Structure and correlates of post-traumatic stress disorder and related disorders in children and adolescents

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Thesis Portfolio Abstract

Background: Traumatic exposure is common among children and adolescents. Following trauma, a sizeable portion of youths go on to develop post-traumatic stress disorder (PTSD). PTSD has far-reaching impacts on child and adolescent development, yet to date there remains significant knowledge gaps around what factors predict PTSD and related disorders within this age group, and what symptom profiles trauma-exposed youths tend to present with.

Methods: The present portfolio comprises two pieces of work. First, a systematic review was carried out to investigate the relationship between anxiety sensitivity and PTSD among children and adolescents. Second, an empirical analysis of pre-existing data was conducted to examine PTSD and complex PTSD (CPTSD) presentations as well as their psychosocial and cognitive correlates among community adolescents.

Results: Anxiety sensitivity is strongly associated with PTSD among children and adolescents. 2.3%, 5.6% and 10% of adolescents were found to meet the criteria for PTSD, CPTSD and disturbances in self-organisation (DSO) respectively. Latent class analysis (LCA) produced a CPTSD class, a DSO class and a healthy class but not a PTSD class. Finally, when compared to adolescents with DSO and healthy adolescents, those with CPTSD were more likely to be female and tended to endorse more/higher overall trauma types, interpersonal trauma types, depression, anxiety and maladaptive cognitive processes.

Conclusion: The combined results of the systematic review and the empirical study corroborated existing cognitive models of anxiety and PTSD. They also had significant implications on the assessment, management and intervention of PTSD and related disorders in children and adolescents.

CHAPTER ONE

Introduction to the Thesis Portfolio

Introduction to the Thesis Portfolio

This chapter presents an overview of the current literature on post-traumatic stress disorder (PTSD) in children and adolescents. Specifically, the definition, prevalence, impact and cognitive theories of PTSD are outlined. These provide the theoretical and clinical context for the present portfolio.

Definition of PTSD

The diagnostic criteria of PTSD have undergone multiple revisions over the years. Historically, PTSD encompassed a range of trauma-related presentations spanning from relationship difficulties to mood difficulties (American Psychiatric Association, 2013; World Health Organization, 1992). However, concerns were raised around the significant overlaps and comorbidity between PTSD and other mental health disorders such as depression and anxiety (Barbano et al., 2019).

According to the 11th version of the International Classification of Diseases (ICD-11), PTSD is now reduced to three core symptoms in addition to trauma exposure, namely 1) re-experiencing of the traumatic event in forms of vivid intrusive memories, images or flashbacks, 2) deliberate avoidance of external and internal reminders and 3) persistent sense of current threat (World Health Organisation, 2018). To account for more chronic and "complex" symptoms, a new diagnosis termed Complex PTSD (CPTSD) was created. In addition to core PTSD symptoms, the diagnostic criteria of CPTSD includes affect dysregulation, negative self-concept and interpersonal difficulties (World Health Organisation, 2018), collectively termed "disturbances in self organisation" (DSO). While preliminary evidence supported the construct validity of CPTSD, findings around its latent structure remains inconclusive (Kazlauskas et al., 2020; Li et al., 2021; Perkonigg et al., 2016; Tian et al., 2021). There is also a dearth of research on CPTSD in children and adolescents (Brewin, 2020).

Prevalence of PTSD among children and adolescents

While initially put forward as an adult disorder (American Psychiatric Association, 1980), PTSD was later found to be equally applicable to children and adolescents (Pynoos, et al., 1987; Yule & Williams, 1990). According to epidemiological studies in the United States (US), United Kingdom (UK) and Europe, between 56% to 84% of children and adolescents experience some form of trauma in their lives (Copeland et al., 2007; Joseph et al., 2000; Karatzias et al., 2020; Landolt et al., 2013; McLaughlin et al., 2013). These include rape, domestic violence, physical assault, life-threatening accidents, natural disasters, illnesses and witnessing death, injury of loved ones and so on (McLaughlin et al., 2013).

Within one month of trauma exposure, it is normal to experience acute stress symptoms such as intrusive memories and hypervigilance (Harvey & Bryant, 2002). For most people, these acute symptoms tend to subside over time (Foa & Riggs, 1995; Hiller et al., 2016; Yehuda & LeDoux, 2007). However, this is not always the case; a significant proportion of children and adolescents go on to develop chronic PTSD (Alisic, et al., 2014; Bryant et al., 2004; Copeland, et al., 2007; Costello et al., 2002; Kassam-Adams & Winston, 2004; Ogle et al., 2013). According to a large epidemiological study in the UK (Lewis et al., 2019), around 8% of children and adolescents met the diagnostic criteria for PTSD at some point before the age of 18. Prospective longitudinal studies showed that children and adolescents could remain afflicted with the condition years or decades after the traumatic event (Morgan et al., 2003; Yule et al., 2000).

Impact of PTSD on children and adolescents

In the absence of effective psychological treatment, the effects of PTSD on children and adolescents can be both debilitating and chronic. PTSD in the context of early life not only disrupts recently acquired developmental skills, but also impede subsequent development of areas such as cognition, emotion regulation, social skills, perception of

danger, self-concept and impulse control (Caffo et al., 2005; Davis and Siegel, 2000; Lubit et al., 2003; Pfefferbaum, 1997). These developmental delays are associated with significant impairment in social and academic functioning (Frieze et al., 2015; McLean et al., 2013).

Moreover, PTSD increases the risk of developing other emotional and behavioral difficulties including depression, anxiety, substance abuse, conduct disorder, aggression, adjustment disorders and externalizing disorders (Bernhard et al., 2018; Kerig et al., 2010; Shaw, 2000; Simmons & Suárez, 2016). In some cases, trauma-exposed children and adolescents may be misdiagnosed with neurodevelopmental conditions such as autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD). Such misdiagnoses not only led to inappropriate treatments, but could also have negative implications on one's self-esteem, peer relationships and schooling experiences (Anderson, 2005; Weinstein et al., 2000).

Cognitive theories of PTSD

The cognitive model of psychopathology holds that it is not the events themselves, but the interpretation of events, that causes distress (Beck, 1972; Ellis, 1977). While originally used to formulate and treat depression, the model was later extended to the treatment of various anxiety disorders (Beck & Clark, 1997).

Among cognitive theories in the PTSD literature (e.g. Brewin et al., 1996; Ehlers & Clark, 2000; Foa & Rothbaum, 2001), the Ehlers and Clark (2000)'s model is one of the most widely researched ones. According to the model, although trauma exists in the past, people with PTSD tend to process the traumatic event and its consequences in a way that produces a sense of ongoing threat. Two factors are proposed to play a role: First, memory of the trauma tends to be fragmented, sensory based, lacking in context, involuntarily triggered and possessing a here-and-now quality. Such disruption of autobiographical memory evokes a strong sense of current threat to the person. Second, trauma and its sequela (e.g. flashbacks,

numbing and anger outbursts) tend to be appraised in negative, overgeneralizing or catastrophic ways. By way of illustration, one may endorse the beliefs “I attract disasters”, “the world is a dangerous place” and “the next disaster will strike soon” in relation to a traumatic event that has occurred. One may also have such beliefs as “I am going crazy”, “I am never going to recover” and “I have changed for the worst” in relation to one’s reactions to trauma. These maladaptive beliefs consequently fuel one’s sense of threat. In an attempt to contain the threat, one may engage in strategies such as safety-seeking behaviours, cognitive avoidance, rumination and thought suppression. However, despite their short-term benefits, these strategies tend to perpetuate and intensify anxiety in the long term, resulting in ongoing PTSD symptoms (Ehlers & Clark, 2000; Nolen-Hoeksema et al., 2004; Sibrava & Borkovec, 2006).

The Ehlers and Clark (2000)’s model helped account for the development and maintenance of PTSD and thereby inform psychological intervention. Trauma-focused cognitive behavioral therapy (TF-CBT), the current first-line treatment recommended by National Institute for Health and Care Excellence (2018) guidelines, specifically focuses on modifying trauma memory, trauma appraisals and resulting maladaptive coping strategies as the main mechanisms of change. As well as adults, TF-CBT was found to be effective among children and adolescents with PTSD (de Arellano et al., 2014).

The present portfolio

This thesis portfolio seeks to address two gaps in the current PTSD literature. Chapter Two presents a systematic review on the relationship between post-traumatic stress symptoms and anxiety sensitivity (a construct that may be conceptually related to trauma appraisal) among trauma-exposed children and young people. Chapter Four presents an empirical study investigating PTSD and complex PTSD (CPTSD) presentations and their psychosocial and cognitive correlates among a group of community adolescents. Theoretical

and conceptual links between these two studies are discussed in Chapter Three. Lastly, Chapter Five integrates the findings of the two studies, examining their respective strengths and limitations, illustrating the wider theoretical and clinical implications and exploring future research directions. The portfolio concludes with the author's reflections on the research process.

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CHAPTER TWO

Systematic Review

Relationship between anxiety sensitivity and post-traumatic stress symptoms in trauma-exposed children and adolescents: a meta-analysis

Prepared for Behaviour Research and Therapy

(see Appendix A for author guidelines for manuscript preparation)

Relationship between anxiety sensitivity and post-traumatic stress symptoms in trauma-exposed children and adolescents: a meta-analysis

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Abstract

Given the high rate of trauma exposure among children and adolescents, it is important to understand the risk factors for post-traumatic stress disorder (PTSD). Anxiety sensitivity has been implicated in multiple anxiety disorders, and an emerging evidence base has explored the relationship between this construct and PTSD. The present review investigated the size of the relationship between anxiety sensitivity and PTSD symptoms among children and adolescents exposed to trauma. A systematic search on multiple electronic databases (MEDLINE, PsycINFO, CINAHL and PTSDpubs) returned a total of 2916 records, among which six (n = 1331) met study inclusion criteria and were included in our random effects meta-analysis. Our results indicated a large effect size (r = .56, 95% CI = .47 - .64) for the relationship between anxiety sensitivity and PTSD symptoms; there was significant between-study heterogeneity. This supported current cognitive models of anxiety and PTSD. Clinical implications, strengths and limitations of the review were discussed.

Keywords: post-traumatic stress disorder, anxiety sensitivity, meta-analysis, child psychology, adolescent psychology

Introduction

The majority of children and adolescents are found to have experienced some form of trauma in their lives (Copeland et al., 2007). While many recover naturally from acute stress symptoms induced by trauma (Hiller et al., 2016), around 10-15% of youths go on to develop post-traumatic stress disorder (PTSD; Alisic, et al., 2014; Bryant et al., 2004; Copeland, et al., 2007; Costello et al., 2002; Kassam-Adams & Winston, 2004; Ogle et al., 2013). According to Lewis et al. (2019), an epidemiological study conducted in England and Wales, around 8% of children and adolescents have suffered from PTSD at some point in their life. PTSD is associated with a wide range of physical, emotional, social and developmental impacts on a young person (Fairbank & Fairbank, 2009). If left unattended, these impacts are likely to persist into adulthood and beyond (Lupien et al., 2009; Ogle et al., 2013). Given such devastating and far-reaching consequences, it is important to understand the factors that predict the development of PTSD in order to prevent and mitigate it.

Predictors of PTSD in children and adolescents

A number of pre-trauma psychosocial risk factors, event-related risk factors and cognitive risk factors were found to predict PTSD symptoms in children and adolescent subsequent to trauma exposure. Psychosocial factors include prior life events, socioeconomic status, intelligence, self-esteem, social support and female gender (Allen et al., 2021; Cox et al., 2008; Trickey et al., 2012), while event-related factors include interpersonal versus non-interpersonal trauma, presence of deaths, injury severity, levels of pain, peritraumatic dissociation and perceived fear responses (Cox et al., 2008, Trickey et al., 2012, Vogt et al., 2007). These factors, however, tended to account for only small to medium effect sizes (Cox et al., 2008; Memarzia et al., 2021; Trickey et al., 2012). Conversely, cognitive factors such as trauma appraisals, data-driven processing, nature of trauma memory, rumination and thought suppression (Brewin et al., 1996; Ehlers & Clark, 2000; Foa et al., 1989) were

consistently shown to be strong predictors of PTSD with medium to large effect sizes (Ehlers et al., 2003; Gómez de La Cuesta et al., 2019; Meiser-Stedman et al., 2009; Memarzia et al., 2021; Stallard & Smith, 2007).

Anxiety sensitivity and PTSD

A construct that may be conceptually associated with trauma appraisal is anxiety sensitivity. Anxiety sensitivity refers to the fear of anxiety and arousal-related sensations due to the belief that they have detrimental consequences for the individual (Reiss, 1985). According to the Anxiety Sensitivity Index (ASI; Reiss et al., 1986), these perceived consequences can be classified into physical domains (e.g. “When I notice my heart beating rapidly, I worry that I might be having a heart attack”), cognitive domains (e.g. “When I cannot keep my mind on a task, I worry that I might be going crazy”) and social domains (e.g. “Other people notice when I feel shaky”).

The association between anxiety sensitivity and panic disorder has been widely established (Donnell & McNally, 1990; Li & Zinbarg, 2007; McNally, 2002; Poletti et al., 2015). This is in line with cognitive models of panic disorder (e.g. Clark, 1986) which consider catastrophic misinterpretations of anxiety-induced bodily symptoms as the core maintaining factor of the disorder. In recent decades, research has begun to explore the role of anxiety sensitivity in other anxiety disorders such as PTSD (Asmundson & Stapleton, 2008; Marshall et al., 2010; Olatunji & Wolitzky-Taylor, 2009; Taylor, 2003). A relationship between anxiety sensitivity and PTSD is postulated due to cognitive theories of PTSD regarding the impact of trauma appraisals (e.g. Ehlers & Clark 2000) as well as high comorbidity rates between PTSD and panic disorder (Leskin & Sheikh, 2002). However, to date this line of research has mostly focused on adults; less is known about how anxiety sensitivity might affect PTSD in children and adolescents.

Current review

The current review aimed to conduct a comprehensive search and analysis of the existing empirical studies on anxiety sensitivity and PTSD symptoms among trauma-exposed children and adolescents. To our knowledge, this review constitutes the first meta-analysis in the area. Clarifying the relationship between anxiety sensitivity and post-traumatic stress symptoms (PTSS) would not only help enrich existing cognitive theories of PTSD, but also inform the prevention, management and treatment of the condition.

Method

Protocol and Registration

This review was registered with PROSPERO: International prospective register of systematic reviews (ID: CRD42022316095) on 16 March 2022 and reported with reference to the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) Statement (Moher et al., 2009).

Search Strategy

A systematic search was conducted by the primary author (HC) to identify all studies on anxiety sensitivity and PTSD among children and adolescents. Electronic databases included MEDLINE, PsycINFO, CINAHL and PTSDpubs. Search terms summarized two key domains: anxiety sensitivity and PTSD OR post-traumatic stress OR post traumatic stress OR posttraumatic stress, and were run by “Abstract and Title”, keywords, and Medical Subject headings (MeSH). Initial searches were open to all ages rather than confined to children and adolescents. This ensured the inclusion of studies that assessed both adults and children but reported on the groups separately. All searches were limited to human studies that were peer reviewed, written in the English language and published from 1980 (when the Diagnostic and Statistical Manual of Mental Disorders first defined PTSD) to October 2022.

Study Selection

Following the initial search and removal of duplicates, titles and abstracts were screened by the first author (HC) against defined inclusion and exclusion criteria. Among studies with relevant titles and abstracts, further full-text screening was conducted. A randomly selected 25% of the full-text articles were co-screened by a second reviewer (AC) to ensure adherence to the inclusion and exclusion criteria.

Studies were included in the review if they 1) were academic journal articles, doctoral or master's theses/dissertations, 2) examined trauma-exposed children and adolescents under the age of 18, 3) adopted cross-sectional or prospective longitudinal designs, 4) assessed severity, symptoms or diagnosis of PTSD with a well-validated assessment measure and 5) contained a correlation analysis between anxiety sensitivity and PTSD, or any statistics that could be converted to correlation statistics (e.g. Cohen's d).

