invited who participated in the study *(specify for each group)*	Numeric	Group 1 (specify__________) = Group 2 (specify__________) = Group 3 (specify __________) =

4.1.4	Mean age of sample *(specify for each group)*	Numeric	Group 1 (specify__________) = Group 2 (specify__________) = Group 3 (specify __________) =
4.1.5	Age range of sample and/or standard deviation *(specify for each group)*	Numeric	Group 1 (specify__________) SD = Range = Group 2 (specify__________) SD = Range = Group 3 (specify __________) SD = Range =
4.1.6	Percentage Male *(specify for each group)*	Numeric	Group 1 (specify__________) = Group 2 (specify__________) = Group 3 (specify __________) =
4.1.7	Ethnicity - % white *(specify for each group)*	Numeric	Group 1 (specify__________) = Group 2 (specify__________) = Group 3 (specify __________) =
4.1.8	Ethnicity - % BME *(specify for each group)*	Numeric	Group 1 (specify__________) = Group 2 (specify__________) = Group 3 (specify __________) =

4.1.9	Time PTSD/ASD measure taken (*how long after the traumatic event(s) were the PTSD/ASD measures taken) Please assign a code from the box on the right as well as providing the exact time point.*	1 = 0-1 months following trauma 2 = > 1month following trauma	Code = Specific time point =
4.1.10	Mean & standard deviation of Total scores on maladaptive appraisal measure *(specify for each group)*	Numeric	Group 1 (specify__________) Total score mean = s.d. = Group 2 (specify__________) Total score mean = s.d. = Group 3 (specify__________) Total score mean = s.d. =
4.1.11	Correlations between subscales	If there are subscales of maladaptive appraisal scores (e.g. PTCI subscales of self, world and self-blame) and the data is provided, please specify the correlations between each of the subscales. *E.g. self & world r = 0.25 ; self & self-blame r = 0.6 ; world and self-blame, r = 0.23*	

4.1.12	Mean and standard deviation of subscale scores (or individual item scores) on maladaptive appraisal measure *(specify name of the subscale, e.g. PTCI- Self and scores for each group)*	Text Numeric	Subscale name: Group 1 (specify__________) mean = s.d. = Group 2 (specify__________) mean = s.d. = Group 3 (specify__________) mean = s.d. =
4.1.13	Mean and standard deviation of subscale scores (or individual item scores) on maladaptive appraisal measure *(specify name of the subscale, e.g. PTCI- Self and scores for each group)*	Text Numeric	Subscale name: Group 1 (specify__________) mean = s.d. = Group 2 (specify__________) mean = s.d. = Group 3 (specify__________) mean = s.d. =
4.1.14	Mean and standard deviation of subscale scores (or individual item scores) on maladaptive appraisal measure *(specify name of the subscale, e.g. PTCI- Self and scores for each group)*	Text Numeric	Subscale name: Group 1 (specify__________) mean = s.d. = Group 2 (specify__________) mean = s.d. = Group 3 (specify__________) mean = s.d. =

4.1.15	Mean and standard deviation of subscale scores (or individual item scores) on maladaptive appraisal measure *(specify name of the subscale, e.g. PTCI- Self and scores for each group)*	Text Numeric	Subscale name: Group 1 (specify__________) mean = s.d. = Group 2 (specify__________) mean = s.d. = Group 3 (specify__________) mean = s.d. =
4.1.16	Mean and standard deviation of subscale scores (or individual item scores) on maladaptive appraisal measure *(specify name of the subscale, e.g. PTCI- Self and scores for each group)*	Text Numeric	Subscale name: Group 1 (specify__________) mean = s.d. = Group 2 (specify__________) mean = s.d. = Group 3 (specify__________) mean = s.d. =
4.2	**Section 4.2: Between groups studies follow-up data (if applicable)**		

4.2.1	Follow-up 1: Mean & standard deviation of Total scores on maladaptive appraisal measure *(specify for each group)*	Numeric	Time since trauma = Group 1 (specify__________) Total score mean = s.d. = Group 2 (specify__________) Total score mean = s.d. = Group 3 (specify__________) Total score mean = s.d. =
4.2.2	Follow-up 1 Mean and standard deviation of subscale scores (or individual item scores) on maladaptive appraisal measure *(specify name of the subscale, e.g. PTCI- Self and scores for each group)*	Text Numeric	Subscale name: Group 1 (specify__________) mean = s.d. = Group 2 (specify__________) mean = s.d. = Group 3 (specify__________) mean = s.d. =
4.2.3	Follow-up 1 Mean and standard deviation of subscale scores (or individual item scores) on maladaptive appraisal measure *(specify name of the subscale, e.g. PTCI- Self and scores for each group)*	Text Numeric	Subscale name: Group 1 (specify__________) mean = s.d. = Group 2 (specify__________) mean = s.d. = Group 3 (specify__________) mean = s.d. =

4.2.4	Follow-up 1 Mean and standard deviation of subscale scores (or individual item scores) on maladaptive appraisal measure *(specify name of the subscale, e.g. PTCI- Self and scores for each group)*	Text Numeric	Subscale name: Group 1 (specify__________) mean = s.d. = Group 2 (specify__________) mean = s.d. = Group 3 (specify__________) mean = s.d. =
4.2.5	Follow-up 1 Mean and standard deviation of subscale scores (or individual item scores) on maladaptive appraisal measure *(specify name of the subscale, e.g. PTCI- Self and scores for each group)*	Text Numeric	Subscale name: Group 1 (specify__________) mean = s.d. = Group 2 (specify__________) mean = s.d. = Group 3 (specify__________) mean = s.d. =
4.2.6	Follow-up 1 Mean and standard deviation of subscale scores (or individual item scores) on maladaptive appraisal measure *(specify name of the subscale, e.g. PTCI- Self and scores for each group)*	Text Numeric	Subscale name: Group 1 (specify__________) mean = s.d. = Group 2 (specify__________) mean = s.d. = Group 3 (specify__________) mean = s.d. =

4.2.7	Follow-up 2: Mean & standard deviation of Total scores on maladaptive appraisal measure *(specify for each group)*	Numeric	Time since trauma = Group 1 (specify__________) Total score mean = s.d. = Group 2 (specify__________) Total score mean = s.d. = Group 3 (specify__________) Total score mean = s.d. =
4.2.8	Follow-up 2 Mean and standard deviation of subscale scores (or individual item scores) on maladaptive appraisal measure *(specify name of the subscale, e.g. PTCI- Self and scores for each group)*	Text Numeric	Subscale name: Group 1 (specify__________) mean = s.d. = Group 2 (specify__________) mean = s.d. = Group 3 (specify__________) mean = s.d. =
4.2.9	Follow-up 2 Mean and standard deviation of subscale scores (or individual item scores) on maladaptive appraisal measure *(specify name of the subscale, e.g. PTCI- Self and scores for each group)*	Text Numeric	Subscale name: Group 1 (specify__________) mean = s.d. = Group 2 (specify__________) mean = s.d. = Group 3 (specify__________) mean = s.d. =

4.2.10	Follow-up 2 Mean and standard deviation of subscale scores (or individual item scores) on maladaptive appraisal measure *(specify name of the subscale, e.g. PTCI- Self and scores for each group)*	Text Numeric	Subscale name: Group 1 (specify__________) mean = s.d. = Group 2 (specify__________) mean = s.d. = Group 3 (specify__________) mean = s.d. =
4.2.11	Follow-up 2 Mean and standard deviation of subscale scores (or individual item scores) on maladaptive appraisal measure *(specify name of the subscale, e.g. PTCI- Self and scores for each group)*	Text Numeric	Subscale name: Group 1 (specify__________) mean = s.d. = Group 2 (specify__________) mean = s.d. = Group 3 (specify__________) mean = s.d. =
4.2.12	Follow-up 2 Mean and standard deviation of subscale scores (or individual item scores) on maladaptive appraisal measure *(specify name of the subscale, e.g. PTCI- Self and scores for each group)*	Text Numeric	Subscale name: Group 1 (specify__________) mean = s.d. = Group 2 (specify__________) mean = s.d. = Group 3 (specify__________) mean = s.d. =

Appendix F

Full Text Studies Reviewed and Reasons for Exclusion

Study Name	Include (I) or Exclude (E)	Exclusion reason code
Abello-Llanos et al (2009)	E	Not published in the English language
Abolghasemi et al (2013)	I	
Agar (2002)	E	Duplicate dataset
Agar et al (2006)	I	
Ali et al (2002)	I	
Allwood et al (2014)	I	
Andrews et al (2000)	E	No suitable measure of maladaptive appraisals
Ankri et al (2010)	E	Sample only consists of individuals with PTSD
Arata & Burkhart (1996)	E	No valid measure of PTSD
Arikan et al (2015)	I	
Ayers et al (2009)	I	
Baker & Williams (2001)	E	No valid measure of PTSD
Bal et al (2005)	E	No valid measure of PTSD
Bal et al (2009)	E	No valid measure of PTSD
Barker-Collo et al (2000)	E	No valid measure of PTSD
Barton et al (2013)	I	
Basoglu et al (2005)	E	No suitable measure of maladaptive appraisals
Beck et al (2004)	I	
Beck et al (2015)	E	No suitable measure of maladaptive appraisals
Beck et al (2015b)	I	
Belsher et al (2012)	I	
Benight & Harper (2002)	E	No suitable measure of maladaptive appraisals
Benight et al (1997)	E	No suitable measure of maladaptive appraisals
Benight et al (1999)	E	No suitable measure of maladaptive appraisals
Benight et al (2000)	E	No suitable measure of maladaptive appraisals
Benight et al (2008)	E	No suitable measure of maladaptive appraisals
Bennett et al (2009)	I	
Ben-Zur & Almog (2013)	E	No suitable measure of maladaptive appraisals
Blain et al (2011)	E	Sample only consists of individuals with PTSD
Blain et al (2013)	E	Sample only consists of individuals with PTSD
Blayney et al (2016)	E	Sample not exposed to Criterion A trauma
Boelen et al (2015)	E	Sample not exposed to Criterion A trauma
Bolster (2015)	I	
Bosmans et al (2013)	E	No suitable measure of maladaptive appraisals

