Trauma Memory Quality: Contributing Factors and Associations with Post-Trauma Mental Health

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Abstract

Trauma exposure is common across the lifespan, with a significant minority of individuals going on to develop post-traumatic stress disorder (PTSD). Central to the aetiology of PTSD are memories characterised by disorganisation, sensory intensity and 'here-and-now' reliving. Whilst cognitive models of PTSD posit that disrupted peri-traumatic cognitive processing underpins the formation of these memory qualities, empirical research exploring this is limited. Furthermore, whilst around half of individuals with PTSD experience comorbid depression, research is yet to synthesise the evidence to determine if the qualities of trauma memories may also be a maintaining factor in post-trauma depression.

This portfolio presents a meta-analysis exploring the strength of the relationship between trauma memory qualities and both PTSD and depression symptoms post-trauma. The empirical paper goes on to explore the pre-, peri- and post-trauma factors that predict problematic trauma memory qualities, and their subsequent impact on PTSD symptoms in children and adolescents following single-event trauma.

The meta-analysis demonstrated a medium estimated effect size for the relationship between trauma memory qualities and both PTSD and depression symptoms across the lifespan. The empirical paper identified that being female, being assaulted, not being seen in resus and experiencing high levels of peri-traumatic pain and panic predicted more problematic trauma memory qualities. Trauma memory qualities were also found to partially explain the association between cognitive processing during the trauma and later PTSD symptoms.

The results suggest that trauma memory qualities are relevant to the aetiology of PTSD and depression symptoms post-trauma. Early screening for the risk factors associated with problematic trauma memory qualities is essential in ensuring preventative interventions can be put in place to mitigate against subsequent PTSD symptoms. Further research on whether

these relationships apply to those who have experienced more long-term chronic forms of trauma is warranted.

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Chapter 1: Meta-Analysis

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Author Guidelines Available in Appendix A.

The Relationship between Trauma Memory Qualities and Post-Trauma Psychopathology: A Meta-Analysis

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Abstract

Cognitive models suggest that fragmented, sensory-based trauma memories with a 'here-and-now' quality are central in the aetiology of post-traumatic stress disorder (PTSD). Around half of those with PTSD experience comorbid depression. Although intrusive memories are common across PTSD and depression, further research is required to explore the specific memory qualities associated with each disorder. The current meta-analysis examined the strength of the associations between self-reported trauma memory qualities and symptoms of both PTSD and depression in trauma-exposed children and adults. Forty studies for PTSD and 10 studies for depression met inclusion criteria and underwent random effects meta-analyses. Subgroup analyses were conducted alongside moderator analyses. A medium effect size was found for the relationship between trauma memory qualities and PTSD symptoms (r=.39, 95% CI=.33-.44). The size of this association was larger in the acute period post-trauma (<1 month) (r=.51) than the post-acute period (r=.37). Risk of bias significantly moderated this association, with low risk studied yielding a larger effect size (r=.47) than medium or high risk studies (r=.32). Among individual memory qualities, disorganisation (r=.36) and a 'here-and-now' quality (r=.38) demonstrated the strongest associations with PTSD symptoms. A medium effect size was found for the relationship between trauma memory qualities and depression symptoms (r=.37, 95% CI=.27-.47). Disorganisation was the only individual memory quality explored within the included papers, showing a small to medium effect size (r=.28). No moderation effects were found for depression, but this should be interpreted with caution due to the limited number of included studies. These findings provide robust empirical support for the association between trauma memory qualities and both PTSD and depression symptoms. This suggests that memory qualities may serve a transdiagnostic function, contributing to post-traumatic distress across diagnostic categories. Implications of these findings and recommendations for future research are discussed.

Key Words: post-traumatic stress disorder, depression, trauma memory qualities, cognitive theory, transdiagnostic, meta-analysis, sensory, disorganised, 'here-and-now', fragmented

Highlights:

- The current meta-analysis examined the strength of the association between trauma memory qualities and symptoms of both PTSD and depression in trauma-exposed adults and children.
- A medium effect size was found for the relationship between trauma memory qualities and PTSD symptoms (r=.39).
- A medium effect size was found for the relationship between trauma memory qualities and depression symptoms (r= .37).

Introduction

Trauma exposure is common across the lifespan, with the World Health Organisation estimating that 70% of individuals experience a trauma in their lifetime (Kessler et al., 2017). A recent umbrella review reported an overall prevalence of post-traumatic stress disorder (PTSD) to be 24% (Schincariol et al., 2024). Other mental health difficulties such as depression also occur post-trauma, with an estimated 52% of individuals with PTSD also presenting with depression (Rytwinski et al., 2013). Comorbid PTSD and depression post-trauma are associated with higher levels of subjective distress (Post et al., 2011) which is further evidenced by higher rates of mental and physical health service utilisation (Chan et al., 2009). Depression is also associated with poorer trauma-focused psychotherapy treatment responses in patients with PTSD (Keyan et al., 2024). At present, trauma-related depression is said to have an unclear pathology, and is associated with a high risk of suicide and relapse (Wang et al., 2023). This emphasises the importance of identifying individual and overlapping risk factors for these disorders post-trauma, in order to generate and implement suitable transdiagnostic treatments.

The emergence of transdiagnostic treatments for PTSD and depression is in its infancy (Gutner et al., 2016). The National Institute for Health and Care Excellence [NICE] (2018) guidelines recommend individual trauma-focused cognitive behavioural therapy (TF-CBT) for PTSD, and CBT for depression as first-line treatments. Managing comorbid disorders through individual protocols increases treatment complexity and duration (Farchione et al., 2012), with the effectiveness of individual treatment protocols being compromised by comorbid symptoms (O'Donnell et al., 2021). There is early evidence to suggest that transdiagnostic treatment protocols with a focus on cognitive flexibility and increasing tolerance of emotional and physical distress are successful in reducing PTSD and depression symptoms (O'Donnell et al., 2021). This suggests that working to tolerate and

regulate distress may be a common mechanism underlying PTSD and depression. Exploring other potential mechanisms underlying both disorders would further support the development of transdiagnostic treatments.

Cognitive models of disorders aim to explain the mechanisms that underlie each specific disorder. Cognitive models of PTSD suggest that cognitive processing during trauma, such as dissociation and data-driven processing, alongside heightened levels of emotional arousal leads to trauma memories that are more sensory-based, fragmented and lack temporal context, giving them a 'here-and-now' quality. Negative appraisals about what the traumatic experience and current intrusive symptoms mean about the self and the world, alongside unhelpful coping strategies like avoidance and rumination are said to maintain a current sense of threat (Brewin et al., 1996; Ehlers & Clark, 2000). Cognitive models of depression note that negative early life experiences contribute to the development of stable negative schemas (mental blueprints for what is likely to happen in a given situation) (Beck, 1967). These schemas act as a vulnerability that is activated when an individual experiences adverse life events. Events are then interpreted through a pessimistic lens, which often focuses on the inherent adequacies of the self, world and future. This can foster a sense of hopelessness, lead to persistent rumination and maintain depressive symptomology (Abramson et al., 1978; Beck, 1967). In line with disorder specific models, self-devaluation, negative self-evaluation and depressive rumination have been identified to be predictive of depression post-trauma and peri-traumatic cognitive processing, trauma memory disorganisation and negative appraisals have been identified as predictive of PTSD symptoms (Ehring et al., 2008). Despite their utility in understanding specific disorders, cognitive models do not account for possible shared mechanisms across disorders. Given the high levels of comorbidity between depression and PTSD post-trauma, focussing on potential common factors is essential.

There is evidence to suggest that the qualities of trauma memories may be related to both PTSD and depressive symptoms post-trauma, with intrusive memories being common across both presentations (Bryant et al., 2011; Patel et al., 2007). Depressive symptoms post-trauma have been associated with trauma memories which were less verbally accessible and disorganised, whereas PTSD symptoms have been associated with memories which were more vivid, contained high levels of sensory detail and had more of a 'here-and-now' quality (Ashbaugh et al., 2018; Birrer et al., 2007). However, 'flashbacks' consisting of memories that can only be involuntarily retrieved, have high levels of sensory and data-driven features, and have a degree of re-experiencing in the present are thought to be specific to PTSD (Brewin, 2025; Bryant, et al., 2011). A meta-analysis has revealed strong associations between trauma memory qualities and PTSD symptoms (r=.51) in children and adolescents (Reed et al., 2023). However, meta-analyses on the associations between trauma memory qualities and both PTSD and depressive symptoms across the lifespan have not been conducted to date. Investigating the links between trauma memory qualities across PTSD and depressive symptoms is important for determining whether these qualities serve as a shared risk factor post-trauma. The current review aims to further the evidence base by exploring the ways in which a variety of trauma memory qualities are associated with PTSD and depressive symptoms post-trauma.

Method

Registration

The meta-analysis was prospectively registered with PROSPERO on 24th February 2025 (CRD420250649359).

