Psychopathology in children and young people following trauma: the course of depression and correlates of poor mental health

Amber Edwards

Primary Supervisor:

Prof. Richard Meiser-Stedman

Secondary Supervisor:

Dr Eleanor Chatburn

Thesis submitted in partial fulfilment of the degree of

Doctorate in Clinical Psychology

Faculty of Medicine and Health Sciences

University of East Anglia

Submission date: 04th March 2025

Word Count: 20,895

Candidate Registration Number: 100373507

Abstract

Exposure to traumatic experiences is common in children and adolescents. Research shows that while many are resilient, a significant number develop mental health disorders, with post-traumatic stress disorder (PTSD) being the most studied. Depression is a response to trauma, affecting up to 24.2% of trauma-exposed youth, and is comorbid with PTSD in over half of cases. Preliminary research suggests depression symptoms do not spontaneously recover.

This thesis explored cognitive factors underlying depression development alongside the prevalence and course of symptoms. A systematic review and meta-analysis found strong links between maladaptive appraisals and both PTSD and depression symptoms (r=.54 and r=.60 respectively). Rumination had a moderate relationship with PTSD (r=.40), but there was insufficient evidence linking depression and rumination following trauma.

These findings highlighted a research gap into depression as a trauma response. The empirical project therefore investigated depression prevalence and course following trauma exposure. It utilised data from the PACT/R data repository to analyse the symptoms of 2006 trauma-exposed children and adolescents. Frequency statistics, meta-analysis and trajectory modelling were conducted. Prevalence rates found were higher than those expected to be found in the general population, and this was consistent across the year post-trauma. Two depression trajectories emerged: a small cohort (n=165) with no-or mild symptoms, and a large cohort (n=411) with persistent moderate symptoms.

Depression symptoms are a common response to trauma in children and adolescents and unlikely to resolve spontaneously within a year. Maladaptive appraisals are linked to both PTSD and depression, suggesting targeting these in treatment could reduce both symptoms. Future research could focus on the cognitive factors involved in the development and maintenance of depression following a trauma, alongside the overlaps with PTSD and complex PTSD.

Table of Contents

List of Tables

Systematic Review and Meta- Analysis

Empirical Paper

List of Figures

Acknowledgements

This thesis would not have been completed without the support of so many, and I want to take this opportunity to acknowledge their contribution. I would firstly like to thank my supervisor, Professor Richard Meiser Stedman, who has guided and supported me throughout this process. Your time, patience, and enthusiasm for research has supported this project to the end. Will Rock, thank you for dedicating so much time and meticulously reviewing the meta-analysis.

Thank you to every child and family who participated in the research which contributed to this thesis. Without you, we would not be able to continue developing our knowledge of the impacts of trauma. I hope this thesis goes a small way in improving our understanding of how to support you and future generations of children.

To my wonderful family, thank you for your steadfast support and unwavering belief in me throughout my career. Mum and Dad, this process would have been impossible without your love, guidance and care. My hilarious sister Chelsea, hopefully it is not long until you can say there's a doctor in the family!

I would also like to thank my wonderful husband, Charles, who has patiently supported me through the highs and lows of the past few years. Without your love and encouragement, I could not have completed this. Thank you to my kind friend Jordanna, without your constant words of support, hilarious laugh, and eternal flow of coffee I don't know how I would have made this happen.

This thesis is dedicated to four important people. To my incredible daughter, Elise, who brings an infectious joy to all those around her. You have challenged me to see the world in a completely different way.

Finally, I would like to dedicate this to my wonderful grandparents, Austin, Joan and Sybil, who are sadly not all here to see me complete this thesis but who believed in me every step of the way.

Chapter One: Introduction to the Thesis Portfolio[^1, 2]

Word Count: 1700

[^1] This thesis portfolio draws from materials written for the Thesis Proposal which was submitted as a summative assessment in preparation for the development of the thesis and as part of fulfilment of the Doctorate in Clinical Psychology. This material has been used throughout the portfolio.

[^2] During the preparation of this work the author used Generative AI (Chat GPT) in order to gain feedback on the language and readability of writing in aspects of this thesis. After using this tool/service, the author reviewed and edited the content as needed and takes full responsibility for the content of the publication.

Trauma Exposure and Mental Health

Exposure to traumatic events is common among youth, with 61.8% of adolescents in the U.S. reporting such experiences (McLaughlin et al., 2013). While many remain resilient, a significant minority develop mental health disorders, with Post-Traumatic Stress Disorder (PTSD) being the most documented (Meiser-Stedman et al, 2016; Greene et al, 2018 etc.). Comorbid major depressive disorder (MDD) occurs in 52% of PTSD cases, contributing to greater distress, impairment, and healthcare utilization (Rytwinski et al., 2013).

Prevalence and Impact of Depression

A meta-analysis by Vibhakar et al. (2019) found that up to 24.2% of youth develop depression following a single trauma. Children who are exposed to trauma are 2.6 times more likely to develop depression compared to those without such exposure, with interpersonal violence associated with higher rates of depression. Depression ranks as one of the leading causes of disability among youth (World Health Organisation [WHO], 2022). It is linked to long-term negative outcomes such as suicidality, poor social functioning, and health problems (Maughan et al., 2013). Given the prevalence of depression post-trauma, it is essential to explore its relationship with PTSD, as both conditions often co-occur, complicating diagnosis and treatment.

Depression and PTSD

Depression is closely entangled with post-traumatic stress within the trauma literature, and it can be difficult to disentangle the two. Rather, it may be more useful to consider them independent diagnoses with shared risk factors. It is likely that depression is a factor in the development or maintenance of chronic PTSD. Meiser-Stedman et al. (2017) found that youth with Acute Stress Disorder (ASD) who went on to develop PTSD experienced more negative alterations in cognitions and mood at 2 weeks than those who did not. They found clinically significant depression was present in a significant minority of cases but was not predicted by ASD and showed little natural recovery.

The comorbidity of PTSD and depression is highly prevalent and likely reflects a bidirectional relationship (Rytwinski et al., 2013). This comorbidity is frequently associated with chronic impairment and delayed treatment response. Many individuals with PTSD do not seek treatment. Of those who do, two-thirds fail to respond adequately (Bryant, 2019). A range of

factors contribute to this, including socio-economic status. One potential contributing factor could be the presence of comorbid psychological conditions and addressing these may lead to improved outcomes. By enhancing our understanding of the relationship between PTSD and MDD following trauma, we can inform screening processes and better identify the most effective treatment interventions at each stage of recovery.

It remains unclear whether PTSD and MDD predict or drive each other, despite shared diagnostic elements (American Psychiatric Association, 2013; WHO, 2022). This cannot, however, fully explain comorbidities seen as the lifetime prevalence of both MDD and PTSD remain the same even once overlapping symptoms are removed (Elhai, Grubaugh, Kashdan, and Frueh, 2008). There are well-established shared risk factors and genetic vulnerabilities for both MDD and PTSD (Angelakis and Nixon, 2015).

Trajectories of Depression and PTSD

Trajectories of PTSD recovery are well-documented, with Bonanno (2004; 2005) identifying four patterns: chronic, delayed, recovery, and resilient. Greene et al. (2018) found that resilience was the most common trajectory (65.7%), followed by recovery (20.8%), chronicity (10.6%), and delayed onset (8.9%). This suggests that many individuals recover spontaneously.

Preliminary research into the trajectories of depression by Zhang et al. (2022) indicate that depression persists for up to nine months post-trauma, with PTSD and depression often occurring together. It remains unclear whether this depression trajectory is also present when there are co-occurring symptoms of PTSD, as those with high levels of PTSD symptoms moved to a treatment group. Given these trajectories, early intervention targeting cognitive symptoms associated with chronic PTSD may be beneficial, particularly for those with comorbid depression.

Cognitive Models of Depression and PTSD

Cognitive models highlight the role of early experiences in the development of depression, and the cognitive and behavioural factors lead to maintenance of such symptoms. Beck's model of depression (Beck et al., 1979) suggests that difficult early experiences can lead to negative self-beliefs and distorted perceptions of the world and future, particularly when guilt or shame is internalised. The learned helplessness model (Seligman 1972, Maier and Seligman,

1976) highlights how feeling unable to escape adverse events and a perceived lack of control can foster a sense of powerlessness, increasing vulnerability to depression. This vulnerability may be particularly pertinent in children and adolescents due to their reliance on others to meet their basic needs.

Cognitive models of PTSD (Ehlers and Clark, 2000) emphasise the role of cognitive processes both during and following a trauma, the intrusive nature of trauma memories, and strategies to control the symptoms, such as avoidance of stimuli or rumination leading to a current sense of threat. Cognitive Behavioural Models of both PTSD and Depression highlight the role of appraisals of the self and the world, alongside avoidance or safety strategies in the maintenance of psychopathology.

Cognitive factors, such as maladaptive appraisals and rumination, play a role in the maintenance of both PTSD and depression following a trauma (Ehring, Ehlers and Glucksman, 2008; Memarzia et al., 2024). In their examination of the overlap between PTSD and MDD in adults, Angelakis and Nixon (2015) identified several shared maladaptive cognitive processes, including intrusive memories, overgeneralized memories, rumination, and maladaptive cognitions.

Despite these models offering valuable insights, gaps remain in the understanding of the specific mechanisms through which trauma triggers depression in children, particularly in the context of developmental stages and trauma types. Furthermore, existing models predominantly focus on adult populations, with limited attention to developmental variations in trauma responses across childhood and adolescence.

Cognitive models inform clinical practice by providing a framework for understanding the role of negative cognitive processes and maladaptive behaviours in the development and maintenance of PTSD and depression. Clinicians are guided by the evidence base in the application of therapies such as Cognitive Behavioural Therapy (CBT). By identifying the cognitive and behavioural factors in the development and maintenance of psychopathology, clinicians can target treatment to aid recovery. The development of robust cognitive models following a trauma can inform clinical practice in trauma-informed care, early intervention, alongside the development of treatment guidelines, ensuring that interventions are effective, person-centred, and promote long-term recovery for those affected by trauma.

Clinical Issues

CBT adapted to the developmental stage of a child or adolescent is recommended as a treatment for both depression and PTSD (National Institute for Health and Care Excellence [NICE], 2018; 2019). Current guidelines for treatment of comorbid PTSD and depression are based on adult literature. They suggest treating the symptoms in succession, focusing on PTSD as a first line unless symptoms of depression are making psychological treatment for PTSD difficult or there is a high risk of harm to the person or others (NICE, 2018).

There are no current guidelines for treating depression which occurs in the context of trauma or comorbid depression and PTSD in children and adolescents. Identifying processes underlying post-traumatic depression, as well as the factors underlying co-morbid depression and PTSD would allow treatment to be targeted to these presentations. Identifying and targeting the mechanisms underlying both diagnoses is likely to be advantageous for treatment outcomes when PTSD and depression present co-morbidly.

Research Aims

This body of research aims to deepen the understanding of the pathology of depression in the context of traumatic experiences in children and young people. First, a systematic review and meta-analysis of the current research of depression and PTSD in children and young people following trauma was conducted. This aimed to examine cognitive factors underpinning both psychopathologies and whether these processes are shared or are condition specific. Specifically, it examined the role of maladaptive appraisals and rumination in the development and maintenance of PTSD and depression.

The empirical paper then sought to understand the prevalence and trajectories of depression in the year following exposure to a potentially traumatic experience. To achieve this, a research study was conducted, which utilised data from a child trauma repository (PACT/R, Kassam Adams et al. 2020). A large volume of data from children who have experienced trauma were synthesised, and analyses of the prevalence and course of depression symptoms were conducted. In summary, the research paper aimed to:

1) Examine the natural recovery trajectories of depression in children and adolescents following single-incident trauma.

2) Investigate the prevalence and severity of post traumatic depression and the individual symptoms of depression within the first-year post-trauma.

This research aimed to examine the course of depression and the cognitive factors which lead to the development and maintenance of symptoms following a trauma, addressing a current gap in understanding. Current evidence heavily emphasises the role of PTSD following a trauma, however there is an increasing body of work highlighting other psychopathologies which emerge following trauma. Deepening this understanding will provide critical insights for clinicians to improve long-term outcomes for affected youth.

Ethical Considerations

The systematic review and meta-analysis conducted adheres to the PRISMA reporting guidelines (Page et al., 2021) to ensure transparency and clarity throughout.

This study utilises secondary data, and as a result, there are no identifiable ethical concerns that require addressing within the scope of this research. The data included in the empirical study was from the PACT/R database (Kassam Adams et al. 2020). All data submitted to the database are required to have appropriate ethical approval to conduct research. Data are anonymised prior to being added to the database, therefore there are no data protection concerns about these data. The PACT/R database is accessed through application to the Child Trauma Data Archives and is overseen by the team at the University of Philadelphia, who ensure that the data is sent to studies using it in line with the intended purpose. Access to the data is agreed by a steering group prior to the data becoming available to the researcher to ensure the proposed study is in line with the ethical approval. Researchers for this study were granted consent to use the database on 17/06/2022 (Appendix A). As there is prior ethical approval for the original studies reviewed by the Child Trauma Data Archives no further ethical approval was sought. Further information on the data repository and ethical approval can be found on the Child Trauma Data Archives website: https://childtraumadata.org/home.

Chapter Two: Systematic Review and Meta-Analysis

Prepared for Submission to: Clinical Psychology Review

Author Guidelines available in Appendix B

Word Count: 5000

The relationship between cognitive processes and psychopathology following a trauma in children and adolescents: A systematic review and meta-analysis

Amber Edwards[1], William Rock [1], Eleanor Chatburn [1], Richard Meiser-Stedman [1]

[1] *Department of Clinical Psychology, University of East Anglia, Norwich, United Kingdom*

Corresponding Author: Amber Edwards, Department of Clinical Psychology, University of East Anglia, Norwich, United Kingdom. Email: amber.edwards@uea.ac.uk

Keywords

Depression, PTSD, appraisal, rumination, children, adolescents

Abstract

Introduction: Current cognitive models highlight the role of maladaptive appraisals and rumination in the development and maintenance of post-traumatic stress disorder (PTSD) in children and adolescents. Recent research has highlighted that such appraisals and processes may not be exclusive to PTSD and may also be linked to the development of depression following a trauma. This systematic review and meta-analysis examined the role of maladaptive appraisals and rumination in the development and maintenance of PTSD and depression following trauma.

Method: A systematic search of the literature was conducted across three databases; PsycInfo, MEDLINE and PTSD Pubs. Forty-seven studies were identified which met inclusion criteria, comprising 14,194 children and adolescents. Random effects meta-analyses were conducted.

Results: Strong cross-sectional relationships were identified between appraisals and both PTSD (r=.54 [95%CI=.47, .61]; k=29) and depression (r=.60 [95% CI=.47, .70; k=12) in trauma-exposed children and adolescents. This relationship retains strength across trauma types. A medium-sized relationship between rumination and PTSD (r=.40 [95% CI=.27, .51]; k=14) was identified. These findings were consistent prospectively, suggesting that maladaptive appraisals (r= .60 [95% CI=.44, .73]; k=4) and rumination (r=.38 [95% CI=.28, .48]; k=8) are predictive of PTSD. There was not enough evidence to comment on the link between rumination and depression.

Conclusion: The relevance and impact of maladaptive appraisals goes beyond PTSD alone and is also linked to the development of depression post-trauma. This has significant clinical implications, as targeting maladaptive appraisals in treatment following a traumatic experience may help to reduce both PTSD and depression symptoms.

Introduction

Trauma exposure and Psychological Outcomes

Children and adolescents across the globe are frequently exposed to various forms of trauma including medical incidents, natural disasters, conflict and interpersonal traumas. Trauma exposure rates vary based on geographic location, socioeconomic factors, education access, and the prevalence of violence or conflict (Benjet et al, 2016). Studies of American youth found prevalence rates of up to 61.8% (McLaughlin et al., 2013). In comparison, studies of Chinese youth reported prevalence rates of 34.3% (Ting et al, 2023). This frequent exposure to trauma can lead to a range of psychological outcomes. While most children and adolescents demonstrate resilience in the face of trauma, a significant minority develop mental health conditions.

Trauma and PTSD

Post-Traumatic Stress Disorder (PTSD) is a mental health condition which may develop following a trauma. It is characterised by intrusion symptoms, avoidance behaviors, negative changes in thinking and mood, and alterations in arousal and reactivity (American Psychiatric Association [APA], 2013). These symptoms must persist for more than one month and cause significant distress or impairment. Higher rates of PTSD are found in children who have experienced repeated or interpersonal traumas, such as abuse or domestic violence, which disrupt the processing of trauma and increase vulnerability to PTSD (Alisic et al. 2014; Woolgar et al., 2022). Trauma exposure, particularly during childhood and adolescence can have a negative impact on both mental and physical health. Trauma exposure increases the risk of mental illness and suicide alsongside substance misuse disorders and chronic diseases (World Health Organisation [WHO], 2024)

Trauma and Depression

Trauma is closely linked to the development of both PTSD and depression. Depression is defined by the presence of a depressed mood and/or a loss of interest or pleasure in daily activities, along with other symptoms such as changes in sleep, appetite, energy levels, concentration, feelings of guilt or worthlessness, and thoughts of death or suicide. These symptoms must last for at least two weeks and cause significant distress or impairment in functioning (APA, 2013). Depression is recognized as one of the leading causes of disability and illness among children and adolescents (WHO, 2024). Adolescent depression has been associated with negative long-term outcomes, such as suicidality, social difficulties, and poor physical and mental health (Maughan et al., 2013). One of the most significant risk factors for depression is exposure to stressful life events.

PTSD and depression often co-occur following trauma, with studies showing that 52% of individuals with PTSD also experience comorbid depression (Rytwinski et al., 2013). This comorbidity is linked to increased distress, impairment, and higher healthcare utilization. In a meta-analysis examining the prevalence of depression following trauma, Vibhakar et al. (2019) discovered that up to 24.2% of children and adolescents develop depression after experiencing a single traumatic event, however these trajectories may be skewed as those who required treatment were not included in their analysis. Their study also found that children who have experienced trauma have 2.6 times greater odds of having depression compared to those who have not undergone trauma.

Comorbidity

The relationship between PTSD and depression remains complex, with questions about whether one disorder acts as a predictor or cause of the other. While there is some overlap in their diagnostic criteria (APA, 2013; World Health Organization, 2022), this does not fully account for the comorbidities observed. Additionally, there are well-established shared risk factors and genetic predispositions (Angelakis & Nixon, 2015). Cognitive factors also contribute to the persistence of both PTSD and depression following a single traumatic event (Ehring, Ehlers & Glucksman, 2008). Furthermore, research has shown that maladaptive cognitive processes are more pronounced in individuals with comorbid depression and PTSD compared to those with either disorder alone (Angelakis & Nixon, 2015).

Cognitive Models and Mechanisms

The cognitive model of PTSD, proposed by Ehlers and Clark (2000), proposes that PTSD symptoms arise when individuals process traumatic events in a way that reinforces a persistent sense of threat. In particular, this sense of threat is thought to arise from 'excessively negative appraisals of the trauma and/or its sequelae and a disturbance of autobiographical memory characterised by poor elaboration and contextualisation, strong associative memory and strong perceptual priming'. They argue that efforts to change the negative appraisals and trauma-related memories are hindered by a range of maladaptive cognitive and behavioral strategies, such as rumination and thought suppression. Rumination is repetitive, often uncontrollable, thinking about the causes, consequences, and feelings associated with negative experiences or events. It is believed to maintain PTSD by reinforcing maladaptive appraisals. It disrupts the processing of traumatic memories, heightens anxiety and hopelessness, and creates internal cues that trigger intrusive memories. There is significant overlap between the dysfunctional behavioural and cognitive strategies highlighted as maintenance factors of PTSD and symptoms commonly seen in depression (such as a hopelessness, negative cognitions, a lack of interest or pleasure in activities; APA, 2013) which can lead to a withdrawal from activities. Depression may, therefore, have a mediation effect for PTSD through appraisals and thought control strategies.

Appraisals, Rumination and PTSD

The role of negative appraisals and rumination following a trauma has been researched across the lifespan. Ehring, Ehlers and Glucksman (2008) looked at negative appraisals and rumination in adults as predictor variables and found that rumination was positively correlated to PTSD and depression 6 months post-trauma. They also found that appraisals also played a role in predicting PTSD and depression. A similar pattern was found in an earlier study (Mayou, Ehlers & Bryant, 2003).

Maladaptive Appraisals and PTSD in Children

The relationship between maladaptive appraisals and the development of PTSD in children and adolescents has been explored in depth. Mitchell et al (2017) sought to understand this relationship through a systematic review of the literature and found a large effect size, suggesting a strong relationship exists (r=.58; 95%CI=.47, .67) between maladaptive appraisals

and PTSD in children over 7 years old. Further synthesis of the research was completed by Gomez de la Cuesta et al. (2019), who found that this relationship was strong across the lifespan (r=.53; 95% CI=.51, .56) and was particularly strong in children (r=.59; 95%CI=.54, .64)

Rumination Post-Trauma

Rumination is recognised as a key maintenance factor for depression (Papageorgiou, 2003). Recent research has highlighted the role of rumination in the development and maintenance of PTSD. Memarzia et al., (2024) found that rumination is a predictive factor for PTSD, but no similar pattern was observed for depression. Instead, maladaptive appraisals were identified as the sole significant predictor of depression following trauma. This supports the Ehlers and Clark (2000) model of PTSD and its application to children. It does not, however, support the idea of rumination as a maintenance factor for depression in the context of trauma.

Although rumination is strongly associated with depression in children and adolescents (Brown et al. 2016), its role in post-traumatic depression remains unclear, suggesting the need for further investigation. There has been much greater emphasis on the understanding the role of maladaptive appraisals on both depression and PTSD. This is potentially related to the lack of measures of rumination in the context of trauma which are validated within the child and adolescent population. The Event-Related Rumination Inventory (ERRI; Cann et al, 2011) is commonly utilized as a tool to measure rumination with children and adolescents, but its psychometric properties have not been evaluated in this age group.

Aims and Focus of this Meta-Analysis

This research aims to examine the role of maladaptive appraisals and rumination in the development and maintenance of PTSD and depression following trauma. Specifically, it will assess whether these cognitive factors are shared across PTSD and depression or distinct to each.

There is significant evidence for the role of maladaptive appraisals in the development and maintenance of PTSD. A meta-analysis by Gomez de la Cuesta et al. (2019) examined the strength of the relationship between maladaptive appraisals and PTSD and found a large effect size (0.59) in adolescents. While models of PTSD highlight the role of rumination in the maintenance of PTSD, a comprehensive review of the prevalence and role of rumination in

PTSD and depression has yet to be conducted. Furthermore, there is limited research on the role of rumination and maladaptive appraisals in the development of depression following trauma.

This study aims to fill this gap by examining the role of maladaptive appraisals and rumination in the development and maintenance of PTSD and depression following trauma. Specifically, it will explore whether these cognitive factors are shared across PTSD and depression or whether they are distinct to each disorder. For the purposes of this review, we understood maladaptive appraisals to refer to negative evaluations of one's experiences, safety, or self, which can contribute to distress after trauma. Rumination, on the other hand, involves the repetitive and passive focus on distressing thoughts and emotions, often exacerbating emotional suffering.

To address this gap, we conducted a systematic literature review and meta-analysis to assess the strength and prevalence of the relationship between maladaptive appraisals, rumination, PTSD, and depression in children and adolescents. By providing a clearer understanding of the cognitive mechanisms underlying PTSD and depression, this research could inform treatment strategies, particularly cognitive-behavioral therapies (CBT), which may benefit from incorporating targeted interventions addressing maladaptive appraisals and rumination.

Method

Project Registration

This meta-analysis was pre-registered with PROSPERO on 10 April 2024 (CRD420445286688).

Search Strategy

A systematic search strategy was used to identify publications relevant to this study. These were conducted in PsycInfo, MEDLINE and PTSD Pubs. The initial search was completed on the 21st June 2024. A second search for literature published after the first search was completed on the 8th November 2024. The search was limited to research conducted after 1980, when PTSD was first introduced to the Diagnostic and Statistical Manual (DSM).

The search terms used were: PTSD OR Posttraumatic stress OR Post traumatic stress OR Post-traumatic stress OR Depress* AND cognitive appraisal* OR appraisal* OR negative cognition* OR 'negative belief' OR "posttraumatic cognition* OR misappraisal* OR ruminat* OR interp* AND accident OR assault OR disaster OR trauma OR abuse OR maltreatment AND child OR adolescent OR teenage* OR boy OR girl OR pupil OR student.

Studies were screened to ensure they met the following inclusion criteria:

1) Participants had experienced a trauma, as defined within DSM-5 PTSD Criterion A (APA, 2013).

2) Participants were children or adolescents, with a sample mean age under 18 years old.

3) A validated measure of PTSD or depression was administered. Measures must demonstrate adequate reliability and validity via publication of their psychometric properties in a peer reviewed journal.

4) i. A measure of negative trauma-related appraisals. An appraisal was defined as the way the person perceived themselves, the world or their symptoms following a potentially traumatic event

OR

ii. A measure of rumination or deliberate rumination. This is defined as 'Repetitive and prolonged negative thinking about... feelings and symptoms, the self, problems or difficult life events and about their causes, consequences, meanings and implications' (National Institute for Clinical Excellence [NICE], 2022)

The review exclusion criteria were:

1) Participants were treatment-seeking or the study was a treatment trial. Universal preventative treatment trials which included trauma-exposed youth regardless of their symptom severity and measured the constructs under investigation prior to beginning a treatment trial were included.

2) The trauma was a psychotic episode or was linked to alcohol/drug misuse.

3) Measures of Acute Stress Disorder (PTSD measure were taken <1 month post trauma)

4) The study was not published in English

5) The measure of appraisal was peri- or pre- traumatic.

6) The measure of rumination exclusively measured intrusive rumination; this was felt by the researchers to strongly overlap with reexperiencing symptoms and could lead to duplicate measurement of the same construct.

7) The population reported had been reported in another research paper. When the same population had been studied in more than one research paper, duplicate populations were only included if they reported on different constructs.

8) Researchers reported rumination or appraisals from participants who had not experienced a trauma and did not differentiate between the trauma exposed and not exposed population within their analysis.

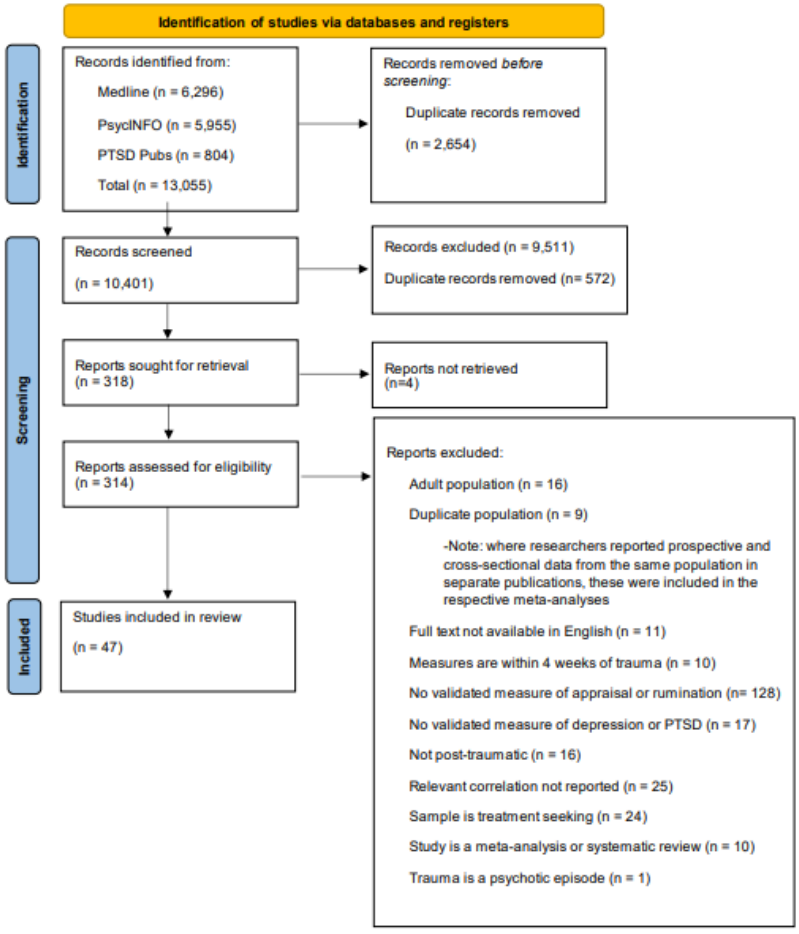
9) The study did not report a correlation coefficient or the correlation coefficient could not be calculated from the reported statistics.

10) Participants experienced a traumatic brain injury.

Screening method

The PRISMA flowchart (Figure A) outlines the articles screened. AE reviewed the title and abstracts in line with the inclusion and exclusion criteria. WR screened 10% of these, with a Cohen's Kappa inter-rater agreement of .47 (moderate agreement). All articles disagreed on were taken forward and screened at the full text stage. At full text stage, the full text of every article was screened by AE. WR screened 20% of these, with a Cohen's Kappa inter-rater agreement of .60 (moderate agreement); any articles disagreed on were discussed with RMS, who made a final decision on inclusion.

Figure 1. *PRISMA flowchart*



Source: Page MJ, et al. BMJ 2021;372:n71. doi: 10.1136/bmj.n71.

Data extraction

Relevant information and data were extracted by AE. All extracted data were checked by WR and disagreements were double-checked and discussed with RMS. Effect size were estimated using Pearsons's zero order correlation coefficient. Where researchers had reported other measures of effect size, this was converted into Pearson's r by the first author. Where authors reported subscales scores and not whole scores, the correlation coefficient of the combined subscales was calculated using Fisher's transformation.

This study focused on cross-sectional data. Where multiple effect sizes were reported, the first time point after 1 month was taken. Prospective longitudinal data were also extracted and reported.

Quality assessment

A quality assessment framework (Appendix C) was adapted from the tool developed by Gomez de la Cuesta et al. (2019). This quality assessment tool was developed by Gomez de la Cuesta et al. (2019) for use with cross-sectional and prospective longitudinal studies utilizing existing tools and adapting them according to the study criteria. They brought together relevant elements of numerous tools including the Quality Appraisal Checklist for Studies Reporting Correlations and Associations (NICE, 2012), the Strengthening of the Reporting of Observational Studies in Epidemiology (STROBE) statement (von Elm et al., 2007), the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies (National Heart and Blood Institute, 2014). Full details of the methodology of this quality assessments tools creation can be found in Gomez de la Cuesta et al. (2019).

This framework rated studies as low, medium, or high, risk of bias, depending on defined factors. This included how representative the sample was, the method of recruitment and sampling, the validity of the measures used, response rates and drop-out rates, and the appropriateness of the analysis. Studies were all rated against this framework by AE and WR (Appendix D).

Meta analysis

As high levels of heterogeneity were anticipated, a random-effects meta-analysis was conducted using the package metafor (Viechtbauer, 2010) in R (version 4.4.1, R core team, 2024). This assumes that each effect is a true effect, and that variation in effect size is due to

between study variance. Q and I^2 were calculated to estimate the degree of heterogeneity. Prediction intervals were calculated and reported to support interpretation of findings, as recommended by IntHout et al. (2016).

Subgroup and Sensitivity analyses

A sensitivity analysis was conducted to include all studies which reported multivariate correlations. A sensitivity analysis was not completed removing low quality studies, as there were none identified meeting our study criteria.

Subgroup analyses were also conducted, looking at study characteristics, methodological influences, and population influences. These were carried out where there were a minimum of ten studies available and the results of these are highlighted in Appendices E, F and G.

Publication bias

To screen for publication bias in meta-analyses where more than 10 studies were available, a funnel plot was created. Egger's test was then used to test for asymmetry within these. Where asymmetry was detected, a 'trim and fill' procedure (Duval & Tweedie, 2000) was completed to address possible publication bias by detecting whether there is any asymmetry within the funnel plot, identifying missing studies, inputting their data and adjusting for the overall effect size (Shi & Lin, 2019).

Results

Search Results

Searches with our described search terms returned 13,055 search results and 47 studies met inclusion criteria. Reasons for exclusion at each stage are highlighted in Figure 1.