Braun-Lewensohn et al (2011)	E	No valid measure of PTSD
Brewin et al (2000)	E	No suitable measure of maladaptive appraisals
Brewin et al (2011)	I	
Brown et al (2011)	E	No suitable measure of maladaptive appraisals
Browne et al (2012)	E	No suitable measure of maladaptive appraisals
Browne et al (2015)	E	Sample only consists of individuals with PTSD
Bryant & Guthrie (2005)	E	Appraisals measured prior to trauma
Bryant & Guthrie (2007)	E	Appraisals measured prior to trauma
Bryant et al (2007)	E (main analyses only)I	Duplicate data set (included in prospective analysis as no duplication here)
Buck et al (2008)	I	
Bueno (1993)	E	Dissertation unavailable after contacting authors
Buodo et al (2012)	I	
Calvert et al (2008)	E	Sample not exposed to Criterion A trauma
Campbell & Morrison (2007)	I	
Carek et al (2010)	I	
Carper et al (2015)	I	
Christiansen & Hansen (2015)	I	
Cieslak et al (2008)	I	
Constans et al (2012)	I	
Coots (2007)	E	Dissertation unavailable after contacting authors
Cowan (2013)	E	Dissertation unavailable after contacting authors
Cromer & Smyth (2010)	I	
Cwikel et al (2000)	E	No valid measure of PTSD
Daie-Gabai et al (2011)	I	
Daigneault et al (2006)	I	
Daniels et al (2011)	E	Sample only consists of individuals with PTSD
Davis et al (2016)	E	Sample only consists of individuals with PTSD
Dawson et al (2014)	E	No suitable measure of maladaptive appraisals
De Haan et al (2015)	I	
De Oliveira et al (2014)	E	No valid measure of PTSD
Dekel & Nuttman-Schwartz (2009)	E	No suitable measure of maladaptive appraisals
Dekel et al (2004)	I	
Dekel et al (2013)	E	No suitable measure of maladaptive appraisals
Denson et al (2007)	I	
DePrince et al (2010)	E	PTSD and other diagnostic groups combined
DePrince et al (2011)	I	
DePrince et al (2015)	E	PTSD and other diagnostic groups combined
Diehle et al (2015)	I	

Dohrenwend et al (2004)	E	No suitable measure of maladaptive appraisals
Dorfel et al (2008)	I	
Duffy et al (2013)	I	
Duffy et al (2015)	I	
Dunlap (2006)	E	Dissertation unavailable after contacting authors
Dunmore et al (1997)	E	Sample only consists of individuals with PTSD
Dunmore et al (1999)	I	
Dunmore et al (2001)	I	
Durakovic-Belko et al (2003)	E	No suitable measure of maladaptive appraisals
D'Urso et al (2014)	I	
Dutton et al (1994)	E	No suitable measure of maladaptive appraisals
Ehlers et al (1998)	I	
Ehlers et al (2000)	I	
Ehlers et al (2003)	E	No valid measure of PTSD
Ehring et al (2006)	I	
Ehring et al (2008)	I	
Ellis et al (2009)	I	
Elsesser & Sartory (2007)	I	
Elsesser et al (2009)	E	Sample not exposed to Criterion A trauma
Elwood & Williams (2007)	E	Sample not exposed to Criterion A trauma
Engelbrecht & Jobson (2014)	I	
Fairbrother & Rachman (2006)	I	
Fairbrother (2003)	E	Duplicate dataset
Ferner (2013)	I	
Field et al (2008)	I	
Foa et al (1999)	I	
Ford et al (2010)	E	Sample not exposed to Criterion A trauma
Freeman et al (2013)	I	
Galante (1990)	E	Dissertation unavailable after contacting authors
Gamache-Martin et al (2013)	I	
Gelkopf et al (2013)	I	
Germain et al (2015)	E	Sample only consists of individuals with PTSD
Gibbons et al (2014)	E	Qualitative study
Ginzburg (2004)	I	
Glück et al (2016)	I	
Gonzalo et al (2012)	I	
Gough (2011)	I	
Gracie et al (2007)	E	Sample not exposed to Criterion A trauma
Gulec et al (2013)	E	No valid measure of PTSD
Hagenaars et al (2007)	I	
Hagenaars et al (2011)	E	Sample only consists of individuals with PTSD

Halligan et al (2003)	I	
Hansen et al (2014)	I	
Harrigan (2008)	E	Dissertation unavailable after contacting authors
Hatcher (2008)	E	Duplicate dataset
Hatcher et al (2009)	E	No valid measure of PTSD
Hayman et al (2014)	E	No valid measure of PTSD
Hearn et al (2012)	E	No suitable measure of maladaptive appraisals
Hebenstreit et al (2015)	E	PTSD and other diagnostic groups combined
Henricks (1992)	E	Dissertation unavailable after contacting authors
Henrie (2015)	E	Sample not exposed to Criterion A trauma
Hiskey et al (2015)	I	
Hitchcock et al (2015)	I	
Hooberman et al (2009)	E	Duplicate dataset
Hooberman et al (2010)	E	Sample only consists of individuals with PTSD
Horsch et al (2012)	I	
Horsch et al (2015)	I	
Hussain & Bhushan (2009)	E	No effect size data after contacting authors
Hyland et al (2013)	I	
Hyland, Maguire et al (2014)	E	No suitable measure of maladaptive appraisals
Hyland, Murphy et al (2015)	E	No valid measure of PTSD
Hyland, Shevlin et al (2014)	E	No suitable measure of maladaptive appraisals
Hyland, Shevlin et al (2015)	E	No suitable measure of maladaptive appraisals
Jayawickreme et al (2012)	E	Sample only consists of individuals with PTSD
Jeavons (2000)	E	No effect size data after contacting authors
Jelinek et al (2013)	I	
Jobson et al (2009)	I	
Kaler et al (2008)	E	Sample not exposed to Criterion A trauma
Kangas et al (2005)	I	
Kangas et al (2007)	I	
Karl et al (2009)	I	
Karstoft et al (2015)	E	No effect size data after contacting authors
Kaur & Kearney (2013)	I	
Kaur & Kearney (2015)	I	
Kazmierczak et al (2012)	E	No suitable measure of maladaptive appraisals
Kilcommons et al (2008)	E	No effect size data after contacting authors
Kingston (2012)	E	Sample only consists of individuals with PTSD
Kira et al (2011)	E	No suitable measure of maladaptive appraisals
Kira et al (2014)	E	No suitable measure of maladaptive appraisals
Kleim et al (2007)	I	
Kleim et al (2012)	I	
Kolts et al (2004)	I	
Koo et al (2014)	I	

Koucky (2014	E	Dissertation unavailable after contacting authors
Kreis et al (2011)	I	
Kyritsi (2005)	E	Participants suffered traumatic brain injury
Kyutoku et al (2012)	E	No suitable measure of maladaptive appraisals
Labrador Encinas et al (2010)	E	Not published in the English language
Lagaretta et al (2015)	E	No suitable measure of maladaptive appraisals
Lancaster (2012)	E	Duplicate dataset
Lancaster et al (2011)	I	
Lancaster et al (2015)	E	Sample not exposed to Criterion A trauma
Laposa & Alden (2003)	I	
Leeson & Nixon (2011)	E	Sample not exposed to Criterion A trauma
Lemos-Miller & Kearney (2006)	I	
Lengua et al (2006)	E	No suitable measure of maladaptive appraisals
Leskela et al (2002)	E	No suitable measure of maladaptive appraisals
Levine et al (2005)	E	Sample not exposed to Criterion A trauma
Lindeman et al (1996)	E	No valid measure of PTSD
Linley & Joseph (2006)	E	No valid measure of PTSD
Littleton et al (2012)	I	
Liu & Chen (2015)	I	
Lommen & Restifo (2009)	E	Sample not exposed to Criterion A trauma
Lommen et al (2009)	I	
Ma et al (2011)	I	
Marra (2009)	E	Sample only consists of individuals with PTSD
Marshall & Leifker (2014)	I	
Marshall et al (2011)	E	No valid measure of PTSD
Matsuoka et al (2009)	E	No suitable measure of maladaptive appraisals
Matthews et al (2009)	I	
Mayou et al (2002)	I	
McCarthy et al (2012)	E	No suitable measure of maladaptive appraisals
McCuaig et al (2012)	E	No suitable measure of maladaptive appraisals
McKay et al (2016)	E	No valid measure of PTSD
Meiser-Stedman, Dalgleish et al (2009)	E	Duplicate dataset (M-S, Smith 2009)
Meiser-Stedman, Smith et al (2009)	I	
Meiser-Stedman, unpublished	I	
Merriman et al (2007)	E	No suitable measure of maladaptive appraisals
Monson et al (2009)	I	
Moore & Farchi (2011)	I	
Mordeno et al (2016)	E	Duplicate dataset
Morris (2010)	E	Duplicate dataset