Search Strategy

A systematic search for relevant literature was conducted in the following databases: PTSDPubs, PsycINFO, PubMed (Medline), CINAHL, Web of Science and The ProQuest Dissertations and Theses Global database. Meta-analyses relevant to trauma memory and psychopathology were searched to identify any additional studies, as well as reference lists of included studies. The search dated from 1980 (when PTSD was included in the DSM-III) to August 2025. Search terms were: PTSD OR PTSS OR "post-traumatic stress" OR "acute stress" OR depress* OR dysthymi* AND "trauma* memor*" OR "memory character*" OR "memory qualit*" OR "memory fragment*" OR "memory disorgani*" OR "cognitive model*" OR "cognitive process*" OR "cognitive factor*" AND trauma* OR viol* OR abus* OR disast* OR maltreat* OR war OR injur* OR accident* OR assault* OR illness* OR collision*. According to the Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5), PTSD cannot be diagnosed within 1 month post-trauma. A diagnosis of acute stress disorder (ASD) may be given if significant symptoms are present within 1 month (American Psychiatric Association [APA], 2013).

The following inclusion criteria were applied:

1. Participants exposed to trauma, as defined by the DSM-5 PTSD Criterion A* (APA, 2013);
2. Included a self-report measure assessing the qualities of trauma memories; and
3. Included a comprehensive measure of PTSD/ASD symptoms (intrusions, avoidance and hyperarousal) and/or a comprehensive measure of depression symptoms;
4. Included an *r* for the relationship between trauma memory qualities and PTSD symptoms and/or depression symptoms, or data that could be converted to *r*.

*Reporting of Criterion A trauma exposure varied across studies. Exposure was either explicitly stated by authors or subjectively determined by MB in discussion with the research team (second and fourth authors). Studies were included if the majority of the sample (>50%) met criteria for Criterion A exposure. Conversely, studies with unclear or minimal exposure were excluded. Although McKinnon et al. (2008) reported a 23% exposure rate, the decision was made to include this study based on the premise of all participants requiring medical care or hospitalisation, with 56% sustaining moderate-severe injuries. This inclusion aligns with a recent meta-analysis on trauma memory qualities and PTSD in children and adolescents (Reed et al., 2023).

The following exclusion criteria were applied:

1) Review articles, book chapters, case studies or studies exclusively reporting qualitative data;
2) Treatment trials or clinical samples exclusively focussing on participants with formal diagnoses of clinical depression or PTSD, and samples selected specifically for high levels of symptomology. These exclusions were made to maintain variability and ensure the findings remained generalisable to broader populations;
3) Studies including those with traumatic brain injuries;
4) Studies where the participant group overlaps with another study. In these cases, the study with the largest sample size or the study containing the most relevant data for the meta-analysis was chosen e.g., studies with an effect size for both PTSD and depression would be prioritised over a study with just one effect size;
5) Studies where the full text was not available or an effect size could not be created from the available data (authors were contacted for raw data where possible)
6) Studies not published in English.

Screening Method

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart in Figure 1 details the screening process. During the first stage of screening, the titles and abstracts of the 8853 articles remaining after duplicate removal were reviewed by the first author (MB). During the second stage of screening, the full texts of the 182 eligible articles were independently reviewed by the first (MB) and second (SN) authors. The screening process was completed using the online software, Rayyan using the blinded screening mode. Where disagreements occurred, these were discussed until a consensus was reached. A consensus was reached for all articles, so a third author was not required.

Data Extraction

Pearson's zero order correlation coefficient '*r*' was used as the estimate of effect size. Where other estimates were provided, these were converted to *r* using the equations outlined in Chapter 4. Authors were contacted if studies included insufficient data to calculate an effect size, and studies were excluded if authors did not respond within 2 weeks. Where studies reported multiple time points, the earliest post-acute (>1 month) effect size was included. This is because symptoms persisting beyond 1 month are more likely to represent a chronic trajectory, than transient acute reactions. Effect sizes from continuous measures were included in the main analysis if available, to avoid underestimation of effect sizes and reduced statistical power associated with dichotomising data (Rousson, 2014). If effect sizes were provided for multiple qualities of trauma memories without a total score, then these were combined to provide an overall *r* for inclusion in the main analysis, using the equations in Chapter 4. If a study only provided an effect size for one trauma memory quality e.g., vividness, then this was included in the main analysis. Effect sizes for individual qualities were also extracted for subgroup analyses.

Quality Assessment and Risk of Bias

Biases in participant selection, attrition, reporting and publication have the potential to compromise the validity, reliability and generalisability of reviews, making it vital to assess biases if accurate interpretations are to be made of the data (Nair & Borkar, 2025). A quality assessment and risk of bias tool was developed, adapted from the tool created by Gómez de La Cuesta et al. (2019). This eight item tool was based on the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies (National Heart Lung and Blood Institute, 2014) and the Quality Appraisal Checklist for Studies Reporting Correlations and Associations (NICE, 2012). The measure and scoring methods can be seen in Appendix B. Risk of bias ratings for all studies were completed independently by MB, and 20% of studies were double coded by SN. Agreement on overall study bias was 76%. The weighted Kappa was .53 for the overall rating.

Publication Bias

Publication bias refers to the possibility that not all studies that are conducted within a certain area are published, with studies that show large and significant effects having more chance of being included (Cuijpers, 2016). This is common in social sciences and mental health research, making assessing for publication bias important within the current meta-analysis (Cuijpers, 2016). Funnel plots were generated using Duval and Tweedie's trim and fill method (Duval & Tweedie, 2000). In this method, studies are imputed to create symmetry and a new effect size is calculated based on this. Higher levels of asymmetry, and the more studies imputed to create symmetry, indicates higher levels of publication bias. Egger's test of the intercept was used to assess for significant levels of asymmetry, indicative of publication bias (Egger et al., 1997).

Data Synthesis

Random effects meta-analyses with restricted maximum likelihood estimates of between study variance were used. This method is appropriate for when it is assumed that the true effect could vary between studies and allows conclusions to be generalised to a wider array of populations (Borenstein et al., 2010; Dettori et al., 2022). In mental health research, variability is common in terms of inclusion criteria, recruitment methods, and measures used, making random-effects meta-analyses relevant and important (Cuijpers, 2016). Analyses were completed in R-Studio, using the 'metafor' package (Viechtbauer, 2010). Extracted *r* values were transformed into a Fisher's *Z* score for analysis, before being back transformed to *r* for reporting of results and interpretation. Pearson's *r* effect sizes were interpreted as small, medium and large based on correlations of 0.1, 0.3 and 0.5, respectively (Cohen, 1988). Heterogeneity of effect sizes was calculated using the *Q* and I^2 statistics. A significant *Q* statistic ($p<.05$) indicates true effect size variation, with the amount of variation being estimated as low (25%), moderate (50%) and high (75%) based on I^2 (Higgins et al., 2003).

Subgroup and Moderator Analyses

Subgroup analyses can help determine whether high levels of heterogeneity are in part caused by differences between subgroups of studies (Cuijpers, 2016). Initial scoping revealed significant heterogeneity in memory qualities assessed and how these were measured. A priori subgroup analyses were planned for any quality with three or more effect sizes. Subgroup analyses were completed for the following qualities: sensory features, a sense of reliving in the 'here-and-now', levels of coherence, disorganisation, fragmentation and vividness. Subgroup analyses were also completed for studies assessing PTSD symptoms within the acute (<1 month post-trauma), and post-acute (>1 month post-trauma) period. Meta-regressions were conducted to explore the factors that may moderate the size of the effect between trauma memory qualities and PTSD symptoms. These included age group

(child vs. adult), trauma type (interpersonal vs. non-interpersonal trauma), Criterion A exposure (full Criterion A exposure vs. partial Criterion A exposure) and risk of bias (low vs. medium/high). Although the moderators are theoretically relevant, research on moderators of this relationship is scarce so these analyses will be exploratory in nature. A leave-one out analysis was completed for the main PTSD analysis to identify any outliers that may be driving any heterogeneity. In order to reduce the chance of making Type 1 errors with multiple meta-regressions being completed, the Holm method was used to adjust the level of significance (Holm, 1979). Within the depression meta-analysis, there was a reduced variety of individual trauma memory qualities assessed, with a subgroup analysis only being completed for disorganisation. Meta-regression analyses were completed for age group, trauma type, Criterion A exposure and risk of bias, as above. A leave-one-out analysis was also completed for the main depression meta-analysis.

Results

Study Characteristics

Forty-one studies were included, with 40 effect sizes being extracted for the main PTSD meta-analysis and 10 effect sizes being extracted for the main depression meta-analysis. The 40 effect sizes for the PTSD analysis came from 39 papers, with Halligan et al. (2003) providing two effect sizes from two independent samples. Nine out of the 10 depression studies overlapped with the 40 included in the PTSD meta-analysis. Appendix C summarises the characteristics of the studies included.

Of the 40 studies included in the PTSD meta-analysis, 11 were conducted with children (6-17 years old) and 29 with adults (18-92 years old). Twelve studies included non-interpersonal traumas and seven studies included interpersonal traumas, with the remaining 21 studies including a mix of trauma types. Twenty-eight studies included participants with

full exposure to Criterion A traumas, whereas 12 studies included only partial exposure e.g., exposure to a distressing but not 'traumatic' event. Sixteen studies were deemed to be low risk of bias, 22 were medium risk and two were high risk. The measures used to assess the qualities of trauma memories were highly variable, with some studies using a pre-existing validated measure, some taking items from pre-existing measures, and some creating items/an item for the specific study.