Participants

This systematic review comprised 47 studies, incorporating 14,194 children and adolescents aged five to twenty years old (mean 13.3, 51.9% female). Studies were identified which had been carried out in Asia (65.1%), Europe (25.6%), United States of America (5.4%), South America (5.4%) and Australia (.8%). Studies looked at a range of trauma types, the vast majority of children had experienced a natural disaster (58.8%). Other trauma types studied included single incident trauma - comprising a range of traumas, usually identified through

Accident and Emergency admission (9.3%), medical emergency (.4%) vehicle accident (5.3%). A significant minority of children had experienced interpersonal trauma, such as sexual abuse or maltreatment (8.7%). Four studies (9.5% of children) looked at a mixture of trauma types, including interpersonal, accidental and medical.

Study characteristics

Descriptions of the individual studies, including age, gender, location, trauma type and measures used are included in Table 1.

Table 1 - *Study demographics and measures used*

Study	(n)	Age (m, SD)	Gender (% f)	Location	Trauma Type	Depression Measure	PTSD Measure	Appraisal Measure	Rumination Measure
Alamdar et al, 2020*	909	14.95 ±1.18	46.6	China	Natural Disaster	-	CRIES	-	ERRI
Alberici et al., 2018 (Sample 1)	320	13.7 ±.05	51.9	UK	Mixed	-	CATS	CPTCI-S	-
Andredes, 2021	325	12.76 ±1.52	47.4	Chile	Natural Disaster	-	CPSS	-	RSC
Ben-Zur et al., 2013	204	15.45 ±1.19	59.0	Israel	War	-	PSS-SR	War Appraisals	-
Collins et al., 2013	120	10.66 ±2.78	53.0	USA	Violent Event	-	TSCC	CAPS	-
Davis et al., 2022	120	13.5 ±2.20	53.0	UK	Abuse	RCADS	CATS	CPTCI	
de Haan et al., 2019a* Sample 2	113	12.98 ±2.77	70.8	German	Interpersonal	CDI	UCLA-RI & CAPS-CA	CPTCI	-
de Haan et al., 2019b*	263	11.9 ±2.50	44.5	Germany	Maltreatment	-	UCLA-RI & CAPS-CA	CPTCI	-
De Haan et al., 2024	115	11.09 ±2.41	46.10	Swiss	MVA or burn injury	CDI	UCLA-RI	CDI	-
D'Urso et al., 2018	60	12.38 ±2.85	55.0	UK	Medical Trauma	-	IES	CPTCI	-
Egberts et al., 2022*	175	11.98 ±3.20	52.0	Netherlands	Parental Cancer	-	CPSS	CPTCI	-
Ehlers et al., 2003	86	12.300 ±2.86	45.0	UK	MVA	-	IES	0-3 Scale**	0-3 Scale**
Hiller et al., 2019	132	9.87 ±1.80	37.9	UK	Single Incident	RCADS	PTSD-RI	CPTCI	CPCQ
Howard., 2022	279	14.25 ±1.78	61.3	USA	Interpersonal	-	CPTSD-I	PTCI	-
Jin and Wang, 2014	75	15.73 ±1.82	45.0	China	Natural Disaster	-	PCL-C	-	RRS
Kangaslampi et al., 2016	482	11.29 ±0.68	50.0	Palestine	War	-	CRIES	CPTCI	-
Kaur, 2014	90	13.27 ±2.79	57.0	USA	Interpersonal	CDI	CPTSD-I	PTCI	
Kilmer et al., 2010	66	8.5 ±1.10	56.1	USA	Natural Disaster	-	UCLA-RI	-	RSC
Lee et al., 2018	237	12.6 ±2.30	93.7	South Korea	Sexual Abuse	CDI	CRIES	CPTCI	-
Leeson and Nixon., 2011	24	11.42 ±2.62	58.0	Australia	Abuse / Maltreatment	CDI	CPSS	CPTCI	-
Liu and Chen, 2015*	285	13.3 ±2.70	56.7	China	Mixed	CDI	UCLA-RI	CPTCI	-
Liu et al., 2021	621	13.77 ±0.85	47.2	China	Natural Disorder	-	PCL-5	-	ERRI
Lobo et al., 2015	131	11.3 ±2.8	58.0	Brazil	Mixed	CDI	TSCC	CPTCI	-
Ma et al., 2011	74	13.7 ±1.05	69.0	China	Natural Disaster	-	CRIES	PTCI	-
Meiser-Stedman et al., 2009 and Meiser-Stedman et al., 2014	59	14 ±1.80	27.0	UK	Physical Assault and MVA	-	CRIES	CPTCI	CRSQ-RS
	61	14 ±1.90	37.4			-	CRIES	-	3 item scale**
Meiser-Stedman et al., 2019 and Memarzia, 2024	226	14.1 ±2.9	42.5	UK	ED Admission	-	CPTSDI	CPTCI	3 item scale**
	234	13.9 ±2.9	43.5			SMFQ	CPSS	CPTCI	3 item scale**
Murray, 2022	81	9.07 ±1.94	38.3	USA	Parental Detainment	-	TSCYC	CPTCI	-
Nixon et al., 2010	90	12.7 ±2.78	39.0	Australia	ED Admission	CDI	CAPS-CA	CPTCI	-
Ponnamperuma et al., 2016	414	13.6 ± NR	54.3	Sri Lanka	Mixed	-	Adolescent PTSD-RI	8 item scale**	-
Qi et al., 2020*	1114	14.69 ±1.56	56.6	China	Natural Disaster	-	PCL-5	-	ERRI
Srinivas., 2015	129	16.5 ±1.60	100	USA	Abuse	-	TSCC	TAQ	-
Stallard et al., 2007	75	14.01 ±3.36	50.7	UK	MVA	-	CAPS-C	Appraisal Scale**	-

Szentágotai-Tătar et al., 2016*	706	15.63 ±1.20	43.5	Romania	Mixed	DASS	-	-	CERQ Rumination subscale
Tierens et al., 2012	672	14.62 ±1.83	47.5	Belgium	MVA	-	CAPS-CA	Appraisal Scale	-
Vasileva et al., 2022	112	6.2 ±1.1	39.3	Germany	Abuse/ Maltreatment	-	UCLA-RI	CPTCI based interview	-
Wahib et al., 2021	409	16.24 ±.98	61.37	Indonesia	Natural Disaster	-	CRIES-13	CPTCI	-
Wang et al., 2020	408	14.16 ±1.77	57.4	China	Natural Disaster	-	PCL-5	-	ERRI
Wang et al., 2022	545	14.16 ±1.77	56.3	China	Natural Disaster	-	PCL-5	-	ERRI
Wu et al., 2015	376	15.98 ±1.64	52.7	China	Natural Disaster	-	CPSS	-	ERRI
Ye et al., 2024	203	14.36 ±1.88	53	China	Natural Disaster	-	CPSS	CERQ	-
Zhang et al., 2018	443	14.44 ±0.71	53	China	Natural Disaster	-	CPSS	PTCC	ERRI
Zhen et al., 2016*	951	14.78 ±1.70	51.6	China	Natural Disaster	-	PCL-5	-	CERQ
Zhou and Wu., 2015	310	14.88 ±1.96	49.7	China	Natural Disaster	-	CPSS	-	ERRI
Zhou et al. 2015	354	14.05 ±1.55	51.6	China	Natural Disaster	-	RPC	-	CERQ
Zhou et al., 2021	1218	16.98 ±1.64	53.5	China	Natural Disaster	-	CPSS	-	ERRI

***Translated version of measures administered in home language (not English) **Scale designed for the study by the researchers**
MVA= Motor Vehicle Accident; ED= Emergency Department
N.B. Where two studies have reported different constructs from the same population they have been combined under the column 'study'.

Depression Measures: Center for Epidemiologic Studies Depression Scale for Children (CES-DS), Children's Depression Inventory (CDI), Depression Anxiety Stress Scales (DASS) , Revised Child Anxiety and Depression Scale (RCADS), Short Mood and Feelings Questionnaire (SMFQ)

PTSD Measures: Child and Adolescent Trauma Scale (CATS), Childhood PTSD Symptom Scale (CPSS), Children's Revised Impact of Event Scale (CRIES),childhood trauma questionnaire – short form (CCTQ-SF) Children's PTSD Inventory (CPTSD-I) Clinician-Administered PTSD Scale for DSM IV - Child/Adolescent Version (CAPS-CA), Impact of Event Scale (IES), Impact of Event Scale Revised (IES-R), Posttraumatic Cognitions Inventory (PTCI), Post-traumatic Symptoms Self-Scale-Report (PSS-SR), PTSD Check List for DSM5 (PCL-5), PTSD Check List Civilian Version (PCL-C), PTSD Reaction Index (PTSD-RI), Revised PTSD Checklist (RPC), The Trauma Symptom Checklist for Children (TSCC), Trauma Symptom Checklist for Young Children (TSCYC), University of California at Los Angeles Post-Traumatic Stress Disorder Reaction Index (UCLA-RI)

Appraisal Measures: Children's Attributions and Perceptions Scale (CAPS), Children's Posttraumatic Cognitions Inventory (CPTC I), Trauma Appraisal Questionnaire (TAQ), War Appraisals (threat, challenge and coping)

Rumination Measures: Child Posttrauma Coping Questionnaire (CPCQ), Cognitive Emotion Regulation Questionnaire(CERQ) - Rumination Subscale, Event Related Rumination Inventory (ERRI), Response Styles Questionnaire–Child Version,Rumination Subscale (CRSQ-RS), Ruminative Response Scale (RRS), Rumination Scale for Children (RSC)

Table 2. *Meta-analysis results*

	k	N	Pooled r (95% CI)	Q	I^2 (95% CI)	PI
Depression as outcome						
Appraisals – Cross Sectional [1]	12	2134	.60* (.47, .70)	183.03*	93.3 (86.2, 97.6)	.08, .86
Interpersonal	6	713	.62* (.38, .78)	96.18*	94.2 (84.7, 99.0)	-.09, .91
Acute Trauma [2]	4	1005	.56* (.34, .72)	44.62*	92.3 (75.6, 99.4)	.04, .84
Mixed/Other	2	416	.61* (.53, .68)	1.38	27.7 (0, 99.9)	.51, .70
Rumination – Cross Sectional	3	1628	.17 (-.03, .36)	41.24*	93.4 (76.0, 99.8)	-.21, .51
Sensitivity Analysis (No Multivariate)	2	909	.27 (.16, .38)	2.59	61.4 (0, 100)	.09, .44
PTSD as outcome						
Appraisals – Cross Sectional	29	5853	.54* (.47, .61)	398.84*	92.5 (87.9, 96.1)	.11, .80
Sensitivity Analysis (No Multivariate)	26	5134	.55* (.47, .62)	377.49*	92.8 (88, 96.3)	.09, .81
Natural Disaster	3	926	.42*** (.10, .66)	70.13*	95.8 (84.5, 99.9)	-.23, .81
Interpersonal	8	1222	.60* (.41, .73)	118.74*	94.3 (86.6, 98.7)	-.03, .89
Acute Trauma [2]	9	1493	.57* (.48, .64)	47.82*	74.9 (43.7, 91.8)	.32, .74
Mixed/Other	9	2212	.51* (.37, .63)	115.50*	94 (86.5, 98.5)	.03, .80
Appraisals – Prospective Longitudinal	4	741	.60* (.44, .73)	19.77**	88.8 (62.2, 99.3)	.22, .83
Rumination – Cross Sectional	14	6227	.40* (.27, .51)	171.26*	96.8 (93.7, 99)	-.12, .75
Sensitivity Analysis (No Multivariate)	13	6153	.43* (.33, .52)	142.46*	94.9 (89.9, 98.5)	.04, .70
Natural Disaster	11	5883	.33* (.21, .44)	132.39*	95.7 (91, 98.9)	-.08, .65
Acute Trauma[2]	3	344	.63* (.36, .80)	18.69*	88.9 (58.7, 99.7)	.06, .89
Rumination – Prospective Longitudinal	8	1717	.38* (.28, .48)	47.10*	82.7 (58.4, 95.5)	.08, .62

* p<.0001 ** p<0.001, ***p<0.05

Note: 1) No Multivariate Analyses were identified in the Depression and Appraisal group

2) Acute trauma = trauma identified in an accident and emergency or medical setting.

k=number of studies, N = number of participants, pooled r = pooled Pearson correlation coefficient, Q = Cochran's Q, I^2 = I squared (percentage of variation due to heterogeneity), PI = prediction interval

Meta analysis

A random-effects meta-analysis was conducted on 47 studies, including 67 independent effect sizes. Individual effect sizes are reported in Table 2. There were large effect sizes found for the relationship between maladaptive appraisals and both PTSD and depression. This was consistent across all trauma types.

A medium effect size was observed for the cross-sectional relationships between rumination and PTSD; this was also observed in prospective studies. When this was broken down by trauma type, rumination had a much larger association with PTSD symptoms when a child or adolescent had experienced an acute trauma (r=.63) than if they had experienced a

natural disaster (r=.33). A small effect size was found between rumination and depression following a trauma, however there was a very limited number of studies available.

There was a large degree of heterogeneity between studies for each meta-analysis, although this was found to a lesser extent in depression. Forest plots were created looking at the effect sizes of cross-sectional data for the cognitive factors explored. Figure 2 shows the forest plot and effect sizes for depression, Figure 3 shows PTSD, and Figure 4 shows PTSD prospectively.

Figure 2 - *Forest Plots for cognitive processes and depression (Cross Sectional)*

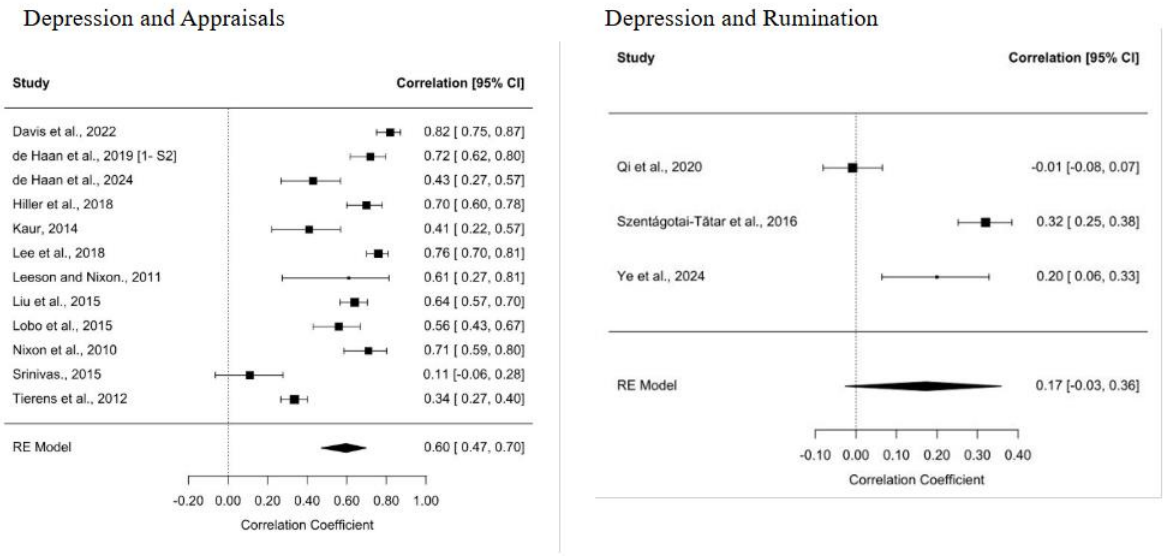


Figure 3 - *Forest Plots for cognitive processes and PTSD (Cross Sectional)*

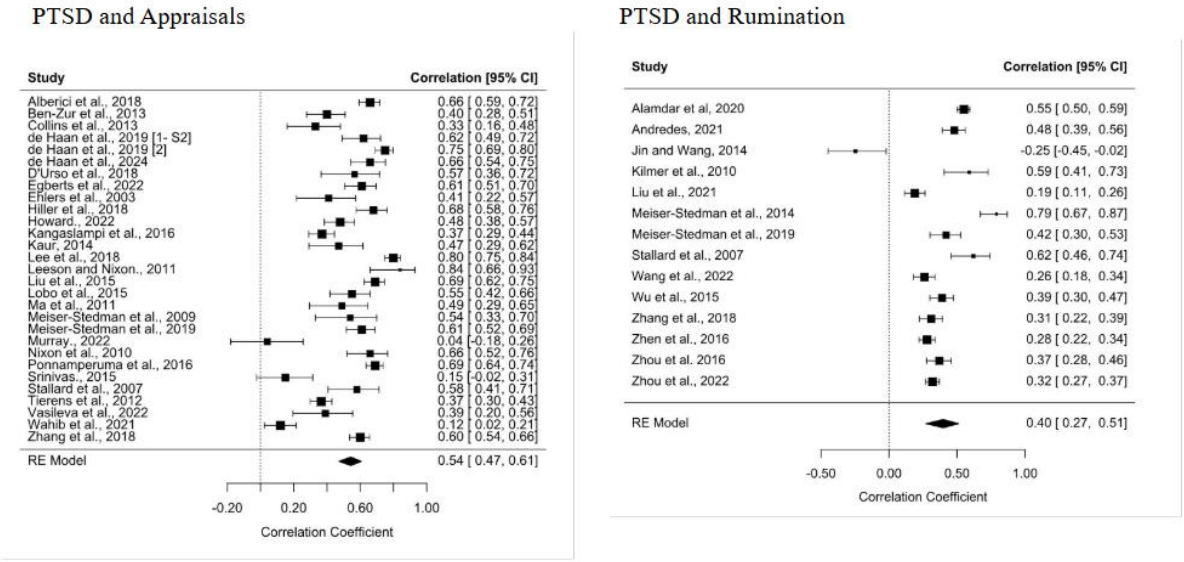
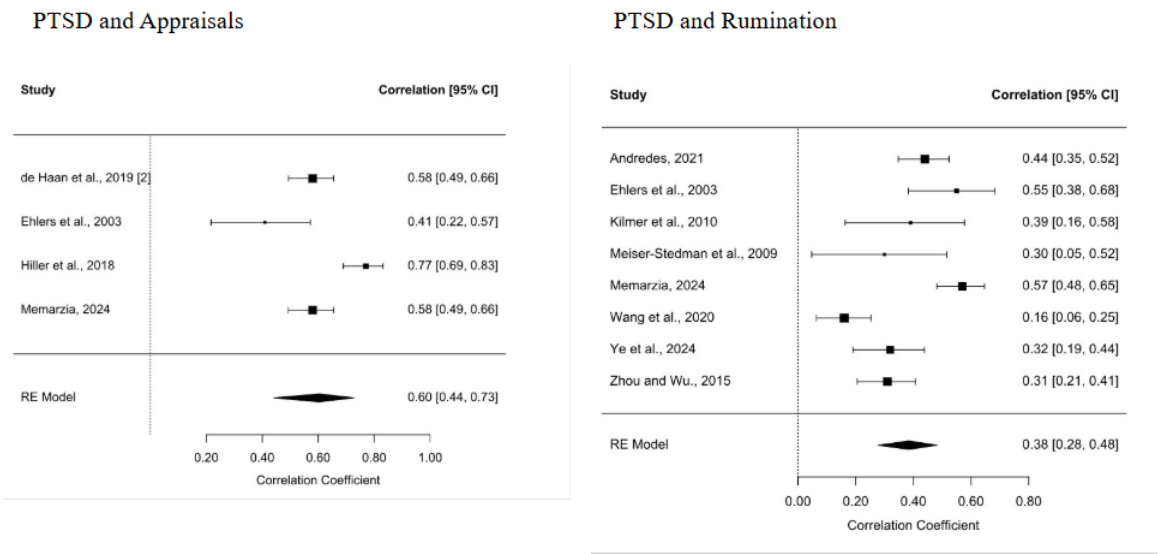


Figure 4 - *Forest Plots for cognitive processes and PTSD (Prospective Longitudinal)*



Sensitivity analysis

Sensitivity analyses were completed to remove studies which used multivariate effect sizes. This had little impact on the effect sizes shown. The exception to this was the relationship

between depression and rumination, where a small effect size was shown instead of no effect size (r = .27; 95% CI = .16-.38; k=2). There was also a smaller range of effect sizes (prediction interval = .09-.44). This is largely due to very few studies included which looked at these variables (k=2).

Subgroup analysis

Further subgroup analyses were carried out looking at the study characteristics (i.e. interpersonal vs non-interpersonal vs mixed trauma; number of traumas), methodological influences (i.e. measure) and population influences (i.e. continent where study undertaken) where there were enough studies available to carry out meaningful sub-analyses (see Table 2 and appendices E-G). We were unable to complete any sub analyses looking at depression and rumination due to the very limited number of available studies.

The relationship between appraisals and depression for each sub-analysis can be found in Appendix E. Maladaptive appraisals had a consistently strong relationship with depression across all study characteristics. The use of the Posttraumatic Cognitions Inventory (PTCI) and Child Post-Traumatic Cognitions Inventory (CPTCI) significantly impacted the strength of relationship found, with a large effect size where such measures were used (r=.66) and a small effect size (r=.24) where they were not used. However, due to the few studies which did not use this measure moderation analyses of the difference was not undertaken. There was little population influence, with large effect sizes found throughout all continents where research was available, except the United States of America (USA) which has a small effect size (r=.26); however, this was only based on two studies.

The table of subgroup analyses for the relationship between maladaptive appraisals and PTSD can be found in Appendix F. Larger effect sizes were found when the trauma had been interpersonal or multiple in nature. The measure of maladaptive appraisals also had little impact on this relationship, with large effect sizes found regardless of measure used (moderator p=.14). Large effect sizes were again consistent across all the continents where research was available, with the exception of the USA which found a moderate effect size (r=.31, k=5).

The subgroup analyses of the relationship between PTSD and rumination can be found in Appendix G. We were unable to complete analyses on the number or type of traumas, as all studies included single incident traumas, and none were interpersonal in nature. Where a trauma-

specific rumination measure was used, there was a large effect size found (r= .46; k=10), a small effect size (.23; k=4) was found when the measure of rumination was not trauma-specific. When looking at population influences, we are only able to report studies from Asia and Europe. Studies from Asia found a moderate effect size (r=.29; k=9), whereas European studies reported a large effect size (r = .63; k=3).

Publication bias

Eggar's test of asymmetry was carried out for each of the respective analyses. None of the other analyses carried out suggested publication bias ($p>0.05$). As there was no asymmetry detected a trim and fill procedure was not conducted on these analyses.

Discussion

Summary of findings

This systematic review and meta-analysis highlighted strong relationships between maladaptive appraisals and the development of both PTSD and depression in trauma-exposed children and adolescents. This suggests that this cognitive factor is shared across both psychological morbidities and is not exclusive to PTSD following trauma. This relationship remains across trauma types, reflecting a universality in the importance of maladaptive appraisals. The relationship between rumination and PTSD was also significant. These findings were consistent across time, suggesting that both maladaptive appraisals and rumination are predictive of PTSD. There is, however, not currently enough evidence to conclusively comment on the link between rumination and depression. Our analysis of the limited research to date suggests that rumination had a stronger relationship with PTSD than depression; this is in contrast to what we would anticipate given the significant association between depression and rumination outside of the context of trauma (e.g. Abela and Hankin, 2011; Brown et al, 2016).

There is currently limited research into the role of rumination in the development of both PTSD and depression following a trauma. The use of trauma-specific rumination measures shows a larger effect size than a general rumination measure in the development of PTSD. This suggests that children and adolescents who experience trauma are more likely to experience rumination linked to the trauma. Due to the limited research available, we were unable to assert whether this finding was consistent with post-traumatic depression.

It is important to note that there was a great deal of heterogeneity identified throughout this systematic review. This may be reflective of the wide variety of trauma types and developmental stages studied, alongside the range of measures used for each construct.

Theoretical and Clinical Implications

The strong relationship between appraisals and PTSD mirrors that which has been found in a previous meta-analysis (Gomez de la Cuesta, 2019, Mitchell et al., 2017). However, maladaptive appraisals are not exclusively present in the development of PTSD. A similar relationship was found between such appraisals and depression, suggesting that the role of appraisals is more universal in the development of psychological morbidity and is not a predictor exclusively of PTSD following a trauma. PTSD has been found to be a risk-factor for depression in trauma exposed children and adolescents (r=.58; Claxton et al., 2021). The presence of maladaptive appraisals in both diagnoses may explain the high levels of co-morbidity found following a trauma.

A recent research study looking at the role of appraisals following trauma showed that appraisals are linked to all the psychological pathology's studied, including; anxiety, depression, PTSD and disturbances in self-organisation found in complex PTSD (Memarzia et at, 2024). This universality suggests that maladaptive appraisals are a useful target for cognitive behavioural treatments, and this may positively impact symptoms of multiple psychopathologies.

The predictive nature of appraisals in the development of both PTSD and depression is similar to that found in adult populations (Ehring, Ehlers & Glucksman, 2008). Even though its association with PTSD is not as strong as appraisals, rumination has also been found to be a predictor of PTSD, reinforcing that Ehlers and Clark (2000) model of PTSD is also applicable to children and adolescents. The strong effect sizes found here underline the predictive qualities of maladaptive appraisals in both PTSD and depression following a trauma.

Beck's Cognitive Triad (Beck et al., 1979) suggests three types of negative schema associated with depression. These are negative views of the self, the world and the future. These themes overlap with the negative appraisals as identified by Ehlers and Clark (2000) as excessively negative regarding the traumatic event and/or the events that followed, leading to a sense of current threat. There is also a significant overlap with the PTCI, which was developed as a comprehensive measure of the appraisals highlighted by the cognitive model highlighted by

Ehlers and Clark (2000). The CPTCI is a validated measure of such appraisals in children. This outlines appraisals related to 'permanent and disturbing change' and 'fragile person in a scary world', which overlaps with the cognitive processes outlined in Beck's Cognitive Triad, nevertheless, there are distinctions between these theoretical conceptions.

Although there is a particularly strong relationship between appraisals and both PTSD and depression, rumination also has a strong relationship with PTSD. It remains unclear whether these are separate or overlapping mechanisms within this context. Our findings suggest that the content of thoughts may have an important role in developing and sustaining PTSD and depression. Alongside this, rumination in itself may be a maintaining strategy, containing maladaptive appraisals, leading to a child or adolescent perseverating on negative appraisals about the self, world and others following a traumatic experience. Alternatively, rumination could be a separate mechanism, reflective of a perseverative, deleterious thinking style. The strength of the relationship between PTSD and trauma related rumination (r=.46; 95%CI= .33, 57; k=10), in comparison to general rumination (r=.23; 95%CI=-.07, .50; k=4) suggest that it may be trauma-focused content, rather than rumination as a process which is associated with PTSD following a trauma.

Suggestions for Further Research

This research has highlighted a large gap in the research between cognitive processes and the development of depression following trauma. In particular, the role of rumination in both the development of PTSD and depression is an area which would urgently benefit from further research. Currently there is very limited understanding of the role of rumination in the development of depression following a trauma in children and adolescents. The research that does exist in this field does not consistently differentiate between children who have been exposed to a traumatic event and their peers. The study of rumination would be further aided by the development and validation of developmentally appropriate tools to measure rumination post-trauma.

Further research into rumination in the development of PTSD and depression could also differentiate between the process of ruminating and the content of rumination. This would allow us to understand whether it is the process of ruminating in itself, or a focus on trauma related thoughts.

The role of maladaptive appraisals in the development of depression and PTSD as independent diagnoses and comorbid PTSD and depression would be worthy of investigation. By doing so, we could better understand whether their presence is linked to more complex or comorbid presentations. There is the potential to be significant challenges in carrying out such research due to the high levels of diagnostic overlap between the two psychological morbidities.

Alongside this, future research could examine the role of maladaptive appraisals in the development of psychological morbidities outside of PTSD. This would allow greater understanding of the role such appraisals make and whether they play a more specific role in the development of PTSD and depression or are more generally linked to the development of psychological morbidities following a traumatic event.

Limitations

This study was limited to studies published in English, giving greater weight to areas and countries with higher socio-economic status. Further research into the impacts of trauma in countries from low economic status or looking at the impacts of trauma on children from different socio-economic backgrounds would allow a richer understanding of the impacts of trauma more universally.

This study is also limited by the wide range of developmental stages incorporated into the analysis. There is significant challenge in analysing the impact of cognitive factors across developmental stages due to the designs of most studies incorporating children and adolescents from a large age range.

Conclusions

This systematic review sought to examine the role of maladaptive appraisals and rumination in the development and maintenance of PTSD and depression following trauma in children. In doing so, we have reaffirmed the well-established link between maladaptive appraisals and PTSD (Gomez de la Cuesta et al., 2019; Mitchell et al., 2017). The relevance and impact of maladaptive appraisals goes beyond PTSD alone and is linked to the development of depression post-trauma. This has significant clinical implications, as targeting maladaptive appraisals in treatment following a traumatic experience is likely to reduce symptoms of both PTSD and depression.

In carrying out this research, a large gap in the understanding of cognitive processes in the development of depression following trauma was identified. In particular, the role of rumination is thus far poorly studied and therefore not clearly understood. The understanding of such processes is essential in treating depression following a trauma and therefore an important area for further research. This would allow us to understand whether our current cognitive models of depression are applicable following a potentially traumatic experience.

References

Abela, J. & Hankin, B. (2011) Rumination as a Vulnerability Factor to Depression During the Transition From Early to Middle Adolescence: A Multiwave Longitudinal Study. *Journal* of Abnormal Psychology, 120(2), 259-271. https://doi.org/10.1037/a0022796

Alamdar, S., Lv, Y., Guo, J., Lu, J., & Zhang, Y. (2020). Attentional bias effect on post-traumatic outcomes in children after earthquake: Mediation role of rumination. PsyCh journal, 9(5), 738-748. https://doi.org/10.1002/pchj.360

Alberici, A., Meiser-Stedman, R., Claxton, J., Smith, P., Ehlers, A., Dixon, C., & McKinnon, A. (2018). The preliminary development and validation of a trauma-related safety-seeking behavior measure for youth: The Child Safety Behavior Scale (CSBS). In Journal of traumatic stress.

Alisic, E., Zalta, A. K., van Wesel, F., Larsen, S. E., Hafstad, G. S., Hassanpour, K., & Smid, G. E. (2014). Rates of post-traumatic stress disorder in trauma-exposed children and adolescents: Meta-analysis. The British Journal of Psychiatry, 204(5), 335-340. https://doi.org/10.1192/bjp.bp.113.131227

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). https://doi.org/10.1176/appi.books.9780890425596

Andrades, M., García, F. E., & Kilmer, R. P. (2021). Post-traumatic stress symptoms and post-traumatic growth in children and adolescents 12 months and 24 months after the earthquake and tsunamis in Chile in 2010: A longitudinal study. International journal of psychology : Journal international de psychologie, 56(1), 48-55. https://doi.org/10.1002/ijop.12718

Angelakis, S., & Nixon, R. D. V. (2015). The Comorbidity of PTSD and MDD: Implications for Clinical Practice and Future Research. Behaviour Change, 32(1), 1-25. https://doi.org/10.1017/bec.2014.26

Beck, A., Rush, J., Shaw, B. & Emery, G.. (1979). Cognitive therapy of depression. In: Guilford Press.

Benjet, C., Bromet, E., Karam, E. G., Kessler, R. C., McLaughlin, K. A., Ruscio, A. M., Shahly, V., Stein, D. J., Petukhova, M., Hill, E., Alonso, J., Atwoli, L., Bunting, B., Bruffaerts,

R., Caldas-de-Almeida, J. M., de Girolamo, G., Florescu, S., Gureje, O., Huang, Y.,…Koenen, K. C. (2016). The epidemiology of traumatic event exposure worldwide: Results from the World Mental Health Survey Consortium. Psychological medicine, 46(2), 327-343. https://doi.org/10.1017/S0033291715001981

Ben-Zur, H., & Almog, N. (2013). Post-traumatic Symptoms and Future Orientation among Israeli Adolescents Two Years after the Second Lebanese War: The Effects of War Exposure, Threat and Coping Appraisals. 6(3), 187-200.

Brown, H. M., Meiser-Stedman, R., Woods, H., & Lester, K. J. (2016). Cognitive vulnerabilities for depression and anxiety in childhood: Specificity of anxiety sensitivity and rumination. Behavioural and cognitive psychotherapy.