Morris et al (2013)	I	
Moser et al (2007)	I	
Mueller et al (2008)	I	
Muller & Maerker (2006)	E	Not published in the English language
Müller (2004)	E	Review article
Müller et al (2010)	I	
Näätänen et al (2002)	E	No suitable measure of maladaptive appraisals
Nail (2012)	E	Dissertation unavailable after contacting authors
Nalipay & Mordeno (2016)	I	
Nickerson et al (2013)	E	No suitable measure of maladaptive appraisals
Nixon & Bryant (2003)	E	No suitable measure of maladaptive appraisals
Nixon & Bryant (2005)	I	
Nixon & Nishith (2005)	E	Sample not exposed to Criterion A trauma
Nixon et al (2008)	I	
Nixon, Ellis et al (2010)	I/E	Excluded from main analysis due to duplicate dataset; included in prospective analysis as no duplication here
Nixon, Nehmy et al (2010)	I/E	Excluded from main analysis due to duplicate dataset; included in prospective analysis as no duplication here
Noguchi et al (2013)	I	
Nygaard & Heir (2012)	I	
O'Donnell et al (2007)	I	
O'Hare et al (2015)	I	
O'Hare et al (2014)	E	Sample not exposed to Criterion A trauma
Olatunji et al (2008)	I	
Olsen (2015)	E	Dissertation unavailable after contacting authors
Owens & Chard (2001)	I	
Owens et al (2008)	E	Sample only consists of individuals with PTSD
Palosaari et al (2013)	I	
Palosaari et al (2015)	I	
Pan (2014)	E	Sample not exposed to Criterion A trauma
Panagioti et al (2012)	E	No suitable measure of maladaptive appraisals
Park et al (2012)	I	
Pereda et al (2011)	E	Sample not exposed to Criterion A trauma
Perez-Sales et al (2012)	E	No suitable measure of maladaptive appraisals
Ponnampermuma & Nicolson (2015)	I	
Porter et al (2013)	I	
Prince-Embury (1992)	E	No valid measure of PTSD
Punamaki et al (2015)	I	
Pyevich et al (2003)	E	Sample not exposed to Criterion A trauma
Regambal et al (2015)	I	

Reich et al (2015)	I	
Richman et al (2009)	E	Sample not exposed to Criterion A trauma
Robinaugh et al (2011)	I	
Ross & Kearney (2015)	I	
Roth et al (2011)	E	No suitable measure of maladaptive appraisals
Rourke et al (2007)	E	No suitable measure of maladaptive appraisals
Salmon et al (2007)	I	
Salmond et al (2011)	I	
Salter (2003)	I	
Sbardelloto et al (2013)	E	No valid measure of PTSD
Schnurr et al (2004)	E	No suitable measure of maladaptive appraisals
Schnyder & Malt (1998)	E	No valid measure of PTSD
Schonenberg et al (2014)	E	PTSD and other diagnostic groups combined
Schorr (2006)	E	No effect size data after contacting authors
Schuler & Boals (2016)	E	Sample not exposed to Criterion A trauma
Sciancalepore & Motta (2004)	E	Duplicate dataset
Sciancalepore & Motta (2004b)	I	
Semb et al (2009)	E	No suitable measure of maladaptive appraisals
Shahar et al (2013)	I	
Shepherd et al (2014)	E	No suitable measure of maladaptive appraisals
Sherrer (2012)	E	Duplicate dataset
Sherrer et al (2015)	E	Sample not exposed to Criterion A trauma
Shin et al (2014)	I	
Smith et al (2015)	E	No suitable measure of maladaptive appraisals
Spaccarelli (1995)	E	No valid measure of PTSD
Spinhoven et al (2015)	E	No suitable measure of maladaptive appraisals
Srinivas et al (2015)	E	Sample not exposed to Criterion A trauma
Ssenyonga et al (2013)	I	
Stallard & Smith (2007)	I	
Stallard (2003)	I	
Startup et al (2007)	I	
Steil & Ehlers (2000)	I	
Su & Chen (2008a)	I	
Su & Chen (2008b)	E	Not published in the English language
Suliman et al (2013)	I	
Suliman et al (2014)	I	
Tierens et al (2012)	E	Duplicate dataset
Tierens et al (2012b)	I	
Trautman et al (2015)	I	
Turluic et al (2015)	E	Sample not exposed to Criterion A trauma

Tutus & Goldbeck (2015)	I	
Ullman et al (2007)	I	
Van Buren & Weierich (2015)	I	
Van den Hout & Engelhard (2004)	E	Sample not exposed to Criterion A trauma
Van Emmerik et al (2006)	I	
Varkovitzky (2013)	I	
Vogt et al (2012)	E	Sample only consists of individuals with PTSD
Vossbeck-Elsebusch et al (2014)	E	Sample not exposed to Criterion A trauma
Wechsler-Zimring et al (2012)	E	Duplicate dataset
Weiner (2014)	E	Dissertation unavailable after contacting authors
Wenninger & Ehlers (1998)	I	
Whitaker (2008)	E	No valid measure of PTSD
Whiting & Bryant (2007)	I	
Williams et al (2005)	E	Sample not exposed to Criterion A trauma
Williams et al (2015)	E	Sample only consists of individuals with PTSD
Wong & Cook (1992)	E	No suitable measure of maladaptive appraisals
Wong (2013)	I	
Woodward et al (2015)	I	
Wortman et al (2011)	E	No suitable measure of maladaptive appraisals
Yehuda (2002)	E	Review article
Zeidner (2006)	E	Sample not exposed to Criterion A trauma

Appendix G

Contribution of Each Study to Meta-Analysis of Overall Effect Size

First Author, Year	Appraisal Measure	Correlation	Lower limit	Upper limit	Z-Value	p-Value
Abolghasemi, 2013	PTCI Combined	0.85	0.78	0.90	11.09	0.00
Agar, 2006	PTCI Combined	0.52	0.28	0.69	3.90	0.00
Ali, 2002	Combined Q'aire	0.55	0.40	0.68	6.12	0.00
Allwood, 2014	CTIC Combined	0.31	0.18	0.43	4.37	0.00
Arikan, 2015	PTCI Combined	0.54	0.46	0.60	11.79	0.00
Ayers, 2009	Combined Q'aire	0.54	0.36	0.68	5.10	0.00
Barton, 2013	PTCI Total	0.64	0.45	0.78	5.36	0.00
Beck, 2004	PTCI Combined	0.40	0.24	0.55	4.46	0.00
Beck, 2015, s1	PTCI Combined	0.36	0.26	0.45	6.47	0.00
Beck, 2015, s2	PTCI Combined	0.37	0.22	0.49	4.76	0.00
Belsher, 2012	PTCI Total	0.76	0.58	0.87	5.98	0.00
Bennett, 2009	PTCI Total	0.42	0.32	0.51	7.65	0.00
Bolster, 2015, s1	PTCI Combined	0.70	0.56	0.80	7.26	0.00
Bolster, 2015, s2	PTCI Total	0.79	0.72	0.84	13.34	0.00
Brewin, 2011	Combined Single Items	0.21	0.05	0.36	2.53	0.01
Buck, 2008	Combined Q'aire	0.66	0.56	0.73	10.58	0.00
Buodo, 2012	PTCI Total	0.23	-0.08	0.49	1.47	0.14
Campbell, 2007	PTCI Combined	0.70	0.51	0.83	5.40	0.00
Carek, 2010	PTCI Combined	0.68	0.49	0.80	5.71	0.00
Carper, 2015	PTCI Combined	0.40	0.24	0.54	4.56	0.00
Christiansen, 2015	PTCI Combined	0.54	0.43	0.62	8.90	0.00
Cieslak, 2008, s1	PTCI Total	0.28	0.04	0.49	2.28	0.02
Cieslak, 2008, s2	PTCI Total	0.28	0.04	0.49	2.28	0.02
Constans, 2012	PTCI Self Abridged	0.79	0.75	0.82	23.96	0.00
Cromer, 2010	PTCI Total	0.48	0.36	0.59	6.77	0.00
Daie-Gabai, 2011	PTCI Combined	0.61	0.53	0.67	12.68	0.00
Daigneault, 2006	CITS Self Blame	0.27	0.08	0.44	2.77	0.01
De Haan, 2015	cPTCI Total	0.62	0.49	0.73	7.32	0.00
Dekel, 2004	WAS Combined	0.14	0.03	0.25	2.54	0.01
Denson, 2007	Self Blame	0.18	0.07	0.28	3.31	0.00
DePrince, 2011, s1	TAQ Combined	0.27	0.07	0.44	2.67	0.01
DePrince, 2011, s2	TAQ Combined	0.17	-0.03	0.37	1.65	0.10
DePrince, 2011, s3	TAQ Combined	0.21	0.09	0.33	3.27	0.00
Diehle, 2015	cPTCI Total	0.66	0.51	0.77	6.96	0.00
Dorfel, 2008	PTCI Combined	0.59	0.35	0.75	4.32	0.00
Duffy, 2013	PTCI Combined	0.68	0.62	0.72	18.02	0.00
Duffy, 2015	PTCI Combined	0.60	0.57	0.62	32.50	0.00
Dunmore, 1999	Combined Q'aire	0.50	0.32	0.64	5.13	0.00
Dunmore, 2001	Combined Q'aire	0.42	0.17	0.61	3.25	0.00
D'Urso, 2014, s1	cPTCI Total	0.54	0.25	0.74	3.39	0.00