Of the 10 studies included in the depression meta-analysis, six were conducted with children (6-17 years old) and four with adults (18-74 years old). Five studies included interpersonal traumas, two studies included non-interpersonal traumas with the remaining three studies containing a mix of trauma types. Seven studies included all participants being exposed to Criterion A trauma, and three included only partial exposure. Five studies were assessed to be low risk of bias, and five medium risk. Fewer studies reported a measure of effect size between trauma memory qualities and depressive symptomology, which was reflected in the variety of measures used and individual trauma qualities measured. All six studies in children utilised the Trauma Memory Quality Questionnaire (TMQQ) (Meiser-Stedman et al. 2007) or an adapted version, including items of disorganisation. All four studies in adults utilised a variation of items measuring disorganisation from the Trauma Memory Questionnaire (TMQ) (Halligan et al., 2003).

Meta-Analysis: PTSD Symptoms

A meta-analysis of all effect sizes measuring the relationship between qualities of trauma memories and PTSD symptoms was conducted, including effect sizes from 40 studies and with an overall sample size of 10,115 (see Figure 2). A medium effect size of r=.39 (95% CI=.33-.44, Z=12.34, p<.0001) was estimated by the random effects model. Estimates of heterogeneity revealed significant, high variation across studies (Q=577.80, df=39, p <.0001, I^2=88.92%) (see Table 1). A leave-one-out analysis (see Appendix D) demonstrated high

stability of the pooled estimated effect size, with *r* (.38-.40) and heterogeneity remaining relatively consistent regardless of which study was removed (I^2=85.77%-89.34%). Egger's test revealed no significant funnel plot asymmetry (z=-1.23, p=0.22). However, the trim and fill funnel plot (see Appendix E) identified 8 potentially missing studies, with the imputed studies showing larger effect sizes than the 40 included in the main analysis. The new adjusted estimated *r* was .44 (95% CI=.38-.49, p<.0001), suggesting the estimated effect size of .39 may be an underestimation of the true effect.

Subgroup Analyses: PTSD Symptoms

Subgroup analyses were completed (see Table 1) for effect sizes where PTSD was assessed in the acute (<1 month post-trauma) and post-acute period (>1 month post-trauma), alongside a variety of individual trauma memory qualities. Significant medium effect sizes were found for the relationship between PTSD symptoms and disorganisation (r=.36) (see Figure F1) and memories having a 'here-and-now' quality (r=.38) (see Figure F2). These effect sizes were almost identical to the overall estimated effect size between trauma memory qualities and PTSD symptoms. Significant small-medium effect sizes were found for the relationship between PTSD symptoms and fragmentation (r=.26) (see Figure F3), sensory re-experiencing (r=.27) (see Figure F4) and vividness (r=.19) (see Figure F5). There was no effect size found for the relationship between PTSD symptoms and coherence (r=.01) (see Figure F6). Heterogeneity varied between individual trauma memory qualities, with this being significant and high for 'here-and-now' quality (Q=26.33, df=6, p=.0002, I^2=76.37%), significant and moderate for disorganisation (Q=30.55, df=8, p=.0002, I^2=68.99), moderate but non-significant for sensory qualities (Q=9.96, df=5, p=.08, I^2=52.4%) and just below the low cut off and non-significant for coherence (Q=6.31, df=6, p=.39, I^2= 22.43).There was extremely low, non-significant heterogeneity for vividness (Q=4.90, df=5, p=.30, I^2=2.35%) and no heterogeneity for fragmentation (Q=0.31, df=2, p=.86, I^2=0.0%). The relationship

between trauma memory qualities and PTSD symptoms was found to be higher in the acute period (r=.51) (see Figure F7), than the post-acute period (r=.37) (see Figure F8). Heterogeneity was high with significant levels of variance across the acute (Q=97.29, df=11, p<.0001, I^2=89.75%) and post-acute periods (Q=435.22, df=28, p<.0001, I^2=85.22%).

Moderator Analyses: PTSD Symptoms

A number of meta-regression analyses were conducted to assess whether age group, trauma type, Criterion A trauma status, or risk of bias had any moderating effect on the size of the relationship between trauma memory qualities and PTSD symptoms (see Table 2). After applying Holm adjustments for multiple testing, only risk of bias was a significant moderator of the effect between trauma memory qualities and PTSD symptoms (p=.006), with lower risk/higher quality studies yielding larger effect sizes (r=.47) than high risk/lower quality studies (r=.32). Without adjustments, age group was borderline significant (p=.047), with studies in children yielding larger effect sizes (r=.48) than adults (r=.36). Whether participants' experiences all qualified as Criterion A traumas or not, and whether a trauma was interpersonal or not did not moderate the effect size.

Meta-Analysis: Depression Symptoms

A meta-analysis of all effect sizes measuring the relationship between the qualities of trauma memories and depression symptoms was conducted, including effect sizes from 10 studies and with an overall sample size of 1198 (see Figure 3). A medium effect size of r=.37 (95% CI=.27-.47, Z=6.65, p<.0001) was estimated by the random effects model (see Table 3). Estimates of heterogeneity revealed significant, medium levels of heterogeneity across studies (Q=28.98, df=9, p=.0007, I^2=73.24%).

A leave-one-out analysis (see Appendix G) indicated that removing Salmond et al. (2011) maintained a similar estimated effect size of r=.34 (CI= .27-.41), but reduced

estimates of heterogeneity to non-significant, small levels of variance (Q=13.68, df=8, p=.09, I^2=42.97%). The trim and fill funnel plot (see Appendix H) did not identify any potentially missing studies, and Egger's test also revealed no significant funnel plot asymmetry (z=0.88, p=.38). This suggests the estimated effect of r is likely a true representation of the current evidence.

Subgroup Analyses: Depression Symptoms

Effect sizes for individual trauma memory qualities were only available for disorganisation (see Table 3). A significant small to medium effect size was found for the relationship between disorganisation and depression symptoms (r=.28) (see Appendix I). Estimates of heterogeneity showed no significant variance between studies (Q=2.26, df=3, p=.52, I^2=0.0). This suggests that any observed variance between the effect sizes is down to chance, rather than true heterogeneity, meaning that the pooled estimated effect size likely provides a robust and consistent representation of the true association between disorganisation and depressive symptoms.

Moderator Analyses: Depression Symptoms

Meta-regression analyses were completed for the same moderators as PTSD, with the exception of the acute/post-acute period as this is specific to the diagnostic criteria of PTSD. Therefore, moderation analyses were completed for age group, trauma type, Criterion A trauma status, and risk of bias (see Table 4). No significant moderation effects were observed. However, the findings should be interpreted with caution due to the small number of studies included.

Discussion

Overall Findings

The current meta-analysis has summarised the existing evidence on the associations between self-reported trauma memory qualities and both PTSD and depression symptoms in trauma-exposed children and adults. A variety of trauma memory qualities were explored for their association with PTSD symptoms including sensory features, vividness, fragmentation, disorganisation, coherence and the sense of having a 'here-and-now' quality. The research conducted on trauma memory qualities and their associations with depression symptoms was sparse in comparison, resulting in only disorganisation being able to be explored as an individual quality.

PTSD Symptoms and Trauma Memory Qualities

The current meta-analysis identified a medium effect size between trauma memory qualities and PTSD (r=.39), with high heterogeneity (I^2=88.92). Although memories characterised by sensory features, disorganisation, fragmentation, vividness and 'here-and-now' qualities were associated with higher PTSD symptoms, this effect was lower than the r=.51 reported by Reed et al. (2023) in the meta-analysis exploring trauma memory qualities and PTSD symptoms in children and adolescents. Descriptively, children (r=.48) showed a larger effect than adults (r=.36) in the current meta-analysis. This discrepancy may suggest stronger associations between trauma memory qualities and PTSD symptoms in children or may reflect measurement differences. Child studies consistently used the TMQQ (Meiser-Stedman et al., 2007), which focusses on the verbal accessibility, sensory qualities and temporal context, whereas adult studies used a wider variety of measures assessing a wider range of memory qualities. No significant publication bias was identified and the leave-one-out analysis did not reveal any large changes to estimated r or heterogeneity suggesting that

the finding of *r*=.39 is likely reflective of the true population effect. However, risk of bias was a significant moderator of the association, with low risk studies yielding larger effect sizes (*r*=.47) than medium-high risk studies (*r*=.32), meaning that our overall *r* may have been supressed by the inclusion of studies with a higher risk of bias.

Subgroup analyses revealed that disorganisation (*r*=.36) and 'here-and-now' (*r*=.38) qualities were most strongly associated with PTSD symptoms. This is in line with cognitive models of PTSD (Brewin et al., 1996; Ehlers & Clark, 2000) which posit that trauma memories are not fully integrated into their autobiographical context so are likely to lack an organised structure and are re-experienced as if the trauma is taking place again. Fragmentation (*r*=.26), sensory features (*r*=.27), and vividness (*r*=.19) revealed weaker associations. Due to the small number of studies within the subgroup analyses, it is not possible to say for certain if these qualities are less important in subsequent PTSD symptomology. Notably, coherence showed no association with PTSD symptoms (*r*=.01). This contradicts the common assumption that low coherence equals high disorganisation (Brewin & Field, 2024). However, Brewin and Field (2024) demonstrated that the direction of item wording significantly dictated the strength of this association. When items were worded to assess coherence e.g., 'it comes to me in words or pictures as a coherent story or episode' there was no association with PTSD symptoms, but when items were worded to assess disorganisation e.g., 'I cannot get what happened straight in my mind', then there was a small to medium association with PTSD symptoms. Brewin and Field's (2024) meta-analysis consisted of those with clinically significant levels of PTSD, so the current study expands on this finding by identifying the same pattern in those with a wide variety of PTSD symptoms.