On the other hand, studies were excluded from the review if they 1) were book chapters, clinical trials/treatment studies, reviews/meta-analyses, single case studies, qualitative studies or animal studies, 2) examined individuals over the age of 18, 3) used clinical or treatment-seeking samples of PTSD (due to difficulty in determining the predictive power of anxiety sensitivity with no comparison to individuals with lesser or no symptoms of PTSD), 4) used samples that were selected due to a mental health disorder (e.g. depression, anxiety) or neurodevelopmental condition (e.g. traumatic brain injury, learning disability) and 5) did not include a correlation analysis between anxiety sensitivity and PTSD or any statistics that could be converted to correlation statistics.

Data Extraction

The following data were extracted from each study: 1) article details (e.g. title, authors, year of publication), 2) study design (i.e. cross-sectional vs. prospective longitudinal), 3) demographic information (e.g. sample population description, age, gender),

4) weeks since trauma exposure, 5) types of trauma (i.e. interpersonal vs. non-interpersonal), 6) country (i.e. high income country vs. middle to low income country), 7) nature of PTSD measure (interview-based vs. questionnaire) and 8) effect size and nature of effect size (e.g. raw correlation, Cohen's d, odd ratios).

In the interest of consistency, a number of rules governed the data extraction process. First, should PTSD be reported in both continuous measures (i.e. symptom severity) and dichotomous measures (i.e. diagnosis), effect sizes from continuous measures were prioritised as dichotomisation of data tend to underestimate effect size (Breh & Seidler, 2007). Additionally, for studies that presented multiple correlation statistics at different time points, the one derived at the earliest time point was selected for our analysis (i.e. cross-sectional data were prioritised over longitudinal data).

Effect size calculation

Pearson's zero-order correlation coefficient (*r*), due to its wide usage and easy interpretability, was used as the primary estimate of effect size. For studies that reported t-tests, ANOVAs or odds ratios, *r* was derived using standardised procedures for transforming effect sizes (Borenstein et al., 2021; Cohen, 1988; Rosnow & Rosenthal, 1996). In accordance with Cohen (1988), a correlation coefficient of 0.1, 0.3 and 0.5 represented small effect, medium effect and large effect respectively. If a study reported more than one effect sizes, *r*'s were converted to Fisher's *z* to obtain a mean before being transformed back to *r* for analysis (Borenstein et al., 2021).

Quality Assessment

In line with recommended practice, a risk of bias assessment was conducted for all included studies to account for differences in methodological quality (Higgins & Altman, 2008). A quality assessment tool was developed for this analysis with reference to existing checklists such as the Quality Appraisal Checklist for Studies Reporting Correlations and

Associations (NICE, 2012) and the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement (Von Elm et al., 2007). The tool consisted of four items concerning 1) sample representativeness, 2) appropriate sampling and recruitment, 3) non-response bias and 4) reliability of anxiety sensitivity measures. Each item was rated on a "yes" (1) or "no" (0) scale, where a higher total score indicated a higher study quality / lower risk of bias (see Table S1).

To ensure process rigour, in addition to quality assessment by the main author (HC) using the above framework, all included studies were co-rated by a second-rater (AC). Inter-rater reliability was recorded and disagreements in quality rating were resolved by discussion.

Meta-analytic method

A meta-analysis was conducted using the R "metafor" (version 2.0.0) package (Viechtbauer & Cheung, 2010) in R (VERSION). Random effects models, which did not assume any common or fixed parameters across studies, were employed to generalise findings beyond the included studies (Cuijpers, 2016; Hedges & Vevea, 1998). Heterogeneity of effect sizes were assessed using the Q statistic (where variation between studies is implied if Q is significant, $p < .05$; Higgins & Thompson, 2002) and the I^2 statistic (where I^2 values of 25%, 50% and 75% represent small, moderate and large degree of heterogeneity respectively; Higgins et al., 2003). As recommended by IntHout et al. (2016), 95% prediction intervals were reported alongside 95% confidence intervals to provide better estimates of effect sizes based on study heterogeneity.

Results

Search outcomes

The search strategy produced 2916 references. After removing duplicates, 1787 records were screened based on titles and abstracts. The process resulted in the exclusion of 1678 records that were deemed irrelevant. Full-text screening were then conducted with the

remaining 106 studies. Six published papers met the inclusion criteria for this systematic review (see Figure 1).

Study characteristics

Table 1 shows the characteristics of the six studies that were included in this review. Published between the years 2007 and 2015 across the United States (k = 2), the United Kingdom (k = 1), the Netherlands (k = 1) and Turkey (k = 2), the included studies examined a total of 1331 adolescents with non-interpersonal trauma (e.g. earthquakes; k = 3) and mixed interpersonal and non-interpersonal trauma (k = 3). Participants had a mean age of 14.7 and 48% were females (n = 639). While most studies took place after the acute stress period (i.e. one month post-trauma; k = 4), two studies conducted their data within the acute stress period. All studies were cross-sectional in nature and employed well-validated measures of anxiety sensitivity (i.e. Child Anxiety Sensitivity Index) and PTSD (i.e. Child Posttraumatic Stress Reaction Index, Child PTSD Symptom Scale and Child Revised Impact of Events Scale).

Meta-analyses

A random-effects meta-analysis of six independent effect sizes indicated a large effect size for the relationship between anxiety sensitivity and PTSS, r = .56, 95% CI = .47 - .64. The 95% prediction interval was .34 - .72. Estimates of heterogeneity suggested significant variance across the studies, Q = 17.2, df = 5, p < .01, I^2 = 72.7%. A forest plot of all effect sizes and confidence intervals from each individual study is shown in Figure 2. With fewer than 10 studies included in the present meta-analysis, tests for funnel plot asymmetry (i.e. publication bias) were not carried out due to insufficient power to distinguish chance from real asymmetry (Borenstein et al., 2009).

Among the effect sizes of the six included studies, two involved the relationship between acute PTSD (i.e. PTSS reported within one month of trauma exposure) and anxiety

sensitivity. To explore whether acute PTSD might have affected our results, a random-effects meta-analysis was conducted with the remaining four effect sizes. This produced a similarly large effect size, r = .55, 95% CI = .44 - .64 with the 95% prediction interval being .31 - .72; the significant heterogeneity across studies persisted, Q = 12.5, df = 3, p < .01, I^2 = 77.6%.

Quality assessment

All six studies were rated against our quality assessment framework, in which higher scores translated to higher study quality (lower risk of bias). Out of a total score of 4, three studies were rated as 2, two studies rated as 3 and one study rated as 4 (see Table S2). Inter-rater reliability was calculated for all six study ratings and an agreement rate of 95.8% was found (intra-class correlation coefficient = 0.88).

Discussion

This review sought to examine the strength of the relationship between anxiety sensitivity and PTSD symptoms among trauma-exposed children and adolescents. The current findings indicated a strong positive relationship between anxiety sensitivity and PTSD symptoms in this population. Based on the data of six empirical studies published between 2007 and 2015 (n = 1331), a large effect size (r = .56) was generated. The effect size remained large after excluding studies on acute PTSD (r = .55). This was comparable to the findings of Gómez de La Cuesta et al. (2019) which meta-analysed the relationship between PTSD and various trauma appraisals.

The current findings corroborated current cognitive models of PTSD. According to Ehlers & Clark (2000), PTSD could be conceptualised as a sense of current threat maintained by 1) trauma memory and 2) maladaptive appraisals of trauma and its sequelae. Maladaptive appraisals may include “I'm going mad” (regarding flashbacks), “my brain is damaged” (regarding the inability to concentrate) and “I am going to die” (regarding panic attacks). Anxiety sensitivity may reflect a pre-trauma vulnerability factor that serves to intensify these

trauma-related maladaptive appraisals, especially those in relation to anxiety sensations. This consequently exacerbates one's sense of current threat and PTSD symptoms.

Moreover, anxiety sensitivity could influence PTSD through the increased use of maladaptive cognitive and behavioural strategies. Given their aversion to anxiety, adolescents with high anxiety sensitivity are more likely to employ strategies such as avoidance, thought suppression, selective attention to threat cues and safety behaviours (Ehlers & Clark, 2000). In particular, Wilson & Hayward (2006) found that anxiety sensitivity tends to precede and aggravate avoidance behaviours. While these strategies may bring relief in the short term, they tend to perpetuate anxiety and PTSD in the long term through various mechanisms (Ehlers & Clark, 2000; Beck & Haigh, 2014; Wells & Leahy, 1998).

It is also possible for anxiety sensitivity to contribute to PTSD symptoms indirectly through panic attacks. As outlined above, anxiety sensitivity is a strong predictor of panic disorder (Donnell & McNally, 1990; Li & Zinbarg, 2007; McNally, 2002; Poletti et al., 2015) as in line with cognitive models of panic disorder (e.g. Clark, 1986). Both peritraumatic and posttraumatic panic attacks were found to predict subsequent development of PTSD (Boscarino & Adams, 2009; Nixon & Bryant, 2003). In other words, anxiety sensitivity may predispose one to experience panic attacks during and after trauma, which in turn maintain and intensify symptoms of PTSD such as avoidance and hypervigilance.

Clinical implications

The present findings helped inform the assessment, prevention and treatment of PTSD among children and adolescents. Given the strong association between anxiety sensitivity and PTSD both during and beyond the acute one-month period, post-trauma anxiety sensitivity level could inform the screening of at-risk youths at various time points. For those assessed to have high risks of developing PTSD, brief intervention targeting anxiety sensitivity such as psychoeducation on anxiety and its function (Mitchell et al., 2014) could be offered.

Furthermore, given the malleable nature of the anxiety sensitivity construct (Keough & Schmidt, 2012; Smits et al., 2008; Vujanovic et al., 2012), anxiety sensitivity could potentially be a target for treatment for those diagnosed with PTSD. Specifically, alongside psychoeducation, intervention such as interoceptive exposure, mindful awareness of bodily sensations and behavioural experiments around the effects of anxiety could be provided (Smits et al., 2008).

Strengths, limitations and future research

The present review was strengthened by the pre-registration of its protocol, homogeneity in anxiety sensitivity measure (i.e. CASI) and large sample size of certain studies (e.g. Kadak et al. 2013). There was also considerable ethnic diversity across study samples (comprising Asian, Caucasian and Black children and adolescents) which increased the generalisability of our findings.

The review is however not without its limitations. Given the small number of studies included, it is impossible to determine publication bias. It is also difficult to conduct moderator analyses that examine the potential impacts of factors such as demographics, trauma types (interpersonal trauma versus non-interpersonal trauma), PTSD measures (interview versus self-reported questionnaire) and country of study (high income country versus low to mid income country). Moreover, as our data were cross-sectional in nature, conclusions around directionality cannot be drawn. It remains unclear to what extent anxiety sensitivity influences PTSD and to what extent experiences of trauma affect anxiety sensitivity (although irrespective of directionality, anxiety sensitivity remains a potentially important target for treatment given its malleable nature). Lastly, as the included studies focused predominantly on PTSD in the context of single traumatic events, the present findings might or might not be generalised to those with experiences of complex trauma such as childhood abuse.

To fill these knowledge gaps, more research is needed on anxiety sensitivity and PTSD in the youth population. Future studies could employ prospective longitudinal designs to complement existing cross-sectional findings. They could also recruit youths with complex trauma history so as to examine the role of anxiety sensitivity on more complex trauma symptomatology. As the literature around the topic becomes larger, moderator analyses would be possible in future systematic reviews and meta-analyses. This may help create a more nuanced understanding of when and under what circumstances anxiety sensitivity influences PTSD and thereby constitutes an effective intervention target.

Conclusion

The current review indicated a large effect size for the relationship between anxiety sensitivity and PTSD symptoms among children and adolescents exposed to trauma. This validated existing cognitive models of anxiety and PTSD and had significant clinical implications in terms of the assessment, prevention and treatment of PTSD in children and adolescents.

Author Contributions

Henry Tak Shing Chiu: Research design, literature review, data analysis and interpretation and write-up

Angel Hiu Tung Chan: Data analysis, critical revision of the manuscript

Richard Meiser-Stedman: Research design, data analysis, critical revision of the manuscript

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Figure 1

PRISMA flow chart.

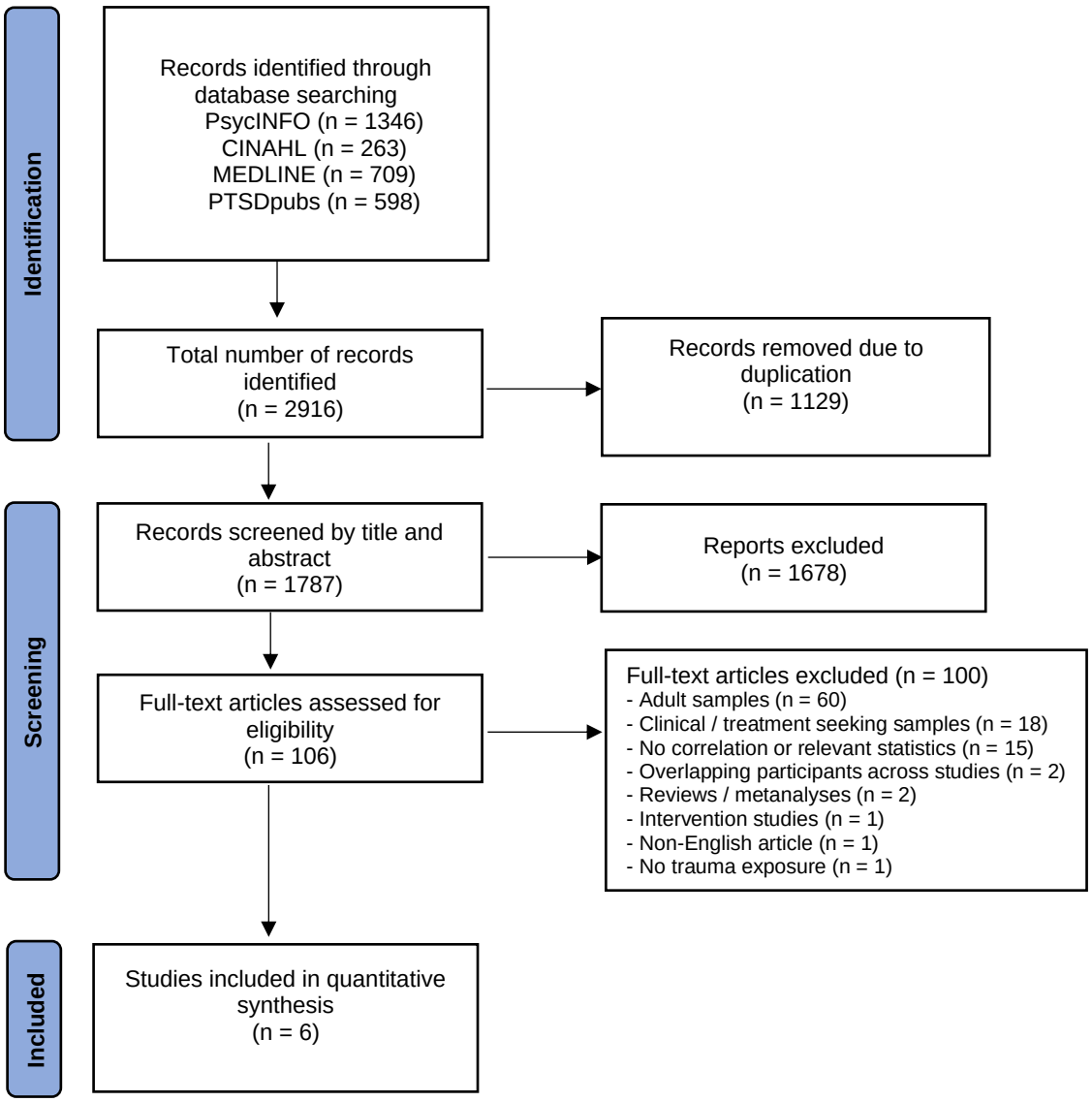

Figure 2

Forest plot.