D'Urso, 2014, s2	cPTCI Total	0.56	0.22	0.78	3.06	0.00
Ehlers, 1998/Mayou 2002*	Appraisal of intrusions	0.52	0.47	0.57	17.15	0.00
Ehlers, 2000	Combined Q'aire	0.38	0.18	0.55	3.54	0.00
Ehring, 2006	PTCI Self	0.67	0.55	0.77	8.03	0.00
Ehring, 2008	PTCI Self	0.53	0.40	0.64	7.08	0.00
Ellis, 2009	cPTCI Total	0.69	0.57	0.78	8.22	0.00
Elsesser, 2007, s1	PTCI Total	0.59	0.37	0.74	4.64	0.00
Elsesser, 2007, s2	PTCI Total	0.33	0.01	0.59	2.03	0.04
Engelbrecht, 2014, s1	PTCI Total	0.67	0.47	0.80	5.37	0.00
Engelbrecht, 2014, s2	PTCI Total	0.61	0.40	0.76	4.77	0.00
Fairbrother, 2006	SARA Combined	0.70	0.52	0.82	5.88	0.00
Ferner, 2013	cPTCI Total	0.79	0.64	0.88	6.78	0.00
Field, 2008	PTCI Combined	0.47	0.28	0.62	4.48	0.00
Foa, 1999	Combined Q'aire	0.58	0.51	0.64	13.04	0.00
Freeman, 2013	PTCI Combined	0.66	0.52	0.76	7.50	0.00
Gamache-Martin, 2013	TAQ total	0.73	0.67	0.78	14.95	0.00
Gelkopf, 2013	PTCI Total	0.56	0.25	0.77	3.28	0.00
Ginzburg, 2004	WAS Combined	0.14	-0.04	0.32	1.53	0.13
Gluck, 2016	PTCI Total	0.66	0.53	0.76	7.69	0.00
Gonzalo, 2012	PTCI Total	0.38	0.22	0.53	4.33	0.00
Gough, 2011 s1	PTCI Total	0.66	0.47	0.79	5.38	0.00
Gough, 2011 s2	PTCI Total	0.32	0.02	0.57	2.10	0.04
Hagenaars, 2007	PTCI Total	0.62	0.34	0.79	3.87	0.00
Halligan, 2003, s1	IPSY Combined	0.75	0.62	0.85	7.48	0.00
Halligan, 2003, s2	IPSY Combined	0.63	0.47	0.75	6.20	0.00
Hansen, 2014	PTCI Combined	0.58	0.51	0.64	13.94	0.00
Hiskey, 2015	PTCI Total	0.69	0.66	0.73	26.22	0.00
Hitchcock, 2015	cPTCI Total	0.46	0.27	0.62	4.38	0.00
Horsch, 2012	PTCI Total	0.61	0.42	0.75	5.21	0.00
Horsch, 2015	PTCI Total	0.28	-0.01	0.53	1.89	0.06
Hyland, 2013	TRIBS depreciation	0.69	0.63	0.74	14.78	0.00
Jelinek, 2013	PTCI Combined	0.57	0.33	0.74	4.17	0.00
Jobson, 2009	Permanent change narrative	0.22	0.03	0.40	2.31	0.02
Kangas, 2005	PTCI Combined	0.56	0.36	0.71	4.85	0.00
Kangas, 2007	PTCI Total	0.36	0.16	0.54	3.35	0.00
Karl, 2009	PTCI Total	0.70	0.57	0.80	7.56	0.00
Kearney et al, 2006,13,15*	PTCI Total	0.60	0.53	0.67	12.05	0.00
Kleim, 2007	PTCI Self	0.47	0.36	0.57	7.27	0.00
Kleim, 2012	PTCI Self	0.51	0.40	0.60	8.00	0.00
Kolts, 2004	PTCI Combined	0.59	0.47	0.68	8.29	0.00
Koo, 2014	PTCI Total	0.56	0.50	0.61	15.85	0.00

Kreis, 2011	PTCI Total	0.89	0.82	0.94	10.12	0.00
Lancaster, 2011	PTCI Total	0.53	0.45	0.59	11.72	0.00
Laposa, 2003	PTCI Total	0.68	0.50	0.80	5.86	0.00
Littleton, 2012	WAS Combined	0.20	0.06	0.32	2.88	0.00
Liu, 2015	cPTCI Total	0.69	0.62	0.75	14.24	0.00
Lommen, 2009	PTCI Combined	0.36	0.18	0.51	3.90	0.00
Ma, 2011	PTCI Total	0.49	0.46	0.52	30.35	0.00
Marshall, 2014	PTCI Total	0.59	0.41	0.73	5.34	0.00
Matthews, 2009	PTCI Combined	0.69	0.54	0.80	6.86	0.00
Meiser-Stedman, 2009b, s2	cPTCI Total	0.67	0.57	0.76	9.31	0.00
Meiser-Stedman, 2009b, s3	cPTCI Total	0.33	0.19	0.45	4.47	0.00
Meiser-Stedman, unpub	cPTCI Total	0.77	0.71	0.82	14.61	0.00
Monson, 2009	WAS Combined	0.04	-0.22	0.30	0.30	0.77
Moore, 2011 s1	Self-blame questionnaire	0.45	-0.11	0.79	1.61	0.11
Moore, 2011, s2	Self-blame questionnaire	0.17	-0.31	0.58	0.69	0.49
Moore, 2011, s3	Self blame	0.13	-0.30	0.51	0.58	0.56
Moore, 2011, s4	Self blame	0.35	-0.22	0.74	1.21	0.23
Morris, 2013	Combined Single Items	0.53	0.26	0.72	3.58	0.00
Moser, 2007	PTCI Combined	0.49	0.41	0.57	10.50	0.00
Mueller, 2008	PTCI Combined	0.57	0.41	0.70	5.90	0.00
Muller, 2010	PTCI Total	0.57	0.50	0.63	12.95	0.00
Nalipay, 2016	PTCI Combined	0.48	0.41	0.54	13.02	0.00
Nixon, 2005	PTCI Total	0.64	0.46	0.77	5.67	0.00
Nixon, 2008	PTCI Total	0.43	0.18	0.62	3.30	0.00
Noguchi, 2013	PTCI Total	0.53	0.37	0.66	5.69	0.00
Nygaard, 2012	Combined Single Items	0.17	0.09	0.25	4.20	0.00
O'Donnell, 2007	PTCI Combined	0.36	0.25	0.47	6.03	0.00
O'Hare, 2015	PTCI Combined	0.48	0.37	0.57	8.00	0.00
Olatunji, 2008	PTCI Total	0.62	0.41	0.77	4.86	0.00
Owens, 2001	Combined PBRS & WAS	0.31	0.10	0.50	2.82	0.00
Palosaari et al 2013, 2015 *	cPTCI Total	0.41	0.30	0.51	6.74	0.00
Park, 2012	PTCI Combined	0.64	0.53	0.73	8.56	0.00
Ponnamperuma, 2015	Q'aire	0.69	0.64	0.74	17.19	0.00
Porter, 2013	PTCI Total	0.31	0.15	0.45	3.70	0.00
Regambal, 2015	PTCI- A	0.34	0.20	0.46	4.72	0.00
Reich, 2015	PTCI Self-blame	0.30	0.08	0.49	2.70	0.01
Robinaugh, 2011	PTCI Total	0.64	0.51	0.74	7.47	0.00
Ross & Kearney 2015	PTCI Total	0.48	0.40	0.56	9.91	0.00
Salmon, 2007	cPTCI Fragile person/Scary world	0.61	0.44	0.73	5.99	0.00

Salmond, 2011	cPTCI Total	0.90	0.83	0.94	10.09	0.00
Salter, 2003	Appraisal of symptoms	0.73	0.60	0.82	7.93	0.00
Sciancalepore & Motta, 2004	PTCI Total	0.54	0.40	0.65	6.62	0.00
Shahar, 2013	PTCI Combined	0.68	0.58	0.75	10.21	0.00
Shin, 2014	PTCI Combined	0.46	0.16	0.68	2.94	0.00
Ssenyonga, 2013	PTCI Total	0.46	0.28	0.61	4.59	0.00
Stallard & Smith, 2007	Combined Single items	0.58	0.41	0.71	5.65	0.00
Stallard, 2003	Combined Single Items	0.69	0.57	0.78	8.26	0.00
Startup, 2007	PTCI Total	0.33	0.09	0.53	2.62	0.01
Steil, 2000, s1	Single item "crazy"	0.46	0.33	0.57	6.21	0.00
Steil, 2000, s2	ICQ	0.61	0.49	0.71	8.24	0.00
Su, 2008	PTCI Total	0.71	0.64	0.77	13.66	0.00
Suliman, 2013	PTCI Total	0.52	0.37	0.63	6.31	0.00
Suliman, 2014	PTCI Total	0.38	0.20	0.53	4.02	0.00
Tierens, 2012	Appraisal Scale	0.52	0.46	0.57	15.04	0.00
Trautman, 2015	PTCI -26	0.39	0.30	0.47	7.76	0.00
Tutus, 2016	PTCI Total	0.44	0.28	0.58	4.95	0.00
Ullman, 2007	Self-blame	0.33	0.28	0.38	11.27	0.00
Van Buren, 2015	PTCI Total	0.57	0.34	0.74	4.25	0.00
Van Emmerick, 2006, s1	PTCI Total	0.71	0.63	0.78	11.74	0.00
Van Emmerick, 2006, s2	PTCI Total	0.43	0.29	0.55	5.73	0.00
Varkovitzky, 2013	PBRS Overaccommodation	0.58	0.47	0.67	8.84	0.00
Wenninger, 1998, s1	PBRS Combined	0.64	0.42	0.79	4.81	0.00
Wenninger, 1998, s2	PBRS Combined	0.58	0.31	0.77	3.75	0.00
Whiting & Bryant, 2007	PTCI Combined	0.66	0.46	0.79	5.43	0.00
Wong, 2013	PTCI Self-blame	0.34	0.11	0.53	2.90	0.00
Woodward, 2015	PTCI Total	0.31	0.22	0.40	6.21	0.00

Appendix H

Table Of Outliers Excluded for Overall Effect Size Sensitivity Analysis.