The subgroup analyses also revealed a larger effect size for the acute (*r*=.51) than post-acute period (*r*=.37), which mirrors the findings by Reed et al. (2023). These findings

suggest that the association between trauma memory qualities and PTSD symptoms are stronger in the early stages post-trauma. The attenuation of this association over time may reflect the natural integration of the trauma memory, or could indicate that other factors implicated in cognitive models of PTSD such as negative appraisals and maladaptive coping strategies (Ehlers & Clark, 2000) are stronger drivers of PTSD symptoms in the post-acute stage. For example, in children and adolescents, Meiser-Stedman et al. (2009) found negative appraisals to be predictive of PTSD symptoms 6 months post-trauma but not trauma memory qualities, when initial symptom severity was taken into account. Halligan et al. (2003) also found negative appraisals to be a stronger predictor of PTSD symptomology 6 months post-trauma in adults.

Depression Symptoms and Trauma Memory Qualities

A medium effect size was found for the association between depression symptoms and trauma memory qualities (r=.37), with moderate-high levels of heterogeneity (I^2=73.24). Leave-one-out analyses revealed that removing Salmond et al. (2011) (r=.74, n=50) did not significantly reduce the overall effect size, but reduced heterogeneity to small, non-significant levels. This provides greater confidence that our overall effect size is representative of the true effect. To our knowledge, this is the first meta-analysis to consider the associations between trauma memory qualities and depression symptoms post-trauma, so there is not yet research to compare this with from the current evidence base.

The observation of a comparable effect size between trauma memory qualities and depression symptoms was surprising, as this challenges the notion that trauma memory qualities are a phenomenon specific to PTSD. The current findings suggest that sensory-laden, verbally inaccessible, disorganised, ‘here-and-now’ qualities are associated with increased depression symptoms post-trauma and posits that such qualities may be a transdiagnostic feature of post-traumatic distress in general. However, as roughly half of

individuals with PTSD symptoms post-trauma also present with comorbid depression symptoms (Rytwinski et al., 2013), participants in the included studies likely experienced overlapping symptomology. Since the primary studies did not isolate mutually exclusive symptomatic groups, it is not possible to isolate the independent associations between trauma memory qualities and depression symptoms. Therefore, two potential explanations could account for the surprising comparable effect sizes. Firstly, problematic trauma memory qualities may be as strongly related to post-trauma depression as they are with PTSD. Secondly, the observed relationship between depression symptoms and problematic trauma memory qualities could be driven by unaccounted for PTSD symptoms. A recent network analysis by Giuliani et al. (2026) would support this second explanation, with authors finding trauma memory qualities to be directly linked to PTSD symptoms but not depression symptoms in children and adolescents.

It is also important to note that the six studies included in the main depression analysis with children used the TMQQ (Meiser-Stedman et al., 2007), whereas the four studies included in the main depression analysis with adults only assessed disorganisation. Therefore, it can only be concluded that self-reported disorganisation is associated with increased depression symptoms in adults from the current meta-analysis (r=.28). This split in the measures used may partially explain the moderate to high levels of heterogeneity identified.

Consideration should also be given to what may be driving the association between disorganisation and depression symptoms. For example, it is well understood that individuals with depression can be over-general and less detailed in their reporting of autobiographical memories (Sumner et al., 2010). As items covering disorganisation from the Trauma Memory Questionnaire (TMQ) (Halligan et al., 2003), relate to deficits in intentional recall e.g., ‘I cannot get what happened straight in my mind’, it may be that part of this self-reported

disorganisation overlaps with over-general memory as part of a presentation of depression, rather than disorganisation due to distorted cognitive processing at the time of the trauma. Meta-regressions revealed no significant moderators of the association between trauma memory qualities and depression symptoms.

Limitations

The current meta-analysis has a number of limitations that warrant mention in order to support accurate interpretation of the findings. Firstly, there were limited studies in the literature which explored the association between trauma memory qualities and depressive symptoms. This not only reduced the power of meta-regression to detect possible moderators but also meant that a wider variety of individual trauma memory qualities were unable to be explored. Despite this creating a slightly uneven exploration within the current meta-analysis, this reflects the current literature available and emphasises the importance of additional research exploring this area. Valentine et al. (2010) argue that meta-analyses including a small number of studies still provide valuable information to the field and are likely to be more valid than other synthesis techniques. This suggests that the findings still add valuable data to the field in our understanding of trauma memory qualities and depression symptoms.

The second limitation relates to the generalisability of the findings. The majority of studies within both the PTSD and depression meta-analyses focused on exposure to single event traumas, so it cannot be said that these findings relate to those who have experienced long-term, more chronic forms of trauma such as war exposure and childhood abuse. In addition, the majority of studies took place in countries where populations are considered to be westernised, educated, industrialised, rich and democratic (WEIRD), which is often the case in clinical research but represents a minority of individuals globally (Henrich et al., 2010). It cannot be said therefore, that our results are generalisable to those from a variety of ethnocultural minority groups or lower socioeconomic backgrounds.

The final limitation relates to the unstandardised nature of measures used to assess trauma memory qualities. Few studies utilised pre-existing validated measures, with a large number of studies utilising single item measures to assess individual trauma memory qualities. In addition, a number of effect sizes from individual trauma memory qualities were combined within the current meta-analyses in order to create one pooled effect size. As the reliability and validity of measures are central in their ability to accurately measure intended constructs (Rodríguez-Violante et al., 2024), it is difficult to determine whether our pooled effects reflect true effects or whether measurement error may have obscured these.

Clinical and Theoretical Implications

The current meta-analysis revealed that a variety of trauma memory qualities are associated with PTSD symptoms and depression symptoms post-trauma, suggesting that trauma memory qualities may represent a core cognitive vulnerability for post-trauma psychopathology. In clinical practice, clinicians should explore the nature of trauma memories post-trauma regardless of whether other PTSD symptomology is present as the findings suggest trauma memories may be implicated in post-trauma depression also. Transdiagnostic mechanisms of change in treatment is an expanding area of research (Gallagher et al., 2017), with the potential for successful treatments being based on presenting difficulties and not diagnostic criteria. A recent meta-analysis revealed that trauma-focused cognitive behavioural therapy (TF-CBT) in children and adolescents was effective in reducing PTSD and depression symptoms post-trauma (Thielemann et al., 2023). The current meta-analysis findings suggest that re-integrating and organising the trauma memory may be a mechanism of change here for the reduction of both PTSD symptoms and depression symptoms. However, as the research by Giuliani et al. (2026) discussed above found memory qualities to be linked to PTSD symptoms but not depression symptoms, it is suggested that memory qualities may not be a strong mechanism underlying

PTSD/depression comorbidity post-trauma. Network analyses reveal that other processes such as maladaptive post-trauma cognitions may serve as a transdiagnostic mechanism underlying PTSD and depression symptoms post-trauma (de Haan et al., 2020).

According to the DSM-5, PTSD can only be diagnosed if individuals have been exposed to an event that involves 'exposure to actual or threatened death, serious injury or sexual violence' (Criterion A). As trauma memory qualities are often thought to be specific to PTSD, those not identified as experiencing a 'trauma', may not receive a thorough assessment of trauma memory qualities. The finding that criterion A trauma status did not moderate the association between trauma memory qualities and both PTSD and depressive symptoms suggests that the memory qualities of distressing but not necessarily traumatic events should also be explored post-trauma as these could still be maintaining current levels of psychological distress. In addition, the mnemonic model of PTSD posits that it is the memory of a distressing event, not the event itself, that determines PTSD symptoms (Rubin et al., 2008a).

Finding moderate effect sizes between disorganisation, fragmentation, vividness, sensory features, 'here-and-now' qualities and PTSD symptoms is in line with cognitive models of PTSD (Ehlers & Clark, 2000). Whilst cognitive models suggest PTSD arises from memory mechanisms unique to traumatic events, others argue that these memories can be explained by more generic psychological processes related to memory and emotion (Rubin et al., 2008b). Under this framework, the degree of PTSD symptoms that an individual experiences is related to the degree in which the traumatic event becomes central to their life story. Memories high on 'centrality' are said to be highly accessible and coherent, with increased coherence being associated with increased PTSD symptoms (Rubin et al., 2008b). In the current meta-analysis, we did not find increased coherence to be associated with PTSD

symptoms, but did find disorganisation to be association with increased PTSD symptoms. The current findings are therefore more in line with cognitive models of PTSD.

Future Research

Cognitive models posit that negative appraisals, trauma memory qualities and maladaptive coping strategies are implicated in the maintenance of PTSD (Ehlers & Clark, 2000), so future research should explore the potential moderating effects of negative appraisals and maladaptive coping strategies on the association between trauma memory qualities and subsequent PTSD. Such research is important in disentangling the complex interactions that maintain PTSD symptoms. In addition, research should continue to explore the ways in which a variety of trauma memory qualities are associated with depression post-trauma in adults due to the literature focussing on disorganisation at present.