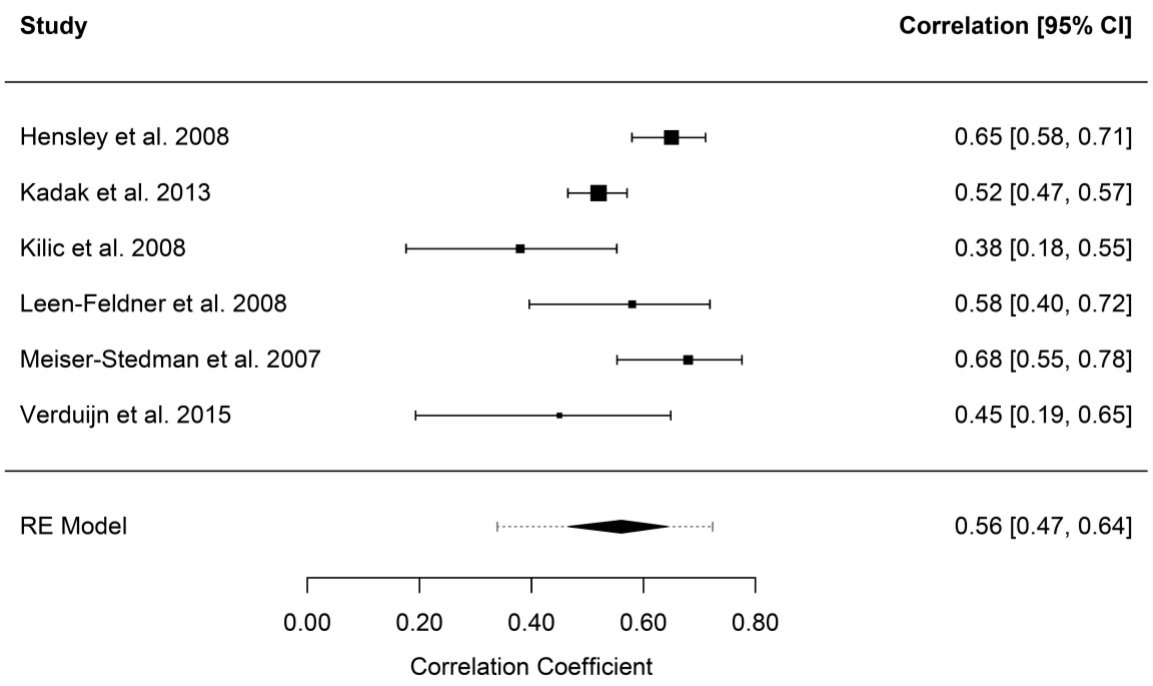

Table 1

Characteristics of included studies.

Article	Trauma type	Recruitment method	Time since trauma	Sample size	Mean Age (SD)	Age range	Female (%)	Race / Ethnicity	Country of study	PTSD measure
Hensley et al. 2008	Hurricane	School	5-8 months	302	12.41 (0.94)	10-15	61%	46% AA, 37% Ca, 8% HL, 6% API, 2% NR	US	CPTS-RI
Kadak et al. 2013	Earthquake	School	6 months	738	16.22 (0.88)	13-17	45%	NR	Turkey	CPTS-RI
Kılıç et al. 2008	Earthquake	CS	5 years	81	11.2 (2.2)	8-15	51%	NR	Turkey	CPTS-RI
Leen-Feldner et al. 2008	Mixed	CS	Mixed (Mean: 37 months)	68	14.74 (2.49)	10-17	63%	90% Ca, 6% HL, 4% Asian	US	CPSS
Meiser-Stedman et al. 2007	Assault or MVA	ED	2-4 weeks	93	13.9 (1.9)	10-16	35.5%	56% Black, 33% Ca, 11% Other	UK	CRIES
Verduijn et al. 2015	Mixed	ED	3 weeks	49	13.8 (2.2)	8-17	35%	NR	Netherlands	CPSS

Notes: AA = African America; API = Asian / Pacific Islander; Ca = Caucasian; CPSS = Child PTSD Symptom Scale; CPTS-RI = Child Posttraumatic Stress Reaction Index; CRIES = Child Revised Impact of Events Scale; CS = community survey; ED = emergency department; HL = Hispanic / Latino; MVA = motor vehicle accident; NR = not reported.

Table S1

Quality Assessment Framework.

1.	Was the study population clearly specified and defined?	Yes (1) = Clear description of ≥ 3 of the following: location, gender, age and ethnicity No (0) = Clear description of < 3 of the following: location, gender, age and ethnicity
2.	Was sampling carried out appropriate to the study design, such that the likelihood of sampling bias was minimised as far as possible?	Yes (1) = probability sampling, e.g. random sampling, whole community method No (0) = non-probability sampling, e.g. convenience sampling, self-referral to study
3.	Was the likelihood of non-response bias minimised as far as possible?	Yes (1) = response rate at least 40% OR an analysis performed that showed no significant difference in relevant demographic characteristics between responders and non-responders No (0) = response rate less than 40% and no analysis performed that showed no significant difference in relevant demographic characteristics between responders and non-responders
4.	Was the anxiety sensitivity measure used reliable?	Yes (1) = Measure with internal consistency (Cronbach's alpha) ≥ 0.7 as reported in the paper; OR measure that is validated in other peer reviewed papers as having adequate internal consistency (e.g. CASI) No (0) = Measure with internal consistency (Cronbach's alpha) < 0.7 as reported in the paper; AND measure that is not validated in other peer reviewed papers as having adequate internal consistency

Table S2

Quality Assessment Ratings.

Article	Study population	Sampling	Non-response bias	Measure	Total (0-4)
Hensley et al. 2008	+	-	-	+	2
Kadak et al. 2013	+	-	-	+	2
Kılıç et al. 2008	+	+	+	+	4
Leen-Feldner et al. 2008	+	-	-	+	2
Meiser-Stedman et al. 2007	+	+	-	+	3
Verduijn et al. 2015	+	+	-	+	3

Notes: + = high quality; - = low quality.

CHAPTER THREE

Bridging Chapter

Bridging Chapter

The systematic review in Chapter 2 provided strong evidence that anxiety sensitivity is significantly and positively correlated with post-traumatic stress disorder (PTSD) symptoms among children and adolescents. A large effect size was yielded irrespective of the inclusion or exclusion of acute PTSD studies. In other words, anxiety sensitivity is likely to play a role in PTSD during both acute and chronic stages within the youth population.

On closer examination, however, our samples were confined to those exposed to single traumatic events such as natural disasters, assaults and motor vehicle accidents. Little is known about the role of anxiety sensitivity in more prolonged or complex trauma such as domestic abuse. This is a notable knowledge gap as complex trauma is found to be associated with more wide-ranging emotional, behavioural and physiological impacts than acute trauma (Briere & Spinazzola, 2009; Dye, 2018; Wamser-Nanney & Vandenberg, 2013). It is possible that young people with complex trauma develop PTSD symptoms through mechanisms that do not involve anxiety sensitivity.

In fact, whether complex trauma results in the same set of PTSD symptoms as single traumatic events is a subject of debate. In the adult literature, it has been proposed that complex trauma may lead to symptoms that are unaccounted for by the classic PTSD diagnosis, including difficulties regulating emotions, feelings of worthlessness and difficulties feeling connected with other people (Cloitre et al., 2013; Herman, 1992; Resick et al., 2012). As such, a new diagnosis termed “complex PTSD” (CPTSD) was added to the 11th version of the International Classification of Diseases (ICD-11; World Health Organisation, 2018). CPTSD yet remains under-researched to date. Existing studies on the topic have mostly focused on adults. It is not clear whether and to what extent the CPTSD diagnosis applies to youth. It is also unclear what predicts the development of CPTSD (as

opposed to PTSD and other trauma related psychopathology) as well as what underlying cognitive processes might be involved in CPTSD within this age group.

In light of this, the following chapter (Chapter Four) presents an empirical piece of research that investigates CPTSD and related disorders among adolescents. Post-traumatic stress presentations in a community adolescent sample were first identified. Psychosocial and cognitive correlates of these presentations were subsequently explored.

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CHAPTER FOUR

Empirical Study

The prevalence, latent structure and psychosocial and cognitive correlates of complex post-traumatic stress disorder in an adolescent community sample

Prepared for the Journal of Anxiety Disorders

(see Appendix B for author guidelines for manuscript preparation)

The prevalence, latent structure and psychosocial and cognitive correlates of complex post-traumatic stress disorder in an adolescent community sample

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Abstract

Background: Complex post-traumatic stress disorder (CPTSD) has received growing attention in recent years. However, the validity of this diagnosis remains unclear, and little is known about its prevalence and risk factors in children and adolescents.

Objectives: This study first examined different post-traumatic stress presentations in adolescents using diagnostic criteria and latent class analysis (LCA). It then explored the role of demographic factors, trauma history factors, psychopathology factors and cognitive factors in predicting different post-traumatic stress presentations.

Methods: Pre-existing cross-sectional data were analysed. The data consisted of self-report measures of trauma exposure, post-traumatic stress, depression, anxiety and maladaptive cognitive processes among 342 community adolescents (12-15 years).

Results: 2.3%, 5.6% and 10% of adolescents met the criteria for PTSD, CPTSD and disturbances in self-organisation (DSO) respectively. An equally robust two-class model (i.e. healthy class and CPTSD class) and three-class model (i.e. healthy class, CPTSD class and DSO class) were generated from LCA. Adolescents with CPTSD were most likely to be female and tended to endorse the most/highest overall trauma types, interpersonal trauma types, depression, anxiety and maladaptive cognitive processes, followed by adolescents with DSO and subsequently healthy adolescents.

Conclusions: CPTSD appeared to be a more common presentation than PTSD among community adolescents. The relatively high prevalence of DSO was noteworthy and suggested that DSO was not necessarily accompanied by PTSD. Given the strong associations between CPTSD and cognitive processes implicated in PTSD, CPTSD as a construct might be conceptually similar to PTSD.

Keywords: post-traumatic stress disorder, complex post-traumatic stress disorder, epidemiology, latent class analysis, cognitive behaviour therapy, adolescent psychology

Introduction

Introduced by the American Psychiatric Association (1980) initially as a means to conceptualise veterans' stress reactions, post-traumatic stress disorder (PTSD) historically reflects psychological difficulties arising from relatively circumscribed traumatic events (Herman, 1992). In recent decades, there have been concerns that PTSD as a diagnosis does not encapsulate the full variety and complexity of trauma-related psychopathology. This is particularly thought to be the case for individuals with chronic trauma history (Herman, 1995). To improve the relevance of stress-related diagnoses, the 11th version of the International Classification of Diseases (ICD-11) proposed the diagnosis of complex PTSD (CPTSD) alongside "simple" PTSD (World Health Organisation, 2018). However, research on CPTSD, especially those conducted with children and adolescents, is still in its infancy.

Origins and definition of CPTSD

One of the earliest accounts of CPTSD can be found in Herman (1992). Examining victims of recurrent trauma such as torture, childhood abuse and domestic violence, the study identified a number of affective, dissociative and somatic post-traumatic stress symptoms (PTSS) that were not delineated in the criteria for PTSD. To account for such PTSS, Herman (1992) put forward a complex post-trauma syndrome that is purportedly a sequala of prolonged traumatisation. Upon verification by the DSM-IV field trials (Roth et al., 1997), CPTSD was recommended for inclusion within the ICD-11. The diagnostic criteria of CPTSD include 1) core PTSD symptoms, namely trauma-exposure, re-experiencing, avoidance and hypervigilance and 2) disturbances in self-organisation (DSO) symptoms, namely affect dysregulation, negative self-concept and relationship difficulties (World Health Organisation, 2018).

Current research on CPTSD

Research efforts in the past decade have focused on examining the validity of CPTSD in adults through latent class analysis (LCA) and latent profile analysis (LPA), both of which serve to identify latent subpopulations (i.e. classes) within a given population based on a set of variables. Cloitre et al. (2013) is one of the earliest studies to perform an LPA on individuals with interpersonal traumas. The findings revealed three distinct classes of individuals: a low symptom class (i.e. low in core PTSD symptoms and low in DSO symptoms), a PTSD class (i.e. high in core PTSD symptoms and low in DSO symptoms) and a CPTSD class (i.e. high in core PTSD symptoms and high in DSO symptoms), thereby supporting the ICD-11 conceptualisation of PTSD and CPTSD. Such findings were subsequently supported by multiple adult studies (Elklit et al., 2014; Hébert & Amédée, 2020; Kazlauskas et al., 2018; Murphy et al., 2016).

However, LCA/LPA findings were not consistent across all samples and ages. In addition to healthy, PTSD and CPTSD classes, an appreciable number of child and adolescent studies reported a fourth class with low core PTSD symptoms but high DSO symptoms (Kazlauskas et al., 2020; Li et al., 2021; Perkonigg et al., 2016; Tian et al., 2021). This “DSO only” class is not recognised within the current ICD-11 classification of post-traumatic stress disorders (i.e. PTSD and CPTSD). Furthermore, Palic et al. (2019) and Liddell et al. (2019) identified a “dissociative” class (i.e. high core PTSD symptoms, negative self-concept and relationship difficulties but low affect dysregulation) and an “affect dysregulation” class (i.e. low core PTSD symptoms, negative self-concept and relationship difficulties but high affect dysregulation) respectively. These symptom profiles again could not fit neatly into the PTSD/CPTSD classification, concomitantly raising questions around the validity of CPTSD in different populations.

Critique on current research

The current literature consists of a number of limitations and gaps. First, due to inconsistent LCA and LPA findings, there is a lack of consensus regarding the validity of CPTSD. Second, as most studies to date have been conducted with adult populations, our understanding of CPTSD among children and adolescents is limited (Brewin, 2020). Given the difference in developmental stage, children and young people could potentially react to recurrent trauma differently and thereby display differing symptom profiles compared to adults (Salmon & Bryant, 2002). Third, epidemiological studies on CPTSD are scant. Little is known about its prevalence in children and adolescents. To our knowledge there are also no epidemiological data on DSO-only presentation, despite repeated reports of the DSO class in child and youth studies. Fourth, correlates of CPTSD are understudied. It remains unclear whether CPTSD possesses risk factors distinct from that of PTSD and other trauma-related psychopathology.

Research questions

The current study addressed the above limitations with two research questions. First, post-trauma stress presentations among community adolescents were examined. Specifically, we first used diagnostic criteria to determine the prevalence of PTSD, CPTSD and DSO, then employed LCA to identify PTSD subgroups in a data-driven manner.

Second, the psychosocial and cognitive correlates of different post-trauma stress presentations from diagnostic criteria and LCA were investigated. Specifically, we compared the groups in terms of 1) demographic factors (i.e. age and sex), 2) trauma history factors (i.e. total trauma exposure, non-interpersonal trauma exposure and interpersonal trauma exposure), 3) psychopathology factors (i.e. anxiety and depression) and 4) cognitive factors including safety-seeking behaviours (i.e. behaviours that are performed overtly or covertly in specific situations to prevent feared outcomes; Salkovskis, 1991), cognitive avoidance (i.e.

disengagement coping strategies that focus on shifting attention away from a distressing stimulus; Sagui-Henson, 2017), rumination (i.e. perseverative thinking about negative information; Nolen-Hoeksema & Morrow, 1993) and trauma appraisals (i.e. beliefs about self, others and the world in relation to trauma and its sequela; Ehlers & Clark, 2000). The above cognitive factors were studied due to their implications in PTSD as suggested by various cognitive models of PTSD (e.g. Brewin et al., 1996; Ehlers & Clark, 2000; Foa & Rothbaum, 2001).