Study Name	LL	UL
Abolghasemi, 2013	0.78	0.90
Allwood, 2014	0.18	0.43
Beck, 2015, s1	0.26	0.45
Beck, 2015, s2	0.22	0.49
Belsher, 2012	0.58	0.87
Bolster, 2015, s2	0.72	0.84
Brewin, 2011	0.05	0.36
Buodo, 2012	-0.08	0.49
Cieslak, 2008, s1	0.04	0.49
Cieslak, 2008, s2	0.04	0.49
Constans, 2012	0.75	0.82
Daigneault, 2006	0.08	0.44
Dekel, 2004	0.03	0.25
Denson, 2007	0.07	0.28
DePrince, 2011, s1	0.07	0.44
DePrince, 2011, s2	-0.03	0.37
DePrince, 2011, s3	0.09	0.33
Duffy, 2013	0.62	0.72
Duffy, 2015	0.57	0.62
Ellis, 2009	0.57	0.78
Ferner, 2013	0.64	0.88
Gamache-Martin, 2013	0.67	0.78
Ginzburg, 2004	-0.04	0.32
Halligan, 2003, s1	0.62	0.85
Hiskey, 2015	0.66	0.73
Hyland, 2013	0.63	0.74
Jobson, 2009	0.03	0.40
Karl, 2009	0.57	0.80
Kreis, 2011	0.82	0.94
Littleton, 2012	0.06	0.32
Liu, 2015	0.62	0.75
Meiser-Stedman, 2009b, s2	0.57	0.76
Meiser-Stedman, 2009b, s3	0.19	0.45
Meiser-Stedman, unpub	0.71	0.82
Monson, 2009	-0.22	0.30
Nygaard, 2012	0.09	0.25
O'Donnell, 2007	0.25	0.47
Owens, 2001	0.10	0.50

Ponnamperuma, 2015	0.64	0.74
Porter, 2013	0.15	0.45
Regambal, 2015	0.20	0.46
Reich, 2015	0.08	0.49
Salmond, 2011	0.83	0.94
Salter, 2003	0.60	0.82
Shahar, 2013	0.58	0.75
Stallard, 2003	0.57	0.78
Su, 2008	0.64	0.77
Trautman, 2015	0.30	0.47
Ullman, 2007	0.28	0.38
Van Emmerick, 2006, s1	0.63	0.78
Woodward, 2015	0.22	0.40

Appendix I

Contribution of Each Study to Meta-Analysis of PTCI/CPTCI Studies Only

First Author, Year	Appraisal Measure	Correlation	Lower limit	Upper limit	Z-Value	p-Value
Abolghasemi, 2013	PTCI Combined	0.85	0.78	0.90	11.09	0.00
Agar, 2006	PTCI Combined	0.52	0.28	0.69	3.90	0.00
Arikan, 2015	PTCI Combined	0.54	0.46	0.60	11.79	0.00
Barton, 2013	PTCI Total	0.64	0.45	0.78	5.36	0.00
Beck, 2004	PTCI Combined	0.40	0.24	0.55	4.46	0.00
Beck, 2015, s1	PTCI Combined	0.36	0.26	0.45	6.47	0.00
Beck, 2015, s2	PTCI Combined	0.37	0.22	0.49	4.76	0.00
Belsher, 2012	PTCI Total	0.76	0.58	0.87	5.98	0.00
Bennett, 2009	PTCI Total	0.42	0.32	0.51	7.65	0.00
Bolster, 2015, s1	PTCI Combined	0.70	0.56	0.80	7.26	0.00
Bolster, 2015, s2	PTCI Total	0.79	0.72	0.84	13.34	0.00
Buodo, 2012	PTCI Total	0.23	-0.08	0.49	1.47	0.14
Campbell, 2007	PTCI Combined	0.70	0.51	0.83	5.40	0.00
Carek, 2010	PTCI Combined	0.68	0.49	0.80	5.71	0.00
Carper, 2015	PTCI Combined	0.40	0.24	0.54	4.56	0.00
Christiansen, 2015	PTCI Combined	0.54	0.43	0.62	8.90	0.00
Cieslak, 2008, s1	PTCI Total	0.28	0.04	0.49	2.28	0.02
Cieslak, 2008, s2	PTCI Total	0.28	0.04	0.49	2.28	0.02
Constans, 2012	PTCI Self Abridged	0.79	0.75	0.82	23.96	0.00
Cromer, 2010	PTCI Total	0.48	0.36	0.59	6.77	0.00
Daie-Gabai, 2011	PTCI Combined	0.61	0.53	0.67	12.68	0.00
De Haan, 2015	cPTCI Total	0.62	0.49	0.73	7.32	0.00
Diehle, 2015	cPTCI Total	0.66	0.51	0.77	6.96	0.00
Dorfel, 2008	PTCI Combined	0.59	0.35	0.75	4.32	0.00
Duffy, 2013	PTCI Combined	0.68	0.62	0.72	18.02	0.00
Duffy, 2015	PTCI Combined	0.60	0.57	0.62	32.50	0.00
D'Urso, 2014, s1	cPTCI Total	0.54	0.25	0.74	3.39	0.00
D'Urso, 2014, s2	cPTCI Total	0.56	0.22	0.78	3.06	0.00
Ehring, 2006	PTCI Self	0.67	0.55	0.77	8.03	0.00
Ehring, 2008	PTCI Self	0.53	0.40	0.64	7.08	0.00
Ellis, 2009	cPTCI Total	0.69	0.57	0.78	8.22	0.00
Elsesser, 2007, s1	PTCI Total	0.59	0.37	0.74	4.64	0.00
Elsesser, 2007, s2	PTCI Total	0.33	0.01	0.59	2.03	0.04
Engelbrecht, 2014, s1	PTCI Total	0.67	0.47	0.80	5.37	0.00
Engelbrecht, 2014, s2	PTCI Total	0.61	0.40	0.76	4.77	0.00
Ferner, 2013	cPTCI Total	0.79	0.64	0.88	6.78	0.00
Field, 2008	PTCI Combined	0.47	0.28	0.62	4.48	0.00
Freeman, 2013	PTCI Combined	0.66	0.52	0.76	7.50	0.00
Gelkopf, 2013	PTCI Total	0.56	0.25	0.77	3.28	0.00

Gluck, 2016	PTCI Total	0.66	0.53	0.76	7.69	0.00
Gonzalo, 2012	PTCI Total	0.38	0.22	0.53	4.33	0.00
Gough, 2011 s1	PTCI Total	0.66	0.47	0.79	5.38	0.00
Gough, 2011 s2	PTCI Total	0.32	0.02	0.57	2.10	0.04
Hagenaars, 2007	PTCI Total	0.62	0.34	0.79	3.87	0.00
Hansen, 2014	PTCI Combined	0.58	0.51	0.64	13.94	0.00
Hiskey, 2015	PTCI Total	0.69	0.66	0.73	26.22	0.00
Hitchcock, 2015	cPTCI Total	0.46	0.27	0.62	4.38	0.00
Horsch, 2012	PTCI Total	0.61	0.42	0.75	5.21	0.00
Horsch, 2015	PTCI Total	0.28	-0.01	0.53	1.89	0.06
Jelinek, 2013	PTCI Combined	0.57	0.33	0.74	4.17	0.00
Kangas, 2005	PTCI Combined	0.56	0.36	0.71	4.85	0.00
Kangas, 2007	PTCI Total	0.36	0.16	0.54	3.35	0.00
Karl, 2009	PTCI Total	0.70	0.57	0.80	7.56	0.00
Kearney et al, 2006,13,15*	PTCI Total	0.60	0.53	0.67	12.05	0.00
Kleim, 2007	PTCI Self	0.47	0.36	0.57	7.27	0.00
Kleim, 2012	PTCI Self	0.51	0.40	0.60	8.00	0.00
Kolts, 2004	PTCI Combined	0.59	0.47	0.68	8.29	0.00
Koo, 2014	PTCI Total	0.56	0.50	0.61	15.85	0.00
Kreis, 2011	PTCI Total	0.89	0.82	0.94	10.12	0.00
Lancaster, 2011	PTCI Total	0.53	0.45	0.59	11.72	0.00
Laposa, 2003	PTCI Total	0.68	0.50	0.80	5.86	0.00
Liu, 2015	cPTCI Total	0.69	0.62	0.75	14.24	0.00
Lommen, 2009	PTCI Combined	0.36	0.18	0.51	3.90	0.00
Ma, 2011	PTCI Total	0.49	0.46	0.52	30.35	0.00
Marshall, 2014	PTCI Total	0.59	0.41	0.73	5.34	0.00
Matthews, 2009	PTCI Combined	0.69	0.54	0.80	6.86	0.00
Meiser-Stedman, 2009b, s2	cPTCI Total	0.67	0.57	0.76	9.31	0.00
Meiser-Stedman, 2009b, s3	cPTCI Total	0.33	0.19	0.45	4.47	0.00
Meiser-Stedman, unpub	cPTCI Total	0.77	0.71	0.82	14.61	0.00
Moser, 2007	PTCI Combined	0.49	0.41	0.57	10.50	0.00
Mueller, 2008	PTCI Combined	0.57	0.41	0.70	5.90	0.00
Muller, 2010	PTCI Total	0.57	0.50	0.63	12.95	0.00
Nalipay, 2016	PTCI Combined	0.48	0.41	0.54	13.02	0.00
Nixon, 2005	PTCI Total	0.64	0.46	0.77	5.67	0.00
Nixon, 2008	PTCI Total	0.43	0.18	0.62	3.30	0.00
Noguchi, 2013	PTCI Total	0.53	0.37	0.66	5.69	0.00
O'Donnell, 2007	PTCI Combined	0.36	0.25	0.47	6.03	0.00
O'Hare, 2015	PTCI Combined	0.48	0.37	0.57	8.00	0.00
Olatunji, 2008	PTCI Total	0.62	0.41	0.77	4.86	0.00