Further to the research by Giuliani et al. (2026) above, future research should continue to explore the relationships between trauma memory qualities and those with just symptoms of PTSD or depression post-trauma. This could include conducting a network analysis of adult data to see if the same relationships between trauma memory qualities and post-trauma psychopathology apply in adults, as Giuliani et al. (2026) found in children and adolescents. Additionally, to determine if there is a direct relationship between trauma memory qualities and depression symptoms, a secondary analysis of clinical trial data could be conducted to see if changes in problematic trauma memory qualities drive improvements in post-trauma depression.

It would also be interesting for future research to employ additional methodology such as latent profile analysis (LPA), in order to identify distinct subgroups of individuals based on their unique configuration of PTSD symptoms, depression symptoms and trauma

memory qualities. This would support the development of possible transdiagnostic frameworks for treatment.

Finally, future research should consider conducting longitudinal studies to explore how the associations between trauma memory qualities and post-trauma psychopathology changes over time due to the majority of studies within the current meta-analysis focussing on PTSD within one year post-trauma.

Conclusions

The current meta-analysis adds valuable information to our current understanding of the ways in which trauma memory qualities relate to post-trauma psychopathology. Medium effect sizes were found for the relationship between trauma memory qualities and both PTSD symptoms and depressive symptoms, which demonstrates the relevance of trauma memory qualities across disorders, challenging the perspective that the quality of trauma memories are specific to the aetiology and maintenance of PTSD.

References

Abramson, L. Y., Seligman, M. E., & Teasdale, J. D. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology*, *87*(1), 49–74. https://doi.org/10.1037/0021-843X.87.1.49

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

Ashbaugh, A. R., Marinos, J., & Bujaki, B. (2018). The impact of depression and PTSD symptom severity on trauma memory. *Memory (Hove, England)*, *26*(1), 106–116. https://doi.org/10.1080/09658211.2017.1334801

Beck, A. T. (1967). *Depression: Clinical, experimental, and theoretical aspects*. Hoeber Medical Division, Harper & Row.

Birrer, E., Michael, T., & Munsch, S. (2007). Intrusive images in PTSD and in traumatised and non-traumatised depressed patients: A cross-sectional clinical study. *Behaviour Research and Therapy*, *45*(9), 2053–2065. https://doi.org/10.1016/j.brat.2007.03.005

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2010). A basic introduction to fixed-effect and random-effects models for meta-analysis. *Research Synthesis Methods*, *1*(2), 97–111. https://doi.org/10.1002/jrsm.12

Brewin, C. R. (2025). Key concepts, methods, findings, and questions about traumatic memories. *Journal of Traumatic Stress*, *38*(5), 771–780. https://doi.org/10.1002/jts.23164

Brewin, C. R., & Field, A. P. (2024). Meta-analysis shows trauma memories in posttraumatic stress disorder lack coherence: A response to Taylor et al. (2022). *Clinical*

Psychological Science, *12*(5), 1027–1033. https://doi.org/10.1177/21677026241240456

Brewin, C. R., Dalgleish, T., & Joseph, S. (1996). A dual representation theory of posttraumatic stress disorder. *Psychological Review*, *103*(4), 670–686. https://doi.org/10.1037/0033-295x.103.4.670

Bryant, R. A., O'Donnell, M. L., Creamer, M., McFarlane, A. C., & Silove, D. (2011). Posttraumatic intrusive symptoms across psychiatric disorders. *Journal of Psychiatric Research*, *45*(6), 842–847. https://doi.org/10.1016/j.jpsychires.2010.11.012

Chan, D., Cheadle, A. D., Reiber, G., Unützer, J., & Chaney, E. F. (2009). Health care utilization and its costs for depressed veterans with and without comorbid PTSD symptoms. *Psychiatric Services*, *60*(12), 1612–1617. https://doi.org/10.1176/ps.2009.60.12.1612

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Routledge. https://doi.org/10.4324/9780203771587

Cuijpers, P. (2016). *Meta-analyses in mental health research: A practical guide.* https://www.researchgate.net/publication/301815425_Meta-analyses_in_mental_health_research_A_practical_guide

de Haan, A., Landolt, M. A., Fried, E. I., Kleinke, K., Alisic, E., Bryant, R., ... & Meiser-Stedman, R. (2020). Dysfunctional posttraumatic cognitions, posttraumatic stress and depression in children and adolescents exposed to trauma: A network analysis. *Journal of child psychology and psychiatry*, *61*(1), 77-87. https://doi.org/10.1111/jcpp.13101

Dettori, J. R., Norvell, D. C., & Chapman, J. R. (2022). Fixed-effect vs random-effects models for meta-analysis: 3 points to consider. *Global Spine Journal*, *12*(7), 1624–1626. https://doi.org/10.1177/21925682221110527

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://doi.org/10.1111/j.0006-341x.2000.00455.x

Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *BMJ*, *315*(7109), 629–634. https://doi.org/10.1136/bmj.315.7109.629

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

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

Farchione, T. J., Fairholme, C. P., Ellard, K. K., Boisseau, C. L., Thompson-Hollands, J., Carl, J. R., Gallagher, M. W., & Barlow, D. H. (2012). Unified protocol for transdiagnostic treatment of emotional disorders: A randomized controlled trial. *Behavior Therapy*, *43*(3), 666–678. https://doi.org/10.1016/j.beth.2012.01.001

Gallagher, M. W. (2017). Transdiagnostic mechanisms of change and cognitive-behavioral treatments for PTSD. *Current Opinion in Psychology, Traumatic Stress*, *14*, 90–95. https://doi.org/10.1016/j.copsyc.2016.12.002

Giuliani, A., De Haan, A., Sharp, T., Chideya, Y., Nixon, R. D., Kangaslampi, S., ... & Halligan, S. L. (2026). Understanding the relationship of trauma memory characteristics to symptoms of PTSD and depression in trauma-exposed children and adolescents: a comprehensive network analysis. *European journal of psychotraumatology*, *17*(1), 2631357. https://doi.org/10.1080/20008066.2026.2631357

Gómez de La Cuesta, G., Schweizer, S., Diehle, J., Young, J., & Meiser-Stedman, R. (n.d.). The relationship between maladaptive appraisals and posttraumatic stress disorder: A meta-analysis. *European Journal of Psychotraumatology*, *10*(1), 1620084. https://doi.org/10.1080/20008198.2019.1620084

Gutner, C. A., Galovski, T., Bovin, M. J., & Schnurr, P. P. (2016). Emergence of transdiagnostic treatments for PTSD and posttraumatic distress. *Current Psychiatry Reports*, *18*(10), 95. https://doi.org/10.1007/s11920-016-0734-x

Halligan, S. L., Michael, T., Clark, D. M., & Ehlers, A. (2003). Posttraumatic stress disorder following assault: The role of cognitive processing, trauma memory, and appraisals. *Journal of Consulting and Clinical Psychology*, *71*(3), 419–431. https://doi.org/10.1037/0022-006X.71.3.419

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *The Behavioral and Brain Sciences*, *33*(2–3), 61–83; discussion 83-135. https://doi.org/10.1017/S0140525X0999152X

Higgins, J. P. T., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in meta-analyses. *BMJ : British Medical Journal*, *327*(7414), 557–560. https://doi.org/10.1136/bmj.327.7414.557

Holm S. (1979). A simple sequentially rejective multiple test procedure. *Scandinavian Journal of Statistics*, 6, 65–70.

Kessler, R. C., Aguilar-Gaxiola, S., Alonso, J., Benjet, C., Bromet, E. J., Cardoso, G., Degenhardt, L., de Girolamo, G., Dinolova, R. V., Ferry, F., Florescu, S., Gureje, O., Haro, J. M., Huang, Y., Karam, E. G., Kawakami, N., Lee, S., Lepine, J.-P., Levinson, D., … Koenen, K. C. (2017). Trauma and PTSDin the WHO world mental health surveys. *European Journal of Psychotraumatology*, *8*(sup5), 1353383. https://doi.org/10.1080/20008198.2017.1353383

Keyan, D., Garland, N., Choi-Christou, J., Tran, J., O'Donnell, M., & Bryant, R. A. (2024). A systematic review and meta-analysis of predictors of response to trauma-focused psychotherapy for posttraumatic stress disorder. *Psychological Bulletin*, *150*(7), 767–797. https://doi.org/10.1037/bul0000438

McKinnon, A. C., Nixon, R. D. V., & Brewer, N. (2008). The influence of data-driven processing on perceptions of memory quality and intrusive symptoms in children following traumatic events. *Behaviour Research and Therapy*, *46*(6), 766–775. https://doi.org/10.1016/j.brat.2008.02.008

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, and Allied Disciplines*, *50*(4), 432–440. https://doi.org/10.1111/j.1469-7610.2008.01995.x

Meiser-Stedman, R., Smith, P., Yule, W., & Dalgleish, T. (2007). The Trauma Memory Quality Questionnaire: Preliminary development and validation of a measure of trauma memory characteristics for children and adolescents. *Memory*, *15*(3), 271–279. https://doi.org/10.1080/09658210701256498

Nair, A. S., & Borkar, N. K. (2025). Various biases in systematic review and meta-analysis and their assessment. *Indian Journal of Anaesthesia*, *69*(1), 138–142. https://doi.org/10.4103/ija.ija_1212_24