Cann, A., Calhoun, L., Tedeschi, R., Triplett, K., Vishnevsky, T., & Lindstrom, C. (2011). Assessing posttraumatic cognitive processes: the Event Related Rumination Inventory. Anxiety, Stress & Coping, 24(2), 137-156. https://doi.org/10.1080/10615806.2010.529901

Claxton, J., Vibhakar, V., Allen, L., Finn, J., Gee, B. & Meiser-Stedman, R. (2021). Risk factors for depression in trauma-exposed children and adolescents: A systematic review and meta-analysis. Journal of Affective Disorders, https://doi.org/10.1016/j.jadr.2021.100150

Collins, K. S., Koeske, G. F., Russell, E. B., & Michalopoulos, L. M. (2013). Children's Attributions of Community Violence Exposure and Trauma Symptomatology. Journal of Child & Adolescent Trauma, 6(3), 201-216. https://doi.org/10.1080/19361521.2013.811458

Davis, R. S., Halligan, S. L., Meiser-Stedman, R., Elliott, E., Ward, G., & Hiller, R. M. (2023). A Longitudinal Investigation of the Relationship Between Trauma-Related Cognitive Processes and Internalising and Externalising Psychopathology in Young People in Out-of-Home Care. Research on child and adolescent psychopathology, 51(4), 485-496. https://doi.org/10.1007/s10802-022-01005-0

de Haan, A., Keller, F., Ganser, H. G., Münzer, A., Witt, A., & Goldbeck, L. (2019b). Longitudinal Associations Between Dysfunctional Maltreatment-Related Cognitions and Psychopathology in Children and Adolescents. Journal of traumatic stress, 32(4), 496-505. https://doi.org/10.1002/jts.22422

de Haan, A., Kleinke, K., Degen, E., & Landolt, M. A. (2024). Longitudinal relationship between posttraumatic cognitions and internalising symptoms in children and adolescents. European journal of psychotraumatology, 15(1). https://doi.org/10.1080/20008066.2024.2398357

de Haan, A., Petermann, F., Meiser-Stedman, R., & Goldbeck, L. (2016). Psychometric Properties of the German Version of the Child Post-Traumatic Cognitions Inventory (CPTCI-GER). Child Psychiatry & Human Development, 47(1), 151-158. https://doi.org/10.1007/s10578-015-0552-0

de Haan, A., Tutus, D., Goldbeck, L., Rosner, R., & Landolt, M. A. (2019a). Do dysfunctional posttraumatic cognitions play a mediating role in trauma adjustment? Findings from interpersonal and accidental trauma samples of children and adolescents. European journal of psychotraumatology, 10(1), 1596508. https://doi.org/10.1080/20008198.2019.1596508

D'Urso, A., Mastroyannopoulou, K., Kirby, A., & Meiser-Stedman, R. (2018). Posttraumatic stress symptoms in young people with cancer and their siblings: results from a UK sample. Journal of psychosocial oncology, 36(6), 768-783. https://doi.org/10.1080/07347332.2018.1494664

Duval, S., & Tweedie, R. (2000). Trim and Fill: A Simple Funnel-Plot-Based Method of Testing and Adjusting for Publication Bias in Meta-Analysis. Biometrics, 56(2), 455-463. https://www.jstor.org/stable/2676988

Egberts, M. R., Verkaik, D., van Baar, A. L., Mooren, T. T. M., Spuij, M., de Paauw-Telman, L. G. E., & Boelen, P. A. (2022). Child Posttraumatic Stress after Parental Cancer: Associations with Individual and Family Factors. Journal of pediatric psychology, 47(9), 1031-1043. https://doi.org/10.1093/jpepsy/jsac041

Ehlers, A., & Clark, D. M. (2000). A cognitive model of posttraumatic stress disorder. Behaviour research and therapy, 38(4), 319-345. https://doi.org/10.1016/S0005-7967(99)00123-0

Ehlers, A., Mayou, R. A., & Bryant, B. (2003). Cognitive predictors of posttraumatic stress disorder in children: results of a prospective longitudinal study. Behaviour research and therapy. 41(1), 1-10. https://doi.org/10.1016/S0005-7967(01)00126-7

Ehring, T., Ehlers, A., & Glucksman, E. (2008). Do Cognitive Models Help in Predicting the Severity of Posttraumatic Stress Disorder, Phobia, and Depression after Motor Vehicle Accidents? A Prospective Longitudinal Study. Journal of consulting and clinical psychology, 76(2), 219-230. https://doi.org/10.1037/0022-006X.76.2.219

Gomez De La Cuesta, G., Schweizer, S., Diehle, J., Young, J., & Meiser-Stedman, R. (2019). The relationship between maladaptive appraisals and posttraumatic stress disorder: A meta-analysis. European journal of psychotraumatology. doi:10.1080/20008198.2019.1620084

Han Byul, L., Kyoung Min, S., Young Ki, C., Namhee, K., Yee Jin, S., Un-Sun, C., Seung Min, B., Minha, H., & Hyoung Yoon, C. (2018). Validation of the Child Post-Traumatic Cognitions Inventory in Korean survivors of sexual violence. Child and adolescent psychiatry and mental health (Vol. 12, pp. 1-12): BMC.

Hiller, R. M., Creswell, C., Meiser-Stedman, R., Lobo, S., Cowdrey, F., Lyttle, M. D., Ehlers, A., & Halligan, S. L. (2019). A Longitudinal Examination of the Relationship between Trauma-Related Cognitive Factors and Internalising and Externalising Psychopathology in Physically Injured Children. Journal of abnormal child psychology, 47(4), 683-693. https://doi.org/10.1007/s10802-018-0477-8

Hiller, R. M., Meiser-Stedman, R., Fearon, P., Lobo, S., McKinnon, A., Fraser, A., & Halligan, S. L. (2016). Research Review: Changes in the prevalence and symptom severity of child posttraumatic stress disorder in the year following trauma – a meta-analytic study. Journal of Child Psychology and Psychiatry, https://doi.org/10.1111/jcpp.12566

Howard, A., Gonzálvez, C., & Kearney, C. A. (2022). Unique factor structures of the Adolescent Dissociative Experiences Scale and Posttraumatic Cognitions Inventory and their relation to PTSD symptom clusters in maltreated youth. Journal of Aggression, Maltreatment & Trauma, 31(2), 219-234. https://doi.org/10.1080/10926771.2021.1894290

IntHout, J., Rovers, M. M., Goeman, J. J., & Ioannidis, J. P. A. (2016). Plea for routinely presenting prediction intervals in meta-analysis. BMJ, 6(7). https://doi.org/10.1136/BMJOPEN-2015-010247

Jin, Y., & Wang, G. (2014). Individual risk factors for PTSD in adolescents from the 2010 earthquake in Yushu: The predictor effect of rumination. African journal of psychiatry, 17(6), 1-6.

Kangaslampi, S., Punamäki, R. L., Qouta, S., Diab, M., & Peltonen, K. (2016). Psychosocial Group Intervention Among War-Affected Children: An Analysis of Changes in Posttraumatic Cognitions. Journal of traumatic stress, 29(6), 546-555. https://doi.org/10.1002/jts.22149

Kaur, H. (2014). Posttraumatic stress disorder in maltreated multiracial youth [dissertation] PTSDpubs. https://www.proquest.com/dissertations-theses/posttraumatic-stress-disorder-maltreated/docview/1560152467/se-2?accountid=10637

Kilmer, R. P., & Gil-Rivas, V. (2010). Exploring posttraumatic growth in children impacted by Hurricane Katrina: correlates of the phenomenon and developmental considerations. Child development, 81(4), 1211-1227. https://doi.org/10.1111/j.1467-8624.2010.01463.x

Lee, H. B., Shin, K. M., Chung, Y. K., Kim, N., Shin, Y. J., Chung, U.-S., Bae, S. M., Hong, M., & Chang, H. Y. (2018). Validation of the Child Post-Traumatic Cognitions Inventory in Korean survivors of sexual violence. Child and adolescent psychiatry and mental health, 12. https://doi.org/10.1186/s13034-018-0235-2

Leeson, F. J., & Nixon, R. D. (2011). The role of children's appraisals on adjustment following psychological maltreatment: a pilot study. Journal of abnormal child psychology, 39(5), 759-771. https://doi.org/10.1007/s10802-011-9507-5

Liu, A., Wang, W., & Wu, X. (2021). The mediating role of rumination in the relation between self-compassion, posttraumatic stress disorder, and posttraumatic growth among adolescents after the jiuzhaigou earthquake. Current Psychology: A Journal for Diverse Perspectives on Diverse Psychological Issues. https://doi.org/10.1007/s12144-021-01643-5

Liu, S.-T., & Chen, S.-H. (2015). A community study on the relationship of posttraumatic cognitions to internalizing and externalizing psychopathology in Taiwanese children and adolescents. Journal of abnormal child psychology, 43(8), 1475-1484. https://doi.org/10.1007/s10802-015-0030-y

Lobo, B. O. M., Brunnet, A. E., Ecker, K. K., Schaefer, L. S., Arteche, A. X., Gauer, G., & Kristensen, C. H. (2015). Psychometric properties of the Child Posttraumatic Cognitions Inventory in a sample of Brazilian children. Journal of aggression, maltreatment & trauma, 24(8), 863-875. https://doi.org/10.1080/10926771.2015.1043065

Ma, X., Liu, X., Hu, X., Qiu, C., Wang, Y., Huang, Y., Wang, Q., Zhang, W., & Li, T. (2011). Risk indicators for post-traumatic stress disorder in adolescents exposed to the 512 Wenchuan earthquake in China. Psychiatry research, 189(3), 385-391. https://doi.org/10.1016/j.psychres.2010.12.016

Maughan, B., Collishaw, S., & Stringaris, A. (2013). Depression in Childhood and Adolescence. Journal of the Canadian Academy of Child & Adolescent Psychiatry, 22(1), 35-40.

McLaughlin, K. A., Koenen, K. C., Hill, E. D., Petukhova, M., Sampson, N. A., Zaslavsky, A. M., & Kessler, R. C. (2013). Trauma Exposure and Posttraumatic Stress Disorder in a National Sample of Adolescents. Journal of the American Academy of Child & Adolescent Psychiatry, 52(8), 815-830. https://doi.org/10.1016/j.jaac.2013.05.011

Meiser-Stedman, R. (2002). Towards a cognitive-behavioral model of PTSD in children and adolescents. Clinical child and family psychology review (Vol. 5, pp. 217-232). United States: Springer.

Meiser-Stedman, R., Dalgleish, T., Glucksman, E., Yule, W., & Smith, P. (2009). Maladaptive cognitive appraisals mediate the evolution of posttraumatic stress reactions: A 6-month follow-up of child and adolescent assault and motor vehicle accident survivors. Journal of abnormal psychology, 118(4), 778-787. https://doi.org/10.1037/a0016945

Meiser-Stedman, R., McKinnon, A., Dixon, C., Boyle, A., Smith, P., & Dalgleish, T. (2017). Acute stress disorder and the transition to posttraumatic stress disorder in children and adolescents: Prevalence, course, prognosis, diagnostic suitability, and risk markers. Depression, Anxiety, 34(348-355). https://doi.org/10.1002/da.22602

Meiser-Stedman, R., Shepperd, A., Glucksman, E., Dalgleish, T., Yule, W., & Smith, P. (2014). Thought control strategies and rumination in youth with acute stress disorder and posttraumatic stress disorder following single-event trauma. Journal of child and adolescent psychopharmacology, 24(1), 47-51. https://doi.org/10.1089/cap.2013.0052

Meiser-Stedman, R., Smith, P., Bryant, R., Salmon, K., Yule, W., Dalgleish, T., & Nixon, R. D. V. (2009). Development and validation of the child post-traumatic cognitions inventory (CPTCI). Journal of Child Psychology and Psychiatry. https://doi.org/10.1111/j.1469-7610.2008.01995.x

Memarzia, J., Lofthouse, K., Dalgleish, T., Boyle, A., McKinnon, A., Dixon, C., Smith, P., & Meiser-Stedman, R. (2024). Predictive models of post-traumatic stress disorder, complex post-traumatic stress disorder, depression, and anxiety in children and adolescents following a single-event trauma. Psychological medicine. https://doi.org/10.1017/S0033291724001648

Mitchell, R., Brennan, K., Curran, D., Hanna, D., & Dyer, K. F. (2017). A Meta-Analysis of the Association Between Appraisals of Trauma and Posttraumatic Stress in Children and Adolescents. The Journal of Traumatic Stress. 30(1), 88-93.

Murray, N. L. (2022). Parental detainment and deportation, child PTSD, post-trauma cognitions, and hope: A moderated mediation model ProQuest Information & Learning]. psyh. https://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2022-34084-108&site=ehost-live

National Institute for Health and Social Excellence (2022) Depression in adults: treatment and management [NICE Guideline No. 222] www.nice.org.uk/guidance/ng222

NICE. (2012). Methods for the development of NICE public health guidance.

Nixon, R. D. V., Ellis, A. A., Nehmy, T. J., & Ball, S.-A. (2010). Screening and predicting posttraumatic stress and depression in children following single-incident trauma. Journal of Clinical Child and Adolescent Psychology, 39(4), 588-596. https://doi.org/10.1080/15374416.2010.486322

Papageorgiou, C., & Siegle, G. J. (2003). Rumination and Depression Advances in Theory and Research. Cognitive Therapy and Research. 27(3), 243-245.

Ponnamperuma, T., & Nicolson, N. A. (2016). Negative Trauma Appraisals and PTSD Symptoms in Sri Lankan Adolescents. Journal of abnormal child psychology, 44(2), 245-255. https://doi.org/10.1007/s10802-015-9985-y

Qi, J., Yang, X., Tan, R., Wu, X., & Zhou, X. (2020). Prevalence and predictors of posttraumatic stress disorder and depression among adolescents over 1 year after the Jiuzhaigou

earthquake. Journal of affective disorders, 261, 1-8. https://doi.org/10.1016/j.jad.2019.09.071

Rytwinski, N. K., Scur, M. D., Feeny, N. C., & Youngstrom, E. A. (2013). The Co-Occurrence of Major Depressive Disorder Among Individuals With Posttraumatic Stress Disorder: A Meta-Analysis. Journal of Traumatic Stress. 26(3), 299-309. https://doi.org/10.1002/jts.21814

Shi, L., & Lin, L. (2019). The trim-and-fill method for publication bias: practical guidelines and recommendations based on a large database of meta-analyses. *Medicine*, *98*(23), e15987. https://doi.org/10.1097/MD.0000000000015987

Srinivas, T., DePrince, A., & Chu, A. (2015). Links between posttrauma appraisals and trauma-related distress in adolescent females from the child welfare system. Child Abuse and Neglect, 47, 14-23. https://doi.org/https://doi.org/10.1016/j.chiabu.2015.05.011

Stallard, P., & Smith, E. (2007). Appraisals and cognitive coping styles associated with chronic post-traumatic symptoms in child road traffic accident survivors. Journal of child psychology and psychiatry, and allied disciplines, 48(2), 194-201. https://doi.org/10.1111/j.1469-7610.2006.01692.x

Szentágotai-Tătar, A., & Miu, A. C. (2016). Individual differences in emotion regulation, childhood trauma and proneness to shame and guilt in adolescence. PloS one, 11(11). https://doi.org/10.1371/journal.pone.0167299

Tierens, M., Bal, S., Crombez, G., Van de Voorde, P., Rosseel, Y., Antrop, I., & Deboutte, D. (2012). The traumatic impact of motor vehicle accidents in high school students. Journal of pediatric psychology, 37(1), 1-10. https://doi.org/10.1093/jpepsy/jsr058

Ting, Y., Xiangdong, L., Haiyang, L., Lei-lei, G., Jin-long, L., Guang, X., Xiaoping, L., Lu, S., Congzhi, W., Liu, Y., Dongmei, Z., Ying, H., Yunxiao, L., & Lin, Z. (2023). Community trauma exposure and post-traumatic stress disorder in Chinese children and adolescents. Frontiers in psychiatry (Vol. 14): Frontiers Media S.A. https://doi.org/10.3389/fpsyt.2023.1151631

Vasileva, M., Fegert, J. M., Rosner, R., & Witt, A. (2022). Negative Posttraumatic Cognitions in 4- to 8-year-old Children following Maltreatment. Journal of child & adolescent trauma, 15(4), 1041-1050. https://doi.org/10.1007/s40653-022-00455-4

Vibhakar, V., Allen, L., Gee, B., & Meiser-Stedman, R. (2019). A systematic review and meta-analysis on the prevalence of depression in children and adolescents after exposure to trauma. Journal of Affective Disorders. https://doi.org/10.1016/j.jad.2019.05.005

von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., & Vandenbroucke, J. P. (2007). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines for Reporting Observational Studies. Epidemiology, 18(6), 800-804. https://doi.org/10.1097/EDE.0b013e3181577654

Wahab, S., Yong, L. L., Chieng, W. K., Yamil, M., Sawal, N. A., Abdullah, N. Q., Muhdisin Noor, C. R., Wd Wiredarma, S. M., Ismail, R., Othman, A. H., & Damanhuri, H. A. (2021). Post-traumatic stress symptoms in adolescents exposed to the earthquake in Lombok, Indonesia: Prevalence and association with maladaptive trauma-related cognition and resilience. Frontiers in psychiatry, 12. https://doi.org/10.3389/fpsyt.2021.680393

Wang, W., Li, N., Yuan, Y., Wu, X., & Lan, X. (2022). Longitudinal relationships between guilt and suicide risk among adolescents in a postdisaster context: Mediating roles of rumination and posttraumatic stress disorder. Suicide & life-threatening behavior, 52(4), 773-781. https://doi.org/10.1111/sltb.12861

Wang, W., Wu, X., & Lan, X. (2020). Rumination mediates the relationships of fear and guilt to posttraumatic stress disorder and posttraumatic growth among adolescents after the Ya'an earthquake. European journal of psychotraumatology, 11(1), 1704993. https://doi.org/10.1080/20008198.2019.1704993

Woolgar, F., Garfield, H., Dalgleish, T., & Meiser-Stedman, R. (2022). Systematic review and meta-analysis: Prevalence of Posttraumatic Stress Disorder (PTSD) in trauma-exposed preschool-aged children. Journal of the American Academy of Child & Adolescent Psychiatry. https://doi.org/10.1016/j.jaac.2021.05.026

World Health Organization. (2024) Adolescent and Young Adult Health https://www.who.int/news-room/fact-sheets/detail/adolescents-health-risks-and-solutions/ . Accessed on 05.02.2025

World Health Organization. (2024) Injuries and Violence https://www.who.int/news-room/fact-sheets/detail/injuries-and-violence . Accessed on 05.02.2025

Wu, X., Zhou, X., Wu, Y., & An, Y. (2015). The role of rumination in posttraumatic stress disorder and posttraumatic growth among adolescents after the Wenchuan earthquake. Frontiers in psychology, 6. https://doi.org/10.3389/fpsyg.2015.01335

Ye, Y., Li, Y., Wu, X., & Zhou, X. (2024). Longitudinal associations between posttraumatic stress disorder, separation anxiety, and rumination among adolescents: Disentangling within-person and between-person associations. Psychological Trauma: Theory, Research, Practice, and Policy. https://doi.org/10.1037/tra0001721

Zhang, Y., Xu, W., Yuan, G., & An, Y. (2018). The relationship between posttraumatic cognitive change, posttraumatic stress disorder, and posttraumatic growth among Chinese adolescents after the Yancheng tornado: The mediating effect of rumination. Frontiers in psychology, 9. https://doi.org/10.3389/fpsyg.2018.00474

Zhen, R., Quan, L., Yao, B., & Zhou, X. (2016). Understanding the Relationship between Rainstorm-Related Experiences and PTSD among Chinese Adolescents after Rainstorm Disaster: The Roles of Rumination and Social Support. Frontiers in psychology, 7, 1407. https://doi.org/10.3389/fpsyg.2016.01407

Zhou, X., & Wu, X. (2016). The relationship between rumination, posttraumatic stress disorder, and posttraumatic growth among Chinese adolescents after earthquake: A longitudinal study. Journal of affective disorders, 193, 242-248. https://doi.org/10.1016/j.jad.2015.12.076

Zhou, X., Wu, X., Fu, F., & An, Y. (2015). Core belief challenge and rumination as predictors of PTSD and PTG among adolescent survivors of the Wenchuan earthquake. Psychological Trauma: Theory, Research, Practice, and Policy, 7(4), 391-397. https://doi.org/10.1037/tra0000031

Zhou, X., Zhen, R., & Wu, X. (2021). Insecure attachment to parents and PTSD among adolescents: The roles of parent–child communication, perceived parental depression, and intrusive rumination. Development and psychopathology, 33(4), 1290-1299. https://doi.org/10.1017/S0954579420000498

Chapter Three: Bridging Chapter

Word Count: 247

This systematic review and meta-analysis highlighted the role of maladaptive appraisals in the development of both depression and PTSD following exposure to potentially traumatic experiences. These appraisals appear to be shared across both psychological morbidities, underscoring the importance of targeting them in psychological treatment following trauma. In addition to maladaptive appraisals, rumination was found to be linked to the development and maintenance of PTSD. This relationship was particularly pronounced when trauma-related rumination was measured, suggesting that the content of rumination, rather than the process of rumination itself, may play a key role in the development of PTSD. However, there was insufficient research to comment on the relationship between rumination and depression or the role of cognitive processes in the maintenance of depression.

The systematic review also revealed a significant gap in research on post-traumatic depression, particularly regarding children and adolescents. This gap is substantial and cannot be fully addressed by a single study. Consequently, the empirical paper in this thesis focuses specifically on depression independent of PTSD. Given the limited research available, particularly in younger populations, the initial steps involve understanding the prevalence and course of depression following trauma. This will help determine whether this area warrants further attention. Although preliminary research has begun to explore the course of depression following trauma (Zhang et al., 2022), it did not address depression symptoms when PTSD symptoms required treatment. Therefore, the empirical paper within this thesis aims to investigate the prevalence and course of depression symptoms independently of PTSD.

Chapter Four: Post-traumatic depression in children and adolescents: an analysis of data from the PACT repository

Prepared for Submission to: Journal of Affective Disorders

Author Guidelines available in Appendix H

Word Count: 4608

Title

Post-traumatic depression in children and adolescents: an analysis of data from the PACT repository

Author

Amber Edwards

Supervised by

Prof Richard Meiser-Stedman

Dr Eleanor Chatburn

Keywords

Depression, trauma, trajectory model, recovery trajectories, symptom profiles

Words

4687

Abstract

Introduction: The prevalence and course of depression following trauma is currently poorly understood within the literature, particularly in children and adolescents. Understanding the trajectory of depressive reactions post-trauma is critical for developing appropriate approaches to early management and treatment. This study considered the prevalence and trajectories of depression symptoms in the year following a trauma.

Method: This study comprised trauma-exposed children and adolescents (n=2006, mean age 12.6±3.16) drawn from the PACT/R international archive. Frequency statistics and random effects meta-analyses were used to analyse the presence of depression at four different time points: acute (>24 hours to 1 month); short (>1 to 3 months); intermediate (>3 to 6 months); and long-term (>6 to 12 months). Two different definitions for depression were used: "likely DSM-5 depression" (the DSM-5 diagnostic criteria) and "likely clinically significant depression" (incorporated the most commonly assessed depression symptoms). Prevalence rates for individual DSM-5 depression symptoms were also analysed. Trajectory modelling of total depression symptoms was also undertaken.

Results: The prevalence of 'likely DSM-5 depression' was 18.5% in the acute window and 14.8% in the long-term window; for 'likely clinically significant depression' the same figures were 38.7% and 34.7%, respectively. Prevalence of individual symptoms ranged between 13.5% and 62.6% in the acute window and 15.5% and 63.5% in the long-term window.

Two trajectories of depression were identified: a small cohort of children and adolescents (n=165) who experienced no-or mild symptoms of depression, and a large cohort (n=411) who experienced persistent moderate symptoms.

Conclusion: Depression symptoms may be a common response to exposure to traumatic experiences in children and adolescents and are unlikely to recover spontaneously within the year following a trauma. Screening for depression in trauma-exposed children and adolescents is warranted, though we note limitations of the present research and the urgent need for more research in this area.

Introduction

Depression in Youth

Depression is a common mental health condition across youth. Depression is characterised by the absence of positive affect, low mood and irritability accompanied by symptoms such as changes in sleep, appetite and energy which impact an adolescent's functioning (American Psychological Association [APA], 2013). Depression is a leading cause of disability and illness among children and adolescents (World Health Organisation [WHO], 2014) and is associated with poor long-term outcomes, including suicidality, social functioning problems, and both physical and mental health difficulties (Maughan et al., 2013). A recent meta-analysis (Lu, Lin and Su, 2024) of adolescents across the globe identified major depression prevalence rates of 3.7% and prevalence of mild-severe depression symptoms of 21.3%. This analysis also noted that older youth have higher rates of depression, with a pooled prevalence rate of mild-severe depression symptoms of 27.4% in 10–18-year-olds and a significantly lower prevalence of 7.1% in children under 10 years old. It is worth noting that there was very little data available for lower income countries and significant heterogeneity identified across studies, potentially highlighting the variation in methodology in assessing depression symptoms.

Depression in youth is a complex issue with multifactorial causes. The biopsychosocial model (Engel, 1977) provides a framework for understanding how different factors interact in the development of depression. Central to this model are factors such as early-life trauma, chronic stress, and genetic predispositions, all of which contribute to the onset of depression. Cognitive behavioural therapy (CBT) has been shown to be effective in the treatment of depression in children and adolescents (García-Escalera et al., 2016); the CBT model (Beck et al, 1979) proposes that a person's early experiences may influence their core beliefs about themselves, making them vulnerable to future depressive episodes. Thus, both the biopsychosocial and CBT models highlight the importance of early experiences, in shaping depressive responses. Shanahan et al. (2011) further reinforce this idea by identifying psychosocial risk factors, such as poverty and maltreatment, that are more strongly associated with childhood depression. These insights suggest that both early intervention and targeted support are crucial in mitigating the impacts of depression in youth.

Trauma in Youth

Exposure to potentially traumatic events is common among youth. Studies indicate that 61.8% of adolescents in the U.S. experience trauma by the age of 17 (McLaughlin et al., 2013). While the majority of youth demonstrate resilience, a significant proportion go on to develop psychological conditions, such as post-traumatic stress disorder (PTSD) and depression. PTSD is the most commonly studied response to trauma, but it is often accompanied by other mental health issues. Research has shown that PTSD and depression frequently co-occur, with up to 52% of PTSD cases involving comorbid depression (Rytwinski et al., 2013). The presence of depression symptoms negatively predicts PTSD psychotherapeutic treatment efficacy (Kilne et al., 2021). Despite this, the natural recovery trajectories for depression following trauma, particularly in youth, are poorly understood, hindering the development of effective interventions for depression following a trauma.

PTSD and Depression

Depression is common in children and adolescents following trauma. A meta-analysis by Vibhakar et al. (2019) found that up to 24.2% of children and adolescents develop depression after a single traumatic event. Moreover, children who experience trauma are 2.6 times more likely to receive a diagnosis of depression compared to those who do not experience trauma. Trauma type also influences depression prevalence, with interpersonal violence linked to a higher rate of depression than other trauma types. These rates are higher than some found of PTSD, Elliot et al. (2021) found rates of PTSD ranged between 4.8-11.1%, dependent on the classification used (DSM-IV, DSM-5, ICD-10 or ICD-11) in children and adolescents exposed to a single incident trauma. Trauma type has been shown to impact the prevalence of PTSD found in children and adolescents. A meta-analysis conducted by Alisic et al. (2014) found that prevalence rates of PTSD ranged between 8.4 and 13.3% if a trauma was not interpersonal, and that increased to 17.8 to 32.95% if a trauma was interpersonal. This reflects the impact of the severity and duration of trauma on symptoms.

Depression and PTSD share many overlapping risk factors, including being triggered by exposure to adverse life events and cognitive distortions (eg. Afifi et al., 2009; Ehring et al., 2006; Spinhoven et al., 2014). The psychopathology of depression post-trauma remains unclear (Wang et al, 2023). It may emerge either as a direct consequence of the trauma or as a result of the ongoing distress caused by PTSD symptoms. PTSD has been found to be a risk factor for depression, conversely depression can increase vulnerability to PTSD and trauma exposure in

women (Breslau et al, 1997). The interaction between these two conditions complicates diagnosis and treatment, which underscores the importance of exploring their comorbid trajectories. It may, therefore, be more useful to consider PTSD and depression as independent diagnoses, with shared risk factors.

Depression is likely involved in the development and maintenance of chronic PTSD. For instance, Meiser-Stedman et al. (2017) found that youth with Acute Stress Disorder (ASD) who developed PTSD had more negative alterations in cognitions and mood after two weeks than those who did not develop PTSD. Clinically significant depression was found in a substantial minority of cases, though it was not predicted by ASD and showed little natural recovery.

Trajectories of PTSD and Depression

The recovery trajectories for PTSD have been comprehensively explored across different age groups. Bonanno (2004) identified four primary recovery trajectories: chronic, delayed, recovery, and resilient. Greene et al. (2017), in their latent class growth analysis of PTSD trajectories, found resilience to be the most common trajectory (65.7%), followed by recovery (20.8%), chronicity (10.6%), and delayed onset (8.9%). These data suggest that approximately half of individuals with PTSD symptoms experience spontaneous recovery. These findings were replicated in a study of children and adolescents by Hiller et al. (2016). They showed that PTSD prevalence decreases by around 50% between 1- and 6-months post-trauma, with little spontaneous recovery occurring after this period.

While PTSD recovery trajectories have been well documented, the trajectory of depression following trauma remains less understood, particularly in children and adolescents. Unlike PTSD, which is often associated with re-experiencing, and physical reactivity (APA, 2013), depression may have distinct pathways of onset, persistence, and resolution post-trauma (Wang et al. 2023); understanding the trajectory of depressive reactions post-trauma is critical for developing appropriate approaches to early management and treatment.

This gap in understanding is particularly critical because depression, unlike PTSD, might follow a more chronic and less spontaneous recovery trajectory. Preliminary research by Zhang et al. (2022) on depression trajectories post-trauma found that high levels of depression were persistent for up to 9 months following trauma, with PTSD and depression often occurring

synchronously. However, those presenting with PTSD were moved into treatment, which means that we have little information on the depression symptoms of those who were presenting with PTSD. It is unclear whether similar trajectories would be observed in those with high PTSD symptoms but no intervention. Based on current evidence, it can be hypothesized that post-traumatic depression may follow a chronic trajectory, with significantly less spontaneous recovery compared to PTSD.

Understanding the trajectory of depression following trauma is essential for developing targeted, disorder-specific interventions. Given the potential for chronic symptoms, as hypothesized, this study aimed to illuminate both the course of post-traumatic depression and its symptomatology, providing critical insights for clinicians to improve long-term outcomes for affected youth. In particular, this study aimed to:

1. Examine the natural recovery trajectories of depression in children and adolescents following single-incident trauma.
2. Investigate the prevalence and severity of post traumatic depression and the individual symptoms of depression within the first-year post-trauma.

Method

Design

The present study involved pooling individual participant data from several previously published prospective longitudinal studies of trauma-exposed children and adolescents, in order to study the course of depression following a potentially traumatic event.

Data were drawn from an international archive – the PACT/R, described in detail below. The present study considered the presence of symptoms of depression, as defined within the Diagnostic and Statistical Manual of Mental Disorders 5 (DSM-5; American Psychiatric Association, 2013), as well as plotting the trajectories of depression symptoms.

Data archive

This study utilised individual participant data included in the Prospective Studies of Acute Child Trauma and Recovery (PACT/R) Data Archive (Kassam-Adams et al. 2020). This archive was formed to address limitations of small sample sizes and variety of measures used across child and adolescent trauma research, such as the ability to generalise findings and make cross-study comparisons. It is an international collaborative effort to bring datasets together in a common format. This archive currently includes data from five countries which was accessed for use in this study in June 2022. Within the data accessed there was a large range of measures of depression (Appendix I).

Datasets included in PACT/R comprise participants who were children and adolescents at the time of enrolment in the study. They were identified based on exposure to an acute, potentially traumatic event and not comprising treatment-seeking youth. The most common trauma types identified in these studies were disaster, injury, road traffic accidents, interpersonal violence and acute illness.

Data Inclusion: The criteria for inclusion in the present study were: children and adolescents aged 7-18 at enrolment, with data collected prospectively at a minimum of two timepoints beginning within six months of a traumatic event. For this research study we requested datasets which included measures of depression alongside trauma measures.

Data Exclusion: Studies where depression symptoms were only measured within 24 hours of a potentially traumatic event were excluded. Studies which used a measure of depression which looked at less than five depression symptoms aligning with the DSM-5 criteria for depression (e.g. the Children's Depression Inventory, Short Form) were excluded. Adolescents were excluded if they were >18 years old at enrolment.