Palosaari et al 2013, 2015 *	cPTCI Total	0.41	0.30	0.51	6.74	0.00
Park, 2012	PTCI Combined	0.64	0.53	0.73	8.56	0.00
Porter, 2013	PTCI Total	0.31	0.15	0.45	3.70	0.00
Regambal, 2015	PTCI- A	0.34	0.20	0.46	4.72	0.00
Reich, 2015	PTCI Self-blame	0.30	0.08	0.49	2.70	0.01
Robinaugh, 2011	PTCI Total	0.64	0.51	0.74	7.47	0.00
Ross & Kearney 2015	PTCI Total	0.48	0.40	0.56	9.91	0.00
Salmon, 2007	cPTCI Fragile person/Scary world	0.61	0.44	0.73	5.99	0.00
Salmond, 2011	cPTCI Total	0.90	0.83	0.94	10.09	0.00
Sciancalepore & Motta, 2004	PTCI Total	0.54	0.40	0.65	6.62	0.00
Shahar, 2013	PTCI Combined	0.68	0.58	0.75	10.21	0.00
Shin, 2014	PTCI Combined	0.46	0.16	0.68	2.94	0.00
Ssenyonga, 2013	PTCI Total	0.46	0.28	0.61	4.59	0.00
Startup, 2007	PTCI Total	0.33	0.09	0.53	2.62	0.01
Su, 2008	PTCI Total	0.71	0.64	0.77	13.66	0.00
Suliman, 2013	PTCI Total	0.52	0.37	0.63	6.31	0.00
Suliman, 2014	PTCI Total	0.38	0.20	0.53	4.02	0.00
Trautman, 2015	PTCI -26	0.39	0.30	0.47	7.76	0.00
Tutus, 2016	PTCI Total	0.44	0.28	0.58	4.95	0.00
Van Buren, 2015	PTCI Total	0.57	0.34	0.74	4.25	0.00
Van Emmerick, 2006, s1	PTCI Total	0.71	0.63	0.78	11.74	0.00
Van Emmerick, 2006, s2	PTCI Total	0.43	0.29	0.55	5.73	0.00
Whiting & Bryant, 2007	PTCI Combined	0.66	0.46	0.79	5.43	0.00
Wong, 2013	PTCI Self-blame	0.34	0.11	0.53	2.90	0.00
Woodward, 2015	PTCI Total	0.31	0.22	0.40	6.21	0.00

Appendix J

Table of Outliers Excluded from PTCI/ CPTCI Meta-Analysis

Study name	LL	UL
Abolghasemi, 2013	0.78	0.90
Beck, 2015, s1	0.26	0.45
Beck, 2015, s2	0.22	0.49
Bennett, 2009	0.32	0.51
Bolster, 2015, s2	0.72	0.84
Buodo, 2012	-0.08	0.49
Cieslak, 2008, s1	0.04	0.49
Cieslak, 2008, s2	0.04	0.49
Constans, 2012	0.75	0.82
Duffy, 2013	0.62	0.72
Ferner, 2013	0.64	0.88
Hiskey, 2015	0.66	0.73
Kreis, 2011	0.82	0.94
Liu, 2015	0.62	0.75
Lommen, 2009	0.18	0.51
Ma, 2011	0.46	0.52
Meiser-Stedman, 2009b, s3	0.19	0.45
Meiser-Stedman, unpub	0.71	0.82
O'Donnell, 2007	0.25	0.47
Palosaari et al 2013, 2015 *	0.30	0.51
Porter, 2013	0.15	0.45
Regambal, 2015	0.20	0.46
Reich, 2015	0.08	0.49
Salmond, 2011	0.83	0.94
Su, 2008	0.64	0.77
Trautman, 2015	0.30	0.47
Van Emmerick, 2006, s1	0.63	0.78
Woodward, 2015	0.22	0.40

Appendix K

Contribution of Each Study to Overall Effect Size for PTCI-Self in Adults.

		Statistics for each study:-				
First Author, Year	**Appraisal Measure**	**Correlation**	**LL**	**UL**	**Z-Value**	**p-Value**
Abolghasemi, 2013	PTCI Self	0.88	0.83	0.91	15.52	0.00
Agar, 2006	PTCI Self	0.62	0.42	0.77	5.00	0.00
Arikan, 2015	PTCI Self	0.55	0.48	0.62	12.21	0.00
Barton, 2013	PTCI Self	0.64	0.45	0.78	5.36	0.00
Beck, 2004	PTCI Self	0.50	0.35	0.63	5.73	0.00
Beck, 2015, S1	PTCI Self	0.43	0.33	0.52	7.94	0.00
Beck, 2015, S2	PTCI Self	0.41	0.27	0.53	5.41	0.00
Bolster, unpub, S1	PTCI Self	0.76	0.64	0.84	8.33	0.00
Buodo, 2012	PTCI Self	0.30	0.02	0.54	2.06	0.04
Campbell, 2007	PTCI Self	0.70	0.53	0.81	6.35	0.00
Carek, 2010	PTCI Self	0.72	0.55	0.83	6.29	0.00
Carper, 2015	PTCI Self	0.47	0.32	0.60	5.52	0.00
Christiansen, 2015	PTCI Self	0.61	0.54	0.67	13.58	0.00
Cieslak, 2008, S1	PTCI Self	0.35	0.12	0.55	2.90	0.00
Cieslak, 2008, S2	PTCI Self	0.35	0.12	0.55	2.90	0.00
Constans, 2012	PTCI Self	0.79	0.75	0.82	23.96	0.00
Cromer, 2010	PTCI Self	0.52	0.40	0.62	7.33	0.00
Daie-Gabai, 2011	PTCI Self	0.71	0.65	0.76	15.94	0.00
Dorfel, 2008	PTCI Self	0.68	0.48	0.81	5.31	0.00
Ehring, 2006	PTCI Self	0.67	0.55	0.77	8.03	0.00
Ehring, 2008	PTCI Self	0.53	0.40	0.64	7.08	0.00
Elsesser, 2007 Sample 1	PTCI Self	0.51	0.29	0.67	4.29	0.00
Engelbrecht, 2014 Asian Sample	PTCI Self	0.68	0.52	0.79	6.44	0.00
Engelbrecht, 2014 Brit Sample	PTCI Self	0.69	0.54	0.80	6.75	0.00
Field, 2008	PTCI Self	0.56	0.39	0.69	5.59	0.00
Foa, 1999	PTCI Self	0.78	0.74	0.82	20.62	0.00
Freeman, 2013	PTCI Self	0.72	0.61	0.81	8.66	0.00
Gelkopf, 2013	PTCI Self	0.55	0.29	0.74	3.71	0.00
Gough, 2011 s1	PTCI Self	0.63	0.42	0.77	5.03	0.00
Gough, 2011 s2	PTCI Self	0.31	0.01	0.56	2.03	0.04
Hagenaars, 2007	PTCI Self	0.66	0.41	0.82	4.30	0.00
Hansen, 2014	PTCI Self	0.59	0.53	0.65	14.33	0.00
Hiskey, 2015	PTCI Self	0.69	0.66	0.72	26.10	0.00
Horsch, 2012	PTCI Self	0.58	0.38	0.73	4.87	0.00
Horsch, 2015	PTCI Self	0.44	0.17	0.65	3.10	0.00
Jelinek, 2013	PTCI Self	0.56	0.35	0.72	4.60	0.00