National Heart, Lung, and Blood Institute. (2014). *Quality assessment tool for observational cohort and cross-sectional studies.* https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools

National Institute for Health and Care Excellence. (2012). *Quality appraisal checklist for studies reporting correlations and associations (Methods guide).* https://www.nice.org.uk/process/pmg4/chapter/appendix-h-quality-appraisal-checklist-for-studies-reporting-correlations-and-associations

National Institute for Health and Care Excellence. (2018). *Post-traumatic stress disorder* (NICE Guideline NG116). https://www.nice.org.uk/guidance/ng116

O'Donnell, M. L., Lau, W., Chisholm, K., Agathos, J., Little, J., Terhaag, S., Brand, R., Putica, A., Holmes, A. C. N., Katona, L., Felmingham, K. L., Murray, K., Hosseiny, F., & Gallagher, M. W. (2021). A pilot study of the efficacy of the unified protocol for transdiagnostic treatment of emotional disorders in treating posttraumatic psychopathology: A randomized controlled trial. *Journal of Traumatic Stress*, *34*(3), 563–574. https://doi.org/10.1002/jts.22650

Patel, T., Brewin, C. R., Wheatley, J., Wells, A., Fisher, P., & Myers, S. (2007). Intrusive images and memories in major depression. *Behaviour Research and Therapy*, *45*(11), 2573–2580. https://doi.org/10.1016/j.brat.2007.06.004Post, L. M., Zoellner, L. A., Youngstrom, E., & Feeny, N. C. (2011). Understanding the relationship between co-occurring PTSD and MDD: Symptom severity and affect. *Journal of Anxiety Disorders*, *25*(8), 1123–1130. https://doi.org/10.1016/j.janxdis.2011.08.003

Reed, J., Taylor, J., Randall, G., Burgess, A., & Meiser-Stedman, R. (2023). Associations between the Trauma Memory Quality Questionnaire and posttraumatic stress symptoms in youth: A systematic review and meta-analysis. *Journal of Traumatic Stress*, *36*(1), 31–43. https://doi.org/10.1002/jts.22903

Rodríguez-Violante, M., Hernández-Medrano, A. J., & Cervantes-Arriaga, A. (2024). The importance of standardized assessment. *Movement Disorders Clinical Practice*, *11*(Suppl 3), S15–S20. https://doi.org/10.1002/mdc3.14085

Rousson, V. (2014). Measuring an effect size from dichotomized data: Contrasted results whether using a correlation or an odds ratio. *Journal of Educational and Behavioral Statistics*, *39*(2), 144-163. https://doi.org/10.3102/1076998614524597

Rubin, D. C., Berntsen, D., & Bohni, M. K. (2008a). A memory-based model of posttraumatic stress disorder: evaluating basic assumptions underlying the PTSD diagnosis. *Psychological review*, *115*(4), 985. https://doi.org/10.1037/a0013397

Rubin, D. C., Boals, A., & Berntsen, D. (2008b). Memory in posttraumatic stress disorder: Properties of voluntary and involuntary, traumatic and nontraumatic autobiographical memories in people with and without posttraumatic stress disorder symptoms. *Journal of Experimental Psychology: General*, *137*(4), 591–614. https://doi.org/10.1037/a0013165

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

Schincariol, A., Orrù, G., Otgaar, H., Sartori, G., & Scarpazza, C. (2024). Posttraumatic stress disorder (PTSD) prevalence: An umbrella review. *Psychological Medicine*, *54*(15), 1–14. https://doi.org/10.1017/S0033291724002319

Sumner, J. A., Griffith, J. W., & Mineka, S. (2010). Overgeneral autobiographical memory as a predictor of the course of depression: A meta-analysis. *Behaviour Research and Therapy*, *48*(7), 614–625. https://doi.org/10.1016/j.brat.2010.03.013

Thielemann, J. F. B., Kasparik, B., König, J., Unterhitzenberger, J., & Rosner, R. (2022). A systematic review and meta-analysis of trauma-focused cognitive behavioral therapy for children and adolescents. *Child Abuse & Neglect*, *134*, 105899. https://doi.org/10.1016/j.chiabu.2022.105899

Valentine, J. C., Pigott, T. D., & Rothstein, H. R. (2010). How many studies do you need? : A primer on statistical power for meta-analysis. *Journal of Educational and Behavioral Statistics*, *35*(2), 215–247. https://doi.org/10.3102/1076998609346961

Viechtbauer, W. (2010). Conducting meta-analyses in r with the metafor package. *Journal of Statistical Software*, *36*, 1–48. https://doi.org/10.18637/jss.v036.i03

Wang, S.-K., Feng, M., Fang, Y., Lv, L., Sun, G.-L., Yang, S.-L., Guo, P., Cheng, S.-F., Qian, M.-C., & Chen, H.-X. (2023). Psychological trauma, posttraumatic stress disorder and trauma-related depression: A mini-review. *World Journal of Psychiatry*, *13*(6), 331–339. https://doi.org/10.5498/wjp.v13.i6.331

Figure 1

PRISMA Flow Diagram

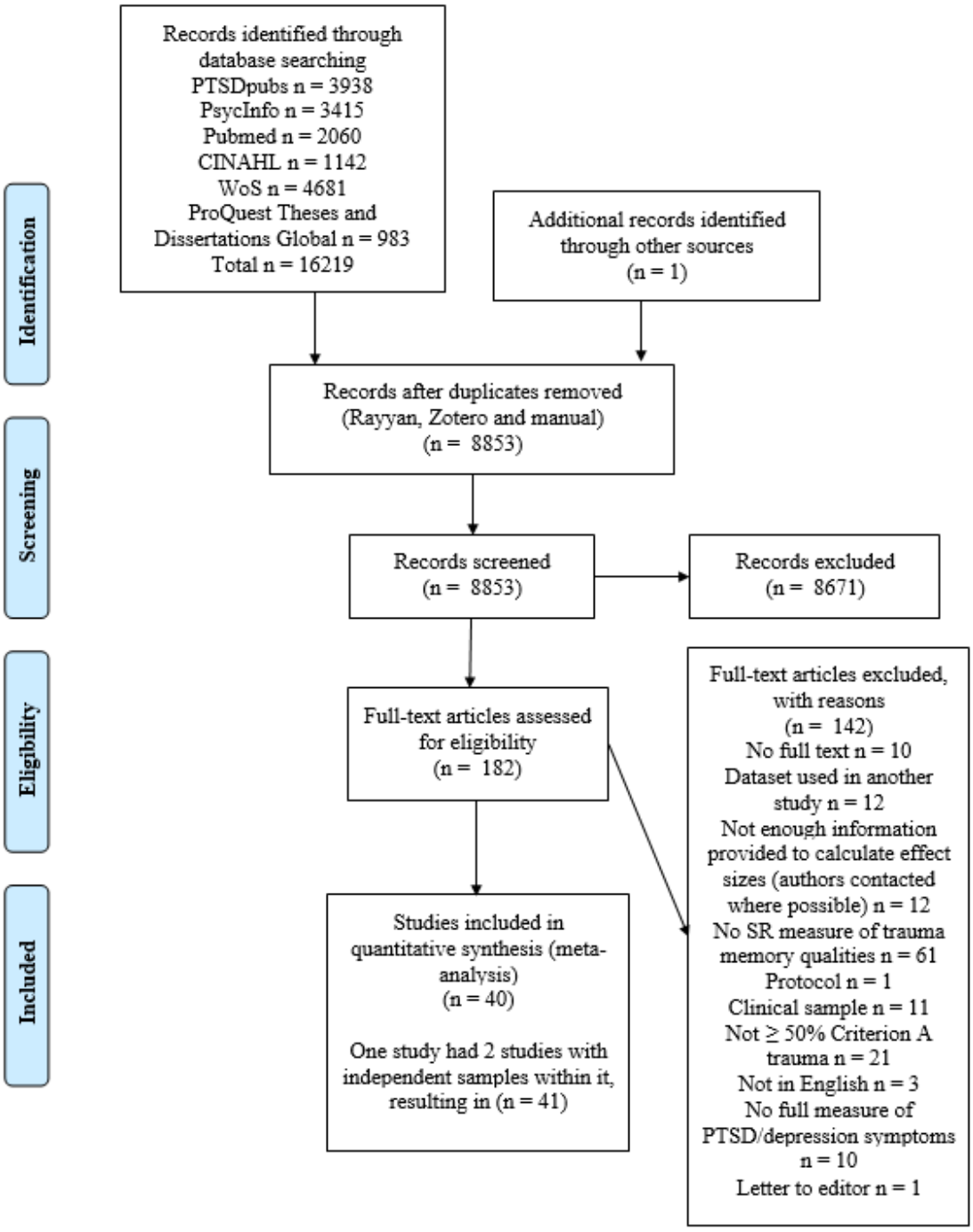


Figure 2

A Forest Plot Illustrating Effects Sizes (r) Extracted from Each Study and the Estimated Overall Effect Size between Trauma Memory Qualities and PTSD Symptoms