Ethical Considerations

All data submitted to the PACT/R archive are required to have appropriate ethical approval. Data are anonymised before being added to the database. The PACT/R database is accessed through application to the Child Trauma Data Archives and is overseen by the team at the University of Philadelphia, who ensure that the data are sent to researchers using it in line with the intended purpose. Access to the data is agreed by a steering group prior to the data becoming available to the researcher to ensure the proposed study is in line with the ethical approval. Researchers for this study were granted consent to use the database on 17th June 2022

(Appendix A). The present study was preregistered with the Open Science Framework (OFS) on the 23rd January 2024 (https://doi.org/10.17605/OSF.IO/UFSD7).

Participants

Thirteen datasets from four countries from the dataset were identified as meeting the criteria of the present study. The pooled dataset incorporated a total of 2006 participants aged 7-18 (mean age 12.56 ± 3.16) The demographics of participants are outlined in Table 3.

Table 3.

Descriptive statistics

Variable		Freq(n)	%
Country:	USA	1211	62.1
	UK	426	21.8
	Australia	135	6.9
	Switzerland	180	9.2
Age	7-10	507	26.0
	11-15	1022	52.4
	16-18	422	21.6
Gender	Male	1215	62.2
	Female	738	37.8
Race	White	909	46.6
	Black	430	22.7
	Asian	38	2.0
	Mixed	60	3.2
	Other	455	24.0
	Not Stated	30	1.5
Trauma Type	Unintentional Injury	1220	62.5
	Acute Medical Event (non-injury)	106	5.4
	Motor Vehicle/Road Traffic Accident	433	22.1
	Interpersonal Violence	163	8.3
	Other	27	1.4
	Not Stated	2	0.1

Defining Depression

To understand the trajectories of depression symptoms, two definitions of 'depression' were used in the present study. These definitions stem from issues that arose in constructing our dataset. First, the majority of depression measures used did not include questions which captured all nine of the symptoms outlined by the DSM-5 criteria for MDD. Second, the depression symptoms addressed by each measure did not necessarily overlap with other measures.

The inconsistency in the measurement of depression symptoms across the dataset highlights a significant challenge in defining depression within this research. As the present study seeks to understand the prevalence and trajectories of depression, we used two definitions of

depression. 'Likely DSM-5 Depression' within this study was defined as the child indicating they have five out of the nine symptoms of depression outlined by the DSM-5, with at least one of these being depressed mood or loss of interest/pleasure in doing things. Impaired functioning related to these symptoms was not included within this definition, as this was not consistently measured within our dataset. While this definition best represented the full symptom range of the DSM-5 diagnosis of MDD, it also involved a high threshold as some measures did not index all nine symptoms. This definition therefore represents a more conservative approach. Due to the lack of congruence between the DSM-5 MDD definition and the symptoms considered within these measures, we also used a definition of 'likely clinically significant depression'. This was defined as the presence of at least three of the five most measured symptoms within the dataset. These symptoms were: i) depressed mood, ii) diminished interest, iii) fatigue, iv) worthlessness and v) decreased concentration.

Depressed mood is defined within the DSM-5 as being a feeling of low mood, hopelessness or irritability in adolescents. These symptoms are therefore combined within this work to reflect at whether 'depressed mood' is present; this operationalisation was used for both the 'likely DSM-5 Depression' and 'likely clinically significant depression' definitions of depression. The presence of each of these individual symptoms is also reported.

A symptom was defined as present if a child or adolescent had experienced the symptoms 'sometimes' or more frequently. A child or adolescent was considered not to have the symptom if they reported experiencing it 'never' or 'rarely'.

In order to combine data on specific symptoms, we used the methodology highlighted by Kassam-Adams et al (2012), who used this archive to study acute stress symptoms in children. The symptoms in each measure were matched to congruent items on the DSM-5 for Major Depressive Disorder (MDD). Consensus on the matching of the measures was completed by the PACT steering group.

The data were dichotomised using the individual measures standard scoring rules for symptom presence and harmonised to map to the DSM-5 criteria for MDD in children and adolescents.

Statistical analyses

Symptom and diagnoses counts, and their associated frequency statistics, were derived using SPSS version 28 (IBM corp, 2021). Data were calculated for four time windows: acute (>24 hours to 1 month); short (>1 month to 3 months); intermediate (>3 months to 6 months); and long-term (>6 months - 12 months). Given that this study utilised data from research with diverse methodologies, it was believed that frequency statistics alone would not adequately account for the heterogeneity across the studies included in the dataset.

Random effects meta-analysis was therefore conducted in R version 4.4.2 (R Core Team, 2024) using the statistical package metafor (Viechtbauer, 2010) to derive prevalence estimates for each of the individual symptoms and each diagnosis within each time window.

Trajectory Modelling

To understand the trajectories of depression for children and adolescents exposed to a potentially traumatic event, trajectories were mapped using the statistical package crimcv (2003 package; Nielson et al., 2014) in R. Trajectories were mapped with studies which measured depression symptoms in three of our time windows: acute, short and long-term; these were selected as there were comparatively few data points for the Intermediate time window. The model which had the lowest Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) values was identified to select the optimal trajectory model. AIC and BIC are measures of fit and complexity, with lower numbers indicating a better fit. As few of the studies included within the PACT/R dataset measured all nine symptoms of depression outlined by the DSM-5, trajectory modelling was completed using the five most measured symptoms included within 'likely clinically significant depression' to maximise the dataset. Graphs to represent this trajectory were plotted using the statistical package ggplot2 in R (2024 package; Wickham, 2016).

Results

What is the prevalence and course of depression post-trauma?

For 'likely DSM-5 depression' (i.e. five or more symptoms of depression) the threshold was met by 18.5% of children and adolescents within the acute period and this was increased withing the short time period, gradually decreasing to 14.8% in the long-term time windows (see Table 4). A very similar pattern was seen within the meta-analysis of the same data. The acute and long-term windows reflected the majority of studies (k=9) and larger samples than the short and intermediate time frames. The 'likely DSM-5 depression' threshold was met by 22.2% of children and adolescents in the acute period (95% CI 15.1-30.3%) and 18.7% (95% CI 9.9-29.5%) in the long-term time window.

For the 'likely clinically significant depression' threshold, a similar pattern was seen with a higher prevalence. The presence of three or more symptoms of depression was reported by 38.7% in the acute window, decreasing slightly to 34.7% in the long-term window. The meta-analysis of this definition reflects an even higher proportion of children and adolescents experiencing such symptoms, with 49.2% prevalence within the acute period, reducing to 41.8% within the long-term window.

A similar pattern was found almost universally across individual depression symptoms, with the prevalence rates increasing in the short and intermediate windows (where there were fewer data available). This subsequently reduced in the long-term window to a prevalence slightly lower than that experienced within the acute window. Depressed mood (in particular depressed feelings and hopelessness), diminished interest in activities and worthlessness were the most commonly endorsed symptoms, while psychomotor agitation or retardation and thoughts of death or suicide were the least commonly endorsed. See Table 4 for the prevalence rates and meta-analysis of each individual symptom at each time point.

Table 4.

Prevalence and Meta-Analysis for depression diagnoses and symptoms

		Acute *>24 hours-1 month*	***Short*** *>1 - 3 months*	***Intermediate*** *>3 - 6 months*	***Long Term*** *>6 - 12 months*
*Likely DSM-5 Depression**	*Raw Proportion*	18.5% (290/1568)	25.0% (159/637)	20.9% (103/493)	14.8% (131/884)
	Meta-Analysis	22.2% (9, 15.1-30.3%)	28.8% (5, 14.6-45.5%)	19.8% (3, 7.3-.36.4%)	18.7% (9, 9.9-29.5%)
*Likely Clinically Significant Depression***	*Raw Proportion*	38.7% (606/1567)	57.9% (319/551)	47.1% (232/493)	34.7% (307/884)
	Meta-Analysis	49.2% (9, 27.8-70.7)	72.1% (5, 36.1-961.6)	49.3% (3, 13.0-86.0%)	41.8% (9, 24.9-59.8%)
*Depressed mood****	*Raw Proportion*	62.6% (980/1566)	64.6% (356/551)	51.2% (252/492)	63.5% (561/883)
	Meta-Analysis	66.9% (9, 46.2-84.7)	72.0% (5, 42.6-93.6%)	57.2% (3, 11.6-95.9%)	59.5% (9, 37.3-79.8)
Depressed feeling	*Raw Proportion*	47.7% (741/1554)	58.4% (321/550)	42.5% (209/492)	51.6% (455/881)
	Meta-Analysis	41.1% (8, 21.0-62.9)	59.7% (5, 24.2-90.1)	41.4% (3, 0.4-94.4%)	49.7% (9, 17.4-82.0%)
Hopelessness	*Raw Proportion*	58.6% (576/983)	47.5% (151/318)	56.3% (153/272)	53.3% (328/615)
	Meta-Analysis	49% (5, 18.0-80.5%)	44.9% (4, 9.2-84.1%)	51.6% (2, 5.8-95.6%)	32.7% (6, 11.2-59.1%)
Irritability	*Raw Proportion*	42.8% (415/970)	33.1% (81/245)	26.6% (72/271)	52.2% (319/611)
	Meta-Analysis	31.2% (5, 20.4-43.1%)	35.1% (3, 21.0-50.7%)	26.8% (2, 20.0-34.2%)	44% (6, 14.2-76.5%)
Diminished Interest	*Raw Proportion*	50.7% (677/1335)	51.2% (282/551)	51.5% (253/491)	54.5% (390/715)
	Meta-Analysis	56.5% (8, 34.3-77.4%)	67.1% (5, 26.9-96.2%)	56.7% (3, 15.3-93.0%)	67% (9,.37.6-90.5%)
Appetite	*Raw Proportion*	27.2% (301/1106)	36.5% (115/315)	23.2% (114/491)	22.5% (125/555)
	Meta-Analysis	35.4% (8, 18.9-54.0%)	37.8% (4, 17.9-60.1%)	23.9% (3, 15.9-32.8%)	23.7% (8, 12.2-37.6%)
Insomnia or Hypersomnia	*Raw Proportion*	40.2% (447/1112)	34.6% (110/318)	33.9% (166/489)	29.0% (161/555)
	Meta-Analysis	42.9% (8, 34.5-51.5%)	34.6% (4, 29.4-39.9%)	30.4% (3, 15.6-47.5%)	29.1% (8, 18.8-40.7%)

Psychomotor agitation or retardation	*Raw Proportion*	25.5% (147/576)	32.0% (108/338)	18.0% (68/378)	15.5% (41/264)
	Meta-Analysis	17.1% (3, 6.1-32.3%)	30.4% (2, 20.7-41.0%)	18.4% (2, 7.6-32.7%)	16.1% (2, 6.2-29.6)
Fatigue	*Raw Proportion*	33.4% (363/1088)	46.2% (241/521)	43.4% (213/491)	31.1% (184/592)
	Meta-Analysis	34.7% (6, 19.1-52.2%)	45.0% (5, 35.4-54.7%)	41.1% (3, 27.8-55.1%)	32.8% (7, 23.0-43.4%)
Worthlessness	*Raw Proportion*	61.6% (964/1566)	62.1% (342/551)	50.5% (248/491)	58.3% (515/884)
	Meta-Analysis	57.6% (9, 39.2-74.9%)	77.3% (5,46.7-.97.0%)	61.9% (3, 36.6-84.1%)	55.8% (9, 32.5-77.8%)
Decreased Concentration	*Raw Proportion*	39.0% (467/1197)	40.4% (205/507)	28.6% (140/490)	29.5% (168/570)
	Meta-Analysis	38.8% (7, 31.5-46.5%)	40.9% (5, 36.1-45.7%)	28.4% (3, 21.8-35.4%)	32.5% (7, 23.4-42.2%)
Thoughts of death/suicide	*Raw Proportion*	13.5% (109/807)	11.1% (18/163)	8.2% (18/219)	17.6% (49/278)
	Meta-Analysis	18.7% (5, 7.8-32.9%)	10.1% (2, 2.4-22.3%)	8.2% (1, 5.0-12.2%)	15.7% (5, 7.0-27.2%)

For proportion n/N are given in parentheses; for meta-analysis, k and 95% CI are given in parentheses.

* The child or young person indicated they have five out of the nine symptoms of depression outlined by the DSM-5, with at least one of these being i) depressed mood or ii) loss of interest or pleasure in doing things. **The presence of three of the five most measured symptoms of depression: depressed mood, diminished interest, fatigue, worthlessness and decreased concentration. ***At least one symptom of depressed mood present, encapsulating symptoms of low mood, hopelessness or irritability as defined in the DSM-5 criteria for MDD

What are the trajectories of depression symptoms following a trauma?

Five hundred and seventy-six children and adolescents had completed measures of their depression symptoms withing the acute, short, and long-term time windows. Trajectory modelling was then completed utilising these data. The model with the lowest AIC and BIC values was identified as the two-group model (Table 5). The best fit model was identified as being the two-group model. This was the model with the lowest AIC and BIC values.

Table 5.

Fit statistics for group-based trajectory models

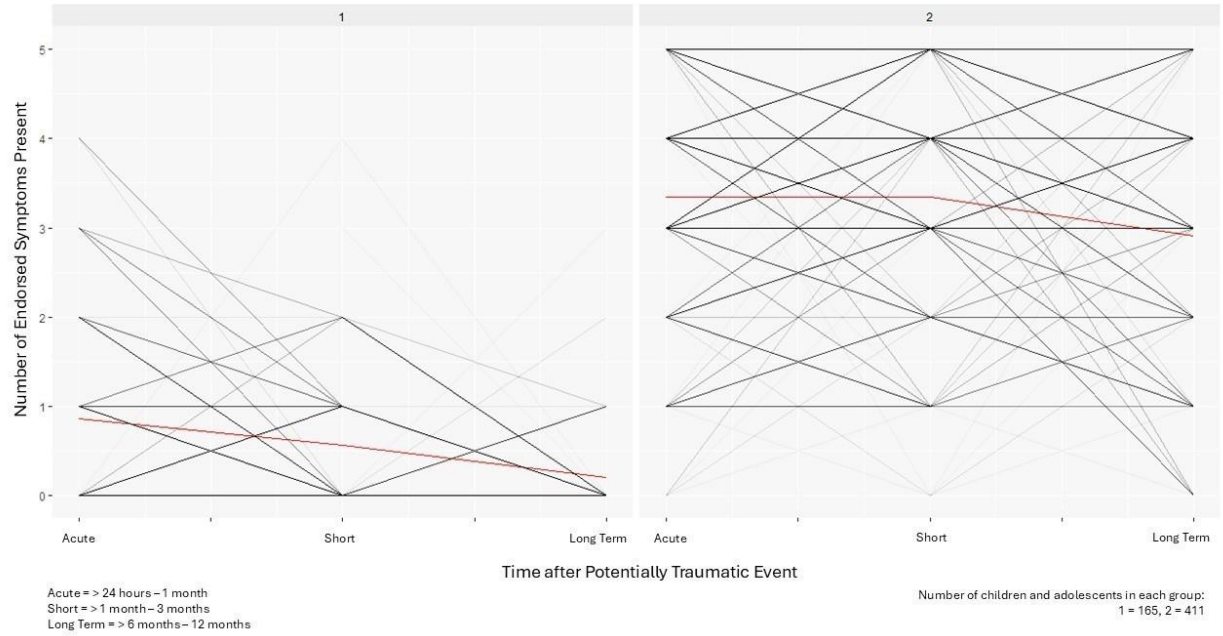
Number of groups	LogL[1]	AIC	BIC	CVE[2]
1	-2575.95	5159.89	5181.71	204.61
2	**-2426.79**	**4871.57**	**4920.66**	**204.14**
3	-2426.65	4881.30	4957.67	204.14
4	-2575.00	5188.00	5291.64	-
5	-2426.65	4901.31	5032.22	205.34
6	-2426.65	4991.30	5069.49	204.73

[1]**Log-Likelihood:** Used to compare the fit of different models. A higher log-likelihood indicates a better model fit. [2]**Classification Accuracy:** Used to evaluate how well the model classifies individuals into their respective trajectory groups. It measures the proportion of individuals that are accurately assigned to the trajectory group they most likely belong to, based on their observed data.

Figure 5 represents the trajectories of the two groups identified. Trajectory group one reflected a low symptom trajectory. This comprised 165 (28.6% of the sample) children and adolescents. The majority of these participants had less than one measured symptom of depression within the acute period following a trauma, and this was sustained within the year following trauma. Trajectory group two reflected a moderate and persistent trajectory. This encompassed 411 children and adolescents (71.4%). Within this model, most participants had at least three symptoms of depression; this did not shift by one year post-trauma (Figure 5).

Figure 5.

Trajectory modelling of the five most measured symptoms of depression



Discussion

Summary of Findings

This study used a pooled dataset of trauma-exposed children and adolescents to begin to understand the prevalence and trajectories of depression symptoms following a trauma. The prevalence rates of depression across definitions and individual symptoms were reflective of a chronic trajectory for a significant proportion of cases. The most commonly reported symptoms were depressed mood (62.6% in the acute-, 64.6% in the short-, 51.2% in the intermediate-, 63.5% in in the long-term window), worthlessness (61.6% in the acute-, 62.1% in the short-, 50.5% in the intermediate-, 58.3% in in the long-term window) and diminished interest (50.7% in the acute-, 51.2% in the short-, 51.5% in the intermediate-, 54.5% in in the long-term window). Only two symptoms showed evidence of recovery between these time windows: insomnia or hypersomnia and psychomotor agitation or retardation.

Prevalence rates varied between 'likely DSM-5 depression' (i.e. met five out of the nine symptoms of depression outlined by the DSM-5; 18.5% in the acute-, 25% in the short-, 20.9%

in the intermediate-, 14.8% in in the long-term window) and 'likely clinically significant depression' (i.e. presence of three of the five most measured symptoms of depression; 38.7% in the acute-, 57.9% in the short-, 47.1 in the intermediate-, 41.8% in in the long-term window) . This finding is likely related to the lack of measures used which incorporated all nine symptoms of the DMS-5 definition of depression. We were unable to address the full DSM-5 criteria for depression, due to the lack of data available on the impairment of these symptoms on functioning.

Two trajectories of depression were identified: a small proportion (n=165) of children and adolescents did not experience depression or only experienced mild symptoms of depression, while the larger proportion (n=411) experienced moderately severe symptoms (i.e. approximately three out of a possible five symptoms) that were persistent up to one-year post-trauma. In contrast to PTSD, no recovery trajectory was identified, reflecting a lack of spontaneous recovery in depression symptoms experienced following a trauma.

Clinical and Theoretical Implications

These findings reflect the importance of incorporating depression into our understanding of psychological responses to trauma. This is particularly pertinent given the high levels of trauma exposure in youth (61.8%; McLaughlin et al. 2013) and long-term impacts of depression on mental and physical health (Maughan et al. 2013). Attending to depression following a trauma also has the potential to increase the efficacy of other treatments, as greater depression severity has been found to reduce the efficacy of treatment for PTSD (ß = -.36) (Kilne et al, 2021). Given that depression symptoms co-occur in 52% of PTSD cases (Rytwinski et al., 2013), this has significant clinical implications.

The majority of prevalence rates identified in this study far exceed the 21.3% prevalence rates of mild-severe depression found in children and adolescents globally (Lu, Lin and Su, 2024). Prevalence rates of likely clinically significant depression in the year following a trauma were consistently higher than those we would expect to see in the general child and adolescent population. Our findings suggest that a significant proportion of children and adolescents who experience a traumatic experience develop symptoms of depression, and that these symptoms do not spontaneously recover. This reflects a clinical need for active screening and treatment of depression symptoms following a trauma and indicates that delaying treatment is unlikely to be advantageous.

Current theoretical models of depression incorporate early experiences into the formulation of the maintenance of depression (Beck et al., 1979; Engel, 1977). However, we currently have little understanding of the factors which lead to post-traumatic depression as a stand-alone diagnosis, and what predisposes a child or adolescent to experience depression rather than another psychopathology.

Given our finding that depression symptoms are likely to be persistent following a trauma for a significant proportion of youth, the development of specific models of depression following a trauma would aid formulation and recovery. Recent exploration into such models has highlighted that many of the cognitive factors linked to depression are also found in PTSD, Complex PTSD and anxiety following trauma (Memarzia et al., 2024). This suggests that such cognitive factors are consistent across diagnoses and require further exploration.

Limitations and Methodological Issues

This research has several limitations. The main challenge was in defining the presence of depression itself, due to the large range of measures utilised. This reflects a wider problem within depression research with non-overlapping measures. Analysis of seven common depression scales found that only 12% of symptoms were present across all measures and the mean overlap amongst scales ranging from .27-.40 (Fried, 2017). To mitigate this challenge two definitions of depression were presented, one which aligns closely to the DSM-5 criteria for depression and one which looks at the five most reported depression symptoms. These were designed to strike a balance between clinical definition and maximising the available data. Whether these children and adolescents would meet clinical criteria for depression is unclear due to the lack of information available on the impact of the symptoms experienced.

Another limitation of this study is that there was a low threshold for symptom presence. The DSM-5 outlines that for a diagnosis of depression symptoms must be present for at least 2 weeks. Therefore, if a child reported experiencing a symptom was experienced 'sometimes' or more frequently it was considered as present within this study. This aligns with the diagnostic criteria utilised, however the severity of symptoms is not measured. Prevalence of symptoms therefore includes mild-severe symptoms and does not differentiate between these, potentially inflating symptom presence.

The majority of the measures used within this study measured symptoms over the last two weeks, as necessary for diagnosis in accordance with the DSM-5. However, the Birleson Depression Self-Rating Scale (Birleson, 1988) and the Center for Epidemiological Studies Depression Scale for Children (Faulstich et al., 1986) looked at symptoms over the last week and therefore not all symptoms are measured across the same time scale.

In order to identify the trajectories of depression, participants were included who had completed measures at three timepoints were identified. In doing so, we were unable to incorporate data from the majority of participants. However, this was still a significant sample size. The trajectories identified are also consistent with the prevalence rates observed in the meta-analysis.

A further limitation of this research is the lack of pre-morbid information on the children and adolescents studied. We are therefore unable to attribute the symptoms of depression directly to the trauma as we cannot compare this to pre-traumatic symptoms.

Further Research and Recommendations

Thus far, the course of post-traumatic depression in children and adolescents has been largely unconsidered. The understanding of the long-term impacts of depressive symptoms following a trauma is limited and as such the utility of our current theoretical models is not understood. Further research and the development of our understanding will allow us to create more effective treatments for this group. Such research would also support in understanding other psychopathologies, such as PTSD and complex PTSD and the interplay with depression symptoms. Further studies could also focus on the understanding of post-traumatic depression across developmental stages.

In order to characterise depression consistently within future research, validated measures of depression should be used in the study of psychological responses to trauma. These should be reflective of the current DSM or ICD definitions of depression, ensuring that they also incorporate the impact of such symptoms on functioning.

Conclusions

The present study brought together a large pre-existing data set incorporating children and adolescents who had been exposed to trauma. It has highlighted that depression is a common response to exposure to traumatic experiences and that symptoms of depression are unlikely to recover spontaneously. This finding indicates that a proactive approach to screening and treatment of depression is likely to improve clinical outcomes for those who have been exposed to a traumatic event.

Depression following a trauma is still largely understudied in the literature and is an area which requires urgent attention to understand the mechanisms underpinning it. Further research would support in the development of a robust model of post-traumatic depression in children. Such research should focus on increasing our understanding of depression following trauma and the relationship with other psychopathologies.

References

Afifi, T. O., Boman, J., Fleisher, W., & Sareen, J. (2009). The relationship between child abuse, parental divorce, and lifetime mental disorders and suicidality in a nationally representative adult sample. *Child abuse & neglect*, *33*(3), 139-147.

Alisic, E., Zalta, A. K., Van Wesel, F., Larsen, S. E., Hafstad, G. S., Hassanpour, K., & Smid, G. E. (2014). Rates of post-traumatic stress disorder in trauma-exposed children and adolescents: meta-analysis. *The British Journal of Psychiatry*, *204*(5), 335-340.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (5th ed.)*. https://doi.org/10.1176/appi.books.9780890425596

Birleson, P. (1988). Depression Self-Rating Scale. *Las depresiones infantiles,* 320.

Bonanno, G. A. (2004). Loss, Trauma, and Human Resilience: Have We Underestimated the Human Capacity to Thrive after Extremely Aversive Events? *American Psychologist,* 59(1), 20-28.

Breslau, N., Davis, G. C., Peterson, E. L., & Schultz, L. (1997). Psychiatric sequelae of posttraumatic stress disorder in women. *Archives of general psychiatry*, *54*(1), 81-87.

Ehring, T., Ehlers, A., & Glucksman, E. (2006). Contribution of cognitive factors to the prediction of post-traumatic stress disorder, phobia and depression after motor vehicle accidents. *Behaviour research and therapy*, *44*(12), 1699-1716.

Elliott, Rachel, Anna McKinnon, Clare Dixon, Adrian Boyle, Fionnuala Murphy, Theresa Dahm, Emma Travers-Hill et al.(2021) Prevalence and predictive value of ICD-11 post-traumatic stress disorder and Complex PTSD diagnoses in children and adolescents exposed to a single-event trauma. *Journal of Child Psychology and Psychiatry* 62, no. 3: 270-276.

Engel, G. L. (2012). The need for a new medical model: a challenge for biomedicine. *Psychodynamic psychiatr*y (Vol. 40, pp. 377-396). United States: Guilford Press. https://doi.org/10.1521/pdps.2012.40.3.377

Faulstich ME, Carey MP, Ruggiero L, et al. (1986) Assessment of depression in childhood and adolescence: An evaluation of the Center for Epidemiological Studies Depression Scale for Children (CES-DC). *American Journal of Psychiatry* 143(8):1024–1027

Fried, E. I. (2017). The 52 symptoms of major depression: Lack of content overlap among seven common depression scales. *Journal of Affective Disorders*, *208*, 191–197. https://doi.org/10.1016/j.jad.2016.10.019

García-Escalera, J., Chorot, P., Valiente, R. M., Reales, J. M., & Sandín, B. (2016). Efficacy of transdiagnostic cognitive-behavioral therapy for anxiety and depression in adults, children and adolescents: A meta-analysis. *Revista de Psicopatologia y Psicologia Clinica*, 21(3), 147-175. https://doi.org/10.5944/rppc.vol.21.num.3.2016.17811

Greene, T., Gelkopf, M., Grinapol, S., Werbeloff, N., Carlson, E., & Lapid, L. (2017). Trajectories of traumatic stress symptoms during conflict: A latent class growth analysis. *Journal of Affective Disorders,* 220, 24-30. https://doi.org/10.1016/j.jad.2017.05.036

Hiller, R. M., Meiser-Stedman, R., Fearon, P., Lobo, S., McKinnon, A., Fraser, A., & Halligan, S. L. (2016). Research Review: Changes in the prevalence and symptom severity of child posttraumatic stress disorder in the year following trauma – a meta-analytic study. *The Journal of Child Psychology and Psychiatry*. https://doi.org/10.1111/jcpp.12566

IBM Corp. (2021). *IBM SPSS Statistics for Windows, Version 28.0.* Armonk, NY: IBM Corp

Kassam-Adams, N., Kenardy, J., Delahanty, D., Marsac, M., Meiser-Stedman, R., Nixon, R. D. V., Landolt, M., & Palmieri, P. (2020). Development of an international data repository and research resource: the Prospective studies of Acute Child Trauma and Recovery (PACT/R) Data Archive. *European Journal of Psychotraumatology.* https://doi.org/10.1080/20008198.2020.1729025

Kassam-Adams, N., Palmieri, P. A., Rork, K., Delahanty, D. L., Kenardy, J., Kohser, K. L., Landolt, M. A., Le Brocque, R., Marsac, M. L., Meiser-Stedman, R., Nixon, R. D. V., Bui, E., & McGrath, C. (2012). Acute stress symptoms in children: Results from an international data archive. *Journal of the American Academy of Child & Adolescent Psychiatry.* https://doi.org/10.1016/j.jaac.2012.05.013

Lu, B., Lin, L., & Su, X. (2024). Global burden of depression or depressive symptoms in children and adolescents: A systematic review and meta-analysis. *Journal of Affective Disorders,* 354, 553-562. https://doi.org/10.1016/j.jad.2024.03.074

Maughan, B., Collishaw, S., & Stringaris, A. (2013). Depression in Childhood and Adolescence. *Journal of the Canadian Academy of Child & Adolescent Psychiatry,* 22(1), 35-40.

McLaughlin, K. A., Koenen, K. C., Hill, E. D., Petukhova, M., Sampson, N. A., Zaslavsky, A. M., & Kessler, R. C. (2013). Trauma Exposure and Posttraumatic Stress Disorder in a National Sample of Adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry*, 52(8), 815-830. https://doi.org/10.1016/j.jaac.2013.05.011

Meiser-Stedman, R., McKinnon, A., Dixon, C., Boyle, A., Smith, P., & Dalgleish, T. (2017). Acute stress disorder and the transition to posttraumatic stress disorder in children and adolescents: Prevalence, course, prognosis, diagnostic suitability, and risk markers. *The Journal of Depression and Anxiety,* 34:348-355.. https://doi.org/10.1002/da.22602

Memarzia, J., Lofthouse, K., Dalgleish, T., Boyle, A., McKinnon, A., Dixon, C., Smith, P., & Meiser-Stedman, R. (2024). Predictive models of post-traumatic stress disorder, complex post-traumatic stress disorder, depression, and anxiety in children and adolescents following a single-event trauma. *Psychological Medicine.* https://doi.org/10.1017/S0033291724001648

Nielsen, J. D., Rosenthal, J. S., Sun, Y., Day, D. M., Bevc, I., & Duchesne, T. (2014). Group-based Criminal Trajectory Analysis Using Cross-validation Criteria. *Communications in statistics*. Theory and methods, United States.

R Core Team (2021). R: A language and environment for statistical computing. *R Foundation for Statistical Computing,* Vienna, Austria. https://www.R-project.org/

Rytwinski, N. K., Scur, M. D., Feeny, N. C., & Youngstrom, E. A. (2013). The Co-Occurrence of Major Depressive Disorder Among Individuals With Posttraumatic Stress Disorder: A Meta-Analysis. *Journal of Traumatic Stress,* 26(3), 299-309. https://doi.org/10.1002/jts.21814

Shanahan, L., Copeland, W. E., Costello, E. J., & Angold, A. (2011). Child-, adolescent-and young adult-onset depressions: Differential risk factors in development? *Psychological Medicine,* 41(11), 2265-2274. https://doi.org/10.1017/S0033291711000675

Spinhoven, P., Penninx, B. W., Van Hemert, A. M., De Rooij, M., & Elzinga, B. M. (2014). Comorbidity of PTSD in anxiety and depressive disorders: Prevalence and shared risk factors. *Child abuse & neglect*, *38*(8), 1320-1330.

Vibhakar, V., Allen, L., Gee, B., & Meiser-Stedman, R. (2019). A systematic review and meta-analysis on the prevalence of depression in children and adolescents after exposure to trauma. *Journal of Affective Disorders.* https://doi.org/10.1016/j.jad.2019.05.005

Wickham, H. (2016). *ggplot2: Elegant Graphics for Data Analysis.* Springer-Verlag New York. ISBN 978-3-319-24277-4, https://ggplot2.tidyverse.org.

Wang, S. K., Feng, M., Fang, Y., Lv, L., Sun, G. L., Yang, S. L., ... & Chen, H. X. (2023). Psychological trauma, posttraumatic stress disorder and trauma-related depression: A mini-review. *World journal of psychiatry*, *13*(6), 331.

Zhang, J., Meiser-Stedman, R., Jones, B., Smith, P., Dalgleish, T., Boyle, A., Edwards, A., Subramanyam, D., Dixon, C., Sinclaire-Harding, L., Schweizer, S., Newby, J., & McKinnon, A. (2022). Trajectory of post-traumatic stress and depression among children and adolescents following single-incident trauma. *European Journal of Psychotraumatology.* https://doi.org/10.1080/20008198.2022.2037906

Chapter Five: Thesis Portfolio Discussion and Critical Evaluation

Word count: 2997

Summary of Findings

This thesis aimed to deepen the understanding of depression in children and adolescents following potentially traumatic events. A systematic review and meta-analysis were conducted to investigate the cognitive factors underlying both depression and PTSD, and to assess whether these factors differ between the two conditions. The findings suggest that maladaptive appraisals play a key role in the development of both PTSD and depression, mirroring the conclusions of Memarzia (2024). Moreover, a strong relationship between rumination and PTSD was identified, particularly trauma-related rumination, which may be more relevant to the maintenance of PTSD than the process of rumination itself. This research underscores the limited focus on depression in trauma-exposed children and adolescents, highlighting the need for more research in this area.