Kangas, 2005	PTCI Self	0.67	0.50	0.79	6.24	0.00
Kangas, 2007	PTCI Self	0.52	0.34	0.66	5.12	0.00
Karl, 2009	PTCI Self	0.72	0.62	0.80	9.39	0.00
Kleim, 2007	PTCI Self	0.47	0.36	0.57	7.77	0.00
Kolts, 2004	PTCI Self	0.64	0.54	0.72	9.38	0.00
Kreis, 2011	PTCI Self	0.89	0.81	0.93	9.99	0.00
Lancaster, 2011	PTCI Self	0.54	0.47	0.61	12.11	0.00
Laposa, 2003	PTCI Self	0.66	0.47	0.79	5.61	0.00
Lommen, 2009	PTCI Self	0.45	0.29	0.59	5.08	0.00
Matthews, 2009	PTCI Self	0.77	0.65	0.85	8.21	0.00
Moser, 2007	PTCI Self	0.55	0.48	0.62	11.99	0.00
Mueller, 2008	PTCI Self	0.62	0.47	0.74	6.61	0.00
Muller, 2010	PTCI Self	0.58	0.51	0.64	13.25	0.00
Nalipay, 2016	PTCI Self	0.53	0.47	0.58	14.77	0.00
Noguchi, 2013	PTCI Self	0.55	0.39	0.68	5.96	0.00
O'Donnell, 2007	PTCI Self	0.45	0.35	0.54	7.66	0.00
O'Hare, 2015	PTCI Self	0.54	0.44	0.62	9.34	0.00
Olatunji, 2008	PTCI Self	0.60	0.38	0.76	4.65	0.00
Park, 2012	PTCI Self	0.67	0.56	0.76	9.14	0.00
Porter, 2013	PTCI Self	0.29	0.13	0.44	3.44	0.00
Shahar, 2013	PTCI Self	0.74	0.66	0.80	11.76	0.00
Shin, 2014	PTCI Self	0.53	0.26	0.73	3.52	0.00
Ssenyonga, 2013	PTCI Self	0.55	0.38	0.68	5.71	0.00
Startup, 2007	PTCI Self	0.64	0.47	0.77	5.87	0.00
Su, 2008	PTCI Self	0.68	0.61	0.74	12.76	0.00
Tutus, 2016	PTCI Self	0.45	0.29	0.59	5.08	0.00
Van Buren, 2015	PTCI Self	0.63	0.42	0.78	4.86	0.00
Van Emmerick, 2006 S2	PTCI Self	0.46	0.33	0.57	6.19	0.00
Van Emmerick, 2006, S1	PTCI Self	0.67	0.58	0.74	10.73	0.00
Whiting & Bryant, 2007	PTCI Self	0.75	0.60	0.85	6.74	0.00

Appendix L

Table of Outliers Excluded from PTCI-Self Sensitivity Analysis.

First Author, Year	LL	UL
Abolghasemi, 2013	0.83	0.91
Beck, 2015, S1	0.33	0.52
Beck, 2015, S2	0.27	0.53
Buodo, 2012	0.02	0.54
Cieslak, 2008, S1	0.12	0.55
Cieslak, 2008, S2	0.12	0.55
Constans, 2012	0.75	0.82
Daie-Gabai, 2011	0.65	0.76
Foa, 1999	0.74	0.82
Gough, 2011 s2	0.01	0.56
Hiskey, 2015	0.66	0.72
Kreis, 2011	0.81	0.93
Matthews, 2009	0.65	0.85
O'Donnell, 2007	0.35	0.54
Porter, 2013	0.13	0.44
Shahar, 2013	0.66	0.80
Van Emmerick, 2006, S1	0.58	0.74

Appendix M

Contribution of Each Study to Overall Effect Size for Maladaptive Appraisals about the World (PTCI World) in Adults

First Author, Year	Appraisal Measure	Correlation	LL	UL	Z-Value	p-Value
Abolghasemi, 2013	PTCI World	-0.05	-0.26	0.17	-0.41	0.68
Agar, 2006	PTCI World	0.35	0.08	0.57	2.49	0.01
Arikan, 2015	PTCI World	0.49	0.41	0.56	10.59	0.00
Barton, 2013	PTCI World	0.52	0.29	0.69	4.08	0.00
Beck, 2004	PTCI World	0.38	0.21	0.53	4.18	0.00
Beck, 2015, S1	PTCI World	0.35	0.25	0.45	6.31	0.00
Beck, 2015, S2	PTCI World	0.31	0.16	0.45	3.98	0.00
Bolster, unpub, S1	PTCI World	0.68	0.53	0.79	6.94	0.00
Buodo, 2012	PTCI World	0.00	-0.29	0.29	0.00	1.00
Campbell, 2007	PTCI World	0.69	0.52	0.81	6.24	0.00
Carek, 2010	PTCI World	0.66	0.47	0.79	5.49	0.00
Carper, 2015	PTCI World	0.26	0.08	0.42	2.88	0.00
Christiansen, 2015	PTCI World	0.49	0.41	0.56	10.27	0.00
Cieslak, 2008, S1	PTCI World	0.40	0.17	0.59	3.36	0.00
Cieslak, 2008, S2	PTCI World	0.40	0.17	0.59	3.36	0.00
Cromer, 2010	PTCI World	0.38	0.24	0.50	5.08	0.00
Daie-Gabai, 2011	PTCI World	0.52	0.44	0.60	10.36	0.00
Dorfel, 2008	PTCI World	0.37	0.08	0.60	2.49	0.01
Elsesser, 2007 Sample 1	PTCI World	0.69	0.54	0.79	6.86	0.00
Engelbrecht, 2014 Asian Sample	PTCI World	0.44	0.19	0.63	3.36	0.00
Engelbrecht, 2014 Brit Sample	PTCI World	0.39	0.14	0.60	3.00	0.00
Field, 2008	PTCI World	0.38	0.18	0.55	3.53	0.00
Foa, 1999	PTCI World	0.69	0.63	0.74	16.72	0.00
Freeman, 2013	PTCI World	0.54	0.38	0.67	5.76	0.00
Gelkopf, 2013	PTCI World	0.47	0.18	0.69	3.00	0.00
Gough, 2011 s1	PTCI World	0.64	0.44	0.78	5.14	0.00
Gough, 2011 s2	PTCI World	0.09	-0.22	0.38	0.57	0.57
Hagenaars, 2007	PTCI World	0.31	-0.05	0.59	1.71	0.09
Hansen, 2014	PTCI World	0.54	0.47	0.60	12.77	0.00
Hiskey, 2015	PTCI World	0.59	0.55	0.63	20.81	0.00
Horsch, 2012	PTCI World	0.58	0.38	0.73	4.87	0.00
Horsch, 2015	PTCI World	0.54	0.30	0.72	3.96	0.00
Jelinek, 2013	PTCI World	0.53	0.31	0.70	4.23	0.00
Kangas, 2005	PTCI World	0.43	0.20	0.61	3.52	0.00
Kangas, 2007	PTCI World	0.27	0.06	0.46	2.46	0.01
Karl, 2009	PTCI World	0.38	0.21	0.53	4.14	0.00
Kolts, 2004	PTCI World	0.58	0.47	0.68	8.19	0.00
Kreis, 2011	PTCI World	0.73	0.57	0.83	6.55	0.00
Lancaster, 2011	PTCI World	0.34	0.25	0.42	7.10	0.00

Laposa, 2003	PTCI World	0.49	0.25	0.67	3.79	0.00
Lommen, 2009	PTCI World	0.13	-0.06	0.31	1.37	0.17
Matthews, 2009	PTCI World	0.65	0.48	0.77	6.24	0.00
Moser, 2007	PTCI World	0.43	0.34	0.51	8.92	0.00
Mueller, 2008	PTCI World	0.53	0.36	0.67	5.38	0.00
Muller, 2010	PTCI World	0.46	0.38	0.53	9.95	0.00
Nalipay, 2016	PTCI World	0.37	0.30	0.43	9.60	0.00
Noguchi, 2013	PTCI World	0.44	0.26	0.59	4.55	0.00
O'Donnell, 2007	PTCI World	0.32	0.20	0.43	5.24	0.00
O'Hare, 2015	PTCI World	0.42	0.31	0.52	6.92	0.00
Olatunji, 2008	PTCI World	0.48	0.23	0.67	3.51	0.00
Park, 2012	PTCI World	0.54	0.41	0.65	6.81	0.00
Porter, 2013	PTCI World	0.28	0.12	0.43	3.32	0.00
Shahar, 2013	PTCI World	0.42	0.28	0.54	5.54	0.00
Shin, 2014	PTCI World	0.54	0.27	0.73	3.58	0.00
Ssenyonga, 2013	PTCI World	0.24	0.03	0.42	2.22	0.03
Startup, 2007	PTCI World	0.51	0.30	0.67	4.36	0.00
Su, 2008	PTCI World	0.59	0.50	0.67	10.43	0.00
Tutus, 2016	PTCI World	0.32	0.14	0.48	3.48	0.00
Van Buren, 2015	PTCI World	0.39	0.11	0.61	2.70	0.01
Van Emmerick, 2006 S2	PTCI World	0.27	0.12	0.41	3.45	0.00
Van Emmerick, 2006, S1	PTCI World	0.53	0.42	0.63	7.81	0.00
Whiting & Bryant, 2007	PTCI World	0.56	0.34	0.72	4.38	0.00

Appendix N

Table of Outliers for Appraisals about the World

First Author, Year	LL	UL
Abolghasemi, 2013	-0.26	0.17
Bolster, unpub, S1	0.53	0.79
Buodo, 2012	-0.29	0.29
Campbell, 2007	0.52	0.81
Elsesser, 2007 Sample 1	0.54	0.79
Foa, 1999	0.63	0.74
Gough, 2011 s2	-0.22	0.38
Hiskey, 2015	0.55	0.63
Kreis, 2011	0.57	0.83
Lommen, 2009	-0.06	0.31
Su, 2008	0.50	0.67