Method

Design

A secondary analysis was conducted to answer the outlined research questions. Data were drawn from a cross-sectional survey of community-recruited youth. The aims of the two primary studies, Claxton (2017) and Alberici et al. (2018), were to examine the comorbidity of depression and PTSD in youth and to develop a trauma-related safety-seeking behaviour measure for youth respectively.

Participants

The participants were adolescents recruited from two rural secondary schools in East Anglia. The inclusion criteria were fluency in English, under the age of 18 and absence of any intellectual or neurodevelopmental disability. Among the 555 students of both schools, 391 (70.5%) agreed to participate. After excluding participants with significant missing data (i.e. missing data >33.3%), the sample size of the present study was 342. This exceeded the minimum sample size of 250 shown by Tein et al (2013) simulation study for achieving sufficient statistical power in LCA. The present sample size was also comparable to existing CPTSD studies that employed LCA or other related latent variable analyses (Achterhof et al., 2019; Cloitre et al., 2013; Knefel et al., 2015).

Measures

Child and Adolescent Trauma Screening (CATS). The CATS (Appendix C) developed by Sachser et al. (2017) to assess DSM-5 PTSD was used to measure trauma exposure, PTSD, CPTSD and DSO. The scale consisted of three parts. The first part assessed trauma exposure with 15 items on exposure to potentially traumatic events and one item asking respondents which event bothered them the most. The 15 items were rated on a "yes" (1) or "no" (0) scale and a higher total score indicated exposure to more trauma types. The second part assessed PTSS with 20 items based on DSM-5 criteria. Items were rated on a 4-point scale of "never" (0), "once in a while" (1), "half the time" (2) and "almost always" (3) and a higher total score translated to higher PTSS. The third part assessed functional impairment with five items rated on a "yes" (1) or "no" (0) scale; a higher total score translated to greater functional impairment. The CATS was validated across different child and adolescent populations and was found to have excellent internal consistency, good convergent and discriminant validity and factorial validity (Nilsson et al., 2020; Sachser et al., 2017). In the present study, trauma exposure items, functional impairment items and 10 PTSS items from the CATS were used to assess PTSD, CPTSD and DSO (see Tables S1, S2 and S3).

Child Post-Traumatic Cognitions Inventory Short-Form (CPTCI-S). The CPTCI-S (Appendix D) developed by McKinnon et al. (2016) was used to measure negative trauma-related appraisals. It was an abridged version of the original CPTCI developed by Meiser-Stedman et al. (2009) and consisted of 10 items assessing respondents' endorsement of maladaptive post-traumatic cognitions on a 4-point scale from "don't agree at all" (0) to "agree a lot" (3). Higher total scores translated to more maladaptive trauma appraisals. The measure can be divided into two subscales, namely Permanent and Disturbing Change (PDC) subscale and Fragile Person in a Scary World (FPSW) subscale. In this study, alongside items

from the CATS, three items from the FPSW subscale were taken to assess CPTSD and DSO (see Tables S2 and S3). To avoid overlapping items, only the PDC subscale was used to measure trauma appraisals as potential correlates of PTSD, CPTSD and DSO. CPTCI-S possesses good to excellent internal consistency, test-retest reliability and construct validity (McKinnon et al., 2016; Lee et al., 2018). Its internal consistency (Cronbach's alphas) in this study was 0.94.

Child Safety Behaviour Scale (CSBS). The CSBS (Appendix E) developed by Alberici et al. (2018) was used to measure safety-seeking behaviours. Comprising 13 items with two subscales, namely strategic hypervigilance (SH) and affective suppression (AS), the measure examined how much respondents engaged in different safety behaviours over the past two weeks. Items were rated on a 4-point scale ranging from "never" (0) to "always" (3) with higher total scores reflecting more safety seeking behaviours. The CSBS was reported to have excellent internal consistency, good test-retest reliability and good discriminant validity (Alberici et al., 2018). Its Cronbach's alpha value in this study was 0.92.

Cognitive Avoidance Questionnaire (CAQ). The CAQ (Appendix F) developed by Sexton and Dugas (2018) was used to measure cognitive avoidance. It consisted of 25 items that examined five worry-related cognitive avoidance strategies, namely thought suppression, thought substitution, distraction, avoidance of threatening stimuli and transformation of images into thoughts. Items were rated on a 5-point scale ranging from "not at all like me" (1) to "always like me" (5). Higher total scores were indicative of more employment of cognitive avoidance strategies. The CAQ was validated across samples and settings with good factor structure and psychometric properties (Postigo et al., 2020; Vanderveren et al., 2020). Its Cronbach's alpha value here was 0.94. In the current study, the five items on transformation of images into thoughts were excluded due to uncertainty concerning its conscious

accessibility (Sexton & Dugas, 2018) and developmental considerations of the study sample. This was consistent with the practice of previous studies (e.g. Claxton, 2017).

Child Response Styles Questionnaire (CRSQ). The CRSQ (Appendix G) developed by Abela et al. (2000) was used to measure rumination. Based on the response styles theory posited by Nolen-Hoeksema et al. (2004), the questionnaire comprised three 13-item sub-scales: rumination, distraction and problem-solving. Only the rumination sub-scale was used in the present study. Items were rated on a 4-point scale from "never" (0) to "almost always" (3) and higher total scores corresponded to more rumination. The CRSQ demonstrated good internal consistency, test-retest reliability and convergent validity (Abela et al., 2007). Its Cronbach's alpha value in this study was 0.95.

Revised Children's Anxiety and Depression Scale-25 (RCADS-25). The RCADS-25 (Appendix H) developed by Ebesutani et al. (2012) was used to measure anxiety and depression. An abridged version of the RCADS, the RCADS-25 comprises 25 items, with 15 items related to the anxiety subscale and 10 items related to the depression subscale. Each item was scored on a 4-point scale with response options ranging from "never" (0) to "always" (3). The RCADS-25 was shown to have good factor structure, construct validity and test-retest reliability (Klaufus et al., 2020). The Cronbach's alphas of the anxiety and depression subscales were 0.91 and 0.92 respectively.

Procedures

The data were collected by previous researchers under the approval of the UK Health Research Authority (Derby Research Ethics Committee, reference 16/EM/0009; refer to Appendix I and Appendix J for the ethics approval letter and recruitment process respectively). It was then passed to the author of the current study by the supervisor of the original data holder, Professor Richard Meiser-Stedman. Prior to this, all identifying information including participants' names, dates of birth and school names were removed

from the dataset. The author of the current study was thus unable to identify participants. This protected participants' confidentiality and privacy in accordance with the General Data Protection Regulation (GDPR) and the Data Protection Act 2018.

Analysis

Preliminary analyses were conducted with IBM SPSS Statistics, version 25. Participants' demographic features, trauma history, anxiety and depression levels and endorsement of cognitive processes were reported using descriptive statistics.

Two approaches were used to examine post-traumatic stress presentations in the sample. First, diagnostic criteria based on ICD-11 were generated in SPSS syntax files to identify the prevalence of PTSD, CPTSD and DSO. The diagnostic algorithm for PTSD was presence of trauma (i.e. ≥1 score in CATS items 1-15), functional impairment (i.e. ≥1 score in CATS items 36-40), reexperiencing (i.e. ≥2 score in CATS items 16, 17 or 18), avoidance (i.e. ≥2 score in CATS items 21 or 22) and hypervigilance (i.e. ≥2 score in CATS items 32 or 33) and absence of CPTSD (see Table S1). The diagnostic algorithm for CPTSD included the criteria for PTSD (except "absence of CPTSD") plus presence of affective dysregulation (i.e. ≥2 score in CATS items 26 or 30), negative self-concept (i.e. ≥2 score in CPTCI items 4 or 5) and relationship difficulties (i.e. ≥2 score in CATS item 28 or CPTCI item 2; see Table S2). Lastly, the algorithm for DSO was presence of affective dysregulation (i.e. ≥2 score in CATS items 26 or 30), negative self-concept (i.e. ≥2 score in CPTCI items 4 or 5) and relationship difficulties (i.e. ≥2 score in CATS item 28 or CPTCI item 2) and absence of PTSD and CPTSD (see Table S3). The above diagnostic algorithms were generated such that the PTSD, CPTSD and DSO groups were non-overlapping.

Second, LCA was conducted with the poLCA-package in R to classify individuals based on their pattern of symptoms. Due to a lack of universal rules on model selection, various fit statistics were used to determine the optimal class model. These included the

Akaike Information Criterion (AIC; Akaike, 1987) and Bayesian Information Criterion (BIC; Schwarz, 1978), where lower values would suggest a better balance between model fit and parsimony and hence better fitting class models. Entropy was also assessed to ensure clear delineation between classes; the closer the entropy value is to one, the more differentiated the classes are (Celeux & Soromenho, 1996). Although there is no agreed upon cut-off criterion, Weller et al. (2020) recommended an entropy of 0.6 or above.

To explore the psychosocial and cognitive correlates of different post-traumatic stress presentations as identified by diagnostic criteria and LCA, independent samples t tests, chi-square tests of independence and analysis of covariance (ANOVAs) were conducted with IBM SPSS Statistics version 25. The independent variable (IV) was the diagnostic groups derived from diagnostic criteria / class memberships generated from LCA. The dependent variables (DVs) were demographic factors (i.e. age and sex), trauma history factors (i.e. total trauma exposure, non-interpersonal trauma exposure, interpersonal trauma exposure), psychopathology factors (i.e. anxiety and depression) and cognitive factors (i.e. safety-seeking behaviours, cognitive avoidance, rumination and trauma-related appraisals). For ANOVAs, if significant differences were detected across classes, post hoc tests were conducted to examine the differences. To address the inflation of type 1 error due to multiple comparisons, the Bonferroni correction was applied in which the alpha value of 0.05 was divided by the number of tests performed.

Results

Sample characteristics

The study sample consisted of 177 males and 165 females in the community with a mean (SD) age of 13.7 (0.6). Participants were exposed to a mean of 2.4 (SD = 2.0) trauma types; 86% of them had been exposed to at least one traumatic event. Summary statistics for all measures are displayed in Table 1.

Post-traumatic stress presentation

Diagnostic criteria

Diagnostic criteria were applied to examine the prevalence of PTSD, CPTSD and DSO (see Table 1). The majority of participants reported exposure to at least one type of trauma. Over half reported that these traumatic experiences markedly interfered with at least one domain of their daily functioning. Based on their presentation, 8 participants (2.3%) met the criteria of PTSD, 19 participants (5.6%) met that of CPTSD and 35 participants (10%) met that of DSO.

Latent class analysis

Latent class analysis was conducted to differentiate participants based on symptom patterns (see Table 2). Two to five class models were tested. Among the four models, the two-class and three-class models were superior to the others due to having lower Akaike information criterion (AIC) values, lower Bayesian information criterion (BIC) values and greater entropy values. Between the two-class and three-class models, different fit statistics supported different models as the optimal model. While the three-class model had a lower AIC, the two-class model had a lower BIC. Normally BIC would be prioritised over AIC due to the former being shown as a more consistent indicator for the correct number of classes (Nylund et al., 2006). In this case, however, the BIC difference was only 5.3 which according to Raftery (1995) suggested “positive” but not “strong” evidence (i.e. BIC difference > 6). On the other hand, the AIC difference was 19.1 which was a more considerable difference (Hu, 2007). That said, the two-class model had a greater entropy than the three-class model. As the two-class and three-class models each had merits and demerits, subsequent analyses were performed on both models.

The two-class model is presented in Figure 1. Class 1 (n = 240; 70.2%) could be considered as the “healthy class” due to low levels of PTSD and DSO symptoms, whereas

Class 2 (n = 102; 29.8%) could be considered as the "CPTSD class" due to high levels of PTSD and DSO symptoms. No "PTSD class" was identified in this model.

The three-class model is presented in Figure 2. Same as the above, Class 1 (n = 230; 67.2%) could be considered as the "healthy class" due to low levels of PTSD and DSO symptoms, while Class 2 (n = 62; 18.1%) could be considered as the "CPTSD class" due to high levels of PTSD and DSO symptoms. The additional Class 3 (n = 50; 14.6%), given low levels of PTSD symptoms yet high levels of DSO symptoms, could be interpreted as the "DSO class". No "PTSD class" was identified in this model.

Correlates

Between groups differences for diagnostic groups

ANOVAs and chi-square tests of independence were conducted to explore the correlates of different diagnostic groups (see Table 3). ANOVAs were used for continuous variables whilst chi-square tests were used for categorical variables (i.e. sex). To adjust for multiple comparisons, the Bonferroni correction was applied in which the alpha level was set at 0.004.

For demographics, although no significant difference in age was found, the chi-square test revealed a significant difference in sex, X^2 (3) = 24.79, p < .001, V = 0.27. Specifically, the CPTSD class comprised more females than the PTSD and DSO classes, which in turn comprised more females than the healthy class. For trauma history factors, significant differences were found in overall trauma types and interpersonal trauma types but not non-interpersonal trauma types. For psychopathology factors, significant differences were identified in both depression and anxiety levels. Significant differences were also detected across all cognitive factors. With the exception of the safety-seeking behaviours strategic hypervigilance subscale, the effect sizes of the differences were all large in nature.

Post hoc tests indicated that CPTSD in general had the highest endorsement of trauma history factors, psychopathology factors and cognitive factors, followed by the DSO class and subsequently the healthy class. Although the PTSD class were roughly sandwiched between the CPTSD class and the healthy class in terms of endorsement of factors, results associated with the PTSD class were mostly insignificant. This was likely due to its small group size (n = 8) and therefore low statistical power.

Between groups differences for the two-class model

Independent samples t tests and chi-square tests were conducted to examine the factors predicting class membership in the two-class model (see Table 4). Independent samples t tests were used for continuous variables whereas chi-square tests were used for categorical variables. The alpha level was set at 0.004 after applying the Bonferroni correction.

No significant difference was found for age, but as above, the CPTSD class was found to have proportionally more females than the healthy class, X^2 (1) = 17.88, p < .001, V = 0.26. The CPTSD class was associated with more trauma types and interpersonal trauma types compared to the healthy class, but there was no difference in non-interpersonal trauma types. The CPTSD class had significantly greater anxiety and depression than the healthy class. For cognitive factors, the CPTSD class scored higher in all measures compared to the healthy class. A small effect was found for the safety-seeking behaviours strategic hypervigilance (SH) subscale; all other effect sizes were large in nature.

Between groups differences for the three-class model

ANOVAs and chi-square tests were conducted to investigate the factors predicting class membership in the three-class model (see Table 5). ANOVAs were used for continuous variables whilst chi-square tests were used for categorical variables. The alpha level was set at 0.004 after applying the Bonferroni correction.

The results were consistent with that of diagnostic groups. The CPTSD class had proportionally more females than the DSO class, which in turn had more females than the healthy class, $X^2(2) = 18.02$, $p < .001$, $V = 0.26$; no differences were observed for age. The CPTSD class was found to endorse the most overall trauma types, interpersonal trauma types (but not non-interpersonal trauma types), depression, anxiety and cognitive processes, followed by DSO class and subsequently the healthy class. The effect sizes of the differences were all large in nature except for the safety-seeking behaviours SH subscale.

Discussion

The current study aimed to investigate the trauma-related symptomatology of community adolescents as generated from diagnostic criteria and LCA and the correlates of these presentations. Despite being a community sample, our adolescents presented with a high degree of trauma exposure: the majority (86%) reported having exposed to at least one traumatic event in their lives. This was higher than what most epidemiological studies reported (i.e. around 60%; McLaughlin et al., 2013) but was nevertheless comparable to Joseph et al. (2000).