To better understand the depression following a trauma we subsequently analysed a pooled data set of trauma exposed children and adolescents, focusing on the prevalence and course of symptoms (PACT/R; Kassam-Adams et al., 2020). Our findings indicated that depression is a common response to exposure to a traumatic experience. Symptoms of depression once present were unlikely to spontaneously recover. This contrasts with the trajectories seen in PTSD which show around 50% natural recovery from PTSD symptoms (Bonanno, 2004; Greene et al., 2018) and aligns with previous findings (Zhang et al., 2022). Depression following trauma appears to have a more persistent course than PTSD symptoms. This distinction suggests that the underlying mechanisms of each disorder may differ, necessitating targeted interventions for each.

Our findings indicate a strong relationship between maladaptive appraisals and both PTSD and depression. This suggests that targeting these cognitive processes in clinical practice could be beneficial. Furthermore, the reduced likelihood of spontaneous recovery from depression in trauma-exposed youth underscores the need for proactive clinical interventions.

A Critical Appraisal of the Present Study

This study sought to address a gap in the current literature looking at child and adolescent trauma. It looked at the role of cognitive processes in the development and maintenance of PTSD and depression following a trauma in children and adolescents. A vast amount of literature was searched to identify research which would allow us to understand this. By studying PTSD alongside depression overlapping cognitive factors were identified. As this thesis sought to better

understand depression, rather than PTSD, a potential alternative to focusing on the cognitive model of PTSD (Ehler's and Clark, 2000), would have been to be guided by the cognitive triad proposed by Beck et al. (1979). This could have looked at cognitive processes focused on the self, the world and the future. There are large overlaps between this triad and maladaptive appraisals, however, these are not identical processes. This could have been measured using the Beck Youth Inventory (BYI-2; Beck et al, 2005) or the Cognitive Triad Inventory for Children (CTI-C, Kaslow et al, 1992) following trauma exposure. Future research could utilise these measures to understand the cognitive processes of depression following a trauma.

Through the use of a data repository, we were able to combine data from a large number of studies looking at childhood trauma to model the prevalence and trajectories of symptoms of depression. As this data repository was focused on trauma exposure, the majority of measures were focused on post-traumatic stress disorder. Therefore, our research was limited by the methodologies chosen by other researchers, the majority of whom had a primary research focus of Acute Stress Disorder and/or PTSD. Some measures included in the PACT/R database were short forms of depression measures leading to the exclusion of some studies due to a lack of available depression data. Due to the variety of measures used, our research sought to align the measures used with the Diagnostic and Statistical Manual of Mental Disorders-5th edition (DSM-5; American Psychiatric Association, 2013) to classify depression. The present study calculated trajectories looking at the most studied symptoms across the included studies to maximise the available data. However, this is a far from perfect solution and tracks a high level of depression symptom presence, rather than depression as a diagnosis in itself.

The aim of this body of research was to expand the current research into depression following a trauma. The data which were included in this study was from single incident traumas, and as such we were not able to comment on the trajectories following multiple traumas. Exposure to multiple traumas is linked to higher prevalence of interpersonal violence and higher likelihood of complex PTSD (cPTSD: Cloitre et al., 2013; Chiu et al, 2023) and this is therefore an area worthy of further investigation.

A Critical Appraisal of the Methodology

The methodological approach chosen for the empirical project aimed to maximise the available data. By calculating prevalence and using a random effects meta-analysis we aimed to take into account the heterogeneity across the studies within the data repository. In order to

synthesise the available data, questions contained within the measures were aligned with the DSM-5 definition. By choosing to do this, rather than using the cut offs for individual measures, we were able to align the measures. The disadvantage of this is that many of the measures used did not contain all the items included in the DSM-5 definition of depression. Two different definitions were therefore chosen to define depression, a more conservative definition (five out of the nine symptoms of depression outlined by the DSM-5) and a more liberal definition (The presence of three of the five most measured symptoms of depression). The purpose of this was to align with current DSM classification due to the large range of symptoms contained within the measures chosen by researchers. A possible alternative way to do this would have been to use the validated cut-offs for each individual measure of depression contained within the repository. We chose not to do so for greater synthesis of the data.

The majority of the data included within this research focused on single incident trauma, rather than multiple traumas. Children and adolescents exposed to multiple traumas are likely to experience different psychological responses to those exposed to single traumas. Multiple traumas are more likely to be interpersonal in nature, including neglect, sexual and physical abuse, these are all risk factors for the development of cPTSD (Leiva-Bianchi et al, 2023). Interpersonal trauma is also linked to depression following trauma exposure (Vibhakar, 2019). Complex Post-Traumatic Stress Disorder (cPTSD) is characterized by the presence of severe PTSD symptoms in conjunction with disturbances in self-organization, specifically in the domains of affective dysregulation, negative self-concept, and interpersonal difficulties (Cloitre et al., 2013). As such, it is plausible that there is considerable overlap between cPTSD and depressive symptoms, particularly symptoms of social withdrawal and negative self-evaluation but this was not analysed within the present research.

Limitations of the Present Study

The limitations of individual studies are discussed in their respective chapters. There were a number of challenges in conducting this research. This was particularly evident within the empirical paper when working to define depression across various studies. In an attempt to address this limitation, depression was defined in two ways and individual symptoms reported. This research was not able to examine Major Depressive Disorder as the majority of the data available within the repository did not include all of the symptoms as defined by the DSM-5 and there was very little information available on the impact of symptoms. It is also worth noting that

across both papers both PTSD and depression symptoms were largely measured using standardised measures, rather than utilising such measures alongside clinical interview, meaning that we cannot conclusively say whether these children and adolescents would meet diagnostic criteria for either depression or PTSD.

The focus of this thesis was depression in children post-trauma. In doing so the overlap of depression with other psychopathologies highlighted within the data were not explored. By examining where depression occurs as an independent diagnosis and where it co-occurs with PTSD, we could have explored whether the chronic trajectories identified overlap with those of PTSD, as well as how frequently each trajectory appear in isolation.

By utilising a data repository, we were able to study the data from a large number of trauma exposed children and adolescents. However, this also meant that there are differences in the study methodologies. Within this research heterogeneity was accounted for by conducting a meta-analysis alongside prevalence statistics.

As the dataset identified for this study only included children involved in single incident trauma, the impacts of multiple traumas on depression was not explored. Due to the significant overlap seen within complex PTSD found within the literature, this would be an avenue for further exploration.

Conceptualisation of Psychological Constructs

As highlighted above, one of the largest difficulties underpinning this thesis was defining the psychological constructs being measured. There is large overlap between the diagnostic criteria of both PTSD and depression in the DSM-5. This raised issues in defining depression within the dataset and therefore decisions were made to ensure that we are accurately reflecting the symptoms shown in the data. This was related to the use of diagnostic definitions of depression. Some of these difficulties arose from the well-established diagnostic overlap between PTSD and Depression (eg. Flory & Yehuda, 2015; Gros et al., 2012). In the DSM-5, PTSD and MDD show substantial symptom overlap. This is particularly present within the domains of affective and cognitive dysregulation. Both disorders include criteria related to persistent negative mood states, such as sadness, guilt, and shame, anhedonia, sleep disturbance, and concentration difficulties. PTSD's "negative alterations in cognitions and mood" parallels depressive symptomatology through features such as persistent negative beliefs about oneself or

the world and emotional numbing, which resemble depressive withdrawal and hopelessness. Maladaptive appraisals (Ehlers & Clark, 2000) have significant overlap to the Cognitive Triad proposed by Beck et al. (1967) in both contain negative interpretations of the self and the world. However, the appraisals in PTSD are conceptualised as maintaining a current sense of threat and those in depression are more general negative beliefs.

Limitations of Diagnostic Criteria

There are high levels of diagnostic overlap found between depression and PTSD when utilising the DSM-5 to define each pathology. There are several possible explanations of the high levels of co-morbidity found, including diagnostic overlap, as discussed above, and a trauma-related phenotype, which could reflect a subtype of PTSD (Flory & Yehuda, 2015).

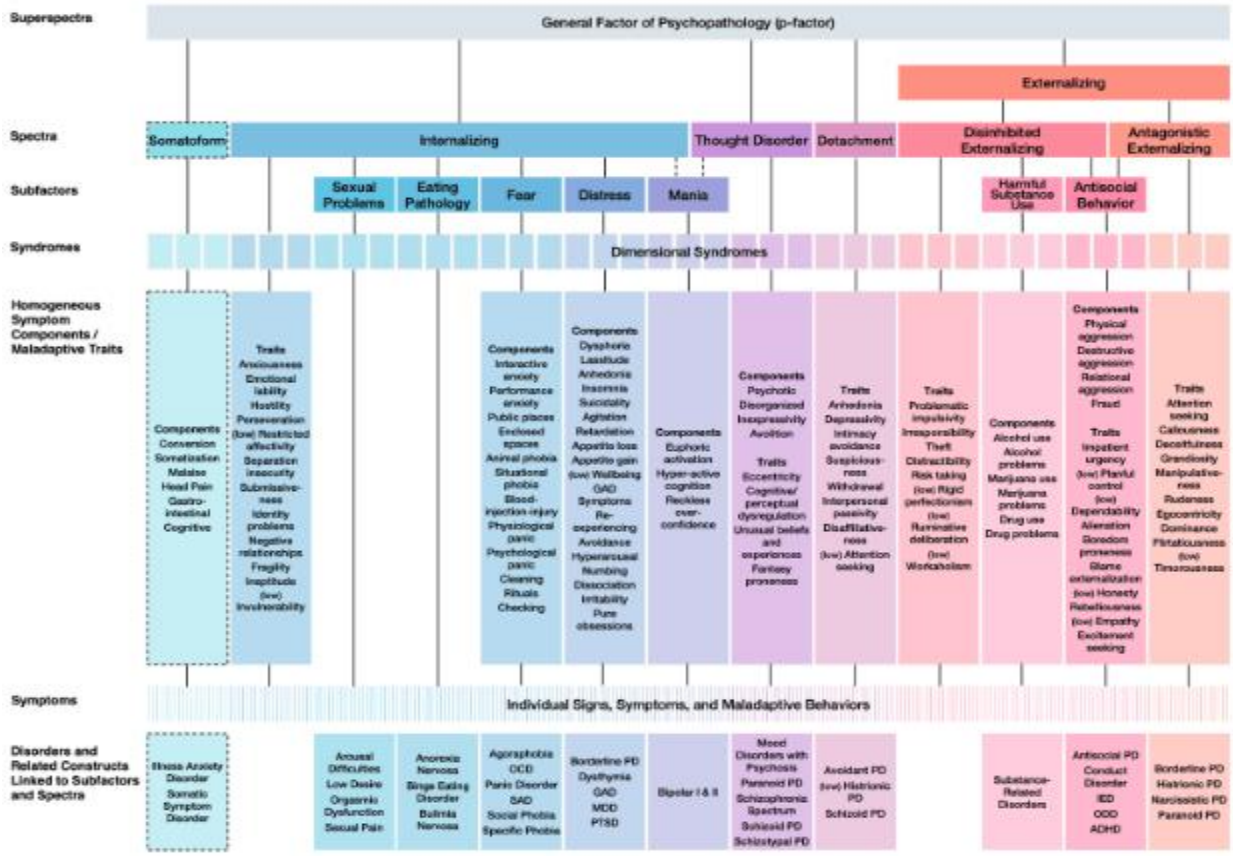
This thesis utilised the DSM-5 criteria to define pathology presence. However, the DSM-5, faces several well-documented limitations (eg. Lasalvia, 2015; Moller, 2018; Thomason, 2014) which constrain both validity and utility. There are high rates of co-morbidity between purportedly discrete disorders, which challenges the notion of distinct psychological morbidities. Alongside this there is considerable within-diagnosis heterogeneity, as individuals meeting criteria for the same disorder may present with widely divergent symptom profiles. Additional problems with diagnostic categories include diagnostic instability over time. Patients may move between categories or fall below thresholds despite experiencing clinically significant impairment.

Alternative Conceptualisations

There have been several attempts within the literature to move towards transdiagnostic models and conceptualisations of psychopathology. One such model it the Hierarchical Taxonomy of Psychopathology (HiTOP; Kotov et al., 2017) model. The HiTOP model was developed to address the limitations of using traditional diagnostic categories. Psychopathology were organised into empirically derived, dimensional constructs. By modelling symptoms and syndromes hierarchically, from narrow components to broader spectra such as internalizing, externalizing, and thought disorder, it works to capture shared variance that explains observed comorbidity. Dimensional scoring preserves clinically meaningful variation below traditional diagnostic thresholds, which can mitigate problems such as heterogeneity and diagnostic instability. As the HiTOP model (Figure 6) is derived from large-scale factor analytic and

genetically informed studies, it also aligns well with underlying biological and psychosocial risk processes, offering a framework which is well suited to transdiagnostic research and targeted interventions.

Figure 6. HiTOP model



Official HiTOP Figure. This figure depicts the full current official HiTOP framework. Dashed lines indicate dimensions included as provisional aspects of the framework.

Abbreviations: ADHD, attention-deficit/hyperactivity disorder; GAD, generalized anxiety disorder; IED, intermittent explosive disorder; MDD, major depressive disorder; OCD, obsessive-compulsive disorder; ODD, oppositional defiant disorder; PD, personality disorder; PTSD, posttraumatic stress disorder; SAD, separation anxiety disorder.

Evaluating Diagnostic Criteria: Reflections From This Thesis

The use of diagnosis within this thesis allowed the study of depression symptoms following a traumatic event, which has thus far had little attention academically. In evaluating depression at both a categorical and symptom level, it became evident that the internalising symptoms often found in depression are both prevalent and persistent across time. A systematic review of the literature also found strong cross-sectional relationships between maladaptive

appraisals and both PTSD and depression. These findings suggest that it may be the maladaptive and maintaining internalising symptoms of distress following a traumatic experience which lead to the development of psychopathology post-trauma. This maps on to transdiagnostic models, such as HiTOP, which conceptualises both depression and PTSD as pathology linked to internalised distress. It could therefore be useful to map the prevalence and trajectory of internalising symptoms to analyse whether such symptoms are linked to persistent psychopathology following a trauma.

Clinical Implications for Practice, Service Delivery and Development

The high prevalence and persistence of depression following trauma exposure in children and adolescents highlight the need for monitoring of depressive symptoms in clinical settings. Trauma-exposed youth should be routinely screened for depression alongside other psychopathologies. Attention should be given by clinicians to identifying maladaptive appraisals following a trauma as part of assessment and formulation. Interventions targeting maladaptive appraisals, such as cognitive therapies, have the potential to reduce both depression and PTSD symptoms, making them a promising avenue for improving treatment outcomes. Treatment trials focusing on these cognitive processes should be prioritised to empirically validate their impact.

Our findings underscore the crucial role of maladaptive cognitive appraisals in both depression and PTSD. As such, targeting these appraisals through cognitive therapy could help reduce symptoms of both disorders. To test this hypothesis, treatment trials focusing on the impact of addressing maladaptive appraisals on depression and PTSD would be valuable. In clinical practice, targeting maladaptive appraisals could be further supported by measuring depression symptoms both before and after treatment, providing clinicians with assessment of the therapeutic impact.

Our findings also suggest that taking a transdiagnostic approach, focusing on the type of symptom and how distress is being expressed, may support in the clinical formulation and therefore treatment of psychopathology post-trauma. Such an approach may inform clinicians of the areas to attend to following a trauma and the links between internalising and externalising symptoms and the expression of distress post-trauma.

Suggestions for Future Research

This research highlights the urgent need for further research into depression following a trauma in children and adolescents. It has highlighted a large gap in the current understanding of the role of rumination in the development and maintenance of depression following a potentially traumatic event.

Further research should focus on utilising the current DSM or ICD criteria to define depression within the cohort studied and ensure that the impact on functioning is measured. This would allow Major Depressive Disorder to be studied and the aetiology to be better understood. Moving forward, it would be useful to conduct longitudinal research to examine the trajectories and prevalence of depression, PTSD and cPTSD. This would support in the understanding of these constructs both co-morbidly and independently of one another. Such research could also examine whether these presentations are linked to certain trauma types and which aspects of PTSD and depression are drivers of one another when they occur co-morbidly.

The findings of our meta-analysis reinforce the findings of Mermazia et al. (2024) that show that maladaptive appraisals are shared across both PTSD and depression. Further research should focus on the development of understanding of other cognitive and behavioural processes and predisposing factors which may lead to the development of PTSD and depression as independent and co-morbid diagnoses. This would allow clinicians to better target treatment for those who have developed psychopathology following a trauma.

Further research of the role of trauma-specific rumination within depression following a trauma would allow us to unpick whether the process of ruminating or the content therein is a factor in the maintenance of post-traumatic depression. An analysis of the utility of our current cognitive models of depression within the context of trauma would also inform the future of psychological treatment for children and adolescents who have experienced trauma, with the hope that this would improve outcomes and have a positive lifelong impact.

Future research could examine the use of targeted treatments for maladaptive appraisals following a trauma, as this construct is shared across the development of both PTSD and depression. An analysis of the symptoms of PTSD, cPTSD and depression prior and post targeted treatment for such appraisals would allow us to better understand the utility of such intervention.

Conclusions

This thesis aimed to advance the understanding of post-traumatic depression in children and adolescents, particularly in relation to the cognitive processes underlying the development and maintenance of depressive and PTSD symptoms. The findings from the systematic review and meta-analysis suggest that maladaptive cognitive appraisals, such as negative self-perceptions and rumination, play a significant role in both conditions. This shared vulnerability may account for some of the high levels of comorbidity found across PTSD and depression. These results highlight the potential benefits of interventions targeting these cognitive distortions, which may offer promising avenues for improving clinical outcomes for affected individuals. The empirical research sought to understand the prevalence and course of depression symptoms following a trauma and utilised a pre-existing dataset to do so. In utilising such a large, pooled dataset two trajectories were established, representing a small group who did not experience symptoms and a larger group who experienced chronic symptoms. Prevalence and meta-analysis data showed that depression symptoms are common and chronic following a single incident trauma.

However, critical gaps remain in our understanding, particularly regarding the role of rumination and the impact of multiple trauma exposures on trauma-related depression. These areas warrant further investigation, as they may provide important insights into the differential trajectories of symptom development and the efficacy of targeted interventions over time.

By addressing these gaps, researchers can enhance our cognitive models of post-traumatic depression, ultimately improving both theoretical frameworks and clinical practices. A more nuanced understanding of how cognitive processes influence trauma-related mental health disorders could lead to more personalised and effective interventions, improving long-term mental health outcomes for children and adolescents who have experienced trauma.

Bibliography

Abela, J. & Hankin, B. (2011) Rumination as a Vulnerability Factor to Depression During the Transition From Early to Middle Adolescence: A Multiwave Longitudinal Study. *Journal of Abnormal Psychology,* 120(2), 259-271. https://doi.org/10.1037/a0022796

Afifi, T. O., Boman, J., Fleisher, W., & Sareen, J. (2009). The relationship between child abuse, parental divorce, and lifetime mental disorders and suicidality in a nationally representative adult sample. *Child abuse & neglect*, *33*(3), 139-147.

Alisic, E., Zalta, A. K., van Wesel, F., Larsen, S. E., Hafstad, G. S., Hassanpour, K., & Smid, G. E. (2014). Rates of post-traumatic stress disorder in trauma-exposed children and adolescents: Meta-analysis. *The British Journal of Psychiatry*, 204(5), 335-340. https://doi.org/10.1192/bjp.bp.113.131227

Alamdar, S., Lv, Y., Guo, J., Lu, J., & Zhang, Y. (2020). Attentional bias effect on post-traumatic outcomes in children after earthquake: Mediation role of rumination. *PsyCh journal*, *9*(5), 738-748. https://doi.org/10.1002/pchj.360

Alberici, A., Meiser-Stedman, R., Claxton, J., Smith, P., Ehlers, A., Dixon, C., & McKinnon, A. (2018). The preliminary development and validation of a trauma-related safety-seeking behavior measure for youth: The Child Safety Behavior Scale (CSBS). In *Journal of traumatic stress*.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (5th ed.).* https://doi.org/10.1176/appi.books.9780890425596

Andrades, M., García, F. E., & Kilmer, R. P. (2021). Post-traumatic stress symptoms and post-traumatic growth in children and adolescents 12 months and 24 months after the earthquake and tsunamis in Chile in 2010: A longitudinal study. *International journal of psychology : Journal international de psychologie*, *56*(1), 48-55. https://doi.org/10.1002/ijop.12718

Angelakis, S., & Nixon, R. D. (2015). The comorbidity of PTSD and MDD: Implications for clinical practice and future research. *Behaviour Change,* 32(1), 1-25.

Beck, A., Rush, J., Shaw, B. & Emery, G.. (1979). *Cognitive therapy of depression.* In: Guilford Press.

Beck, J.S., Beck, A.T., Jolly, J.B., & Steer, R.A. (2005). Beck Youth Inventories- Second Edition for Children and Adolescents manual. San Antonio, TX: PsychCorp

Benjet, C., Bromet, E., Karam, E. G., Kessler, R. C., McLaughlin, K. A., Ruscio, A. M., Shahly, V., Stein, D. J., Petukhova, M., Hill, E., Alonso, J., Atwoli, L., Bunting, B., Bruffaerts, R., Caldas-de-Almeida, J. M., de Girolamo, G., Florescu, S., Gureje, O., Huang, Y.,…Koenen, K. C. (2016). The epidemiology of traumatic event exposure worldwide: Results from the World Mental Health Survey Consortium. *Psychological medicine*, 46(2), 327-343. https://doi.org/10.1017/S0033291715001981

Ben-Zur, H., & Almog, N. (2013). Post-traumatic Symptoms and Future Orientation among Israeli Adolescents Two Years after the Second Lebanese War: The Effects of War Exposure, Threat and Coping Appraisals. *6*(3), 187-200. https://research.ebsco.com/linkprocessor/plink?id=231e08c9-6b5b-343a-96cf-dceb41b6cad4

Birleson, P. (1988). Depression Self-Rating Scale. *Las depresiones infantiles,* 320.

Breslau, N., Davis, G. C., Peterson, E. L., & Schultz, L. (1997). Psychiatric sequelae of posttraumatic stress disorder in women. *Archives of general psychiatry*, *54*(1), 81-87.

Brown, H. M., Meiser-Stedman, R., Woods, H., & Lester, K. J. (2016). Cognitive vulnerabilities for depression and anxiety in childhood: Specificity of anxiety sensitivity and rumination. *Behavioural and cognitive psychotherapy*.

Bonanno, G. A. (2004). Loss, Trauma, and Human Resilience: Have We Underestimated the Human Capacity to Thrive after Extremely Aversive Events? *American Psychologist*, 59(1), 20-28.

Bonanno, G. A. (2005). Resilience in the face of potential trauma. *Current directions in psychological science*, *14*(3), 135-138.

Bryant, R. A. (2019). Post-traumatic stress disorder: a state-of-the-art review of evidence and challenges. *World psychiatry,* 18(3), 259-269.

Cann, A., Calhoun, L., Tedeschi, R., Triplett, K., Vishnevsky, T., & Lindstrom, C. (2011). Assessing posttraumatic cognitive processes: the Event Related Rumination Inventory.

Anxiety, Stress & Coping, 24(2), 137-156. https://doi.org/10.1080/10615806.2010.529901

Claxton, J., Vibhakar, V., Allen, L., Finn, J., Gee, B. & Meiser-Stedman, R. (2021). Risk factors for depression in trauma-exposed children and adolescents: A systematic review and meta-analysis. *Journal of Affective Disorders,* https://doi.org/10.1016/j.jadr.2021.100150

Cloitre, M., Garvert, D. W., Brewin, C. R., Bryant, R. A., & Maercker, A. (2013). Evidence for proposed ICD-11 PTSD and complex PTSD: A latent profile analysis. European journal of psychotraumatology, 4(1), 20706.

Collins, K. S., Koeske, G. F., Russell, E. B., & Michalopoulos, L. M. (2013). Children's Attributions of Community Violence Exposure and Trauma Symptomatology. *Journal of Child & Adolescent Trauma*, *6*(3), 201-216. https://doi.org/10.1080/19361521.2013.811458

Davis, R. S., Halligan, S. L., Meiser-Stedman, R., Elliott, E., Ward, G., & Hiller, R. M. (2023). A Longitudinal Investigation of the Relationship Between Trauma-Related Cognitive Processes and Internalising and Externalising Psychopathology in Young People in Out-of-Home Care. *Research on child and adolescent psychopathology*, *51*(4), 485-496. https://doi.org/10.1007/s10802-022-01005-0

de Haan, A., Keller, F., Ganser, H. G., Münzer, A., Witt, A., & Goldbeck, L. (2019). Longitudinal Associations Between Dysfunctional Maltreatment-Related Cognitions and Psychopathology in Children and Adolescents. *Journal of traumatic stress*, *32*(4), 496-505. https://doi.org/10.1002/jts.22422

de Haan, A., Kleinke, K., Degen, E., & Landolt, M. A. (2024). Longitudinal relationship between posttraumatic cognitions and internalising symptoms in children and adolescents. *European journal of psychotraumatology,* 15(1). https://doi.org/10.1080/20008066.2024.2398357

de Haan, A., Petermann, F., Meiser-Stedman, R., & Goldbeck, L. (2016). Psychometric Properties of the German Version of the Child Post-Traumatic Cognitions Inventory (CPTCI-GER). *Child Psychiatry & Human Development*, 47(1), 151-158. https://doi.org/10.1007/s10578-015-0552-0

de Haan, A., Tutus, D., Goldbeck, L., Rosner, R., & Landolt, M. A. (2019). Do dysfunctional posttraumatic cognitions play a mediating role in trauma adjustment? Findings from interpersonal and accidental trauma samples of children and adolescents. *European journal of psychotraumatology*, *10*(1), 1596508. https://doi.org/10.1080/20008198.2019.1596508

D'Urso, A., Mastroyannopoulou, K., Kirby, A., & Meiser-Stedman, R. (2018). Posttraumatic stress symptoms in young people with cancer and their siblings: results from a UK sample. *Journal of psychosocial oncology*, *36*(6), 768-783. https://doi.org/10.1080/07347332.2018.1494664

Duval, S., & Tweedie, R. (2000). Trim and Fill: A Simple Funnel-Plot-Based Method of Testing and Adjusting for Publication Bias in Meta-Analysis. *Biometrics*, 56(2), 455-463. https://www.jstor.org/stable/2676988

Egberts, M. R., Verkaik, D., van Baar, A. L., Mooren, T. T. M., Spuij, M., de Paauw-Telman, L. G. E., & Boelen, P. A. (2022). Child Posttraumatic Stress after Parental Cancer: Associations with Individual and Family Factors. *Journal of pediatric psychology*, *47*(9), 1031-1043. https://doi.org/10.1093/jpepsy/jsac041

Ehlers, A., & Clark, D. M. (2000). A cognitive model of posttraumatic stress disorder. Behaviour research and therapy, 38(4), 319-345. https://doi.org/10.1016/S0005-7967(99)00123-0

Ehlers, A., Mayou, R. A., & Bryant, B. (2003). Cognitive predictors of posttraumatic stress disorder in children: results of a prospective longitudinal study. *Behaviour research and therapy.* 41(1), 1-10. https://doi.org/10.1016/S0005-7967(01)00126-7

Ehring, T., Ehlers, A., & Glucksman, E. (2006). Contribution of cognitive factors to the prediction of post-traumatic stress disorder, phobia and depression after motor vehicle accidents. *Behaviour research and therapy*, *44*(12), 1699-1716.

Ehring, T., Ehlers, A., & Glucksman, E. (2008). Do cognitive models help in predicting the severity of posttraumatic stress disorder, phobia, and depression after motor vehicle accidents? A prospective longitudinal study. *Journal of consulting and clinical psychology,* 76(2), 219.

Elhai, J.D., Grubaugh, A.L., Kashdan, T.B., & Frueh, C. (2008). Empirical examination of a proposed refinement to DSM-IV posttraumatic stress disorder symptom criteria using the National Comorbidity Survey Replication data. *Journal of Clinical Psychiatry*, 69, 597–602. doi:10.4088/JCP.v69n0411

Elliott, R., McKinnon, A., Dixon, C., Boyle, A., Murphy, F., Dahm, T., ... & Hitchcock, C. (2021). Prevalence and predictive value of ICD-11 post-traumatic stress disorder and Complex PTSD diagnoses in children and adolescents exposed to a single-event trauma. *Journal of Child Psychology and Psychiatry*, *62*(3), 270-276.

Engel, G. L. (2012). The need for a new medical model: a challenge for biomedicine. *Psychodynamic psychiatr*y (Vol. 40, pp. 377-396). United States: Guilford Press. https://doi.org/10.1521/pdps.2012.40.3.377

Faulstich ME, Carey MP, Ruggiero L, et al. (1986) Assessment of depression in childhood and adolescence: An evaluation of the Center for Epidemiological Studies Depression Scale for Children (CES-DC). *American Journal of Psychiatry* 143(8):1024–1027

Flory, J. D., & Yehuda, R. (2015). Comorbidity between post-traumatic stress disorder and major depressive disorder: alternative explanations and treatment considerations. *Dialogues in clinical neuroscience*, 17(2), 141–150. https://doi.org/10.31887/DCNS.2015.17.2/jflory

Fried, E. I. (2017). The 52 symptoms of major depression: Lack of content overlap among seven common depression scales. *Journal of Affective Disorders*, *208*, 191–197. https://doi.org/10.1016/j.jad.2016.10.019

García-Escalera, J., Chorot, P., Valiente, R. M., Reales, J. M., & Sandín, B. (2016). Efficacy of transdiagnostic cognitive-behavioral therapy for anxiety and depression in adults, children and adolescents: A meta-analysis. *Revista de Psicopatologia y Psicologia Clinica*, 21(3), 147-175. https://doi.org/10.5944/rppc.vol.21.num.3.2016.17811

Greene, T., Gelkopf, M., Grinapol, S., Werbeloff, N., Carlson, E., & Lapid, L. (2017). Trajectories of traumatic stress symptoms during conflict: A latent class growth analysis. *Journal of Affective Disorders,* 220, 24-30. https://doi.org/10.1016/j.jad.2017.05.036

Gros, D. F., Price, M., Magruder, K. M., & Frueh, B. C. (2012). Symptom overlap in posttraumatic stress disorder and major depression. *Psychiatry research*, *196*(2-3), 267-270.

Gomez De La Cuesta, G., Schweizer, S., Diehle, J., Young, J., & Meiser-Stedman, R. (2019). The relationship between maladaptive appraisals and posttraumatic stress disorder: A meta-analysis. *European journal of psychotraumatology.* *doi:10.1080/20008198.2019.1620084*

Han Byul, L., Kyoung Min, S., Young Ki, C., Namhee, K., Yee Jin, S., Un-Sun, C., Seung Min, B., Minha, H., & Hyoung Yoon, C. (2018). Validation of the Child Post-Traumatic Cognitions Inventory in Korean survivors of sexual violence. *Child and adolescent psychiatry and mental health* (Vol. 12, pp. 1-12): BMC.