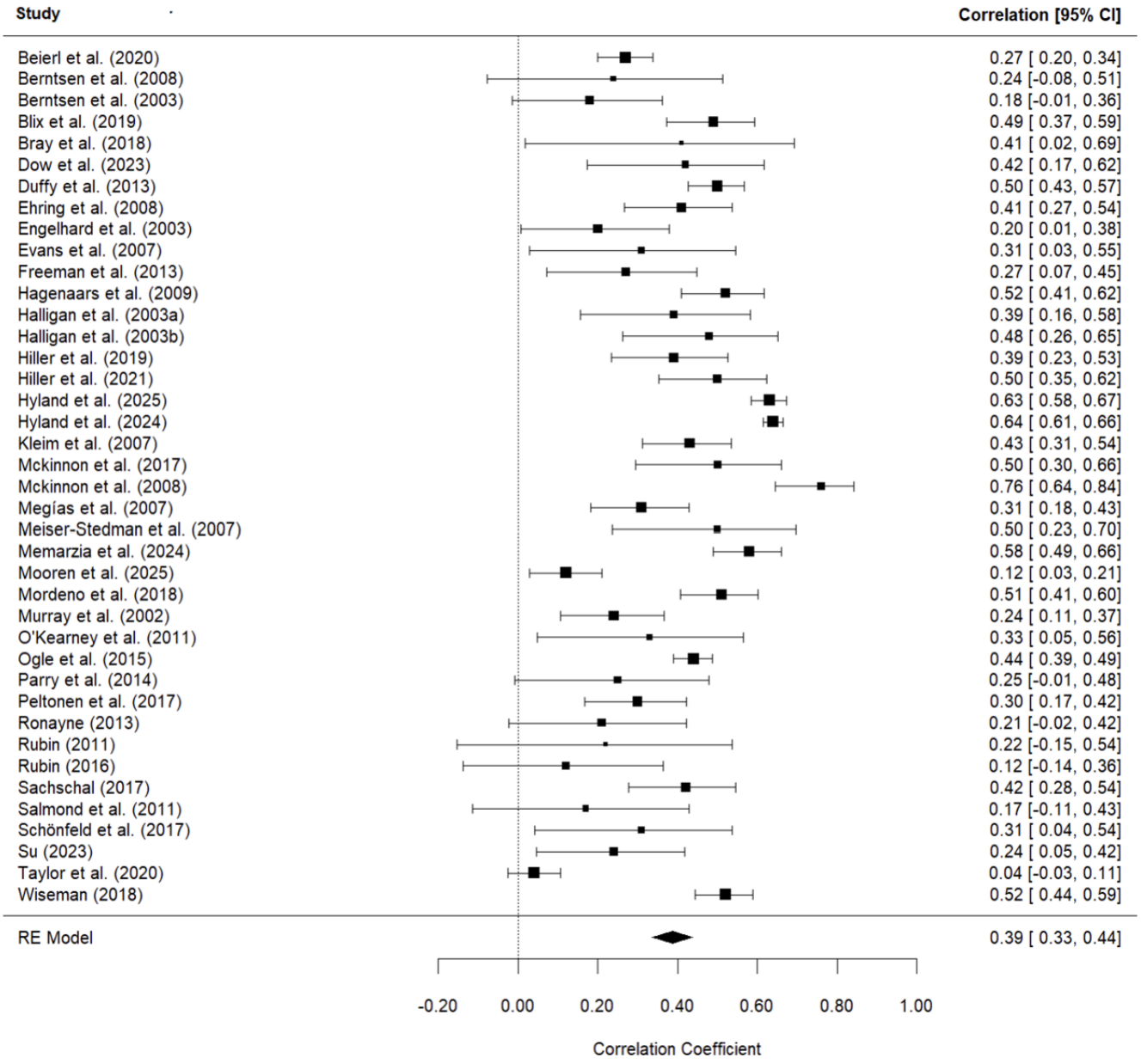


Table 1

Results from PTSD Symptoms Meta-Analysis and Subgroup Meta-Analyses

Analysis Type	*k*	*N*	*r*	LL	UL	*Z*	*Q*	I^2 (%)
Main Analysis	40	10115	.39	.33	.44	12.34**	577.80**	88.92
Sub group analysis								
Sensory	6	1145	.27	.18	.35	5.86**	9.96 (*p*=.08)	52.4
Here-and-now	7	1130	.38	.26	.49	5.86**	26.33 (*p*=.0002)	76.37
Coherence	7	1651	.01	-.05	.08	0.42 (*p*=0.67)	6.31(*p*=.39)	22.43
Disorganisation	9	1896	.36	.28	.44	7.96**	30.55 (*p*=.0002)	68.99
Fragmentation	3	379	.26	.16	.35	5.15**	0.31 (*p*=.86)	0.0
Vividness	5	657	.19	.11	.27	4.65**	4.90 (*p*=.30)	2.35
Acute PTSD	12	1246	.51	.37	.63	6.07**	97.29**	89.75
Post-acute PTSD	29	6976	.37	.31	.43	10.97**	435.22**	85.22

Note. PTSD = post-traumatic stress disorder; LL = lower limit of the 95% confidence interval; UL = upper limit of the 95% confidence interval.

**p<.0001

Table 2

Results from PTSD Symptoms Moderator Analyses

Moderator	Estimate (*r*)	SE	LCI	UCI	*p*
Age group					
Child (*k*=11)	.477	0.064	.375	.568	
Adult (*k*=29)	.356	0.038	.291	.419	
Meta-regression coefficient	0.147	0.074	0.002	0.292	.047
Interpersonal trauma					
Interpersonal (*k*=7)	.427	0.069	.311	.531	
Not interpersonal (*k*=12)	.419	0.053	.331	.500	
Meta-regression coefficient	0.010	0.087	-0.160	0.180	.907
Criterion A					
Full criterion A (*k*=28)	.376	0.040	.307	.441	
Part criterion A (*k*=12)	.416	0.061	.312	.510	
Meta-regression coefficient	-0.047	0.073	-0.190	0.096	.520
Risk of bias					
High/medium (*k*=24)	.324	0.041	.250	.394	
Low (*k*=16)	.468	0.046	.394	.536	
Meta-regression coefficient	-0.172	0.062	-0.293	-0.050	.006

Note. PTSD = post-traumatic stress disorder; LCI = lower limit of the 95% confidence interval; UCI = upper limit of the 95% confidence interval. Subgroup estimates and confidence intervals are reported in *r*. Standard errors (SE) are reported in Fisher's Z transformed units to maintain statistical symmetry. Meta-regression coefficients are reported in Fisher's Z transformed units to ensure statistical linearity and accuracy in the estimation of moderators.

Figure 3

Forest Plot Illustrating Effects Sizes (r) Extracted from Each Study and the Estimated Overall Effect Size between Trauma Memory Qualities and Depression Symptoms