Prevalence of PTSD, CPTSD and DSO

Based on diagnostic criteria, 2.3% and 5.6% of adolescents were found to have PTSD and CPTSD respectively. Such rates were comparable with previous statistical rates that around 8% of children and adolescents in the UK suffered from post-traumatic stress disorders (Lewis et al., 2019). Our sample revealed significantly more CPTSD cases than PTSD cases. This was consistent with the findings of a recent child epidemiological study (Redican et al., 2022) as well as findings from the adult literature (e.g. Karatzias, et al., 2019; Langtry et al., 2021; Maercker et al., 2022). What was unique about our data, however, was our prevalence findings for DSO which had not been investigated in the past. Our data showed that a notable 10% of participants were found to present with DSO. This represented

a higher prevalence rate than PTSD and CPTSD combined, suggesting the significance of DSO-only presentation among adolescents.

Latent structure

LCA results suggested two similarly robust ways of conceptualising post-traumatic stress presentations in the present sample. The two-class model divided the sample into adolescents with CPTSD (i.e. high in all six symptoms) and healthy adolescents (i.e. low in all six symptoms). On the other hand, the three-class model grouped adolescents into those with CPTSD (i.e. high in all six symptoms), those with DSO symptoms (i.e. low in core PTSD symptoms, high in DSO symptoms) and healthy adolescents (i.e. low in all six symptoms).

Based on the results from the two models, several points are noteworthy. First, both the two-class and three-class models indicated a clear CPTSD class. This substantiated the findings of previous LCA studies (e.g. Gilbar et al., 2018; Karatzias et al., 2017) and provided a strong statistical evidence for the construct validity of CPTSD.

Second, there appeared to be no "simple" PTSD class in either model. This ran counter to the findings of Sachser et al. (2016) which identified a PTSD class alongside a CPTSD class among a group of treatment-seeking children and adolescents. In fact, to our knowledge the present study is the first study that failed to identify a pure PTSD class in its LCA. Our data suggested that "simple" PTSD as defined by ICD-11 may not be sufficiently rich to capture the typical presentation of traumatic stress in youth. Conversely, it is possible that the more complex symptom profile associated with CPTSD is the modal presentation of clinically-significant post-traumatic stress.

Third, with reference to the three-class model, a considerable number of adolescents presented with low core PTSD symptoms but high DSO symptoms. Such exclusive DSO presentation does not fit readily into the current PTSD/CPTSD conceptualisation and is thus

far not recognised by the ICD-11 as a proper diagnosis in its own right. However, as outlined above, the DSO class has been documented in the literature (e.g. Li et al., 2021; Tian et al., 2021). Reflecting previous findings, our data could suggest that it is possible for adolescents to develop DSO symptoms but not core PTSD symptoms subsequent to trauma. Such presentation might constitute a unique form of post-trauma symptomatology currently understudied in the field. That said, given the moderate levels of depression in the DSO class, an alternative interpretation is that the DSO class simply represented adolescents suffering from or vulnerable to depression. In this sense, DSO may or may not be related to trauma.

Correlates

Based on the combined results of diagnostic groups and symptom classes between-group analyses, a number of factors were found to be significant correlates of CPTSD and DSO. In terms of demographic factors, while age did not account for PTSD presentation, female sex was associated with a higher likelihood of having CPTSD and DSO. This corroborated previous research findings that females were more prone to post-traumatic stress disorders than males (Knefel et al., 2015; Perkonigg et al., 2016; Sachser et al., 2016).

With respect to trauma history factors, trauma exposure was found to correlate with post-traumatic stress presentations. Those with relatively high exposure to different trauma types were more likely to have CPTSD as opposed to DSO or no symptoms. This echoed previous findings concerning the relationship between prolonged traumatisation and CPTSD (e.g. Cloitre et al., 2013). In addition to overall number of trauma, specific forms of trauma were also associated with post-trauma symptomatology. Interpersonal trauma was associated with CPTSD but not DSO. This is consistent with the notion that interpersonal trauma exerts more far-reaching impact on one's self-regulation than non-interpersonal trauma, resulting in more complex presentation such as disturbances in relationship and emotion dysregulation (Bell et al., 2019).

Depression and anxiety levels were most elevated in adolescents with CPTSD, followed by those with DSO and subsequently healthy adolescents. While this is an important finding in and of itself, given the cross-sectional nature of the present analysis and therefore lack of information on directionality, the specific roles of depression and anxiety in PTSD profiles are unclear. Depression and anxiety could potentially act as risk factors, consequences or comorbid mental health difficulties – or a combination of such – in relation to different post-traumatic stress presentations.

Lastly, consistent with cognitive behavioural models of PTSD (e.g. Ehlers & Clark, 2000), adolescents with CPTSD exhibited more safety-seeking behaviours (particularly those related to affective suppression), cognitive avoidance, rumination and trauma-related appraisals (specifically of the "permanent and disturbing change" type), compared to adolescents with DSO and healthy adolescents. These differences mostly involved medium and large effect sizes, with an especially large effect for appraisals. Being some of the first data to consider cognitive correlates of CPTSD in youths, the current data suggest that the CPTSD construct is associated with cognitive psychological processes in a similar fashion as "simple" PTSD.

Theoretical and clinical implications

The present study has a number of theoretical and clinical implications. First, the finding that there are more CPTSD than PTSD cases justifies and echoes the current interest in CPTSD in the trauma literature. It also suggests that CPTSD applies to adolescents as well as adults. Clinically, it would be helpful for clinicians to look out for DSO symptoms alongside core PTSD symptoms when assessing trauma-exposed adolescents, holding in mind that presence of DSO symptoms might be the norm rather than the exception. This may create a better understanding of adolescents' risks (e.g. the presence of affect dysregulation

may indicate higher risks) and allow for more accurate predictions of how they might respond to treatment (e.g. presence of DSO symptoms may signal a need for longer treatment).

Moreover, given how CPTSD (as opposed to PTSD) is shown to be the modal presentation of post-traumatic stress in youth in our data, a change in routine outcome measures might be warranted in youth services. Currently, the Children's Revised Impact of Event Scale, 8-item (CRIES-8; Perrin et al., 2005) is routinely used in Child and Adolescent Mental Health Services (CAMHS) to assess post-traumatic stress symptoms. However, the CRIES-8 consists solely of items on PTSD symptoms (i.e. four items on reexperiencing and four items on avoidance). This may lead to CPTSD symptoms being unassessed and subsequently unidentified. In view of this, the International Trauma Questionnaire (ITQ; Cloitre et al., 2018), a recently developed measure that assesses both PTSD and CPTSD symptoms as set forth by the ICD-11, might be a more useful alternative due to its ability to provide a fuller picture of the young person's post-traumatic stress presentation.

Second, the high rates of DSO-only presentation in our sample calls for more attention on this unique symptom profile. On a research level, this points to a need to further investigate the DSO construct in terms of whether it represents a distinct form of psychopathology that occurs in response to trauma, or simply constitutes symptoms of other existing mental health disorders (e.g. depression). The prevalence of DSO-only presentation also raises questions around the dual conceptualisation of post-trauma psychopathology (i.e. PTSD and CPTSD) in ICD-11 within the adolescent population. Clinically, when it comes to working with trauma-exposed adolescents, the current findings suggest the importance of assessing and managing DSO symptoms even in the absence of core PTSD symptoms.

Third, our data suggested that cognitive factors commonly associated with "simple" PTSD, namely safety-seeking behaviours, cognitive avoidance, rumination and trauma-related appraisals, also apply to adolescents with CPTSD. This implies that as a construct

CPTSD may not be as distinct as previously assumed, that is, it may not be caused and perpetuated by a distinct set of cognitive processes or trauma history. In clinical practice, this may mean that adolescents with complex trauma presentations could potentially benefit from traditional PTSD treatments that focus on cognitive processes, an example being Trauma-Focused Cognitive Behavioural Therapy (TF-CBT; National Institute for Health and Care Excellence, 2018). Such reasoning aligns with the findings of Sachser et al. (2016) which showed that adolescents with PTSD and adolescents with CPTSD responded similarly well to TF-CBT.

Strengths, limitations and future research

In terms of strengths, our sample was a fairly representative community sample with a high response rate, an appropriate sample size and a balanced number of male and female adolescents. To our knowledge, this study is the first study that combined a diagnosis-driven approach (i.e. diagnostic criteria) with a data-driven approach (i.e. LCA) in the analysis of PTSD presentations and their correlates. The two approaches complemented each other and helped shed light on the important subtleties around the PTSD/CPTSD conceptualisation.

In terms of limitations, diagnostic groups in our study were derived from self-reported symptoms instead of structured diagnostic interviews. Moreover, due to the use of community sampling, the sample sizes of our diagnostic groups were naturally small (e.g. only eight adolescents were found to have PTSD). This limits our ability to draw strong conclusions. Lastly, given the use of cross-sectional as opposed to prospective longitudinal design, the present study is exploratory and unable to attribute causality between variables.

In light of the above limitations, more research on the area is warranted. Future research could replicate the current study design with structured diagnostic interviews, larger sample sizes and other adolescent samples (e.g. treatment-seeking samples) to increase generalisability of findings. Furthermore, studies that employ prospective longitudinal

designs would be useful for delineating the causes, prognosis and long-term impacts of CPTSD and DSO symptoms, giving us further insights into the validity of CPTSD as a diagnosis.

Conclusion

This study examined post-traumatic stress presentations among community adolescents through diagnostic criteria and LCA and investigated the risk factors for different symptom profiles. Important findings included CPTSD being more common than PTSD, high rates of DSO-only presentation and high endorsement of PTSD-related cognitive processes among adolescents with CPTSD. These have clinical implications for assessment, management and treatment of adolescents with complex trauma presentation. Future research could build on current findings by using interview-based measures, larger sample sizes and longitudinal designs.

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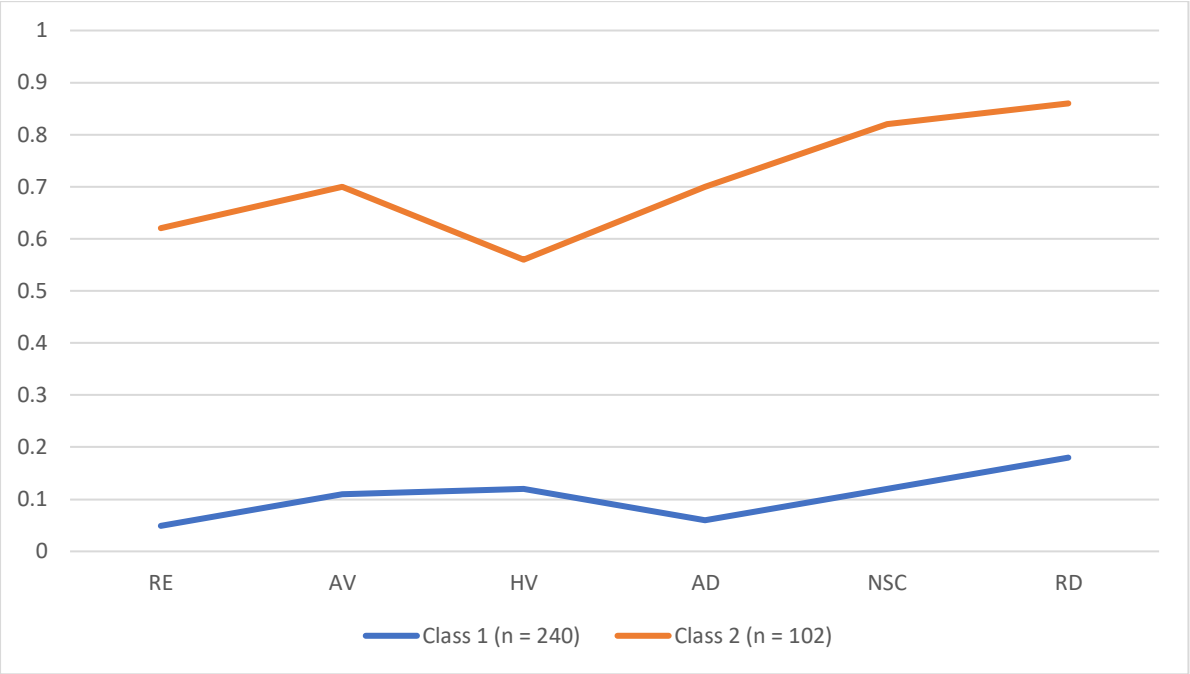
Figure 1

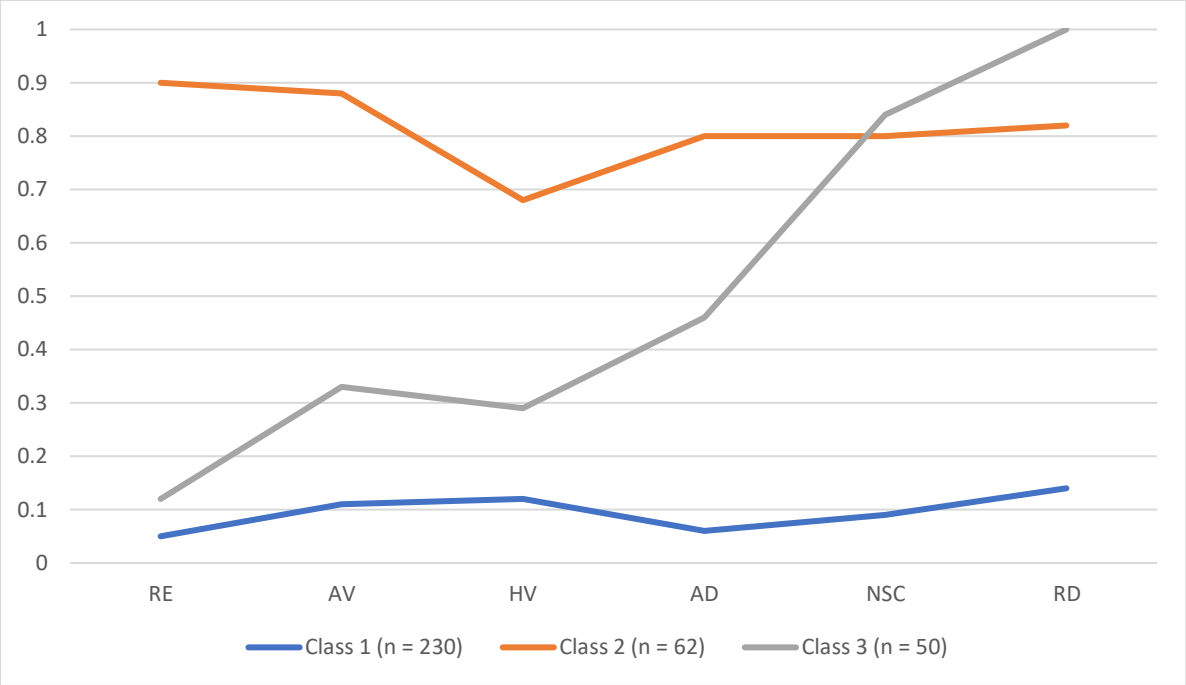
Two-class model.



Note: AD = affective dysregulation; AV = avoidance; HV = hypervigilance; NSC = negative self-concept; RD = relationship difficulties; RE = reexperiencing.

Figure 2

Three-class model.



Note: AD = affective dysregulation; AV = avoidance; HV = hypervigilance; NSC = negative self-concept; RD = relationship difficulties; RE = reexperiencing.

Table 1

Descriptive statistics on demographic, trauma history, psychopathology and cognitive factors and PTSD symptom clusters (N = 342).