Hiller, R. M., Creswell, C., Meiser-Stedman, R., Lobo, S., Cowdrey, F., Lyttle, M. D., Ehlers, A., & Halligan, S. L. (2019). A Longitudinal Examination of the Relationship between Trauma-Related Cognitive Factors and Internalising and Externalising Psychopathology in Physically Injured Children. *Journal of abnormal child psychology*, *47*(4), 683-693. https://doi.org/10.1007/s10802-018-0477-8

Hiller, R. M., Halligan, S. L., Ariyanayagam, R., Dalgleish, T., Smith, P., Yule, W., Glucksman, E., Watson, P., & Meiser-Stedman, R. (2016). Predictors of posttraumatic stress symptom trajectories in parents of children exposed to motor vehicle collisions. *Journal of Pediatric Psychology*. https://doi.org/10.1093/jpepsy/jsv068

Hiller, R. M., Meiser-Stedman, R., Fearon, P., Lobo, S., McKinnon, A., Fraser, A., & Halligan, S. L. (2016). Research Review: Changes in the prevalence and symptom severity of child posttraumatic stress disorder in the year following trauma – a meta-analytic study. *Journal of Child Psychology and Psychiatry,* https://doi.org/10.1111/jcpp.12566

Howard, A., Gonzálvez, C., & Kearney, C. A. (2022). Unique factor structures of the Adolescent Dissociative Experiences Scale and Posttraumatic Cognitions Inventory and their relation to PTSD symptom clusters in maltreated youth. *Journal of Aggression, Maltreatment & Trauma*, *31*(2), 219-234. https://doi.org/10.1080/10926771.2021.1894290

IBM Corp. (2021). *IBM SPSS Statistics for Windows, Version 28.0.* Armonk, NY: IBM Corp

IntHout, J., Rovers, M. M., Goeman, J. J., & Ioannidis, J. P. A. (2016). Plea for routinely presenting prediction intervals in meta-analysis. *BMJ*, 6(7). https://doi.org/10.1136/BMJOPEN-2015-010247

Julia, D., Carlijn de, R., Richard, M.-S., Frits, B., & Ramón, J. L. L. (2015). The Dutch version of the Child Posttraumatic Cognitions Inventory: validation in a clinical sample and a school sample. *European journal of psychotraumatology* (Vol. 6, pp. 1-8): Taylor & Francis Group. https://doi.org/10.3402/ejpt.v6.26362

Jin, Y., & Wang, G. (2014). Individual risk factors for PTSD in adolescents from the 2010 earthquake in Yushu: The predictor effect of rumination. *African journal of psychiatry*, *17*(6), 1-6.

Kangaslampi, S., Punamäki, R. L., Qouta, S., Diab, M., & Peltonen, K. (2016). Psychosocial Group Intervention Among War-Affected Children: An Analysis of Changes in Posttraumatic Cognitions. *Journal of traumatic stress*, *29*(6), 546-555. https://doi.org/10.1002/jts.22149

Kaslow, N. J., Stark, K. D., Printz, B., Livingston, R., & Tsai, S. L. (1992). Cognitive Triad Inventory for Children: Development and relation to depression and anxiety. *Journal of Clinical Child Psychology, 21*(4), 339–347. https://doi.org/10.1207/s15374424jccp2104_3

Kassam-Adams, N., Kenardy, J., Delahanty, D., Marsac, M., Meiser-Stedman, R., Nixon, R. D. V., Landolt, M., & Palmieri, P. (2020). Development of an international data repository and research resource: the Prospective studies of Acute Child Trauma and Recovery (PACT/R) Data Archive. *European Journal of Psychotraumatology.* https://doi.org/10.1080/20008198.2020.1729025

Kassam-Adams, N., Palmieri, P. A., Rork, K., Delahanty, D. L., Kenardy, J., Kohser, K. L., Landolt, M. A., Le Brocque, R., Marsac, M. L., Meiser-Stedman, R., Nixon, R. D. V., Bui, E., & McGrath, C. (2012). Acute stress symptoms in children: Results from an international data archive. *Journal of the American Academy of Child & Adolescent Psychiatry.* https://doi.org/10.1016/j.jaac.2012.05.013

Kaur, H. (2014). *Posttraumatic stress disorder in maltreated multiracial youth [dissertation]* PTSDpubs. https://www.proquest.com/dissertations-theses/posttraumatic-stress-disorder-maltreated/docview/1560152467/se-2?accountid=10637

Kilmer, R. P., & Gil-Rivas, V. (2010). Exploring posttraumatic growth in children impacted by Hurricane Katrina: correlates of the phenomenon and developmental considerations. *Child development*, *81*(4), 1211-1227. https://doi.org/10.1111/j.1467-8624.2010.01463.x

Kotov, R., Krueger, R. F., Watson, D., Achenbach, T. M., Althoff, R. R., Bagby, R. M., Brown, T. A., Carpenter, W. T., Caspi, A., Clark, L. A., Eaton, N. R., Forbes, M. K., Forbush, K. T., Goldberg, D., Hasin, D., Hyman, S. E., Ivanova, M. Y., Lynam, D. R., Markon, K., Miller, J. D., … Zimmerman, M. (2017). The Hierarchical Taxonomy of Psychopathology (HiTOP): A dimensional alternative to traditional nosologies. *Journal of abnormal psychology*, *126*(4), 454–477. https://doi.org/10.1037/abn0000258

Lasalvia A. (2015). DSM-5 two years later: facts, myths and some key open issues. *Epidemiology and psychiatric sciences*, *24*(3), 185–187. https://doi.org/10.1017/S2045796015000256

Lee, H. B., Shin, K. M., Chung, Y. K., Kim, N., Shin, Y. J., Chung, U.-S., Bae, S. M., Hong, M., & Chang, H. Y. (2018). Validation of the Child Post-Traumatic Cognitions Inventory in Korean survivors of sexual violence. *Child and adolescent psychiatry and mental health*, *12*. https://doi.org/10.1186/s13034-018-0235-2

Leeson, F. J., & Nixon, R. D. (2011). The role of children's appraisals on adjustment following psychological maltreatment: a pilot study. *Journal of abnormal child psychology*, *39*(5), 759-771. https://doi.org/10.1007/s10802-011-9507-5

Leiva-Bianchi, M., Nvo-Fernandez, M., Villacura-Herrera, C., Mino-Reyes, V., & Varela, N. P. (2023). What are the predictive variables that increase the risk of developing a complex trauma? A meta-analysis. *Journal of Affective Disorders*, *343*, 153-165.

Liu, A., Wang, W., & Wu, X. (2021). The mediating role of rumination in the relation between self-compassion, posttraumatic stress disorder, and posttraumatic growth among adolescents after the jiuzhaigou earthquake. *Current Psychology: A Journal for Diverse Perspectives on Diverse Psychological Issues*. https://doi.org/10.1007/s12144-021-01643-5

Liu, S.-T., & Chen, S.-H. (2015). A community study on the relationship of posttraumatic cognitions to internalizing and externalizing psychopathology in Taiwanese children and

adolescents. *Journal of abnormal child psychology*, *43*(8), 1475-1484. https://doi.org/10.1007/s10802-015-0030-y

Lu, B., Lin, L., & Su, X. (2024). Global burden of depression or depressive symptoms in children and adolescents: A systematic review and meta-analysis. *Journal of Affective Disorders,* 354, 553-562. https://doi.org/10.1016/j.jad.2024.03.074

Lobo, B. O. M., Brunnet, A. E., Ecker, K. K., Schaefer, L. S., Arteche, A. X., Gauer, G., & Kristensen, C. H. (2015). Psychometric properties of the Child Posttraumatic Cognitions Inventory in a sample of Brazilian children. *Journal of aggression, maltreatment & trauma*, *24*(8), 863-875. https://doi.org/10.1080/10926771.2015.1043065

Ma, X., Liu, X., Hu, X., Qiu, C., Wang, Y., Huang, Y., Wang, Q., Zhang, W., & Li, T. (2011). Risk indicators for post-traumatic stress disorder in adolescents exposed to the 512 Wenchuan earthquake in China. *Psychiatry research*, *189*(3), 385-391. https://doi.org/10.1016/j.psychres.2010.12.016

Maier, S. F., & Seligman, M. E. (1976). Learned helplessness: theory and evidence. *Journal of experimental psychology: general*, 105(1), 3.

Mao, L., Wu, Y., Hong, X., Li, P., Yuan, X., & Hu, M. (2023). The influence of childhood maltreatment on trait depression in patients with major depressive disorder: A moderated mediation model of rumination and mindful attention awareness. Journal of affective disorders, 331, 130-138.

Maughan, B., Collishaw, S., & Stringaris, A. (2013). Depression in childhood and adolescence. *Journal of the Canadian Academy of Child and Adolescent Psychiatry,* 22(1), 35.

McLaughlin, K. A., Koenen, K. C., Hill, E. D., Petukhova, M., Sampson, N. A., Zaslavsky, A. M., & Kessler, R. C. (2013). Trauma Exposure and Posttraumatic Stress Disorder in a National Sample of Adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry*, 52(8), 815-830. https://doi.org/10.1016/j.jaac.2013.05.011

Meiser-Stedman, R. (2002). Towards a cognitive-behavioral model of PTSD in children and adolescents. *Clinical child and family psychology review* (Vol. 5, pp. 217-232). United States: Springer.

Meiser-Stedman, R., Dalgleish, T., Glucksman, E., Yule, W., & Smith, P. (2009a). Maladaptive cognitive appraisals mediate the evolution of posttraumatic stress reactions: A 6-month follow-up of child and adolescent assault and motor vehicle accident survivors. *Journal of abnormal psychology*, *118*(4), 778-787. https://doi.org/10.1037/a0016945

Meiser-Stedman, R., McKinnon, A., Dixon, C., Boyle, A., Smith, P., & Dalgleish, T. (2017). Acute stress disorder and the transition to posttraumatic stress disorder in children and adolescents: Prevalence, course, prognosis, diagnostic suitability, and risk markers. *Depression, Anxiety,* 34(348-355). https://doi.org/10.1002/da.22602

Meiser-Stedman, R., McKinnon, A., Dixon, C., Boyle, A., Smith, P., & Dalgleish, T. (2019). A core role for cognitive processes in the acute onset and maintenance of post-traumatic stress in children and adolescents. In *Journal of Child Psychology and Psychiatry*.

Meiser-Stedman, R., Shepperd, A., Glucksman, E., Dalgleish, T., Yule, W., & Smith, P. (2014). Thought control strategies and rumination in youth with acute stress disorder and posttraumatic stress disorder following single-event trauma. *Journal of child and adolescent psychopharmacology*, *24*(1), 47-51. https://doi.org/10.1089/cap.2013.0052

Meiser-Stedman, R., Smith, P., Bryant, R., Salmon, K., Yule, W., Dalgleish, T., & Nixon, R. D. V. (2009b). Development and validation of the child post-traumatic cognitions inventory (CPTCI). *Journal of Child Psychology and Psychiatry.* https://doi.org/10.1111/j.1469-7610.2008.01995.x

Memarzia, J., Lofthouse, K., Dalgleish, T., Boyle, A., McKinnon, A., Dixon, C., Smith, P., & Meiser-Stedman, R. (2024). Predictive models of post-traumatic stress disorder, complex post-traumatic stress disorder, depression, and anxiety in children and adolescents following a single-event trauma. *Psychological Medicine*. https://doi.org/10.1017/S0033291724001648

Mitchell, R., Brennan, K., Curran, D., Hanna, D., & Dyer, K. F. (2017). A Meta-Analysis of the Association Between Appraisals of Trauma and Posttraumatic Stress in Children and Adolescents. *The Journal of Traumatic Stress.* 30(1), 88-93.

Murray, N. L. (2022). *Parental detainment and deportation, child PTSD, post-trauma cognitions, and hope: A moderated mediation model* ProQuest Information & Learning]. psyh. https://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2022-34084-108&site=ehost-live

Möller H. J. (2018). Possibilities and limitations of DSM-5 in improving the classification and diagnosis of mental disorders. Możliwości i ograniczenia DSM-5 w polepszeniu klasyfikacji i diagnozy zaburzeń psychicznych. *Psychiatria polska*, *52*(4), 611–628. https://doi.org/10.12740/PP/91040

National Institute for Health and Care Excellence. (2012). Methods for the development of NICE public health guidance.

National Institute for Health and Care Excellence. (2018). Post-traumatic stress disorder *[NICE Guideline No. 116]*. https://www.nice.org.uk/guidance/ng116

National Institute for Health and Care Excellence. (2019). Depression in children and young people: identification and management *[NICE Guideline No. 134]*. https://www.nice.org.uk/guidance/ng134

National Institute for Health and Social Excellence (2022*) Depression in adults: treatment and management* [NICE Guideline No. 222] www.nice.org.uk/guidance/ng222

Nielsen, J. D., Rosenthal, J. S., Sun, Y., Day, D. M., Bevc, I., & Duchesne, T. (2014). Group-based Criminal Trajectory Analysis Using Cross-validation Criteria. *Communications in statistics*. Theory and methods, United States.

Nixon, R. D. V., Ellis, A. A., Nehmy, T. J., & Ball, S.-A. (2010). Screening and predicting posttraumatic stress and depression in children following single-incident trauma. *Journal of Clinical Child and Adolescent Psychology*, *39*(4), 588-596. https://doi.org/10.1080/15374416.2010.486322

Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. Journal of abnormal psychology, 100(4), 569.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*, 372. https://doi.org/10.1136/bmj.n71

Papageorgiou, C., & Siegle, G. J. (2003). Rumination and Depression Advances in Theory and Research. *Cognitive Therapy and Research.* 27(3), 243-245.

Ponnamperuma, T., & Nicolson, N. A. (2016). Negative Trauma Appraisals and PTSD Symptoms in Sri Lankan Adolescents. *Journal of abnormal child psychology*, *44*(2), 245-255. https://doi.org/10.1007/s10802-015-9985-y

Qi, J., Yang, X., Tan, R., Wu, X., & Zhou, X. (2020). Prevalence and predictors of posttraumatic stress disorder and depression among adolescents over 1 year after the Jiuzhaigou earthquake. *Journal of affective disorders*, *261*, 1-8. https://doi.org/10.1016/j.jad.2019.09.071

R Core Team (2021). R: A language and environment for statistical computing. *R Foundation for Statistical Computing,* Vienna, Austria. https://www.R-project.org/.

Rytwinski, N. K., Scur, M. D., Feeny, N. C., & Youngstrom, E. A. (2013). The co-occurrence of major depressive disorder among individuals with posttraumatic stress disorder: A meta-analysis. *Journal of traumatic stress,* 26(3), 299-309.

Seligman, M. E. (1972). Learned helplessness. *Annual review of medicine,* 23(1), 407-412.

Shanahan, L., Copeland, W. E., Costello, E. J., & Angold, A. (2011). Child-, adolescent-and young adult-onset depressions: Differential risk factors in development? *Psychological Medicine,* 41(11), 2265-2274. https://doi.org/10.1017/S0033291711000675

Shi, L., & Lin, L. (2019). The trim-and-fill method for publication bias: practical guidelines and recommendations based on a large database of meta-analyses. *Medicine*, *98*(23), e15987. https://doi.org/10.1097/MD.0000000000015987

Spinhoven, P., Penninx, B. W., Van Hemert, A. M., De Rooij, M., & Elzinga, B. M. (2014). Comorbidity of PTSD in anxiety and depressive disorders: Prevalence and shared risk factors. *Child abuse & neglect*, *38*(8), 1320-1330.

Srinivas, T., DePrince, A., & Chu, A. (2015). Links between posttrauma appraisals and trauma-related distress in adolescent females from the child welfare system. *Child Abuse and Neglect*, *47*, 14-23. https://doi.org/https://doi.org/10.1016/j.chiabu.2015.05.011

Stallard, P., & Smith, E. (2007). Appraisals and cognitive coping styles associated with chronic post-traumatic symptoms in child road traffic accident survivors. *Journal of child psychology and psychiatry, and allied disciplines*, *48*(2), 194-201. https://doi.org/10.1111/j.1469-7610.2006.01692.x

Szentágotai-Tătar, A., & Miu, A. C. (2016). Individual differences in emotion regulation, childhood trauma and proneness to shame and guilt in adolescence. *PloS one*, *11*(11). https://doi.org/10.1371/journal.pone.0167299

Thomason, T. C. (2014). Criticisms, benefits, and limitations of the DSM-5. Arizona Counseling Journal, 30.

Tierens, M., Bal, S., Crombez, G., Van de Voorde, P., Rosseel, Y., Antrop, I., & Deboutte, D. (2012). The traumatic impact of motor vehicle accidents in high school students. *Journal of pediatric psychology*, *37*(1), 1-10. https://doi.org/10.1093/jpepsy/jsr058

Ting, Y., Xiangdong, L., Haiyang, L., Lei-lei, G., Jin-long, L., Guang, X., Xiaoping, L., Lu, S., Congzhi, W., Liu, Y., Dongmei, Z., Ying, H., Yunxiao, L., & Lin, Z. (2023). Community trauma exposure and post-traumatic stress disorder in Chinese children and adolescents. *Frontiers in psychiatry* (Vol. 14): Frontiers Media S.A. https://doi.org/10.3389/fpsyt.2023.1151631

Valdez, C. E., & Lilly, M. M. (2017). Posttraumatic rumination: content, correlates, and processes. Journal of Clinical Psychology, 73(6), 707-721.

Vasileva, M., Fegert, J. M., Rosner, R., & Witt, A. (2022). Negative Posttraumatic Cognitions in 4- to 8-year-old Children following Maltreatment. *Journal of child & adolescent trauma*, *15*(4), 1041-1050. https://doi.org/10.1007/s40653-022-00455-4

Vibhakar, V., Allen, L. R., Gee, B., & Meiser-Stedman, R. (2019). A systematic review and meta-analysis on the prevalence of depression in children and adolescents after exposure to trauma. *Journal of affective disorders*, 255, 77-89.

von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., & Vandenbroucke, J. P. (2007). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines for Reporting Observational Studies. *Epidemiology*, 18(6), 800-804. https://doi.org/10.1097/EDE.0b013e3181577654

Wahab, S., Yong, L. L., Chieng, W. K., Yamil, M., Sawal, N. A., Abdullah, N. Q., Muhdisin Noor, C. R., Wd Wiredarma, S. M., Ismail, R., Othman, A. H., & Damanhuri, H. A. (2021). Post-traumatic stress symptoms in adolescents exposed to the earthquake in Lombok, Indonesia: Prevalence and association with maladaptive trauma-related cognition and resilience. *Frontiers in psychiatry*, *12*. https://doi.org/10.3389/fpsyt.2021.680393

Wang, S. K., Feng, M., Fang, Y., Lv, L., Sun, G. L., Yang, S. L., ... & Chen, H. X. (2023). Psychological trauma, posttraumatic stress disorder and trauma-related depression: A mini-review. *World journal of psychiatry*, *13*(6), 331.

Wang, W., Li, N., Yuan, Y., Wu, X., & Lan, X. (2022). Longitudinal relationships between guilt and suicide risk among adolescents in a postdisaster context: Mediating roles of rumination and posttraumatic stress disorder. *Suicide & life-threatening behavior*, *52*(4), 773-781. https://doi.org/10.1111/sltb.12861

Wang, W., Wu, X., & Lan, X. (2020). Rumination mediates the relationships of fear and guilt to posttraumatic stress disorder and posttraumatic growth among adolescents after the Ya'an earthquake. *European journal of psychotraumatology*, *11*(1), 1704993. https://doi.org/10.1080/20008198.2019.1704993

Wickham, H. (2016). *ggplot2: Elegant Graphics for Data Analysis.* Springer-Verlag New York. ISBN 978-3-319-24277-4, https://ggplot2.tidyverse.org.

Woolgar, F., Garfield, H., Dalgleish, T., & Meiser-Stedman, R. (2022). Systematic review and meta-analysis: Prevalence of Posttraumatic Stress Disorder (PTSD) in trauma-exposed preschool-aged children. *Journal of the American Academy of Child & Adolescent Psychiatry.* https://doi.org/10.1016/j.jaac.2021.05.026

World Health Organization. (2022). *ICD-11: International classification of diseases (11th revision)*. https://icd.who.int/

World Health Organization. (2024) *Adolescent and Young Adult Health* https://www.who.int/news-room/fact-sheets/detail/adolescents-health-risks-and-solutions/ . Accessed on 05.02.2025

World Health Organization. (2024) *Injuries and Violence* https://www.who.int/news-room/fact-sheets/detail/injuries-and-violence . Accessed on 05.02.2025

Wu, X., Zhou, X., Wu, Y., & An, Y. (2015). The role of rumination in posttraumatic stress disorder and posttraumatic growth among adolescents after the Wenchuan earthquake. *Frontiers in psychology*, 6. https://doi.org/10.3389/fpsyg.2015.01335

Ye, Y., Li, Y., Wu, X., & Zhou, X. (2024). Longitudinal associations between posttraumatic stress disorder, separation anxiety, and rumination among adolescents: Disentangling

within-person and between-person associations. *Psychological Trauma: Theory, Research, Practice, and Policy.* https://doi.org/10.1037/tra0001721

Zhang, J., Meiser-Stedman, R., Jones, B., Smith, P., Dalgleish, T., Boyle, A., Edwards, A., Subramanyam, D., Dixon, C., Sinclaire-Harding, L., Schweizer, S., Newby, J., & McKinnon, A. (2022). Trajectory of post-traumatic stress and depression among children and adolescents following single-incident trauma. *European Journal of Psychotraumatology.* https://doi.org/10.1080/20008198.2022.2037906

Zhang, Y., Xu, W., Yuan, G., & An, Y. (2018). The relationship between posttraumatic cognitive change, posttraumatic stress disorder, and posttraumatic growth among Chinese adolescents after the Yancheng tornado: The mediating effect of rumination. *Frontiers in psychology*, *9*. https://doi.org/10.3389/fpsyg.2018.00474

Zhen, R., Quan, L., Yao, B., & Zhou, X. (2016). Understanding the Relationship between Rainstorm-Related Experiences and PTSD among Chinese Adolescents after Rainstorm Disaster: The Roles of Rumination and Social Support. *Frontiers in psychology,* 7, 1407. https://doi.org/10.3389/fpsyg.2016.01407

Zhou, X., & Wu, X. (2016). The relationship between rumination, posttraumatic stress disorder, and posttraumatic growth among Chinese adolescents after earthquake: A longitudinal study. *Journal of affective disorders*, 193, 242-248. https://doi.org/10.1016/j.jad.2015.12.076

Zhou, X., Wu, X., Fu, F., & An, Y. (2015). Core belief challenge and rumination as predictors of PTSD and PTG among adolescent survivors of the Wenchuan earthquake. *Psychological Trauma: Theory, Research, Practice, and Policy,* 7(4), 391-397. https://doi.org/10.1037/tra0000031

Zhou, X., Zhen, R., & Wu, X. (2021). Insecure attachment to parents and PTSD among adolescents: The roles of parent–child communication, perceived parental depression, and intrusive rumination. *Development and psychopathology,* 33(4), 1290-1299. https://doi.org/10.1017/S0954579420000498

Appendices

Appendix A. *PACT/R Data Request Approval*

RE: [External]PACT/R Data Request - Post-Traumatic Depression

childtraumadata <childtraumadata@chop.edu>
Fri 17/06/2022 14:38
To:Amber Edwards (MED - Postgraduate Researcher) <Amber.Edwards@uea.ac.uk>
Cc:Richard Meiser-Stedman (MED - Staff) <R.Meiser-Stedman@uea.ac.uk>

Good morning Amber,

Your request has been approved and we finished pulling your data! Sorry for my delayed response we took our time a bit with this project given your timeline.

I've shared a folder with you through ShareFile with access to your dataset as well as a few resources for you:

- Note on dataset preparation – this is an overview of how we pulled your data from the archive and a brief guide to understanding the data
- Data Dictionary – this is an updated copy of our data dictionary where you can find additional information about the measures in your dataset as well as a full list of measures across the archive
- Development paper – I believe you've already had a chance to review this paper, but I like to include it as it gives a good overview of our meta data and can sometimes help investigators sort out any additional data they may be interested in
- Measures spreadsheet – this spreadsheet is a breakdown of all of the valid N of participants for each measure across the 14 studies in your dataset. One thing to note here is that while we do have comprehensive coverage of child depression measures, only a few studies have PTS risk prediction measures.

I've also shared this folder with Dr. Meiser-Stedman. Let me know if you have any questions about your data as you have time to dig into it!

Best,
Leila

Appendix B. *Guidance for Clinical Psychology Review*

https://www.sciencedirect.com/journal/clinical-psychology-review/publish/guide-for-authors

About the journal

Aims and scope

Clinical Psychology Review publishes substantive reviews of topics germane to clinical psychology. Papers cover diverse issues including: psychopathology, psychotherapy, behavior therapy, cognition and cognitive therapies, behavioral medicine, community mental health, assessment, and child development. Papers should be cutting edge and advance the science and/or practice of clinical psychology.

Reviews on other topics, such as psychophysiology, learning therapy, experimental psychopathology, and social psychology often appear if they have a clear relationship to research or practice in clinical psychology. Integrative literature reviews and summary reports of innovative ongoing clinical research programs are also sometimes published. Reports on individual research studies and theoretical treatises or clinical guides without an empirical base are not appropriate.

Benefits to authors

We also provide many author benefits, such as free PDFs, a liberal copyright policy, special discounts on Elsevier publications and much more. Please click here for more information on our author services.

Please see our Guide for Authors for information on article submission. If you require any further information or help, please visit our Support Center

Peer review

This journal follows a single anonymized review process. Your submission will initially be assessed by our editors to determine suitability for publication in this journal. If your submission is deemed suitable, it will typically be sent to a minimum of two reviewers for an independent expert assessment of the scientific quality. The decision as to whether your article is accepted or rejected will be taken by our editors. Authors who wish to appeal the editorial decision for their manuscript may submit a formal appeal request in accordance with the procedure outlined in Elsevier's Appeal Policy. Only one appeal per submission will be considered and the appeal decision will be final.

Read more about peer review.

Our editors are not involved in making decisions about papers which:

they have written themselves.

have been written by family members or colleagues.

relate to products or services in which they have an interest.

Any such submissions will be subject to the journal's usual procedures and peer review will be handled independently of the editor involved and their research group. Read more about editor duties.

Special issues and article collections

The peer review process for special issues and article collections follows the same process as outlined above for regular submissions, except, a guest editor will send the submissions out to the reviewers and may recommend a decision to the journal editor. The journal editor oversees the peer review process of all special issues and article collections to ensure the high standards of publishing ethics and responsiveness are respected and is responsible for the final decision regarding acceptance or rejection of articles.

Open access

We refer you to our open access information page to learn about open access options for this journal.

Ethics and policies

Ethics in publishing

Authors must follow ethical guidelines stated in Elsevier's Publishing Ethics Policy.

Submission declaration

When authors submit an article to an Elsevier journal it is implied that:

the work described has not been published previously except in the form of a preprint, an abstract, a published lecture, academic thesis or registered report. See our policy on multiple, redundant or concurrent publication.

the article is not under consideration for publication elsewhere.

the article's publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out.

if accepted, the article will not be published elsewhere in the same form, in English or in any other language, including electronically, without the written consent of the copyright-holder.

To verify compliance with our journal publishing policies, we may check your manuscript with our screening tools.

Authorship

All authors should have made substantial contributions to all of the following:

The conception and design of the study, or acquisition of data, or analysis and interpretation of data.

Drafting the article or revising it critically for important intellectual content.

Final approval of the version to be submitted.

Authors should appoint a corresponding author to communicate with the journal during the editorial process. All authors should agree to be accountable for all aspects of the work to ensure that the questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Changes to authorship

The editors of this journal generally will not consider changes to authorship once a manuscript has been submitted. It is important that authors carefully consider the authorship list and order of authors and provide a definitive author list at original submission.

The policy of this journal around authorship changes:

All authors must be listed in the manuscript and their details entered into the submission system.

Any addition, deletion or rearrangement of author names in the authorship list should only be made prior to acceptance, and only if approved by the journal editor.

Requests to change authorship should be made by the corresponding author, who must provide the reason for the request to the journal editor with written confirmation from all authors, including any authors being added or removed, that they agree with the addition, removal or rearrangement.

All requests to change authorship must be submitted using this form. Requests which do not comply with the instructions outlined in the form will not be considered.

Only in exceptional circumstances will the journal editor consider the addition, deletion or rearrangement of authors post acceptance.

Publication of the manuscript may be paused while a change in authorship request is being considered.

Any authorship change requests approved by the journal editor will result in a corrigendum if the manuscript has already been published.

Any unauthorised authorship changes may result in the rejection of the article, or retraction, if the article has already been published.

Declaration of interests

All authors must disclose any financial and personal relationships with other people or organizations that could inappropriately influence or bias their work. Examples of potential competing interests include:

Employment

Consultancies

Stock ownership

Honoraria

Paid expert testimony

Patent applications or registrations

Grants or any other funding

The Declaration of Interests tool should always be completed.

Authors with no competing interests to declare should select the option, "I have nothing to declare".

The resulting Word document containing your declaration should be uploaded at the "attach/upload files" step in the submission process. It is important that the Word document is saved in the .doc/.docx file format. Author signatures are not required.

We advise you to read our policy on conflict of interest statements, funding source declarations, author agreements/declarations and permission notes.

Funding sources

Authors must disclose any funding sources who provided financial support for the conduct of the research and/or preparation of the article. The role of sponsors, if any, should be declared in relation to the study design, collection, analysis and interpretation of data, writing of the report and decision to submit the article for publication. If funding sources had no such involvement this should be stated in your submission.

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants, scholarships and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, it is recommended to include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of generative AI in scientific writing

Authors must declare the use of generative AI in scientific writing upon submission of the paper. The following guidance refers only to the writing process, and not to the use of AI tools to analyse and draw insights from data as part of the research process:

Generative AI and AI-assisted technologies should only be used in the writing process to improve the readability and language of the manuscript.

The technology must be applied with human oversight and control and authors should carefully review and edit the result, as AI can generate authoritative-sounding output that can be incorrect, incomplete or biased. Authors are ultimately responsible and accountable for the contents of the work.

Authors must not list or cite AI and AI-assisted technologies as an author or co-author on the manuscript since authorship implies responsibilities and tasks that can only be attributed to and performed by humans.

The use of generative AI and AI-assisted technologies in scientific writing must be declared by adding a statement at the end of the manuscript when the paper is first submitted. The statement will appear in the published work and should be placed in a new section before the references list. An example:

Title of new section: Declaration of generative AI and AI-assisted technologies in the writing process.

Statement: During the preparation of this work the author(s) used [NAME TOOL / SERVICE] in order to [REASON]. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the published article.

The declaration does not apply to the use of basic tools, such as tools used to check grammar, spelling and references. If you have nothing to disclose, you do not need to add a statement.

Please read Elsevier's author policy on the use of generative AI and AI-assisted technologies, which can be found in our GenAI Policies for journals.

Please note: to protect authors' rights and the confidentiality of their research, this journal does not currently allow the use of generative AI or AI-assisted technologies such as ChatGPT or similar services by reviewers or editors in the peer review and manuscript evaluation process, as is stated in our GenAI Policies for journals. We are actively evaluating compliant AI tools and may revise this policy in the future.

Preprints

Preprint sharing

Authors may share preprints in line with Elsevier's article sharing policy. Sharing preprints, such as on a preprint server, will not count as prior publication.

We advise you to read our policy on multiple, redundant or concurrent publication.

Use of inclusive language

Inclusive language acknowledges diversity, conveys respect to all people, is sensitive to differences, and promotes equal opportunities. Authors should ensure their work uses inclusive language throughout and contains nothing which might imply one individual is superior to another on the grounds of:

age

gender

race

ethnicity

culture

sexual orientation

disability or health condition

We recommend avoiding the use of descriptors about personal attributes unless they are relevant and valid. Write for gender neutrality with the use of plural nouns ("clinicians, patients/clients") as default. Wherever possible, avoid using "he, she," or "he/she."

No assumptions should be made about the beliefs of readers and writing should be free from bias, stereotypes, slang, reference to dominant culture and/or cultural assumptions.

These guidelines are meant as a point of reference to help you identify appropriate language but are by no means exhaustive or definitive.

Reporting sex- and gender-based analyses

There is no single, universally agreed-upon set of guidelines for defining sex and gender. We offer the following guidance:

Sex and gender-based analyses (SGBA) should be integrated into research design when research involves or pertains to humans, animals or eukaryotic cells. This should be done in accordance with any requirements set by funders or sponsors and best practices within a field.

Sex and/or gender dimensions of the research should be addressed within the article or declared as a limitation to the generalizability of the research.

Definitions of sex and/or gender applied should be explicitly stated to enhance the precision, rigor and reproducibility of the research and to avoid ambiguity or conflation of terms and the constructs to which they refer.

We advise you to read the Sex and Gender Equity in Research (SAGER) guidelines and the SAGER checklist (PDF) on the EASE website, which offer systematic approaches to the use of sex and gender information in study design, data analysis, outcome reporting and research interpretation.

For further information we suggest reading the rationale behind and recommended use of the SAGER guidelines.