Appendix O

Contribution of Each Study to Overall Effect Size for Self-Blame Data

First Author, Year	Appraisal Measure	r	LL	UL	Z-Value	p-Value
Abolghasemi, 2013	PTCI Self-blame	0.40	0.21	0.56	3.94	0.00
Agar, 2006	PTCI Self-blame	0.18	-0.10	0.44	1.26	0.21
Barton, 2013	PTCI Self-blame	0.35	0.09	0.57	2.58	0.01
Beck, 2004	PTCI Self-blame	-0.05	-0.23	0.14	-0.52	0.60
Beck, 2015, S1	PTCI Self-blame	0.03	-0.08	0.14	0.52	0.60
Beck, 2015, S2	PTCI Self-blame	0.25	0.10	0.39	3.17	0.00
Bolster, unpub, S1	PTCI Self-blame	0.36	0.14	0.54	3.15	0.00
Buodo, 2012	PTCI Self-blame	0.11	-0.18	0.39	0.75	0.45
Campbell, 2007	PTCI Self-blame	0.35	0.07	0.58	2.42	0.02
Carek, 2010	PTCI Self-blame	0.47	0.22	0.66	3.53	0.00
Carper, 2015	PTCI Self-blame	0.26	0.08	0.42	2.88	0.00
Christiansen, 2015	PTCI Self-blame	0.21	0.11	0.31	4.08	0.00
Cieslak, 2008, S1	PTCI Self-blame	-0.10	-0.33	0.15	-0.80	0.43
Cieslak, 2008, S2	PTCI Self-blame	-0.10	-0.33	0.15	-0.80	0.43
Cromer, 2010	PTCI Self-blame	0.24	0.09	0.38	3.16	0.00
Daie-Gabai, 2011	PTCI Self-blame	0.12	0.01	0.23	2.17	0.03
Dorfel, 2008	PTCI Self-blame	0.40	0.12	0.62	2.71	0.01
Elsesser, 2007 Sample 1	PTCI Self-blame	0.31	0.05	0.53	2.32	0.02
Engelbrecht, 2014 Asian Sample	PTCI Self-blame	0.45	0.21	0.64	3.48	0.00
Engelbrecht, 2014 Brit Sample	PTCI Self-blame	0.39	0.14	0.60	3.00	0.00
Field, 2008	PTCI Self-blame	0.13	-0.09	0.34	1.15	0.25
Foa, 1999	PTCI Self-blame	0.57	0.50	0.63	12.77	0.00
Freeman, 2013	PTCI Self-blame	0.48	0.31	0.62	4.99	0.00
Gelkopf, 2013	PTCI Self-blame	0.19	-0.16	0.50	1.06	0.29
Gough, 2011 s1	PTCI Self-blame	0.22	-0.07	0.47	1.52	0.13
Gough, 2011 s2	PTCI Self-blame	0.26	-0.04	0.52	1.68	0.09
Hagenaars, 2007	PTCI Self-blame	0.64	0.37	0.81	4.04	0.00
Hiskey, 2015	PTCI Self-blame	0.37	0.31	0.42	11.90	0.00
Horsch, 2012	PTCI Self-blame	0.64	0.46	0.77	5.57	0.00
Horsch, 2015	PTCI Self-blame	0.13	-0.17	0.41	0.86	0.39
Jelinek, 2013	PTCI Self-blame	0.20	-0.09	0.46	1.33	0.18
Kangas, 2005	PTCI Self-blame	0.12	-0.14	0.35	0.90	0.37
Kangas, 2007	PTCI Self-blame	0.28	0.07	0.46	2.61	0.01
Karl, 2009	PTCI Self-blame	0.23	0.04	0.40	2.42	0.02
Kolts, 2004	PTCI Self-blame	0.30	0.15	0.44	3.83	0.00
Kreis, 2011	PTCI Self-blame	0.44	0.20	0.64	3.36	0.00
Lancaster, 2011	PTCI Self-blame	0.24	0.15	0.33	4.95	0.00
Laposa, 2003	PTCI Self-blame	0.37	0.11	0.58	2.75	0.01
Lommen, 2009	PTCI Self-blame	0.24	0.05	0.40	2.53	0.01

Matthews, 2009	PTCI Self-blame	0.25	0.01	0.46	2.04	0.04
Moser, 2007	PTCI Self-blame	0.32	0.23	0.41	6.43	0.00
Mueller, 2008	PTCI Self-blame	0.38	0.18	0.55	3.64	0.00
Muller, 2010	PTCI Self-blame	0.28	0.19	0.37	5.75	0.00
Nalipay, 2016	PTCI Self-blame	0.40	0.33	0.46	10.51	0.00
Noguchi, 2013	PTCI Self-blame	0.05	-0.15	0.25	0.48	0.63
O'Donnell, 2007	PTCI Self-blame	0.02	-0.10	0.14	0.32	0.75
O'Hare, 2015	PTCI Self-blame	0.25	0.13	0.36	3.95	0.00
Olatunji, 2008	PTCI Self-blame	0.62	0.41	0.77	4.86	0.00
Porter, 2013	PTCI Self-blame	0.15	-0.02	0.31	1.74	0.08
Reich, 2015	PTCI Self-blame	0.30	0.08	0.49	2.70	0.01
Shin, 2014	PTCI Self-blame	-0.06	-0.38	0.26	-0.39	0.70
Ssenyonga, 2013	PTCI Self-blame	0.27	0.07	0.45	2.57	0.01
Startup, 2007	PTCI Self-blame	0.25	0.00	0.47	1.98	0.05
Su, 2008	PTCI Self-blame	0.64	0.56	0.71	11.67	0.00
Tutus, 2016	PTCI Self-blame	0.33	0.15	0.49	3.60	0.00
Van Buren, 2015	PTCI Self-blame	0.33	0.04	0.57	2.25	0.02
Van Emmerick, 2006 S2	PTCI Self-blame	0.12	-0.04	0.27	1.50	0.13
Van Emmerick, 2006, S1	PTCI Self-blame	0.47	0.35	0.58	6.75	0.00
Whiting & Bryant, 2007	PTCI Self-blame	0.20	-0.08	0.45	1.40	0.16

Appendix P

Table of Outliers for Self-Blame Appraisals.

First Author, Year	LL	UL
Beck, 2004	-0.23	0.14
Beck, 2015, S1	-0.08	0.14
Cieslak, 2008, S1	-0.33	0.15
Cieslak, 2008, S2	-0.33	0.15
Daie-Gabai, 2011	0.01	0.23
Foa, 1999	0.50	0.63
Hagenaars, 2007	0.37	0.81
Horsch, 2012	0.46	0.77
O'Donnell, 2007	-0.10	0.14
Olatunji, 2008	0.41	0.77
Su, 2008	0.56	0.71
Van Emmerick, 2006, S1	0.35	0.58

Appendix Q

The Posttraumatic Cognitions Inventory (PTCI; Foa et al., 1999)

Instructions:

We are interested in the kind of thoughts which you may have had after a traumatic experience. Below are a number of statements that may or may not be representative of your thinking. Please read each statement carefully and tell us how much you AGREE or DISAGREE with each statement.

<u>Negative Cognitions about the Self Items:</u>

2. I can’t trust that I will do the right thing

3. I am a weak person

4. I will not be able to control my anger and will do something terrible

5. I can’t deal with even the slightest upset

6. I used to be a happy person but now I am always miserable

9. I feel dead inside

12. I am inadequate

14. If I think about the event, I will not be able to handle it

16. My reactions since the event mean that I am going crazy

17. I will never be able to feel normal emotions again

20. I have permanently changed for the worse

21. I feel like an object, not like a person

24. I feel isolated and set apart from others

25. I have no future

26. I can’t stop bad things from happening to me

28. My life has been destroyed by the trauma

29. There is something wrong with me as a person

30. My reactions since the event show that I am a lousy coper

33. I feel like I don’t know myself any more

35. I can’t rely on myself

36. Nothing good can happen to me anymore

Negative Cognitions about the World

7. People can’t be trusted

8. I have to be on guard all the time

10. You can never know who will harm you

11. I have to be especially careful because you never know what can happen next

18. The world is a dangerous place

23. I can’t rely on other people

27. People are not what they seem

Self-Blame

1. The event happened because of the way I acted

15. The event happened to me because of the sort of person I am

19. Somebody else would have stopped the event from happening

22. Somebody else would not have gotten into this situation

31. There is something about me that made the event happen

Foa, E. B., A. Ehlers, et al. (1999). "The posttraumatic cognitions inventory (PTCI): Development and validation." Psychological Assessment 11(3): 303-314.

Appendix R

Items in the Child Posttraumatic Cognitions Inventory (CPTCI)

Permanent and disturbing change:

I feel like I am a different person since the frightening event.

I used to be a happy person but now I am always sad.

I will never be able to have normal feelings again.

I'm scared that I'll get so angry that I'll break something or hurt someone.

My life has been destroyed by the frightening event.

My reactions since the frightening event mean I have changed for the worse.

My reactions since the frightening event mean I will never get over it.

My reactions since the frightening event mean something is seriously wrong with me.

My reactions since the frightening event show that I must be going crazy.

Not being able to get over all my fears means that I am a failure. .

Nothing good can happen to me anymore.

Something terrible will happen if I do not try to control my thoughts about the frightening event.

The frightening event has changed me forever.

Fragile person/Scary world:

Anyone could hurt me.

Bad things always happen.

Everyone lets me down.

I am a coward.

I am no good.

I can't cope when things get tough.

I can't stop bad things from happening to me.

I don't trust people.

I have to be really careful because something bad could happen.

I have to watch out for danger all the time.

Life is not fair.

Small things upset me.