Variables	Mean	SD	Range	Frequency (%)
Demographic factors				
Age	13.7	0.6	12-15	-
Gender				
Male	-	-	-	177 (52)
Female	-	-	-	165 (48)
Trauma history factors				
Trauma types	2.4	1.94	0-11	-
Non-interpersonal trauma	0.7	0.7	0-3	-
Interpersonal trauma	1.5	1.4	0-8	-
Psychopathology factors				
Anxiety (RCADS-25)	8.8	8.0	0-42	-
Depression (RCADS-25)	6.0	6.1	0-28	-
Cognitive factors				
Safety behaviours (CSBS)	19.1	12.3	0-60	-
Cognitive avoidance (CAQ)	36.2	20.3	0-98	-
Rumination (CRSQ)	9.3	10.1	0-39	-
Trauma appraisal (CPTCI-PDC)	2.4	3.8	0-18	
PTSD symptom clusters				
Trauma exposure	-	-	-	293 (86)
Impairment	-	-	-	178 (52)
Reexperiencing	-	-	-	78 (23)
Avoidance	-	-	-	96 (28)
Hypervigilance	-	-	-	89 (26)
Affective dysregulation	-	-	-	89 (26)
Negative self-concept	-	-	-	109 (32)
Relationship difficulties	-	-	-	130 (38)
PTSD	-	-	-	8 (2.3)
CPTSD	-	-	-	19 (5.6)
DSO	-	-	-	35 (10)

Notes: CAQ = Cognitive Avoidance Questionnaire; CPTCI-PDC = Child Post-Traumatic Cognitions Inventory - Permanent and Disturbing Change subscale; CPTSD = complex post-traumatic stress disorder; CRSQ = Child Response Styles Questionnaire; CSBS = Child Safety Behaviour Scale; DSO = disturbances in self-organisation; PTSD = post-traumatic stress disorder; RCADS-25 = Revised Children's Anxiety and Depression Scale-25.

Table 2

Fit indices of latent class analysis (N = 342).

Model	Log likelihood	Number of parameter	AIC	BIC	Entropy
2 classes	-930.8	13	1887.5	1938.5	0.86
3 classes	-914.2	20	1868.4	1943.8	0.73
4 classes	-907.8	27	1869.6	1971.4	0.51
5 classes	-905.3	34	1878.7	2006.8	0.67

Table 3

ANOVAs for diagnostic groups (N = 342).

	Healthy group (N = 280)		PTSD group (N = 8)		CPTSD group (N = 19)		DSO group (N = 35)		Test statistic		
Variables	M	SD	M	SD	M	SD	M	SD	*F*	*p*	η2
Demographic factor											
Age	13.71	0.59	13.79	0.50	13.80	0.76	13.69	0.48	0.19	0.90	0.002
Trauma history factors											
Trauma types	2.14[a]	1.76	3.65	1.39	4.88[c]	2.63	3.09[b]	1.76	16.63*	< 0.001	0.13
Non-interpersonal trauma	0.63	0.69	1.00	0.76	1.05	0.85	0.74	0.61	2.89	0.04	0.03
Interpersonal trauma	1.33[a]	1.29	2.50	1.51	3.32[c]	2.06	2.02[b]	1.36	15.94*	< 0.001	0.12
Psychopathology factors											
Anxiety (RCADS-25)	6.54[a]	5.77	11.13	5.33	26.95[c]	7.35	15.31[b]	6.78	85.83*	< 0.001	0.44
Depression (RCADS-25)	4.14[a]	4.19	9.63[b]	5.42	20.16[c]	4.96	11.34[b]	6.25	95.60*	< 0.001	0.46
Cognitive factors											
Safety behaviours – SH (CSBS)	7.10[a]	4.81	7.75	3.01	12.00[b]	4.90	7.60[a]	4.54	6.31*	< 0.001	0.05
Safety behaviours – AS (CSBS)	4.40[a]	3.66	7.25	3.01	12.63[b]	3.48	9.43[a]	3.63	47.10*	< 0.001	0.30
Cognitive avoidance (CAQ)	31.61[a]	17.37	44.25	9.95	72.16[b]	14.66	50.62[a]	19.21	42.11*	< 0.001	0.28
Rumination (CRSQ)	6.49[a]	7.22	10.63[a]	9.61	28.21[c]	9.56	19.67[b]	11.75	64.80*	< 0.001	0.38
Trauma appraisal (CPTCI-PDC)	1.15[a]	2.14	2.88[a]	3.72	11.16[c]	4.14	6.94[b]	3.97	130.58*	< 0.001	0.54

Note: *p < .004; CAQ = Cognitive Avoidance Questionnaire; CPTCI-PDC = Child Post-Traumatic Cognitions Inventory - Permanent and Disturbing Change subscale; CPTSD = complex post-traumatic stress disorder; CRSQ = Child Response Styles Questionnaire; CSBS = Child Safety Behaviour Scale; DSO = disturbances in self-organisation; PTSD = post-traumatic stress disorder; RCADS-25 = Revised Children's Anxiety and Depression Scale-25. Superscript characters indicate significant post-hoc differences.

Table 4

Independent samples t tests for the two-class model (N = 342).

	Healthy class (N = 240)		CPTSD class (N = 102)		Test statistic		
Variables	M	SD	M	SD	*t*	*p*	Cohen's d
Demographic factor							
Age	13.71	0.60	13.71	0.53	0.004	0.99	0.01
Trauma history factors							
Number of trauma types	2.03	1.71	3.29	2.23	-4.91*	< 0.001	-0.67
Non-interpersonal trauma	0.62	0.69	0.82	0.72	-2.33	0.02	-0.29
Interpersonal trauma	1.27	1.24	2.14	1.73	-4.42*	< 0.001	-0.62
Psychopathology factors							
Anxiety (RCADS-25)	6.00	5.06	16.00	9.01	-10.12*	< 0.001	-1.54
Depression (RCADS-25)	3.74	3.77	11.67	7.16	-10.17*	< 0.001	-1.58
Cognitive factors							
Safety behaviours – SH (CSBS)	6.87	4.66	9.02	5.01	-3.68*	< 0.001	-0.45
Safety behaviours – AS (CSBS)	3.96	3.38	9.20	4.01	-11.95*	< 0.001	-1.47
Cognitive avoidance (CAQ)	29.75	14.21	54.39	20.39	-10.62*	< 0.001	-1.52
Rumination (CRSQ)	5.90	6.45	17.59	12.19	-8.66*	< 0.001	-1.37
Trauma appraisal (CPTCI – PDC)	0.84	1.78	6.22	4.68	-10.83*	< 0.001	-1.83

Note: *p < .004; CAQ = Cognitive Avoidance Questionnaire; CPTCI-PDC = Child Post-Traumatic Cognitions Inventory - Permanent and Disturbing Change subscale; CPTSD = complex post-traumatic stress disorder; CRSQ = Child Response Styles Questionnaire; CSBS = Child Safety Behaviour Scale; RCADS-25 = Revised Children's Anxiety and Depression Scale-25. Superscript characters indicate significant post-hoc differences.

Table 5

ANOVAs for the three-class model (N = 342).

	Healthy class (N = 230)		CPTSD Class (N = 62)		DSO Class (N = 50)		Test statistic		
Variables	M	SD	M	SD	M	SD	*F*	*p*	η2
Demographic factor									
Age	13.71	0.61	13.71	0.57	13.73	0.42	0.02	1.00	0.00
Trauma history factors									
Trauma types	2.06[a]	1.78	3.61[b]	2.26	2.39[a]	1.66	16.46*	< 0.001	0.09
Non-interpersonal trauma	0.65	0.72	0.90	0.69	0.49	0.55	5.02	0.007	0.03
Interpersonal trauma	1.26[a]	1.28	2.34[b]	1.83	1.70[a]	1.23	14.86*	< 0.001	0.09
Psychopathology factors									
Anxiety (RCADS-25)	5.68[a]	4.85	18.40[c]	8.58	11.49[b]	7.39	108.54*	< 0.001	0.41
Depression (RCADS-25)	3.53[a]	3.56	13.21[c]	7.23	8.47[b]	5.85	103.19*	< 0.001	0.40
Cognitive factors									
Safety behaviours – SH (CSBS)	6.71[a]	4.62	9.73[b]	4.84	8.26	5.03	10.45*	< 0.001	0.06
Safety behaviours – AS (CSBS)	3.75[a]	3.29	9.98[c]	3.77	7.77[b]	3.76	89.39*	< 0.001	0.36
Cognitive avoidance (CAQ)	29.33[a]	14.17	59.37[c]	19.45	43.05[b]	17.75	88.92*	< 0.001	0.36
Rumination (CRSQ)	5.52[a]	6.19	19.67[c]	12.24	13.61[b]	10.27	73.81*	< 0.001	0.33
Trauma appraisal (CPTCI-PDC)	0.77[a]	1.77	7.21[c]	4.63	3.86[b]	3.82	128.03*	< 0.001	0.50

Note: *p < .004; CAQ = Cognitive Avoidance Questionnaire; CPTCI-PDC = Child Post-Traumatic Cognitions Inventory - Permanent and Disturbing Change subscale; CPTSD = complex post-traumatic stress disorder; CRSQ = Child Response Styles Questionnaire; CSBS = Child Safety Behaviour Scale; DSO = disturbances in self-organisation; PTSD = post-traumatic stress disorder; RCADS-25 = Revised Children's Anxiety and Depression Scale-25. Superscript characters indicate significant post-hoc differences.

Table S1

Diagnostic algorithm for PTSD.

ICD-11 Criteria	**Item scores**
Trauma	≥ 1 score in CATS items 1-15
Functional impairment	≥ 1 score in CATS items 36-40
Reexperiencing	≥2 score in any of the following items: CATS 16 *Upsetting thoughts or pictures about what happened that pop into your head.* CATS 17 *Bad dreams reminding you of what happened* CATS 18 *Feeling as if what happened is happening all over again.*
Avoidance	≥2 score in any of the following items: CATS 21 *Trying not to think about what happened. Or to not have feelings about it.* CATS 22 *Staying away from people, places, things, or situations that remind you of what happened*.
Hypervigilance	≥2 score in any of the following items: CATS 32 *Being overly careful (checking to see who is around you).* CATS 33 *Being jumpy*.
Absence of CPTSD	N/A

Notes: CATS = Child and Adolescent Trauma Screening; CPTSD = complex post-traumatic stress disorder.

Table S2

Diagnostic algorithm for CPTSD.

ICD-11 Criteria	**Item scores**
Trauma	≥ 1 score in CATS items 1-15
Functional impairment	≥ 1 score in CATS items 36-40
Reexperiencing	≥2 score in any of the following items: CATS 16 *Upsetting thoughts or pictures about what happened that pop into your head.* CATS 17 *Bad dreams reminding you of what happened* CATS 18 *Feeling as if what happened is happening all over again.*
Avoidance	≥2 score in any of the following items: CATS 21 *Trying not to think about what happened. Or to not have feelings about it.* CATS 22 *Staying away from people, places, things, or situations that remind you of what happened*.
Hypervigilance	≥2 score in any of the following items: CATS 32 *Being overly careful (checking to see who is around you).* CATS 33 *Being jumpy*.
Affect dysregulation	≥2 score in any of the following items: CATS 26 *Bad feelings (afraid, angry, guilty, ashamed) a lot of the time.* CATS 30 *Feeling mad. Having fits of anger and taking it out on others.*
Negative self-concept	≥2 score in any of the following items: CPTCI 4 *I am no good.* CPTCI 5 *I can't cope when things get tough.*
Relationship difficulties	≥2 score in any of the following items: CATS 28 *Not feeling close to people* CPTCI 2 *I don't trust people.*

Notes: CATS = Child and Adolescent Trauma Screening; CPTCI = Child Post-Traumatic Cognitions Inventory.

Table S3

Algorithm for DSO.

ICD-11 Criteria	**Item scores**
Affect dysregulation	≥2 score in any of the following items: CATS 26 *Bad feelings (afraid, angry, guilty, ashamed) a lot of the time.* CATS 30 *Feeling mad. Having fits of anger and taking it out on others.*
Negative self-concept	≥2 score in any of the following items: CPTCI 4 *I am no good.* CPTCI 5 *I can't cope when things get tough.*
Relationship difficulties	≥2 score in any of the following items: CATS 28 *Not feeling close to people* CPTCI 2 *I don't trust people.*
Absence of PTSD	N/A
Absence of CPTSD	N/A

Notes: CATS = Child and Adolescent Trauma Screening; CPTCI = Child Post-Traumatic Cognitions Inventory; CPTSD = complex post-traumatic stress disorder; PTSD = post-traumatic stress disorder.

Table S4

Descriptive statistics on trauma exposure (N = 342).

Traumatic event	**Frequency (%)**
Serious natural disaster like a flood, tornado, hurricane, or fire	19 (5.6)
Serious accident or injury like a car/bike crash, dog bite, sports injury	140 (40.9)
Robbed by threat, force or weapon	12 (3.5)
Slapped, punched, or beat up in your family	35 (10.2)
Slapped, punched, or beat up by someone not in your family	102 (29.8)
Seeing someone in your family get slapped, punched or beat up	53 (15.5)
Seeing someone in the community get slapped, punched or beat up	172 (50.3)
Someone older touching your private parts when they shouldn't	9 (2.6)
Someone forcing or pressuring sex, or when you couldn't say no	4 (1.2)
Someone close to you dying suddenly or violently	101 (29.5)
Attacked, stabbed, shot at or hurt badly	14 (4.1)
Seeing someone attacked, stabbed, shot at, hurt badly or killed	28 (8.2)
Stressful or scary medical procedure	69 (20.2)
Being around war	3 (0.9)
Other stressful or scary event	64 (18.7)

CHAPTER FIVE

Extended Discussion and Critical Evaluation

General Discussion and Critical Evaluation

This chapter first summarizes the main findings of the systematic review and the empirical study. It then discusses their respective strengths and limitations, theoretical and clinical implications and areas for future research. Lastly, personal reflections on the research process are presented.

Main Findings

Systematic Review

A strong association was found between anxiety sensitivity and PTSD symptoms in children and adolescents. The relationship was strong for both acute PTSD (i.e. within one month of trauma exposure) and chronic PTSD (i.e. beyond one month of trauma exposure).

Empirical Study

In our sample, 2.3% and 5.6% of adolescents met the criteria for PTSD and CPTSD respectively. CPTSD was found to be a more common presentation than PTSD among adolescents in the community. Moreover, a significant proportion of adolescents (i.e. 10%) presented with disturbances in self-organization (DSO) symptoms in the absence of core PTSD symptoms.

Several psychosocial and cognitive variables differentiated CPTSD from DSO or no symptoms. Specifically, adolescents who were 1) females, 2) exposed to more trauma types and interpersonal trauma and 3) more anxious and depressed were more likely to meet to criteria for CPTSD as opposed to DSO or no symptoms. Cognitive factors previously shown to be associated with PTSD – namely safety-seeking behaviors, cognitive avoidance, rumination and trauma appraisals – were also significantly related to CPTSD.

Strengths and Limitations

Systematic Review

Strengths

The protocol of the review was pre-registered in PROSPERO: International prospective register of systematic reviews. This helped reduce bias, increase transparency and avoid duplication of reviews by other researchers (Stewart et al., 2012). Moreover, the same anxiety sensitivity measure (i.e. Child Anxiety Sensitivity Index; CASI) was used across all studies. This removed potential confounders associated with differential measures and facilitated comparisons across studies. Some included studies comprised a large sample size (e.g. n = 738) which boosted the statistical power of the current review. Lastly, ethnicity across study samples was appreciably diverse with considerable number of Asian, African and Hispanic / Latino participants in addition to Caucasian ones. This enhanced the generalisability of our findings.

Limitations

Due to the dearth of research on the topic, the present review was conducted with only a small number of studies. This made it difficult to rule out publication bias with funnel plots (Borenstein et al., 2009). Besides, the cross-sectional nature of our data meant that causality could only be speculated. As much as anxiety sensitivity is proposed to influence PTSD, it is possible for PTSD to influence anxiety sensitivity (i.e. reverse causality or bidirectionality). It may also be that anxiety sensitivity and PTSD are both independently affected by a third variable or latent construct. Additionally, studies included in this review mainly focused on PTSD caused by single traumatic events. The relationship between anxiety sensitivity and PTSD in the context of complex or prolonged trauma (e.g. child sexual abuse) is thus less clear.