Definitions of sex and/or gender

We ask authors to define how sex and gender have been used in their research and publication. Some guidance:

Sex generally refers to a set of biological attributes that are associated with physical and physiological features such as chromosomal genotype, hormonal levels, internal and external anatomy. A binary sex categorization (male/female) is usually designated at birth ("sex assigned at birth") and is in most cases based solely on the visible external anatomy of a newborn. In reality, sex categorizations include people who are intersex/have differences of sex development (DSD).

Gender generally refers to socially constructed roles, behaviors and identities of women, men and gender-diverse people that occur in a historical and cultural context and may vary across societies and over time. Gender influences how people view themselves and each other, how they behave and interact and how power is distributed in society.

Jurisdictional claims

Elsevier respects the decisions taken by its authors as to how they choose to designate territories and identify their affiliations in their published content. Elsevier's policy is to take a neutral position with respect to territorial disputes or jurisdictional claims, including, but not limited to, maps and institutional affiliations. For journals that Elsevier publishes on behalf of a third party owner, the owner may set its own policy on these issues.

Maps: Readers should be able to locate any study areas shown within maps using common mapping platforms. Maps should only show the area actually studied and authors should not include a location map which displays a larger area than the bounding box of the study area. Authors should add a note clearly stating that "map lines delineate study areas and do not necessarily depict accepted national boundaries". During the review process, Elsevier's editors may request authors to change maps if these guidelines are not followed.

Institutional affiliations: Authors should use either the full, standard title of their institution or the standard abbreviation of the institutional name so that the institutional name can be independently verified for research integrity purposes.

Writing and formatting

File format

We ask you to provide editable source files for your entire submission (including figures, tables and text graphics). Some guidelines:

Save files in an editable format, using the extension .doc/.docx for Word files and .tex for LaTeX files. A PDF is not an acceptable source file.

Lay out text in a single-column format.

Remove any strikethrough and underlined text from your manuscript, unless it has scientific significance related to your article.

Use spell-check and grammar-check functions to avoid errors.

We advise you to read our Step-by-step guide to publishing with Elsevier.

Title page

You are required to include the following details in the title page information:

Article title. Article titles should be concise and informative. Please avoid abbreviations and formulae, where possible, unless they are established and widely understood, e.g., DNA).

Author names. Provide the given name(s) and family name(s) of each author. The order of authors should match the order in the submission system. Carefully check that all names are accurately spelled. If needed, you can add your name between parentheses in your own script after the English transliteration.

Affiliations. Add affiliation addresses, referring to where the work was carried out, below the author names. Indicate affiliations using a lower-case superscript letter immediately after the author's name and in front of the corresponding address. Ensure that you provide the full postal address of each affiliation, including the country name and, if available, the email address of each author.

Corresponding author. Clearly indicate who will handle correspondence for your article at all stages of the refereeing and publication process and also post-publication. This responsibility includes answering any future queries about your results, data, methodology and materials. It is important that the email address and contact details of your corresponding author are kept up to date during the submission and publication process.

Present/permanent address. If an author has moved since the work described in your article was carried out, or the author was visiting during that time, a "present address" (or "permanent address") can be indicated by a footnote to the author's name. The address where the author carried out the work must be retained as their main affiliation address. Use superscript Arabic numerals for such footnotes.

Abstract

You are required to provide a concise and factual abstract which does not exceed 250 words. The abstract should briefly state the purpose of your research, principal results and major conclusions. Some guidelines:

Abstracts must be able to stand alone as abstracts are often presented separately from the article.

Avoid references. If any are essential to include, ensure that you cite the author(s) and year(s).

Avoid non-standard or uncommon abbreviations. If any are essential to include, ensure they are defined within your abstract at first mention.

Keywords

You are required to provide 1 to 7 keywords for indexing purposes. Keywords should be written in English. Please try to avoid keywords consisting of multiple words (using "and" or "of").

We recommend that you only use abbreviations in keywords if they are firmly established in the field.

Highlights

You are required to provide article highlights at submission.

Highlights are a short collection of bullet points that should capture the novel results of your research as well as any new methods used during your study. Highlights will help increase the discoverability of your article via search engines. Some guidelines:

Submit highlights as a separate editable file in the online submission system with the word "highlights" included in the file name.

Highlights should consist of 3 to 5 bullet points, each a maximum of 85 characters, including spaces.

We encourage you to view example article highlights and read about the benefits of their inclusion.

Graphical abstract

You are encouraged to provide a graphical abstract at submission.

The graphical abstract should summarize the contents of your article in a concise, pictorial form which is designed to capture the attention of a wide readership. A graphical abstract will help draw more attention to your online article and support readers in digesting your research. Some guidelines:

Submit your graphical abstract as a separate file in the online submission system.

Ensure the image is a minimum of 531 x 1328 pixels (h x w) or proportionally more and is readable at a size of 5 x 13 cm using a regular screen resolution of 96 dpi.

Our preferred file types for graphical abstracts are TIFF, EPS, PDF or MS Office files.

We encourage you to view example graphical abstracts and read about the benefits of including them.

Tables

Tables must be submitted as editable text, not as images. Some guidelines:

Place tables next to the relevant text or on a separate page(s) at the end of your article.

Cite all tables in the manuscript text.

Number tables consecutively according to their appearance in the text.

Please provide captions along with the tables.

Place any table notes below the table body.

Avoid vertical rules and shading within table cells.

We recommend that you use tables sparingly, ensuring that any data presented in tables is not duplicating results described elsewhere in the article.

Figures, images and artwork

Figures, images, artwork, diagrams and other graphical media must be supplied as separate files along with the manuscript. We recommend that you read our detailed artwork and media instructions. Some excerpts:

When submitting artwork:

Cite all images in the manuscript text.

Number images according to the sequence they appear within your article.

Submit each image as a separate file using a logical naming convention for your files (for example, Figure_1, Figure_2 etc).

Please provide captions for all figures, images, and artwork.

Text graphics may be embedded in the text at the appropriate position. If you are working with LaTeX, text graphics may also be embedded in the file.

Artwork formats

When your artwork is finalized, "save as" or convert your electronic artwork to the formats listed below taking into account the given resolution requirements for line drawings, halftones, and line/halftone combinations:

Vector drawings: Save as EPS or PDF files embedding the font or saving the text as "graphics."

Color or grayscale photographs (halftones): Save as TIFF, JPG or PNG files using a minimum of 300 dpi (for single column: min. 1063 pixels, full page width: 2244 pixels).

Bitmapped line drawings: Save as TIFF, JPG or PNG files using a minimum of 1000 dpi (for single column: min. 3543 pixels, full page width: 7480 pixels).

Combinations bitmapped line/halftones (color or grayscale): Save as TIFF, JPG or PNG files using a minimum of 500 dpi (for single column: min. 1772 pixels, full page width: 3740 pixels).

Please do not submit:

files that are too low in resolution (for example, files optimized for screen use such as GIF, BMP, PICT or WPG files).

disproportionally large images compared to font size, as text may become unreadable.

Figure captions

All images must have a caption. A caption should consist of a brief title (not displayed on the figure itself) and a description of the image. We advise you to keep the amount of text in any image to a minimum, though any symbols and abbreviations used should be explained.

Provide captions in a separate file.

Color artwork

If you submit usable color figures with your accepted article, we will ensure that they appear in color online.

Please ensure that color images are accessible to all, including those with impaired color vision. Learn more about color and web accessibility.

For articles appearing in print, you will be sent information on costs to reproduce color in the printed version, after your accepted article has been sent to production. At this stage, please indicate if your preference is to have color only in the online version of your article or also in the printed version.

Generative AI and Figures, images and artwork

Please read our policy on the use of generative AI and AI-assisted tools in figures, images and artwork, which can be found in Elsevier's GenAI Policies for Journals. This policy states:

We do not permit the use of Generative AI or AI-assisted tools to create or alter images in submitted manuscripts.

The only exception is if the use of AI or AI-assisted tools is part of the research design or methods (for example, in the field of biomedical imaging). If this is the case, such use must be described in a reproducible manner in the methods section, including the name of the model or tool, version and extension numbers, and manufacturer.

The use of generative AI or AI-assisted tools in the production of artwork such as for graphical abstracts is not permitted. The use of generative AI in the production of cover art may in some cases be allowed, if the author obtains prior permission from the journal editor and publisher, can demonstrate that all necessary rights have been cleared for the use of the relevant material, and ensures that there is correct content attribution.

Supplementary material

We encourage the use of supplementary materials such as applications, images and sound clips to enhance research. Some guidelines:

Cite all supplementary files in the manuscript text.

Submit supplementary materials at the same time as your article. Be aware that all supplementary materials provided will appear online in the exact same file type as received. These files will not be formatted or typeset by the production team.

Include a concise, descriptive caption for each supplementary file describing its content.

Provide updated files if at any stage of the publication process you wish to make changes to submitted supplementary materials.

Do not make annotations or corrections to a previous version of a supplementary file.

Switch off the option to track changes in Microsoft Office files. If tracked changes are left on, they will appear in your published version.

Video

This journal accepts video material and animation sequences to support and enhance your scientific research. We encourage you to include links to video or animation files within articles. Some guidelines:

When including video or animation file links within your article, refer to the video or animation content by adding a note in your text where the file should be placed.

Clearly label files ensuring the given file name is directly related to the file content.

Provide files in one of our recommended file formats. Files should be within our preferred maximum file size of 150 MB per file, 1 GB in total.

Provide "stills" for each of your files. These will be used as standard icons to personalize the link to your video data. You can choose any frame from your video or animation or make a separate image.

Provide text (for both the electronic and the print version) to be placed in the portions of your article that refer to the video content. This is essential text, as video and animation files cannot be embedded in the print version of the journal.

We publish all video and animation files supplied in the electronic version of your article.

For more detailed instructions, we recommend that you read our guidelines on submitting video content to be included in the body of an article.

Research data

We are committed to supporting the storage of, access to and discovery of research data, and our research data policy sets out the principles guiding how we work with the research community to support a more efficient and transparent research process.

Research data refers to the results of observations or experimentation that validate research findings, which may also include software, code, models, algorithms, protocols, methods and other useful materials related to the project.

Please read our guidelines on sharing research data for more information on depositing, sharing and using research data and other relevant research materials.

For this journal, the following instructions from our research data guidelines apply.

Option B: Research data deposit, citation and linking

You are encouraged to:

Deposit your research data in a relevant data repository.

Cite and link to this dataset in your article.

If this is not possible, make a statement explaining why research data cannot be shared.

Data statement

To foster transparency, you are encouraged to state the availability of any data at submission.

Ensuring data is available may be a requirement of your funding body or institution. If your data is unavailable to access or unsuitable to post, you can state the reason why (e.g., your research data includes sensitive or confidential information such as patient data) during the submission process. This statement will appear with your published article on ScienceDirect.

Read more about the importance and benefits of providing a data statement.

Data linking

Linking to the data underlying your work increases your exposure and may lead to new collaborations. It also provides readers with a better understanding of the described research.

If your research data has been made available in a data repository there are a number of ways your article can be linked directly to the dataset:

Provide a link to your dataset when prompted during the online submission process.

For some data repositories, a repository banner will automatically appear next to your published article on ScienceDirect.

You can also link relevant data or entities within the text of your article through the use of identifiers. Use the following format: Database: 12345 (e.g. TAIR: AT1G01020; CCDC: 734053; PDB: 1XFN).

Learn more about linking research data and research articles in ScienceDirect.

Article structure

Article sections

Divide your manuscript into clearly defined sections covering all essential elements using headings.

Glossary

Please provide definitions of field-specific terms used in your article, in a separate list.

Footnotes

We advise you to use footnotes sparingly. If you include footnotes in your article, ensure that they are numbered consecutively.

You may use system features that automatically build footnotes into text. Alternatively, you can indicate the position of footnotes within the text and present them in a separate section at the end of your article.

Acknowledgements

Include any individuals who provided you with help during your research, such as help with language, writing or proof reading, in the acknowledgements section. Acknowledgements should be placed in a separate section which appears directly before the reference list. Do not include acknowledgements on your title page, as a footnote to your title, or anywhere else in your article other than in the separate acknowledgements section.

Author contributions: CRediT

Corresponding authors are encouraged to acknowledge co-author contributions using CRediT (Contributor Roles Taxonomy) roles:

Conceptualization

Data curation

Formal analysis

Funding acquisition

Investigation

Methodology

Project administration

Resources

Software

Supervision

Validation

Visualization

Writing – original draft

Writing – review and editing

Not all CRediT roles will apply to every manuscript and some authors may contribute through multiple roles.

We advise you to read more about CRediT and view an example of a CRediT author statement.

Funding sources

Authors must disclose any funding sources who provided financial support for the conduct of the research and/or preparation of the article. The role of sponsors, if any, should be declared in relation to the study design, collection, analysis and interpretation of data, writing of the report and decision to submit the article for publication. If funding sources had no such involvement this should be stated in your submission.

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants, scholarships and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, it is recommended to include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Appendices

We ask you to use the following format for appendices:

Identify individual appendices within your article using the format: A, B, etc.

Give separate numbering to formulae and equations within appendices using formats such as Eq. (A.1), Eq. (A.2), etc. and in subsequent appendices, Eq. (B.1), Eq. (B. 2) etc. In a similar way, give separate numbering to tables and figures using formats such as Table A.1; Fig. A.1, etc.

Journal specific information

Manuscripts should be prepared according to the guidelines set forth in the most recent publication manual of the American Psychological Association. Of note, section headings should not be numbered.

Manuscripts should ordinarily not exceed 50 pages, including references and tabular material. Exceptions may be made with prior approval of the Editor in Chief. Manuscript length can often be managed through the judicious use of appendices. In general the References section should be limited to citations actually discussed in the text. References to articles solely included in meta-analyses should be included in an appendix, which will appear in the on line version of the paper but not in the print copy. Similarly, extensive Tables describing study characteristics, containing material published elsewhere, or presenting formulas and other technical material should also be included in an appendix. Authors can direct readers to the appendices in appropriate places in the text.

It is authors' responsibility to ensure their reviews are comprehensive and as up to date as possible (at least to 3 months within date of submission) so the data are still current at the time of publication. Authors are referred to the PRISMA Guidelines (http://www.prisma-statement.org/) for guidance in conducting reviews and preparing manuscripts. Adherence to the Guidelines is not required, but is recommended to enhance quality of submissions and impact of published papers on the field.

References

References within text

Any references cited within your article should also be present in your reference list and vice versa. Some guidelines:

References cited in your abstract must be given in full.

We recommend that you do not include unpublished results and personal communications in your reference list, though you may mention them in the text of your article.

Any unpublished results and personal communications included in your reference list must follow the standard reference style of the journal. In substitution of the publication date add "unpublished results" or "personal communication."

References cited as "in press" imply that the item has been accepted for publication.

Linking to cited sources will increase the discoverability of your research.

Before submission, check that all data provided in your reference list are correct, including any references which have been copied. Providing correct reference data allows us to link to abstracting and indexing services such as Scopus, Crossref and PubMed. Any incorrect surnames, journal or book titles, publication years or pagination within your references may prevent link creation.

We encourage the use of Digital Object Identifiers (DOIs) as reference links as they provide a permanent link to the electronic article referenced.

Reference style

Citations in the text should follow the referencing style used by the American Psychological Association. You are referred to the Publication Manual of the American Psychological Association, Seventh Edition (2020) ISBN 978-1-4338-3215-4.

The reference list should be arranged alphabetically and then chronologically. More than one reference from the same author(s) in the same year must be identified by the letters 'a', 'b', 'c', etc., placed after the year of publication.

Examples:

Reference to a journal publication:

Van der Geer, J., Handgraaf T., & Lupton, R. A. (2020). The art of writing a scientific article. Journal of Scientific Communications, 163, 51–59. https://doi.org/10.1016/j.sc.2020.00372.

Reference to a journal publication with an article number:

Van der Geer, J., Handgraaf, T., & Lupton, R. A. (2022). The art of writing a scientific article. Heliyon, 19, Article e00205. https://doi.org/10.1016/j.heliyon.2022.e00205.

Reference to a book:

Strunk, W., Jr., & White, E. B. (2000). The elements of style (4th ed.). Longman (Chapter 4).

Reference to a chapter in a book:

Mettam, G. R., & Adams, L. B. (2020). How to prepare an electronic version of your article. In B. S. Jones, & R. Z. Smith (Eds.), Introduction to the electronic age (pp. 281–304). E-Publishing Inc.

Reference to a website:

Powertech Systems. (2022). Lithium-ion vs lead-acid cost analysis. Retrieved from http://www.powertechsystems.eu/home/tech-corner/lithium-ion-vs-lead-acid-cost-analysis/. Accessed January 6, 2022.

Reference to a dataset:

Oguro, M., Imahiro, S., Saito, S., & Nakashizuka, T. (2015). Mortality data for Japanese oak wilt disease and surrounding forest compositions [dataset]. Mendeley Data, v1. https://doi.org/10.17632/xwj98nb39r.1.

Reference to a conference paper or poster presentation:

Engle, E.K., Cash, T.F., & Jarry, J.L. (2019, November). The Body Image Behaviours Inventory-3: Development and validation of the Body Image Compulsive Actions and Body Image Avoidance Scales. Poster session presentation at the meeting of the Association for Behavioural and Cognitive Therapies, New York, NY.

Reference to software:

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). Advanced Terrestrial Simulator (ATS) (Version 0.88) [Computer software]. Zenodo. https://doi.org/10.5281/zenodo.3727209.

Web references

When listing web references, as a minimum you should provide the full URL and the date when the reference was last accessed. Additional information (e.g. DOI, author names, dates or reference to a source publication) should also be provided, if known.

You can list web references separately under a new heading directly after your reference list or include them in your reference list.

Data references

We encourage you to cite underlying or relevant datasets within article text and to list data references in the reference list.

When citing data references, you should include:

author name(s)

dataset title

data repository

version (where available)

year

global persistent identifier

Add [dataset] immediately before your reference. This will help us to properly identify the dataset. The [dataset] identifier will not appear in your published article.

Preprint references

We ask you to mark preprints clearly. You should include the word "preprint" or the name of the preprint server as part of your reference and provide the preprint DOI.

Where a preprint has subsequently become available as a peer-reviewed publication, use the formal publication as your reference.

If there are preprints that are central to your work or that cover crucial developments in the topic, but they are not yet formally published, you may reference the preprint.

Reference management software

Most Elsevier journals have their reference template available in popular reference management software products. These include products that support Citation Style Language (CSL) such as Mendeley Reference Manager.

If you use a citation plug-in from these products, select the relevant journal template and all your citations and bibliographies will automatically be formatted in the journal style. We advise you to remove all field codes before submitting your manuscript to any reference management software product.

If a template is not available for this journal, follow the format given in examples in the reference style section of this Guide for Authors.

Submitting your manuscript

Submission checklist

Before completing the submission of your manuscript, we advise you to read our submission checklist:

One author has been designated as the corresponding author and their full contact details (email address, full postal address and phone numbers) have been provided.

All files have been uploaded, including keywords, figure captions and tables (including a title, description and footnotes) included.

Spelling and grammar checks have been carried out.

All references in the article text are cited in the reference list and vice versa.

Permission has been obtained for the use of any copyrighted material from other sources, including the Web.

For gold open access articles, all authors understand that they are responsible for payment of the article publishing charge (APC) if the manuscript is accepted. Payment of the APC may be covered by the corresponding author's institution, or the research funder.

After receiving a final decision

Article Transfer Service

If your manuscript is more suitable for an alternative Elsevier journal, you may receive an email asking you to consider transferring your manuscript via the Elsevier Article Transfer Service.

The recommendation could come from the journal editor, a dedicated in-house scientific managing editor, a tool-assisted recommendation or a combination.

If you agree with the recommendation, your manuscript will be transferred and independently reviewed by the editors of the new journal. You will have the opportunity to make revisions, if necessary, before the submission is complete at the destination journal.

Publishing agreement

Authors will be asked to complete a publishing agreement after acceptance. The corresponding author will receive a link to the online agreement by email. We advise you to read Elsevier's policies related to copyright to learn more about our copyright policies and your, and your employer’s/institution’s, additional rights for subscription and gold open access articles.

License options

Authors will be offered open access user license options which will determine how you, and third parties, can reuse your gold open access article. We advise that you review these options and any funding body license requirements before selecting a license option.

Open access

We refer you to our open access information page to learn about open access options for this journal.

Permission for copyrighted works

If excerpts from other copyrighted works are included in your article, you must obtain written permission from the copyright owners and credit the source(s) within your article using Elsevier's permission request and license form (Word).

Proof correction

To ensure a fast publication process we will ask you to provide proof corrections within two days.

Corresponding authors will be sent an email which includes a link to our online proofing system, allowing annotation and correction of proofs online. The environment is similar to Word. You can edit text, comment on figures and tables and answer questions raised by our copy editor. Our web-based proofing service ensures a faster and less error-prone process.

You can choose to annotate and upload your edits on the PDF version of your article, if preferred. We will provide you with proofing instructions and available alternative proofing methods in our email.

The purpose of the proof is to check the typesetting, editing, completeness and correctness of your article text, tables and figures. Significant changes to your article at the proofing stage will only be considered with approval of the journal editor.

Share Link

A customized Share Link, providing 50 days free access to the final published version of your article on ScienceDirect, will be sent by email to the corresponding author. The Share Link can be used to share your article on any communication channel, such as by email or on social media.

For an extra charge, you will be provided with the option to order paper offprints. A link to an offprint order form will be sent by email when your article is accepted for publication.

A Share Link will not be provided if your article is published gold open access. The final published version of your gold open access article will be openly available on ScienceDirect and can be shared through the article DOI link.

Responsible sharing

We encourage you to share and promote your article to give additional visibility to your work, enabling your paper to contribute to scientific progress and foster the exchange of scientific developments within your field. Read more about how to responsibly share and promote your article.

Resources for authors

Elsevier Researcher Academy

If you would like help to improve your submission or navigate the publication process, support is available via Elsevier Researcher Academy.

Elsevier Researcher Academy offers free e-learning modules, webinars, downloadable guides and research writing and peer review process resources.

Language and editing services

We recommend that you write in American or British English but not a combination of both.

If you feel the English language in your manuscript requires editing to eliminate possible grammatical or spelling errors and to conform to correct scientific English, you may wish to use the English Language Editing service provided by Elsevier's Author Services.

Appendix C. *Quality Assessment Framework*

Population 1 - Was the study population, participants and setting well defined?	0 = sample characteristics, trauma and appraisal/rumination variables not reported in any detail	1= sample characteristics, trauma and appraisals/rumination variable are reported with limited detail	2= sample characteristics, trauma and appraisal/rumination variable are described in detail (including type of study, country of origin, age, gender, ethnicity)
Population 2 - Was the sampling carried out appropriate to the study design, where likelihood of sampling bias minimised?	0 = convenience sampling	1= admissions to a pediatric unit/hospital admission, etc	2= random sampling of those exposed to traumatic event and those not or random sampling of population
Methods 1: Was there a validated measure of trauma or depression was the trauma group appropriately recruited?	0 = not reported	1= yes or no questions to trauma by researchers/not valid measure of trauma	2= trauma appropriately recruited/valid measure of trauma
Methods 2: Was the measure of appraisal or rumination a valid and reliable measure	0 = not reported	1= any other rumination/appraisal measure	2= CTCI or similar valid measure
Methods 3: Was the likelihood of non-response bias minimised	0 = not reported or unclear	1= response rate around 20% or minimal explanation of how this was treated	2= response rate at least 40%, or analysis performed to show no significant difference between responders and non-responders
Analysis 1: Was the sample size adequate?	0 = justification of sample size not reported or very small sample size	1= sample size adequate but did not refer to sample size calculations or consider previous	2= sample size adequate and based on sample size/power calculations or reference to other studies

		studies/minimal information on sample size,	
Analysis 2: Was there appropriate statistical analysis used?	0=statistical methods were inappropriate or the study lacked information on the statistical methodology when reporting the data or size of effect	1= statistical method appropriate but with some missing information e.g. confidence intervals	2= statistical analysis were appropriate
High = >9 Moderate = 5-8 Low = <5			

Appendix D - *Systematic Review: Risk of bias and study quality*

Study	Risk of Bias	Study Quality
Alamdar et al, 2020	12	High
Alberici et al., 2018 (Sample 1)	13	High
Andredes, 2021	11	High
Ben-Zur et al., 2013	10	High
Collins et al., 2013	10	High
Davis et al., 2022	11	High
de Haan et al., 2019 [1] Sample 2	11	High
de Haan et al., 2019 [2]	12	High
De Haan et al., 2024	12	High
D'Urso et al., 2018	11	High
Egberts et al., 2022	10	High
Ehlers et al., 2003	11	High
Hiller et al., 2018	13	High
Howard., 2022	9	High
Jin and Wang, 2014	8	Moderate
Kangaslampi et al., 2016	11	High
Kaur, 2014	11	High
Kilmer et al., 2010	12	High
Lee et al., 2018	11	High
Leeson and Nixon., 2011	13	High
Liu et al., 2015	12	High
Liu et al., 2021	12	High
Lobo et al., 2015	10	High
Ma et al., 2011	9	High
Meiser-Stedman et al., 2009 & Meiser-Stedman et al., 2014	12	High
Meiser-Stedman et al., 2019 & Memarzia, 2024	12	High

Murray, 2022	10	High
Nixon et al., 2010	10	High
Ponnamperuma et al., 2016	9	High
Qi et al., 2020	8	Moderate
Srinivas., 2015	10	High
Stallard et al., 2007	11	High
Szentágotai-Tătar et al., 2016	11	High
Tierens et al., 2012	9	High
Vasileva et al., 2022	11	High
Wahib et al., 2021	9	High
Wang et al., 2020 & Wang et al., 2022	11	High
Wu et al., 2015	11	High
Ye et al., 2024	11	High
Zhang et al., 2018	13	High
Zhen et al., 2016	10	High
Zhou and Wu., 2015	11	High
Zhou et al. 2016	11	High
Zhou et al., 2022	12	High

Note: High Study Quality = Risk of Bias >9; Moderate Study Quality = Risk of Bias 5-8; Low Study Quality = Risk of Bias <5

Appendix E. *Depression and Appraisal Sub-Analyses (Cross Sectional)*

	k	N	Pooled r (95% CI)	Q	I^2 (95% CI)	PI	Moderator p
Study Characteristics							n/a
Trauma Type							
Interpersonal Trauma	6	713	.62 (.38, .78)	96.18*	94.2 (84.7, 99)	-.10, .91	
Non-Interpersonal Trauma	3	919	.50 (.24, .70)	29.14*	93 (73.6, 99.8)	-.05, .82	
Mixed	3	502	.63 (.56, .70)	3.33	33.5 (0, 98.9)	.53, .72	
Number of Traumas							n/a
Single Incident	5	1134	.49** (.23, .68)	59.37*	95.6 (84.5, 99.4)	-.17, .84	
Multiple Trauma	5	584	.69* (.54, .80)	29.28*	87.7 (63.4, 98.5)	.27, .89	
Mixed	2	416	.61* (.53, .68)	1.38	27.7 (0, 99.9)	.51, .70	
Methodological Influences							
Measure of Appraisals							n/a
C/PTCI used	10	1333	.66* (.57, .73)	55.06*	84.9 (66.5, 95.4)	.33, .84	
Alternative Appraisal Measure	2	801	.24*** (.01, .44)	6.03***	83.4 (16.7, 100)	-.14, .55	
Population Influences							
Continent							n/a
Asia	2	522	.7* (.57, .8)	7.25***	86.2 (30.7, 100)	.45, .85	

Europe	5	1152	.63* (.42, .78)	98.07*	94.9 (85.7, 99.3)	.04, .90
North America (USA)	2	219	.26 (-.05, .53)	5.44***	81.6 (7.8, 100)	-.24, .65
South America	1	131	-	-	-	-
Australia	2	110	.69* (.58, .78)	.53	0 (0, 99.8)	.57, .78

* p<.0001 ** p<0.001 ***p<0.05

Appendix F. *PTSD and Appraisal Sub-Analyses*

	k	N	Pooled r (95% CI)	Q	I^2 (95% CI)	PI	Moderator p
Study Characteristics							
Trauma Type							n/a
Interpersonal Trauma	8	1222	.60* (.41, .73)	118.74*	94.3 (86.6, 98.7)	-.03, .89	
Non-Interpersonal Trauma	13	2589	.50* (.39, .59)	144.55*	90.7 (80.9, 96.6)	.08, .77	
Mixed	8	2042	.56* (.45, .66)	89.42*	91.2 (79.4, 97.9)	.20, .79	
Number of Traumas							n/a
Single Incident	16	2924	48* (.38, .57)	169.23*	90.7 (82.2, 96.1)	.04, .77	
Multiple Trauma	9	1779	.59* (.45, .71)	135.20*	93.9 (86.0, 98.5)	.08, .86	
Mixed	4	1150	.66* (.62, .70)	5.78	41.3 (0, 97.7)	.59, .73	
Methodological Influences							.14
Measure of Appraisals							
C/PTCI used	21	3710	.57* (.49, .65)	294.24*	91.9 (85.8, 96.3)	.13, .83	
Alternative Appraisal Measure	8	2143	.46* (.33, .58)	93.97*	91.8 (80.5, 98.0)	.05, .74	
Population Influences							
Continent							n/a
Asia	7	2344	.57* (.38, .71)	219.29*	97.1 (93, 99.4)	-.03, .87	
Europe	14	2569	.57* (.5, .64)	106.79*	83 (66, 92.9)	.30, .76	
North America (USA)	5	699	.31*(.13, .47)	22.77*	82.2 (49.4, 97.9)	-10, .63	
South America	1	131	-	-	-	-	
Australia	2	110	.75* (.50, .88)	3.08	67.5 (0, 100)	.32, .92	

* p<.0001 ** p<0.001 *** p<0.05

Appendix G. *PTSD and Rumination Sub-Analyses (Cross Sectional)*

	k	N	Pooled r (95% CI)	Q	I^2 (95% CI)	PI	Moderator p
Methodological Influences							
Rumination Measure							.10
Trauma Rumination Measure	10	3658	.46* (.33, .57)	120.78*	94.9 (88.6, 98.7)	.01, .75	
General Rumination Measure	4	2569	.23 (-.07, .50)	37.97*	98 (93, 99.9)	-.41, .72	
Population Influences							
Continent							n/a
Asia	9	5492	.29* (.16, .41)	116.96*	95.8 (90.6, 99.1)	-.11, .61	
Europe	3	344	.63* (.36, .80)	18.69*	88.9 (58.7, 99.7)	.06, .89	
North America (USA)	1	66	-	-	-	-	-
South America	1	325	-	-	-	-	-
Australia	0	-	-	-	-	-	-

* p<.0001 ** p<0.001 *** p<0.05

Appendix H. *Guidance for Journal of Affective Disorders*

https://www.sciencedirect.com/journal/journal-of-affective-disorders/publish/guide-for-authors

About the journal

Aims and scope

Official Journal of the International Society for Affective Disorders The Journal of Affective Disorders publishes papers concerned with affective disorders in the widest sense: depression, mania, mood spectrum, emotions and personality, anxiety and stress. It is interdisciplinary and aims to bring together different approaches for a diverse readership. Top quality papers will be accepted dealing with any aspect of affective disorders, including neuroimaging, cognitive neurosciences, genetics, molecular biology, experimental and clinical neurosciences, pharmacology, neuroimmunoendocrinology, intervention and treatment trials.

Journal of Affective Disorders is the companion title to the open access Journal of Affective Disorders Reports.

Article types

The Journal primarily publishes:

Full-Length Research Papers

(up to 5000 words, excluding references and up to 6 tables/figures)

Review Articles and Meta-analyses

(up to 8000 words, excluding references and up to 10 tables/figures)

Short Communications

(up to 2000 words, 20 references, 2 tables/figures)

Correspondence

(up to 1000 words, 10 references, 1 table/figure).

At the discretion of the accepting Editor-in-Chief, and/or based on reviewer feedback, authors may be allowed fewer or more than these guidelines.

Peer review

This journal follows a single anonymized review process. Your submission will initially be assessed by our editors to determine suitability for publication in this journal. If your submission is deemed suitable, it will typically be sent to a minimum of two reviewers for an independent expert assessment of the scientific quality. The decision as to whether your article is accepted or rejected will be taken by our editors. Authors who wish to appeal the editorial decision for their manuscript may submit a formal appeal request in accordance with the procedure outlined in Elsevier's Appeal Policy. Only one appeal per submission will be considered and the appeal decision will be final.

Read more about peer review.

Our editors are not involved in making decisions about papers which:

they have written themselves.

have been written by family members or colleagues.

relate to products or services in which they have an interest.