Empirical Study

Strengths

Our sample was reasonably representative due to a high response rate during the recruitment process (70.5%), an appropriate sample size (n = 342) and a balanced number of male and female adolescents. To our knowledge, this study is the first study that examines PTSD presentations and their correlates with both diagnostic criteria and LCA. The combination of diagnosis-driven and data-driven methodologies provides a richer picture of post-trauma stress disorders than do studies that use either methodology alone. This study is also one of the first that explores the correlates and risk factors of CPTSD. Amidst current debates around CPTSD as a new diagnosis, our findings provide timely insights into its clinical utility as well as construct validity.

Limitations

On the other hand, diagnostic groups in this study were generated from self-reported symptoms instead of structured diagnostic interviews. Some may argue that questionnaires-based measures lower the threshold for diagnosis and overestimate prevalence rates (Stevens et al., 2013). Also, as our sample was taken from the community where the majority of adolescents were asymptomatic, the size of some diagnostic groups was small. In particular, the PTSD group comprised only eight adolescents, leading to insufficient power for between-group analyses. Lastly, this study adopted a cross-sectional rather than prospective longitudinal design. Therefore, our findings only suggest correlational but not necessarily causal relationships.

Implications

Theoretical implications

The current body of work helps enrich existing cognitive models of anxiety and PTSD. According to Ehlers and Clark (2000)’s model, trauma appraisal plays a key role in

the development of PTSD. Anxiety sensitivity is hypothesized to be conceptually related to trauma appraisal such that it concerns how one construes their own stress response to trauma. The present systematic review substantiates this hypothesis by demonstrating the association between anxiety sensitivity and PTSD among children and adolescents. Apart from trauma appraisals, cognitive models also underscore the importance of processes such as cognitive avoidance, rumination and safety-seeking behaviours (Brewin et al., 1996; Ehlers & Clark, 2000; Foa & Rothbaum, 2001). The current empirical study suggests that these processes are relevant to CPTSD as much as they are to PTSD, thereby expanding the applicability of these theories.

At the same time, such findings raise questions around the distinctiveness of CPTSD as a diagnosis. Achterhof et al. (2019) argued that results from LCA alone do not necessarily possess nosological value due to their data-driven nature. Rather, to establish CPTSD as a separate diagnosis, an element of "clinical meaningfulness" is required alongside statistical evidence. This can be in the form of differential risk factors, comorbidities, prognoses, functional impairments or treatments in relation to other diagnoses (Achterhof et al., 2019; Dalenberg et al., 2012). To date, research on the "clinical meaningfulness" of CPTSD remains scarce.

That said, our data suggest that CPTSD (rather than PTSD) is the typical presentation of traumatic stress in youth. This at first glance may seem like a counter-intuitive finding – instead of revealing the validity (or lack thereof) of CPTSD, it raises questions around the clinical usefulness of PTSD. Yet it is important to note the difference between ICD-11's and the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)'s definitions of PTSD. In the interest of parsimony and clinical utility, ICD-11 defines PTSD with the three main features of reexperiencing, avoidance and hypervigilance. On the other hand, DSM-5 defines PTSD with significantly more criteria. One set of criteria is "negative

alteration in cognitions and moods" which resembles DSO symptoms proposed by ICD-11. The symptom profile of PTSD in DSM-5, which is well-validated (Regier et al., 2013), might hence share more similarities with ICD-11 CPTSD than ICD-11 PTSD. In view of this, it may be that more research on ICD-11 PTSD is needed before one can be assured of its validity.

Clinical implications

Both the systematic review and the empirical study helped inform the assessment and intervention of PTSD and related disorders in children and adolescents. In terms of assessment, given the association between anxiety sensitivity and PTSD both within and beyond the acute one-month period, the CASI can be used to screen at-risk youths at any point after trauma exposure. This may facilitate prevention of PTSD and related disorders. Regarding those who have developed PTSD, the CASI is also an important tool for gauging symptom severity and formulating relevant maintaining factors. Moreover, to better assess risks and predict treatment outcomes, attention can be paid to affect dysregulation, negative self-concept and relationship difficulties (i.e. DSO symptoms) in addition to – or even in the absence of – core PTSD symptoms. Provided the high prevalence rates of CPTSD and DSO in our findings, presentation of DSO symptoms might be the norm rather than the exception among trauma-exposed children and adolescents.

In terms of intervention, given its malleability, anxiety sensitivity can be a useful target for treatment among youths who are at risk of or diagnosed with PTSD. Intervention can range from psychoeducation around anxiety and its bodily sensations to interoceptive exposure, behavioral experiments and practice of mindfulness (Smits et al., 2008). Furthermore, given the relevance of cognitive factors in CPTSD, there is a preliminary basis for offering Trauma-Focused Cognitive Behavioural Therapy (TF-CBT) for adolescents with

more complex trauma presentations. Intervention could specifically focus on modifying safety-seeking behaviors, cognitive avoidance, rumination and trauma appraisals.

Future Research Directions

In light of the small number of studies in the systematic review, more research on anxiety sensitivity and PTSD in children and adolescents is warranted. Along with cross-sectional studies, prospective longitudinal studies can be conducted to delineate the directionality of relationship between anxiety sensitivity and PTSD. Future research can incorporate youths with complex trauma presentation to determine whether anxiety sensitivity plays a similar role in CPTSD (or PTSD in the context of complex trauma). Additionally, apart from the relationship itself, moderators and mediators of the relationship can be investigated. This would help identify how and under what conditions anxiety sensitivity impacts on PTSD, which subsequently informs whether and when targeting anxiety sensitivity is most useful during treatments.

Building on what we found about the prevalence of CPTSD and DSO, more epidemiological research is needed for identifying current needs and informing service commission and delivery. To complement current findings from questionnaires-based measures, future research can adopt structured diagnostic interviews such as the Clinician-Administered PTSD Scale (CAPS). Moreover, to elucidate the "clinical meaningfulness" of the CPTSD diagnosis (Achterhof et al., 2019) and determine whether CPTSD constitutes a diagnosis in its own right (i.e. conceptually and clinically distinct from PTSD), more research can be conducted around its risk factors, comorbidities, prognoses, functional implications and treatments.

Reflections on the Research Process

My journey of compiling this portfolio has been an intellectually challenging yet fulfilling process. It all began when I started working with people with personality disorders.

Noticing how most of them presented with years of trauma history, I have come to appreciate the far-reaching impacts of psychological trauma and how they may go beyond what the traditional PTSD diagnosis delineates. In some sense, I believed something is missing from the puzzle. This drove me to study the newly introduced CPTSD with the belief that it might go a long way towards understanding and supporting people with severe mental health difficulties.

The bulk of my work revolves around the big question – "Is CPTSD a valid diagnosis?". The significance of this question lies not only in its clinical implications (e.g. how to better treat people with complex trauma presentation), but also in its social and moral connotations (e.g. is it fair to label people with personality disorders when they are in fact exhibiting complex PTSD symptoms?). It is hence important to "get this right". However, given how various perspectives and approaches have been put forward in the CPTSD literature (e.g. whilst some use latent variable identification techniques to study CPTSD, others argue that statistical evidence alone cannot justify its existence), it soon became clear to me that there is no one way of answering this question. To complicate things further, the very concept of diagnosis is debatable according to large bodies of medical (Hyman, 2010), psychological (Haslam et al., 2020) and social sciences (Roberts, 2005) literature. As I slowly got overwhelmed by the intellectual and philosophical debates around CPTSD and psychiatric diagnoses, I was encouraged by my supervisor to keep my focus on my results and start from there. This helped adjust my expectation around how much I should "achieve" by the end of this thesis. I learnt to ringfence my discussion to my findings and only draw conclusions that could be reasonably inferred in the context of my data, which in hindsight were extremely important skills.

Moreover, the findings of my empirical study did not turn out to be as "straightforward" as I would have preferred. For example, our latent class analysis (LCA)

revealed no PTSD class. This is far from a common finding in the literature, nor is this intuitive, as one would assume the existence of PTSD before asking whether a "complex" form of PTSD exists. I noticed an urge to re-analyze my data in a different way so as to produce findings that "make more sense". My discussion with my supervisor, however, reminded me of the point of science and how my findings are valuable to the field irrespective of their agreement with the wider literature. This retrospectively is an important realization. The intellectual process of making sense of my findings (e.g. drawing on the differences between ICD-11's and DSM-5's definitions of PTSD), albeit riddled with uncertainty and stress, paradoxically elevated my interest in research and made me contemplate doing more research in my post-qualified career.

Conclusion

This thesis portfolio helps fill two important knowledge gaps in the PTSD literature. While the systematic review explores the role of anxiety sensitivity in PTSD among trauma-exposed children and adolescents, the empirical study examines post-traumatic stress presentations and their psychosocial and cognitive correlates among community youths. The findings not only enrich existing cognitive models of anxiety and PTSD, but also provide insights into the subtleties around the PTSD/CPTSD conceptualisation. It is hoped that this body of work could benefit trauma-exposed children and adolescents by informing the assessment and intervention of post-traumatic stress symptoms.

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Appendix A

Author Guidelines for Behaviour Research and Therapy

GUIDE FOR AUTHORS

INTRODUCTION

The major focus of *Behaviour Research and Therapy* is an experimental psychopathology approach to understanding emotional and behavioral disorders and their prevention and treatment, using cognitive, behavioral, and psychophysiological (including neural) methods and models. This includes laboratory-based experimental studies with healthy, at risk and subclinical individuals that inform clinical application as well as studies with clinically severe samples. The following types of submissions are encouraged: theoretical reviews of mechanisms that contribute to psychopathology and that offer new treatment targets; tests of novel, mechanistically focused psychological interventions, especially ones that include theory-driven or experimentally-derived predictors, moderators and mediators; and innovations in dissemination and implementation of evidence-based practices into clinical practice in psychology and associated fields, especially those that target underlying mechanisms or focus on novel approaches to treatment delivery. In addition to traditional psychological disorders, the scope of the journal includes behavioural medicine (e.g., chronic pain). The journal will not consider manuscripts dealing primarily with measurement, psychometric analyses, and personality assessment.

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Coon, E., Berndt, M., Jan, A., Svyatsky, D., Atchley, A., Kikinzon, E., Harp, D., Manzini, G., Shelef, E., Lipnikov, K., Garimella, R., Xu, C., Moulton, D., Karra, S., Painter, S., Jafarov, E., & Molins, S. (2020, March 25). *Advanced Terrestrial Simulator (ATS) v0.88 (Version 0.88)*. Zenodo. https:// doi.org/10.5281/zenodo.3727209.

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Appendix B

Author Guidelines for Journal of Anxiety Disorders

GUIDE FOR AUTHORS

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The *Journal of Anxiety Disorders* publishes articles of relevance to the epidemiology, psychopathology, etiology, assessment, treatment, and prevention of anxiety and related disorders in both child and adult populations. The format of the articles includes randomized controlled trials, single case clinical outcome studies, theoretical expositions, epidemiological studies, investigations of early mechanisms of risk, genetic and biomarker studies, neuroimaging studies, critical literature reviews, meta-analyses, and dissemination and implementation studies. We are also interested in evaluations of novel treatment delivery strategies, including the use of information technologies. Authors are encouraged to use methodologically rigorous sampling, structured or semistructured diagnostic interviews, randomization, therapist fidelity, and inter-rater reliability procedures where appropriate. Given limited journal space, we can accept only a limited number of studies, and we prefer to publish studies of clinical or community samples. However, we recognize that studies using other samples (e.g., undergraduate analogues) can provide meaningful increments to knowledge. Therefore, while emphasizing our preference for clinical or community samples that are most appropriate for the question under study, we will consider studies using other samples in so far as we judge them to make a significant incremental contribution to the understanding of anxiety and related disorders or anxiety psychopathology more broadly.

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Divide your article into clearly defined and numbered sections. Subsections should be numbered 1.1 (then 1.1.1, 1.1.2, ...), 1.2, etc. (the abstract is not included in section numbering). Use this numbering also for internal cross-referencing: do not just refer to

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State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

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A Theory section should extend, not repeat, the background to the article already dealt with in the Introduction and lay the foundation for further work. In contrast, a Calculation section represents a practical development from a theoretical basis.

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Results should be clear and concise.

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This should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

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The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

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Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

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Appendix C

Child and Adolescent Trauma Screen (CATS)

Stressful or scary events happen to many people. Below is a list of stressful and scary events that sometimes happen. Mark YES if it has ever happened to you. Mark NO if it hasn't ever happened to you.

1. Serious natural disaster like a flood, tornado, hurricane, earthquake, or fire.	Yes ☐ No ☐
2. Serious accident or injury like a car/bike crash, dog bite, sports injury.	Yes ☐ No ☐
3. Robbed by threat, force or weapon.	Yes ☐ No ☐
4. Slapped, punched, or beat up in your family.	Yes ☐ No ☐
5. Slapped, punched, or beat up by someone not in your family.	Yes ☐ No ☐
6. Seeing someone in your family get slapped, punched or beat up.	Yes ☐ No ☐
7. Seeing someone in the community get slapped, punched or beat up.	Yes ☐ No ☐
8. Someone older touching your private parts when they shouldn't.	Yes ☐ No ☐
9. Someone forcing or pressuring sex, or when you couldn't say no.	Yes ☐ No ☐
10. Someone close to you dying suddenly or violently.	Yes ☐ No ☐
11. Attacked, stabbed, shot at or hurt badly.	Yes ☐ No ☐
12. Seeing someone attacked, stabbed, shot at, hurt badly or killed.	Yes ☐ No ☐
13. Stressful or scary medical procedure.	Yes ☐ No ☐
14. Being around war.	Yes ☐ No ☐
15. Other stressful or scary event?	Yes ☐ No ☐

Describe:_____

Which one is bothering you the most now?_____

Thinking about the most scary or upsetting event that has happened to you:
Mark 0, 1, 2 or 3 for how often the following things have bothered you in the last two weeks:

0 Never / 1 Once in a while / 2 Half the time / 3 Almost always

16	Upsetting thoughts or pictures about what happened that pop into your head.	0	1	2	3
17	Bad dreams reminding you of what happened.	0	1	2	3
18	Feeling as if what happened is happening all over again.	0	1	2	3
19	Feeling very upset when you are reminded of what happened.	0	1	2	3
20	Strong feelings in your body when you are reminded of what happened (sweating, heart beating fast, upset stomach).	0	1	2	3
21	Trying not to think about what happened. Or to not have feelings about it.	0	1	2	3
22	Staying away from people, places, things, or situations that remind you of what happened.	0	1	2	3
23	Not being able to remember part of what happened.	0	1	2	3
24	Negative thoughts about yourself or others. Thoughts like I won't have a good life, no one can be trusted, the whole world is unsafe.	0	1	2	3
25	Blaming yourself for what happened. Or blaming someone else when it isn't their fault	0	1	2	3
26	Bad feelings (afraid, angry, guilty, ashamed) a lot of the time.	0	1	2	3
27	Not wanting to do things you used to do.	0	1	2	3
28	Not feeling close to people.	0	1	2	3
29	Not being able to have good or happy feelings.	0	1	2	3
30	Feeling mad. Having fits of anger and taking it out on others.	0	1	2	3
31	Doing unsafe things.	0	1	2	3
32	Being overly careful (checking to see who is around you).	0	1	2	3
33	Being jumpy.	0	1	2	3
34	Problems paying attention.	0	1	2	3
35	Trouble falling or staying asleep.	0	1	2	3

Please mark YES or NO if the problems you marked interfered with:

36. Getting along with others	☐ Yes ☐ No	39. Family Relationship	☐ Yes ☐ No
37. Hobbies/Fun	☐ Yes ☐ No	40. General happiness	☐ Yes ☐ No
38. School or work	☐ Yes ☐ No		

Appendix D

Child Post-Traumatic Cognitions Inventory Short-Form (CPTCI-S)

Thinking about the most scary or upsetting event that has happened to you:
We would like to know what kinds of thoughts and feelings you've been having.
Below is a list of statements. Please read each statement carefully and tell us how much you AGREE or DISAGREE with each statement by ticking one box.
People react to frightening events in many different ways.
There are no right or wrong answers.