Any such submissions will be subject to the journal's usual procedures and peer review will be handled independently of the editor involved and their research group. Read more about editor duties.

Special issues and article collections

The peer review process for special issues and article collections follows the same process as outlined above for regular submissions, except, a guest editor will send the submissions out to the reviewers and may recommend a decision to the journal editor. The journal editor oversees the peer review process of all special issues and article collections to ensure the high standards of publishing ethics and responsiveness are respected and is responsible for the final decision regarding acceptance or rejection of articles.

Open access

We refer you to our open access information page to learn about open access options for this journal.

Ethics and policies

Ethics in publishing

Authors must follow ethical guidelines stated in Elsevier's Publishing Ethics Policy.

Submission declaration

When authors submit an article to an Elsevier journal it is implied that:

the work described has not been published previously except in the form of a preprint, an abstract, a published lecture, academic thesis or registered report. See our policy on multiple, redundant or concurrent publication.

the article is not under consideration for publication elsewhere.

the article's publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out.

if accepted, the article will not be published elsewhere in the same form, in English or in any other language, including electronically, without the written consent of the copyright-holder.

To verify compliance with our journal publishing policies, we may check your manuscript with our screening tools.

Authorship

All authors should have made substantial contributions to all of the following:

The conception and design of the study, or acquisition of data, or analysis and interpretation of data.

Drafting the article or revising it critically for important intellectual content.

Final approval of the version to be submitted.

Authors should appoint a corresponding author to communicate with the journal during the editorial process. All authors should agree to be accountable for all aspects of the work to ensure that the questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Changes to authorship

The editors of this journal generally will not consider changes to authorship once a manuscript has been submitted. It is important that authors carefully consider the authorship list and order of authors and provide a definitive author list at original submission.

The policy of this journal around authorship changes:

All authors must be listed in the manuscript and their details entered into the submission system.

Any addition, deletion or rearrangement of author names in the authorship list should only be made prior to acceptance, and only if approved by the journal editor.

Requests to change authorship should be made by the corresponding author, who must provide the reason for the request to the journal editor with written confirmation from all authors, including any authors being added or removed, that they agree with the addition, removal or rearrangement.

All requests to change authorship must be submitted using this form. Requests which do not comply with the instructions outlined in the form will not be considered.

Only in exceptional circumstances will the journal editor consider the addition, deletion or rearrangement of authors post acceptance.

Publication of the manuscript may be paused while a change in authorship request is being considered.

Any authorship change requests approved by the journal editor will result in a corrigendum if the manuscript has already been published.

Any unauthorised authorship changes may result in the rejection of the article, or retraction, if the article has already been published.

Declaration of interests

All authors must disclose any financial and personal relationships with other people or organizations that could inappropriately influence or bias their work. Examples of potential competing interests include:

Employment

Consultancies

Stock ownership

Honoraria

Paid expert testimony

Patent applications or registrations

Grants or any other funding

The Declaration of Interests tool should always be completed.

Authors with no competing interests to declare should select the option, "I have nothing to declare".

The resulting Word document containing your declaration should be uploaded at the "attach/upload files" step in the submission process. It is important that the Word document is saved in the .doc/.docx file format. Author signatures are not required.

We advise you to read our policy on conflict of interest statements, funding source declarations, author agreements/declarations and permission notes.

Funding sources

Authors must disclose any funding sources who provided financial support for the conduct of the research and/or preparation of the article. The role of sponsors, if any, should be declared in relation to the study design, collection, analysis and interpretation of data, writing of the report and decision to submit the article for publication. If funding sources had no such involvement this should be stated in your submission.

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants, scholarships and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, it is recommended to include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of generative AI in scientific writing

Authors must declare the use of generative AI in scientific writing upon submission of the paper. The following guidance refers only to the writing process, and not to the use of AI tools to analyse and draw insights from data as part of the research process:

Generative AI and AI-assisted technologies should only be used in the writing process to improve the readability and language of the manuscript.

The technology must be applied with human oversight and control and authors should carefully review and edit the result, as AI can generate authoritative-sounding output that can be incorrect, incomplete or biased. Authors are ultimately responsible and accountable for the contents of the work.

Authors must not list or cite AI and AI-assisted technologies as an author or co-author on the manuscript since authorship implies responsibilities and tasks that can only be attributed to and performed by humans.

The use of generative AI and AI-assisted technologies in scientific writing must be declared by adding a statement at the end of the manuscript when the paper is first submitted. The statement will appear in the published work and should be placed in a new section before the references list. An example:

Title of new section: Declaration of generative AI and AI-assisted technologies in the writing process.

Statement: During the preparation of this work the author(s) used [NAME TOOL / SERVICE] in order to [REASON]. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the published article.

The declaration does not apply to the use of basic tools, such as tools used to check grammar, spelling and references. If you have nothing to disclose, you do not need to add a statement.

Please read Elsevier's author policy on the use of generative AI and AI-assisted technologies, which can be found in our GenAI Policies for journals.

Please note: to protect authors' rights and the confidentiality of their research, this journal does not currently allow the use of generative AI or AI-assisted technologies such as ChatGPT or similar services by reviewers or editors in the peer review and manuscript evaluation process, as is stated in our GenAI Policies for journals. We are actively evaluating compliant AI tools and may revise this policy in the future.

Preprints

Preprint sharing

Authors may share preprints in line with Elsevier's article sharing policy. Sharing preprints, such as on a preprint server, will not count as prior publication.

We advise you to read our policy on multiple, redundant or concurrent publication.

Use of inclusive language

Inclusive language acknowledges diversity, conveys respect to all people, is sensitive to differences, and promotes equal opportunities. Authors should ensure their work uses inclusive language throughout and contains nothing which might imply one individual is superior to another on the grounds of:

age

gender

race

ethnicity

culture

sexual orientation

disability or health condition

We recommend avoiding the use of descriptors about personal attributes unless they are relevant and valid. Write for gender neutrality with the use of plural nouns ("clinicians, patients/clients") as default. Wherever possible, avoid using "he, she," or "he/she."

No assumptions should be made about the beliefs of readers and writing should be free from bias, stereotypes, slang, reference to dominant culture and/or cultural assumptions.

These guidelines are meant as a point of reference to help you identify appropriate language but are by no means exhaustive or definitive.

Reporting sex- and gender-based analyses

There is no single, universally agreed-upon set of guidelines for defining sex and gender. We offer the following guidance:

Sex and gender-based analyses (SGBA) should be integrated into research design when research involves or pertains to humans, animals or eukaryotic cells. This should be done in accordance with any requirements set by funders or sponsors and best practices within a field.

Sex and/or gender dimensions of the research should be addressed within the article or declared as a limitation to the generalizability of the research.

Definitions of sex and/or gender applied should be explicitly stated to enhance the precision, rigor and reproducibility of the research and to avoid ambiguity or conflation of terms and the constructs to which they refer.

We advise you to read the Sex and Gender Equity in Research (SAGER) guidelines and the SAGER checklist (PDF) on the EASE website, which offer systematic approaches to the use of

sex and gender information in study design, data analysis, outcome reporting and research interpretation.

For further information we suggest reading the rationale behind and recommended use of the SAGER guidelines.

Definitions of sex and/or gender

We ask authors to define how sex and gender have been used in their research and publication. Some guidance:

Sex generally refers to a set of biological attributes that are associated with physical and physiological features such as chromosomal genotype, hormonal levels, internal and external anatomy. A binary sex categorization (male/female) is usually designated at birth ("sex assigned at birth") and is in most cases based solely on the visible external anatomy of a newborn. In reality, sex categorizations include people who are intersex/have differences of sex development (DSD).

Gender generally refers to socially constructed roles, behaviors and identities of women, men and gender-diverse people that occur in a historical and cultural context and may vary across societies and over time. Gender influences how people view themselves and each other, how they behave and interact and how power is distributed in society.

Jurisdictional claims

Elsevier respects the decisions taken by its authors as to how they choose to designate territories and identify their affiliations in their published content. Elsevier's policy is to take a neutral position with respect to territorial disputes or jurisdictional claims, including, but not limited to,

maps and institutional affiliations. For journals that Elsevier publishes on behalf of a third party owner, the owner may set its own policy on these issues.

Maps: Readers should be able to locate any study areas shown within maps using common mapping platforms. Maps should only show the area actually studied and authors should not include a location map which displays a larger area than the bounding box of the study area. Authors should add a note clearly stating that "map lines delineate study areas and do not necessarily depict accepted national boundaries". During the review process, Elsevier's editors may request authors to change maps if these guidelines are not followed.

Institutional affiliations: Authors should use either the full, standard title of their institution or the standard abbreviation of the institutional name so that the institutional name can be independently verified for research integrity purposes.

Writing and formatting

File format

We ask you to provide editable source files for your entire submission (including figures, tables and text graphics). Some guidelines:

Save files in an editable format, using the extension .doc/.docx for Word files and .tex for LaTeX files. A PDF is not an acceptable source file.

Lay out text in a single-column format.

Remove any strikethrough and underlined text from your manuscript, unless it has scientific significance related to your article.

Use spell-check and grammar-check functions to avoid errors.

We advise you to read our Step-by-step guide to publishing with Elsevier.

Title page

You are required to include the following details in the title page information:

Article title. Article titles should be concise and informative. Please avoid abbreviations and formulae, where possible, unless they are established and widely understood, e.g., DNA).

Author names. Provide the given name(s) and family name(s) of each author. The order of authors should match the order in the submission system. Carefully check that all names are accurately spelled. If needed, you can add your name between parentheses in your own script after the English transliteration.

Affiliations. Add affiliation addresses, referring to where the work was carried out, below the author names. Indicate affiliations using a lower-case superscript letter immediately after the author's name and in front of the corresponding address. Ensure that you provide the full postal address of each affiliation, including the country name and, if available, the email address of each author.

Corresponding author. Clearly indicate who will handle correspondence for your article at all stages of the refereeing and publication process and also post-publication. This responsibility includes answering any future queries about your results, data, methodology and materials. It is important that the email address and contact details of your corresponding author are kept up to date during the submission and publication process.

Present/permanent address. If an author has moved since the work described in your article was carried out, or the author was visiting during that time, a "present address" (or "permanent address") can be indicated by a footnote to the author's name. The address where the author

carried out the work must be retained as their main affiliation address. Use superscript Arabic numerals for such footnotes.

Abstract

You are required to provide a concise and factual abstract which does not exceed 250 words. The abstract should briefly state the purpose of your research, principal results and major conclusions. Some guidelines:

Abstracts must be able to stand alone as abstracts are often presented separately from the article.

Avoid references. If any are essential to include, ensure that you cite the author(s) and year(s).

Avoid non-standard or uncommon abbreviations. If any are essential to include, ensure they are defined within your abstract at first mention.

Keywords

You are required to provide 1 to 7 keywords for indexing purposes. Keywords should be written in English. Please try to avoid keywords consisting of multiple words (using "and" or "of").

We recommend that you only use abbreviations in keywords if they are firmly established in the field.

Highlights

You are required to provide article highlights at submission.

Highlights are a short collection of bullet points that should capture the novel results of your research as well as any new methods used during your study. Highlights will help increase the discoverability of your article via search engines. Some guidelines:

Submit highlights as a separate editable file in the online submission system with the word "highlights" included in the file name.

Highlights should consist of 3 to 5 bullet points, each a maximum of 85 characters, including spaces.

We encourage you to view example article highlights and read about the benefits of their inclusion.

Graphical abstract

You are encouraged to provide a graphical abstract at submission.

The graphical abstract should summarize the contents of your article in a concise, pictorial form which is designed to capture the attention of a wide readership. A graphical abstract will help draw more attention to your online article and support readers in digesting your research. Some guidelines:

Submit your graphical abstract as a separate file in the online submission system.

Ensure the image is a minimum of 531 x 1328 pixels (h x w) or proportionally more and is readable at a size of 5 x 13 cm using a regular screen resolution of 96 dpi.

Our preferred file types for graphical abstracts are TIFF, EPS, PDF or MS Office files.

We encourage you to view example graphical abstracts and read about the benefits of including them.

Math formulae

Submit math equations as editable text, not as images.

Present simple formulae in line with normal text, where possible.

Use the solidus (/) instead of a horizontal line for small fractional terms such as X/Y.

Present variables in italics.

Denote powers of e by exp.

Display equations separately from your text, numbering them consecutively in the order they are referred to within your text.

Tables

Tables must be submitted as editable text, not as images. Some guidelines:

Place tables next to the relevant text or on a separate page(s) at the end of your article.

Cite all tables in the manuscript text.

Number tables consecutively according to their appearance in the text.

Please provide captions along with the tables.

Place any table notes below the table body.

Avoid vertical rules and shading within table cells.

We recommend that you use tables sparingly, ensuring that any data presented in tables is not duplicating results described elsewhere in the article.

Figures, images and artwork

Figures, images, artwork, diagrams and other graphical media must be supplied as separate files along with the manuscript. We recommend that you read our detailed artwork and media instructions. Some excerpts:

When submitting artwork:

Cite all images in the manuscript text.

Number images according to the sequence they appear within your article.

Submit each image as a separate file using a logical naming convention for your files (for example, Figure_1, Figure_2 etc).

Please provide captions for all figures, images, and artwork.

Text graphics may be embedded in the text at the appropriate position. If you are working with LaTeX, text graphics may also be embedded in the file.

Artwork formats

When your artwork is finalized, "save as" or convert your electronic artwork to the formats listed below taking into account the given resolution requirements for line drawings, halftones, and line/halftone combinations:

Vector drawings: Save as EPS or PDF files embedding the font or saving the text as "graphics."

Color or grayscale photographs (halftones): Save as TIFF, JPG or PNG files using a minimum of 300 dpi (for single column: min. 1063 pixels, full page width: 2244 pixels).

Bitmapped line drawings: Save as TIFF, JPG or PNG files using a minimum of 1000 dpi (for single column: min. 3543 pixels, full page width: 7480 pixels).

Combinations bitmapped line/halftones (color or grayscale): Save as TIFF, JPG or PNG files using a minimum of 500 dpi (for single column: min. 1772 pixels, full page width: 3740 pixels).

Please do not submit:

files that are too low in resolution (for example, files optimized for screen use such as GIF, BMP, PICT or WPG files).

disproportionally large images compared to font size, as text may become unreadable.

Figure captions

All images must have a caption. A caption should consist of a brief title (not displayed on the figure itself) and a description of the image. We advise you to keep the amount of text in any image to a minimum, though any symbols and abbreviations used should be explained.

Provide captions in a separate file.

Color artwork

If you submit usable color figures with your accepted article, we will ensure that they appear in color online.

Please ensure that color images are accessible to all, including those with impaired color vision. Learn more about color and web accessibility.

For articles appearing in print, you will be sent information on costs to reproduce color in the printed version, after your accepted article has been sent to production. At this stage, please indicate if your preference is to have color only in the online version of your article or also in the printed version.

Generative AI and Figures, images and artwork

Please read our policy on the use of generative AI and AI-assisted tools in figures, images and artwork, which can be found in Elsevier's GenAI Policies for Journals. This policy states:

We do not permit the use of Generative AI or AI-assisted tools to create or alter images in submitted manuscripts.

The only exception is if the use of AI or AI-assisted tools is part of the research design or methods (for example, in the field of biomedical imaging). If this is the case, such use must be described in a reproducible manner in the methods section, including the name of the model or tool, version and extension numbers, and manufacturer.

The use of generative AI or AI-assisted tools in the production of artwork such as for graphical abstracts is not permitted. The use of generative AI in the production of cover art may in some cases be allowed, if the author obtains prior permission from the journal editor and publisher, can demonstrate that all necessary rights have been cleared for the use of the relevant material, and ensures that there is correct content attribution.

Supplementary material

We encourage the use of supplementary materials such as applications, images and sound clips to enhance research. Some guidelines:

Cite all supplementary files in the manuscript text.

Submit supplementary materials at the same time as your article. Be aware that all supplementary materials provided will appear online in the exact same file type as received. These files will not be formatted or typeset by the production team.

Include a concise, descriptive caption for each supplementary file describing its content.

Provide updated files if at any stage of the publication process you wish to make changes to submitted supplementary materials.

Do not make annotations or corrections to a previous version of a supplementary file.

Switch off the option to track changes in Microsoft Office files. If tracked changes are left on, they will appear in your published version.

Video

This journal accepts video material and animation sequences to support and enhance your scientific research. We encourage you to include links to video or animation files within articles.

Some guidelines:

When including video or animation file links within your article, refer to the video or animation content by adding a note in your text where the file should be placed.

Clearly label files ensuring the given file name is directly related to the file content.

Provide files in one of our recommended file formats. Files should be within our preferred maximum file size of 150 MB per file, 1 GB in total.

Provide "stills" for each of your files. These will be used as standard icons to personalize the link to your video data. You can choose any frame from your video or animation or make a separate image.

Provide text (for both the electronic and the print version) to be placed in the portions of your article that refer to the video content. This is essential text, as video and animation files cannot be embedded in the print version of the journal.

We publish all video and animation files supplied in the electronic version of your article.

For more detailed instructions, we recommend that you read our guidelines on submitting video content to be included in the body of an article.

Research data

We are committed to supporting the storage of, access to and discovery of research data, and our research data policy sets out the principles guiding how we work with the research community to support a more efficient and transparent research process.

Research data refers to the results of observations or experimentation that validate research findings, which may also include software, code, models, algorithms, protocols, methods and other useful materials related to the project.

Please read our guidelines on sharing research data for more information on depositing, sharing and using research data and other relevant research materials.

For this journal, the following instructions from our research data guidelines apply.

Option B: Research data deposit, citation and linking

You are encouraged to:

Deposit your research data in a relevant data repository.

Cite and link to this dataset in your article.

If this is not possible, make a statement explaining why research data cannot be shared.

Data statement

To foster transparency, you are encouraged to state the availability of any data at submission.

Ensuring data is available may be a requirement of your funding body or institution. If your data is unavailable to access or unsuitable to post, you can state the reason why (e.g., your research data includes sensitive or confidential information such as patient data) during the submission process. This statement will appear with your published article on ScienceDirect.

Read more about the importance and benefits of providing a data statement.

Data linking

Linking to the data underlying your work increases your exposure and may lead to new collaborations. It also provides readers with a better understanding of the described research.

If your research data has been made available in a data repository there are a number of ways your article can be linked directly to the dataset:

Provide a link to your dataset when prompted during the online submission process.

For some data repositories, a repository banner will automatically appear next to your published article on ScienceDirect.

You can also link relevant data or entities within the text of your article through the use of identifiers. Use the following format: Database: 12345 (e.g. TAIR: AT1G01020; CCDC: 734053; PDB: 1XFN).

Learn more about linking research data and research articles in ScienceDirect.

Data in Brief and MethodsX: co-submission

You are encouraged to publish research data, methods or protocols related to your manuscript as a co-submission article in Data in Brief or MethodsX. By publishing a co-submission, you further advance research reproducibility, interoperability, and open science. In case both your original research article and your co-submission article(s) get accepted for publication, they will be linked together on ScienceDirect.

When submitting your original research article, please follow the co-submission process active for this journal:

Describe the research data, methods or protocols in a separate paper to be considered for publication in Data in Brief or in MethodsX.

Adhere to one of the following submission templates:

Data article template (Data in Brief)

Methods article template (MethodsX)

Protocol article template (MethodsX)

Online submission of your co-submission article:

When you upload the files for your original research article, in the 'Attach Files' step in the Editorial Manager submission process, please also upload the file(s) for your co-submission.

Please select 'Data in Brief' or 'MethodsX' from the 'Select Item Type' drop-down menu when you upload your co-submission file(s).

Submit your co-submission file(s) as a Word document.

Article structure

Article sections

Divide your manuscript into clearly defined sections covering all essential elements using headings.

Glossary

Please provide definitions of field-specific terms used in your article, in a separate list.

Footnotes

We advise you to use footnotes sparingly. If you include footnotes in your article, ensure that they are numbered consecutively.

You may use system features that automatically build footnotes into text. Alternatively, you can indicate the position of footnotes within the text and present them in a separate section at the end of your article.

Acknowledgements

Include any individuals who provided you with help during your research, such as help with language, writing or proof reading, in the acknowledgements section. Acknowledgements should be placed in a separate section which appears directly before the reference list. Do not include acknowledgements on your title page, as a footnote to your title, or anywhere else in your article other than in the separate acknowledgements section.

Author contributions: CRediT

Corresponding authors are required to acknowledge co-author contributions using CRediT (Contributor Roles Taxonomy) roles:

Conceptualization

Data curation

Formal analysis

Funding acquisition

Investigation

Methodology

Project administration

Resources

Software

Supervision

Validation

Visualization

Writing – original draft

Writing – review and editing

Not all CRediT roles will apply to every manuscript and some authors may contribute through multiple roles.

We advise you to read more about CRediT and view an example of a CRediT author statement.

Funding sources

Authors must disclose any funding sources who provided financial support for the conduct of the research and/or preparation of the article. The role of sponsors, if any, should be declared in relation to the study design, collection, analysis and interpretation of data, writing of the report and decision to submit the article for publication. If funding sources had no such involvement this should be stated in your submission.

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants, scholarships and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, it is recommended to include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Appendices

We ask you to use the following format for appendices:

Identify individual appendices within your article using the format: A, B, etc.

Give separate numbering to formulae and equations within appendices using formats such as Eq. (A.1), Eq. (A.2), etc. and in subsequent appendices, Eq. (B.1), Eq. (B. 2) etc. In a similar way, give separate numbering to tables and figures using formats such as Table A.1; Fig. A.1, etc.

References

References within text

Any references cited within your article should also be present in your reference list and vice versa. Some guidelines:

References cited in your abstract must be given in full.

We recommend that you do not include unpublished results and personal communications in your reference list, though you may mention them in the text of your article.

Any unpublished results and personal communications included in your reference list must follow the standard reference style of the journal. In substitution of the publication date add "unpublished results" or "personal communication."

References cited as "in press" imply that the item has been accepted for publication.

Linking to cited sources will increase the discoverability of your research.

Before submission, check that all data provided in your reference list are correct, including any references which have been copied. Providing correct reference data allows us to link to abstracting and indexing services such as Scopus, Crossref and PubMed. Any incorrect surnames, journal or book titles, publication years or pagination within your references may prevent link creation.

We encourage the use of Digital Object Identifiers (DOIs) as reference links as they provide a permanent link to the electronic article referenced.

Reference style

All citations in the text should refer to:

Single author: the author's name (without initials, unless there is ambiguity) and the year of publication.

Two authors: both authors' names and the year of publication.

Three or more authors: first author's name followed by 'et al.' and the year of publication.

Citations can be made directly (or parenthetically). Groups of references can be listed either first alphabetically, then chronologically, or vice versa. Examples: "as demonstrated (Allan, 2020a,

2020b; Allan and Jones, 2019)" or "as demonstrated (Jones, 2019; Allan, 2020). Kramer et al. (2023) have recently shown".

The list of references should be arranged alphabetically and then chronologically if necessary. More than one reference from the same author(s) in the same year must be identified by the letters 'a', 'b', 'c', etc., placed after the year of publication.

Abbreviate journal names according to the List of Title Word Abbreviations (LTWA).

Examples:

Reference to a journal publication:

Van der Geer, J., Handgraaf, T., Lupton, R.A., 2020. The art of writing a scientific article. J. Sci. Commun. 163, 51–59. https://doi.org/10.1016/j.sc.2020.00372.

Reference to a journal publication with an article number:

Van der Geer, J., Handgraaf, T., Lupton, R.A., 2022. The art of writing a scientific article. Heliyon. 19, e00205. https://doi.org/10.1016/j.heliyon.2022.e00205.

Reference to a book:

Strunk Jr., W., White, E.B., 2000. The Elements of Style, fourth ed. Longman, New York.

Reference to a chapter in a book:

Mettam, G.R., Adams, L.B., 2023. How to prepare an electronic version of your article, in: Jones, B.S., Smith, R.Z. (Eds.), Introduction to the Electronic Age. E-Publishing Inc., New York, pp. 281–304.

Reference to a website:

Cancer Research UK, 2023. Cancer statistics reports for the UK. http://www.cancerresearchuk.org/aboutcancer/statistics/cancerstatsreport/ (accessed 13 March 2023).

Reference to a dataset:

Oguro, M., Imahiro, S., Saito, S., Nakashizuka, T., 2015. Mortality data for Japanese oak wilt disease and surrounding forest compositions [dataset]. Mendeley Data, v1. https://doi.org/10.17632/xwj98nb39r.1.

Reference to software:

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. Advanced Terrestrial Simulator (ATS) v0.88 (Version 0.88) [software]. Zenodo. https://doi.org/10.5281/zenodo.3727209.

Web references

When listing web references, as a minimum you should provide the full URL and the date when the reference was last accessed. Additional information (e.g. DOI, author names, dates or reference to a source publication) should also be provided, if known.

You can list web references separately under a new heading directly after your reference list or include them in your reference list.

Data references

We encourage you to cite underlying or relevant datasets within article text and to list data references in the reference list.

When citing data references, you should include:

author name(s)

dataset title

data repository

version (where available)

year

global persistent identifier

Add [dataset] immediately before your reference. This will help us to properly identify the dataset. The [dataset] identifier will not appear in your published article.

Preprint references

We ask you to mark preprints clearly. You should include the word "preprint" or the name of the preprint server as part of your reference and provide the preprint DOI.

Where a preprint has subsequently become available as a peer-reviewed publication, use the formal publication as your reference.

If there are preprints that are central to your work or that cover crucial developments in the topic, but they are not yet formally published, you may reference the preprint.

Reference management software

Most Elsevier journals have their reference template available in popular reference management software products. These include products that support Citation Style Language (CSL) such as Mendeley Reference Manager.

If you use a citation plug-in from these products, select the relevant journal template and all your citations and bibliographies will automatically be formatted in the journal style. We advise you to remove all field codes before submitting your manuscript to any reference management software product.

If a template is not available for this journal, follow the format given in examples in the reference style section of this Guide for Authors.

Submitting your manuscript

Submission checklist

Before completing the submission of your manuscript, we advise you to read our submission checklist:

One author has been designated as the corresponding author and their full contact details (email address, full postal address and phone numbers) have been provided.

All files have been uploaded, including keywords, figure captions and tables (including a title, description and footnotes) included.

Spelling and grammar checks have been carried out.

All references in the article text are cited in the reference list and vice versa.

Permission has been obtained for the use of any copyrighted material from other sources, including the Web.

For gold open access articles, all authors understand that they are responsible for payment of the article publishing charge (APC) if the manuscript is accepted. Payment of the APC may be covered by the corresponding author's institution, or the research funder.

Suggest reviewers

To support the peer review process, we ask you to provide names and institutional email addresses of several potential reviewers for their manuscript. Some guidelines:

Reviewers should not be colleagues or have co-authored or collaborated with you during the last three years.

Do not suggest reviewers with whom you have competing interests.

Suggest reviewers who are located in different countries or regions from yourself. This helps to provide a broad and balanced assessment of your work and to ensure scientific rigor.

Consider diversity in your reviewer suggestions, such as gender, race and ethnicity and career stage.

Do not suggest members of our Editorial Board.

The journal editors will take the final decision on whether to invite your suggested reviewers.

After receiving a final decision

Article Transfer Service

If your manuscript is more suitable for an alternative Elsevier journal, you may receive an email asking you to consider transferring your manuscript via the Elsevier Article Transfer Service.

The recommendation could come from the journal editor, a dedicated in-house scientific managing editor, a tool-assisted recommendation or a combination.

If you agree with the recommendation, your manuscript will be transferred and independently reviewed by the editors of the new journal. You will have the opportunity to make revisions, if necessary, before the submission is complete at the destination journal.

Publishing agreement

Authors will be asked to complete a publishing agreement after acceptance. The corresponding author will receive a link to the online agreement by email. We advise you to read Elsevier's policies related to copyright to learn more about our copyright policies and your, and your employer's/institution's, additional rights for subscription and gold open access articles.

License options

Authors will be offered open access user license options which will determine how you, and third parties, can reuse your gold open access article. We advise that you review these options and any funding body license requirements before selecting a license option.

Open access

We refer you to our open access information page to learn about open access options for this journal.

Permission for copyrighted works

If excerpts from other copyrighted works are included in your article, you must obtain written permission from the copyright owners and credit the source(s) within your article using Elsevier's permission request and license form (Word).

Proof correction

To ensure a fast publication process we will ask you to provide proof corrections within two days.

Corresponding authors will be sent an email which includes a link to our online proofing system, allowing annotation and correction of proofs online. The environment is similar to Word. You

can edit text, comment on figures and tables and answer questions raised by our copy editor. Our web-based proofing service ensures a faster and less error-prone process.

You can choose to annotate and upload your edits on the PDF version of your article, if preferred. We will provide you with proofing instructions and available alternative proofing methods in our email.

The purpose of the proof is to check the typesetting, editing, completeness and correctness of your article text, tables and figures. Significant changes to your article at the proofing stage will only be considered with approval of the journal editor.

Share Link

A customized Share Link, providing 50 days free access to the final published version of your article on ScienceDirect, will be sent by email to the corresponding author. The Share Link can be used to share your article on any communication channel, such as by email or on social media.

For an extra charge, you will be provided with the option to order paper offprints. A link to an offprint order form will be sent by email when your article is accepted for publication.

A Share Link will not be provided if your article is published gold open access. The final published version of your gold open access article will be openly available on ScienceDirect and can be shared through the article DOI link.

Responsible sharing

We encourage you to share and promote your article to give additional visibility to your work, enabling your paper to contribute to scientific progress and foster the exchange of scientific

developments within your field. Read more about how to responsibly share and promote your article.

Resources for authors

Elsevier Researcher Academy

If you would like help to improve your submission or navigate the publication process, support is available via Elsevier Researcher Academy.

Elsevier Researcher Academy offers free e-learning modules, webinars, downloadable guides and research writing and peer review process resources.

Language and editing services

We recommend that you write in American or British English but not a combination of both.

If you feel the English language in your manuscript requires editing to eliminate possible grammatical or spelling errors and to conform to correct scientific English, you may wish to use the English Language Editing service provided by Elsevier's Author Services.

Getting help and support

Author support

We recommend that you visit our Journal Article Publishing Support Center if you have questions about the editorial process or require technical support for your submission. Some popular FAQs:

How can I track the status of my submitted article?

When will my article be published?

Appendix I. *Measures of Depression*

Measure	k[1]	DSM-5 Depression Symptoms included (n)	Symptom Presence[3]	
Birleson Depression Self-Rating Scale (BIRL)	2	7/9 Not included - Decreased concentration; thoughts of death or suicide	Yes	1 (sometimes) 2 (mostly)
			No	0 (never)
Center for Epidemiological Studies Depression Scale for Children (CES-DC)[2]	2	8/9 Not included - Thoughts of death or suicide	Yes	1 (some or a little of the time), 2 (occasionally or a moderate amount of the time 3 (most or all of the time)
			No	0 (rarely or never)
Child Depression Inventory (CDI)	4	8/9 Not included - Psychomotor agitation or retardation	Yes	1 (experience symptom(s) many times) 2 (experience symptom(s) all the time)
			No	0 (do not experience symptom(s))
CDI version 2 - German	2	7/9 Not included - Psychomotor agitation or retardation; thoughts of death or suicide	Yes	1 (experience symptom(s) many times) 2 (experience symptom(s) all the time)
			No	0 (do not experience symptom(s))
Reynolds Adolescent Depression Scale (RADS)	1	7/9 Not included - Psychomotor agitation or retardation; decreased concentration	Yes	3 (sometimes) 4 (most of the time)
			No	1 (almost never) 2 (hardly ever)
Reynolds Child Depression Scale (RCDS)	1	8/9 Not included - Psychomotor agitation or retardation	Yes	2 (sometimes) 3 (a lot of the time) 4 (all the time)
			No	1 (almost never)
Patient Health Questionnaire-9 (PHQ-9) child report	1	9/9	Yes	1 (several days) 2 (more than half the days) 3 (nearly every day)
			No	0 (not at all)
Short Mood and Feelings Questionnaire (SMFQ)	1	6/9 Not included – appetite; insomnia or hypersomnia; thoughts of death or suicide	Yes	1 (sometimes) 2 (true)
			No	0 (not true)

Note: [1]Some studies used more than one measure of depression across the course of their research.
[2]Relevant symptoms were reverse coded.
[3]A symptom was defined as present if experienced 'sometimes' or more frequently. It was considered not present if experienced 'never' or 'rarely'.