		Don't agree at all	*Don't agree a bit*	*Agree a bit*	*Agree a lot*
1	My reactions since the frightening event meant I have changed for the worse.	[ ]	[ ]	[ ]	[ ]
2	I don't trust people.	[ ]	[ ]	[ ]	[ ]
3	My reactions since the frightening event mean something is seriously wrong with me.	[ ]	[ ]	[ ]	[ ]
4	I am no good.	[ ]	[ ]	[ ]	[ ]
5	I can't cope when things get tough.	[ ]	[ ]	[ ]	[ ]
6	I used to be a happy person but now I am always sad.	[ ]	[ ]	[ ]	[ ]
7	Bad things always happen.	[ ]	[ ]	[ ]	[ ]
8	I will never be able to have normal feelings again	[ ]	[ ]	[ ]	[ ]
9	My life has been destroyed by the frightening event.	[ ]	[ ]	[ ]	[ ]
10	My reactions since the frightening event show that I must be going crazy.	[ ]	[ ]	[ ]	[ ]

Appendix E

Child Safety Behaviour Scale (CSBS)

Thinking about the most scary or upsetting event that has happened to you:
We would now like to find out about the different things you have been doing since the frightening event in the past two weeks.
Please read this list and then tell us how much you AGREE or DISAGREE with each sentence, by ticking the box that best matches you.
Remember, there are no right or wrong answers to these questions.

	Never	*Sometimes*	*Often*	*Always*
1. I do not like being away from adults that I trust (e.g., teachers, parents)	[ ]	[ ]	[ ]	[ ]
2. I always check that my friends and family are safe	[ ]	[ ]	[ ]	[ ]
3. I am always thinking about ways to make myself safer	[ ]	[ ]	[ ]	[ ]
4. I am really careful to stay away from unsafe situations	[ ]	[ ]	[ ]	[ ]
5. I am careful not to do dangerous things	[ ]	[ ]	[ ]	[ ]
6. I often do things to try and make myself feel safer	[ ]	[ ]	[ ]	[ ]
7. I always check that doors and windows are locked or I ask my parents to	[ ]	[ ]	[ ]	[ ]
8. When I go somewhere now I always check for the quickest way to leave in case something goes wrong	[ ]	[ ]	[ ]	[ ]
9. I do not like to try new things	[ ]	[ ]	[ ]	[ ]
10. I try to stop my feelings about it	[ ]	[ ]	[ ]	[ ]
11. I always check my body is okay	[ ]	[ ]	[ ]	[ ]
12. I do not like changing the way I do things	[ ]	[ ]	[ ]	[ ]
13. I try really hard to stop my thoughts about it	[ ]	[ ]	[ ]	[ ]
14. I try not to let other people see how I am feeling	[ ]	[ ]	[ ]	[ ]
15. I like to know exactly what is happening around me	[ ]	[ ]	[ ]	[ ]
16. I do extra things to make sure the places I am are safe	[ ]	[ ]	[ ]	[ ]
17. I do not like making choices	[ ]	[ ]	[ ]	[ ]
18. I always like to make sure that the people around me are not dangerous (e.g., by asking mum, staring at people)	[ ]	[ ]	[ ]	[ ]
19. I sleep with the lights on so that I feel safer	[ ]	[ ]	[ ]	[ ]
20. I like to be near a telephone, or, I like my parents to be near a telephone so they or I can quickly call for help	[ ]	[ ]	[ ]	[ ]
21. I have a plan of what I should do if things go wrong	[ ]	[ ]	[ ]	[ ]

Appendix F

Cognitive Avoidance Questionnaire (CAQ)

People react differently to certain types of thoughts. Here is a list of things people might think or do about certain thoughts.
Please read each statement and circle the number (1, 2, 3, 4 or 5) that best describes how much it is like you. Remember there are no right or wrong answers.
1 Not at all like me / 2 A little like me / 3 Sometimes like me / 4 A lot like me / 5 Always like me

1	There are things that I would rather not think about.	1	2	3	4	5
2	I avoid certain situations that make me pay attention to things I don't want to think about.	1	2	3	4	5
3	I think about things that concern me as if they were happening to someone else.	1	2	3	4	5
4	I have thoughts that I try to avoid.	1	2	3	4	5
5	I try not to think about the most upsetting parts of some situations so as not to be too afraid.	1	2	3	4	5
6	I sometimes avoid objects that can trigger upsetting thoughts.	1	2	3	4	5
7	I distract myself to avoid thinking about certain upsetting subjects.	1	2	3	4	5
8	I avoid people who make me think about things that I do not want to think about.	1	2	3	4	5
9	I often do things to distract myself from my thoughts.	1	2	3	4	5
10	I try to think about boring and unimportant things instead of things that worry me.	1	2	3	4	5
11	Sometimes I throw myself into an activity to avoid thinking about certain things.	1	2	3	4	5
12	To avoid thinking about things that upset me, I force myself to think about something else	1	2	3	4	5
13	There are things I try not to think about.	1	2	3	4	5
14	Sometimes I avoid places that make me think about things I would prefer not to think about.	1	2	3	4	5
15	I try to think about happy things that have happened to me instead of scary things that might happen	1	2	3	4	5
16	I avoid actions that remind me of things I do not want to think about.	1	2	3	4	5
17	I think about many little things so I don’t think about more important matters	1	2	3	4	5
18	Sometimes I keep myself occupied just to stop thoughts from popping up in my mind.	1	2	3	4	5
19	I avoid situations that involve people who make me think about unpleasant things.	1	2	3	4	5
20	I think about things that are worrying other people rather than thinking about my own worries.	1	2	3	4	5

Appendix G

Child Response Styles Questionnaire (CRSQ)

We are interested in what you are like. The following items ask you questions about how you feel. This is a survey, not a test. There are no right or wrong answers. Some young people are very different from one another; each young person filling in this questionnaire will be putting down something different.

When young people feel sad, they do and think different things. What about you? What do you do and think when you feel sad? For each question, it is very important that you mark what you **usually** do, not what you think you should do.

1. When I am sad, I think about how alone I feel.	Almost never	Sometimes	Often	Always
2. When I am sad, I go away by myself and think about why I feel this way.	Almost never	Sometimes	Often	Always
3. When I am sad, I think, “I’m ruining everything.”	Almost never	Sometimes	Often	Always
4. When I am sad, I think about how sad I feel.	Almost never	Sometimes	Often	Always
5. When I am sad, I go some place alone to think about my feelings.	Almost never	Sometimes	Often	Always
6. When I am sad, I think about how angry I am with myself.	Almost never	Sometimes	Often	Always
7. When I am sad, I think about other times when I have felt sad.	Almost never	Sometimes	Often	Always
8. When I am sad, I think about a recent situation wishing it had gone better.	Almost never	Sometimes	Often	Always
9. When I am sad, I think, “there must be something wrong with me or I wouldn’t feel this way.”	Almost never	Sometimes	Often	Always
10. When I am sad, I think, “I am disappointing my friends, family, or teachers.”	Almost never	Sometimes	Often	Always
11. When I am sad, I think about all of my failures, faults, and mistakes.	Almost never	Sometimes	Often	Always
12. When I am sad, I think, “why can’t I handle things better?”	Almost never	Sometimes	Often	Always
13. When I am sad, I think about how I don’t feel like doing anything.	Almost never	Sometimes	Often	Always

Appendix H

Revised Children's Anxiety and Depression Scale-25 (RCADS-25)

Below is a list of sentences of things that happen to people. Please put a circle around the word that shows how often each of these things happen to you. There are no right or wrong answers.

1. I feel sad or empty	Never	Sometimes	Often	Always
2. I worry when I think I have done poorly at something	Never	Sometimes	Often	Always
3. I would feel afraid of being on my own at home	Never	Sometimes	Often	Always
4. Nothing is much fun anymore	Never	Sometimes	Often	Always
5. I worry that something awful will happen to someone in my family	Never	Sometimes	Often	Always
6. I am afraid of being in crowded places (like shopping centres, the movies, buses, busy playgrounds)	Never	Sometimes	Often	Always
7. I worry what other people think of me	Never	Sometimes	Often	Always
8. I have trouble sleeping	Never	Sometimes	Often	Always
9. I feel scared if I have to sleep on my own	Never	Sometimes	Often	Always
10. I have problems with my appetite	Never	Sometimes	Often	Always
11. I suddenly become dizzy or faint when there is no reason for this	Never	Sometimes	Often	Always
12. I have to do some things over and over again (like washing my hands, cleaning or putting things in a certain order)	Never	Sometimes	Often	Always
13. I have no energy for things	Never	Sometimes	Often	Always
14. I suddenly start to tremble or shake when there is no reason for this	Never	Sometimes	Often	Always
15. I cannot think clearly	Never	Sometimes	Often	Always
16. I feel worthless	Never	Sometimes	Often	Always
17. I have to think of special thoughts (like numbers or words) to stop bad things from happening	Never	Sometimes	Often	Always
18. I think about death	Never	Sometimes	Often	Always
19. I feel like I don't want to move	Never	Sometimes	Often	Always
20. I worry that I will suddenly get a scared feeling when there is nothing to be afraid of	Never	Sometimes	Often	Always
21. I am tired a lot	Never	Sometimes	Often	Always
22. I feel afraid that I will make a fool of myself in front of people	Never	Sometimes	Often	Always
23. I have to do some things in just the right way to stop bad things from happening	Never	Sometimes	Often	Always
24. I feel restless	Never	Sometimes	Often	Always
25. I worry that something bad will happen to me	Never	Sometimes	Often	Always

Appendix I

Ethics Approval letter

NHS
Health Research Authority

East Midlands - Derby Research Ethics Committee
The Old Chapel
Royal Standard Place
Nottingham
NG1 6FS

Telephone: 0115 8839521

08 February 2016

Ms Alice Alberici
Trainee clinical psychologist
University of East Anglia
Norwich Research Park
Norwich, NR4 7TJ

Dear Ms Alberici

Study title:	**Cognitive processes in posttraumatic stress disorder (PTSD) and depression following trauma: a cross-sectional study of secondary school pupils**
REC reference:	**16/EM/0009**
Protocol number:	**1**
IRAS project ID:	**188569**

Thank you for your letter, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

We plan to publish your research summary wording for the above study on the HRA website, together with your contact details. Publication will be no earlier than three months from the date of this opinion letter. Should you wish to provide a substitute contact point, require further information, or wish to make a request to postpone publication, please contact the REC Manager, Miss Vic Strutt, NRESCommittee.EastMidlands-Derby@nhs.net.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Conditions of the favourable opinion

Management permission must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements. Each NHS organisation must confirm through the signing of agreements and/or other documents that it has given permission for the research to proceed (except where explicitly specified otherwise).

Guidance on applying for NHS permission for research is available in the Integrated Research Application System, www.hra.nhs.uk or at http://www.rdforum.nhs.uk.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of management permissions from host organisations

Registration of Clinical Trials

All clinical trials (defined as the first four categories on the IRAS filter page) must be registered on a publically accessible database within 6 weeks of recruitment of the first participant (for medical device studies, within the timeline determined by the current registration and publication trees).

There is no requirement to separately notify the REC but you should do so at the earliest opportunity e.g. when submitting an amendment. We will audit the registration details as part of the annual progress reporting process.

To ensure transparency in research, we strongly recommend that all research is registered but for non-clinical trials this is not currently mandatory.

If a sponsor wishes to contest the need for registration they should contact Catherine Blewett (catherineblewett@nhs.net), the HRA does not, however, expect exceptions to be made. Guidance on where to register is provided within IRAS.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Ethical review of research sites

NHS sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	*Version*	*Date*
Copies of advertisement materials for research participants [Advert Stream 2 guardians]	V2.1	25 January 2016
Copies of advertisement materials for research participants [New Document. Advert Stream 2 16-17 years]	V1	29 January 2016
Covering letter on headed paper [Cover letter]	V2.0	25 January 2016
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Indemnity letter]	1	10 December 2015
IRAS Checklist XML [Checklist_29012016]		29 January 2016

Letter from sponsor [Letter from sponsor]	1	10 December 2015
Other [School letter of support to REC]	1	10 December 2015
Other [GCP Jade Claxton]	1	10 December 2015
Other [GCP AA Chief investigator]	1	10 December 2015
Other [Aftercare sheet stream 1]	1	14 December 2015
Other [Aftercare sheet stream 2]	1	14 December 2015
Other [caseness letter]	1	14 December 2015
Other [Info sheet guardians stream 2]	1	14 December 2015
Other [Opt-out info school invite guardians]	1	14 December 2015
Other [Opt-out school invite 16+]	1	14 December 2015
Participant consent form [Assent form under 16 years stream 1]	V2.0	25 January 2016
Participant consent form [Consent form guardian stream 2]	V2.0	25 January 2016
Participant consent form [Consent form over 16 years stream 1]	V2.0	25 January 2016
Participant consent form [Assent form under 16 years stream 2]	V2.0	25 January 2016
Participant consent form [Consent form over 16 years stream 2]	V2.0	25 January 2016
Participant information sheet (PIS) [Opt0out school invitation guardian stream 1]	V2.0	25 January 2016
Participant information sheet (PIS) [Opt-out school invitation over 16 years]	V2.0	25 January 2016
Participant information sheet (PIS) [Information sheet guardians Stream 2]	V2.0	25 January 2016
Participant information sheet (PIS) [Information sheet under 16 years stream 2 V2.0]	V2.0	25 January 2016
Participant information sheet (PIS) [Info sheet under 16 years stream 1]	V2.0	25 January 2016
Participant information sheet (PIS) [Information sheet over 16 years stream 2]	V2.0	25 January 2016
REC Application Form [REC_Form_02122015]		02 December 2015
Research protocol or project proposal [Research Protocol]	V2.1	25 January 2016
Summary CV for Chief Investigator (CI) [CI CV AA]	1	10 December 2015
Summary CV for student [CV JC]	1	10 December 2015
Summary CV for supervisor (student research) [CV RMS]	1	14 December 2015
Summary, synopsis or diagram (flowchart) of protocol in non technical language [Thesis recruitment diagram]	1	10 December 2015
Validated questionnaire [Questionnaire Battery]	V2.0	

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document *"After ethical review – guidance for researchers"* gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol

- Progress and safety reports
- Notifying the end of the study

The HRA website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website:
http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance/

HRA Training

We are pleased to welcome researchers and R&D staff at our training days – see details at
http://www.hra.nhs.uk/hra-training/

16/EM/0009	**Please quote this number on all correspondence**

With the Committee's best wishes for the success of this project.

Yours sincerely

pp. V. Swift

Mr Peter Korczak (Chair)
Chair

Email: NRESCommittee.EastMidlands-Derby@nhs.net

Enclosures: "After ethical review – guidance for researchers

Copy to: *Mrs Sue Steel*

Appendix J

Recruitment Process

Contact was first made with secondary schools and colleges in the East Anglian region. Two secondary schools expressed interest in the study and were able to participate within the recruitment timeframe. Participants' guardians were given a guardian information sheet and consent form that contain study details and the opt-out procedure. Guardians' consent was presumed if no opt-out was received.

On the day of data collection, participants were presented with an information sheet and a consent form. The consent form stated that any information provided would be kept private and confidential according to the Data Protection Act 1998 unless safety concerns were raised. The form also informed participants of their right to drop out at any point of the study without consequences and without the need to provide reasons. Upon their consent, participants were asked to fill in a questionnaires pack which required approximately 10 minutes to complete. Since the questionnaires contained questions on the most scary or upsetting event that participants had experienced, trained researchers were available at all times to take care of any potentially distressed participants. On completion of the questionnaires pack, participants were given an aftercare sheet signposting various mental health support such as helplines, self-help, relevant websites and a point of contact within their schools. Contact details of the researchers were also provided in case there were further concerns about any aspect of the study.