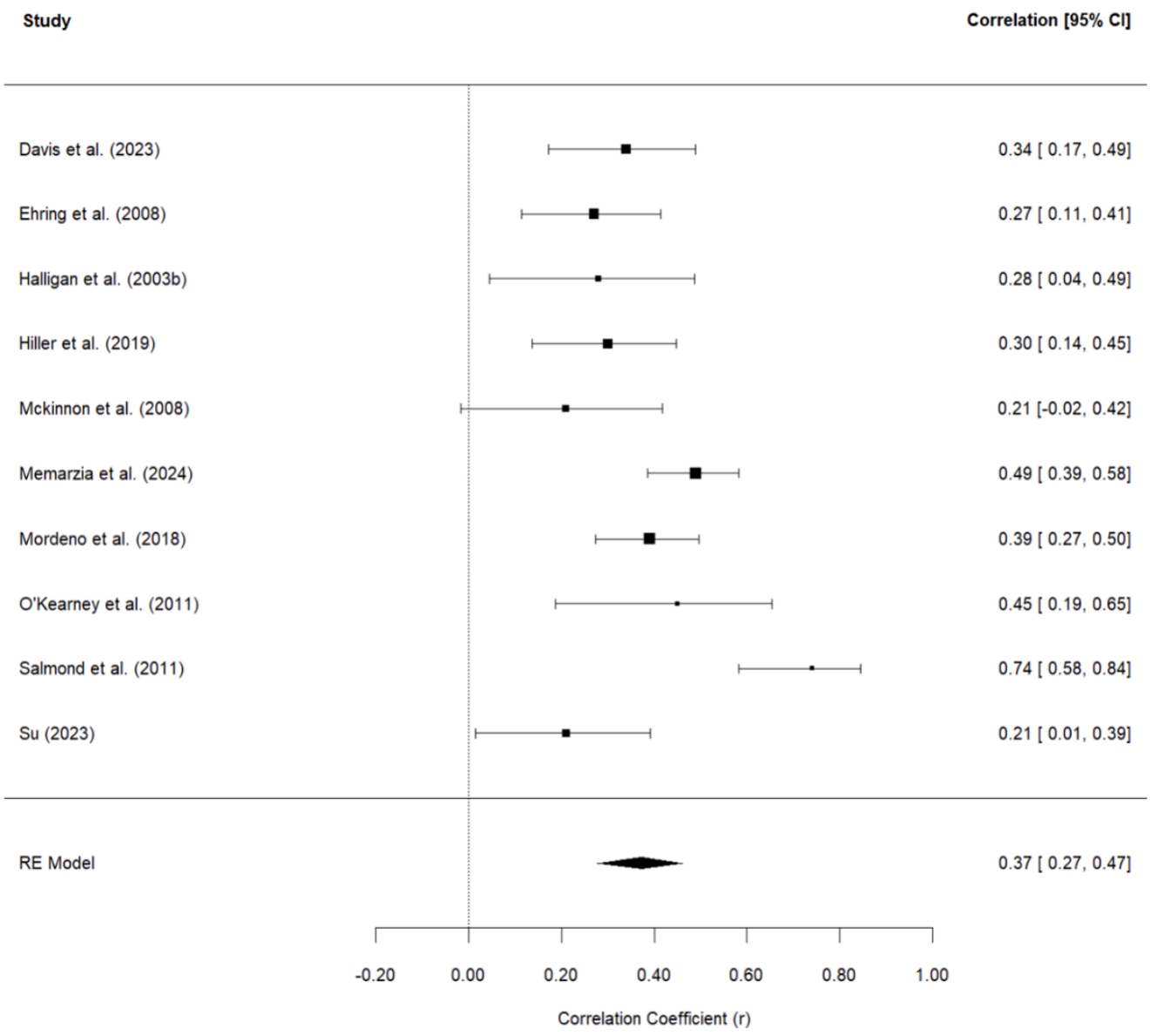


Table 3

Results from Depression Symptoms Meta-Analysis and Subgroup Meta-Analyses

Analysis	*k*	*N*	*r*	LL	UL	*Z*	*Q*	I^2 (%)
Main analysis	10	1198	.37	.27	.47	6.65**	28.98 (*p*=0.0007)	73.24
Subgroup analysis								
Disorganisation	4	362	.28	.18	.37	5.38**	2.26 (*p*=0.52)	0.0

Note. LL = lower limit of the 95% confidence interval; UL = upper limit of the 95% confidence interval.

***p*<.0001

Table 4

Results from Depression Symptoms Moderator Analyses

Moderator	Estimate (*r*)	SE	LCI	UCI	*p*
Age group					
Child (*k*=6)	.417	0.072	.294	.527	
Adult (*k*=4)	.294	0.094	.119	.451	
Meta-regression coefficient	0.142	0.118	-0.090	0.374	.231
Interpersonal trauma					
Not-interpersonal (*k*=5)	.300	0.041	.226	.371	
Interpersonal (*k*=2)	.318	0.076	.178	.446	
Meta-regression coefficient	0.020	0.087	-0.150	0.190	.816
Criterion A					
Full criterion A (*k*=7)	.418	0.066	.305	.519	
Part criterion A (*k*=3)	.258	0.102	.064	.433	
Meta-regression coefficient	0.182	0.122	-0.057	0.420	.136
Risk of bias					

High/medium (*k*=5)	.424	0.091	.266	.559	
Low (*k*=5)	.331	0.083	.178	.467	
Meta-regression coefficient	0.109	0.124	-0.134	0.351	.380

Note. LCI = lower limit of the 95% confidence interval; UCI = upper limit of the 95% confidence interval. Subgroup estimates and confidence intervals are reported in *r*. Standard errors (SE) are reported in Fisher's Z transformed units to maintain statistical symmetry. Meta-regression coefficients are reported in Fisher's Z transformed units to ensure statistical linearity and accuracy in the estimation of moderators.

Chapter 2: Bridging Chapter

Word Count: 442

The current meta-analysis identified medium effect sizes between trauma memory qualities and both PTSD and depression symptoms post-trauma. This suggests that trauma memory qualities may be a transdiagnostic mechanism underlying the maintenance of both disorders. Disorganisation was the only individual quality explored for depression due to the limited number of studies available. Disorganisation was also noted to have one of the highest association with PTSD symptoms. This suggests that interventions to improve the organisation of trauma memories may be successful in reducing symptomology across both presentations. However, it is important to note that the qualities within the current meta-analysis were assessed with self-report measures, so it could be argued that it was the perception of disorganisation that was associated with PTSD and depression symptoms post-trauma. The Trauma Memory Quality Questionnaire (TMQQ) (Meiser-Stedman et al., 2007) was utilised to assess qualities of trauma memories in children and adolescents across the PTSD and depression effect sizes. This assesses the verbal accessibility, temporal context and sensory qualities of memories. Descriptively, TMQQ scores had larger associations with PTSD and depression symptoms, compared to studies in adults which used a wide variety of measures. This may suggest that the TMQQ is a valid measure in capturing the kind of qualities that are associated with post-trauma psychopathology.

The following empirical study expands on the finding that trauma memory qualities are associated with PTSD symptoms, by exploring the factors predictive of problematic trauma memories. Specifically, the following study will explore the pre, peri- and post-trauma factors predictive of TMQQ scores in the acute period (<1 month) post-trauma and their subsequent relationship with later PTSD symptoms. The empirical study will be based on a pre-existing data set from the ASPECTS study (Meiser-Stedman et al., 2017) which explored the onset and maintenance of PTSD in children and adolescents exposed to single-event trauma. Research investigating the factors associated with problematic trauma

memories to date is limited, with research focusing on correlations between one factor and trauma memory qualities. The current study expands on this by exploring the factors that remain unique predictors of trauma memory qualities when multiple factors are considered. This represents the true complexity of cognitive processing during a traumatic experience.

References

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 and Anxiety*, *34*(4), 348–355. https://doi.org/10.1002/da.22602

Meiser-Stedman, R., Smith, P., Yule, W., & Dalgleish, T. (2007). The Trauma Memory Quality Questionnaire: Preliminary development and validation of a measure of trauma memory characteristics for children and adolescents. *Memory*, *15*(3), 271–279. https://doi.org/10.1080/09658210701256498

Chapter 3: Empirical Paper

Prepared for Submission to European Journal of Psychotraumatology

Author Guidelines available in Appendix A.

A Prospective Study on the Predictors and Outcomes of Acute Trauma Memory Qualities

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Word Count: 7977 (incl. abstract and reference, excl. tables and figures)

Abstract

Traumatic memories which are sensory-laden, fragmented, verbally inaccessible and have a 'here-and-now' quality have been associated with increased post-traumatic stress disorder (PTSD) symptoms in children and adolescents. Research shows small to moderate associations between peri-traumatic cognitive processes and these problematic memory qualities, but research is yet to explore the pre-, peri- and post-trauma factors that are predictive of such memory qualities. It has been suggested that memories high in these qualities may mediate the relationship between peri-traumatic cognitive processes and PTSD symptoms, but research exploring this to date is limited. The current study aimed to test two hypotheses. Firstly, that peri-traumatic processes will predict more variance in acute trauma memory qualities than participant demographics, trauma characteristics and post-trauma social support. Secondly, that trauma memory qualities will mediate the relationship between a variety of peri-traumatic cognitive processes and PTSD symptoms. The sample included 260 children aged 8-17 years old recruited from local emergency departments following experiencing a single-event trauma. Data was collected on demographics (age, gender and ethnicity) and trauma characteristics (trauma type and injury severity factors) from hospital records. Self-report questionnaires were utilised to collect data on peri-traumatic dissociation, data-driven processing, threat, panic, pain and trauma memory qualities at 2 weeks post-trauma and PTSD symptoms at 2 months post-trauma. Hierarchical multiple regression revealed peri-traumatic panic and pain, alongside being female, being assaulted (vs. other trauma types) and not being seen in resus to be unique predictors of trauma memory qualities at 2 weeks post-trauma. Peri-traumatic processes explained the largest amount of variance in trauma memory quality scores. Simple mediation analyses revealed that trauma memory qualities mediated the relationship between peri-traumatic cognitive processes and PTSD symptoms, with pain and threat showing full mediation. This study provided empirical

evidence that peri-traumatic cognitive processes, primarily panic and pain, are powerful predictors of acute trauma memory qualities. Further, this study evidenced that the impact of disrupted peri-traumatic cognitive processes on PTSD symptoms, may in part be through sensory-laden, verbally inaccessible memories with a 'here-and-now' quality.

Key Words: post-traumatic stress disorder, trauma memory qualities, TMQQ, cognitive models, panic, pain, dissociation, data-driven processing, threat

Highlights:

- Being female, being assaulted (vs. other trauma types), not being seen in resus and experiencing higher levels of peri-traumatic panic and pain were unique predictors of trauma memory qualities at 2 weeks post-trauma in children and adolescents exposed to single-event trauma.
- Trauma memory qualities, as measured by the Trauma Memory Quality Questionnaire (TMQQ) (Meiser-Stedman et al., 2007b), mediated the relationship between all peri-traumatic cognitive processes and PTSD symptoms 2 months post-trauma.
- Peri-traumatic panic and pain are key predictors of sensory-laden, verbally inaccessible memories with a 'here-and-now' quality within the acute stage (<1 month) post-trauma.

Introduction

Exposure to traumatic events in childhood and adolescence is common, with prevalence rates estimating that more than two thirds of children experience at least one potentially traumatic event by age 16 (Copeland et al., 2007). Natural recovery following trauma is common (Meiser-Stedman et al., 2017a), but an estimated 12-16% of trauma exposed children go on to develop Post-Traumatic Stress Disorder (PTSD) (Alisic et al., 2014; Visser et al., 2025). PTSD is characterised by intrusive re-experiencing; cognitive and behavioural avoidance; negative alterations in cognition in mood; and heightened arousal and reactivity, with symptoms causing significant levels of distress and impairment in daily functioning (American Psychiatric association [APA], 2013). PTSD is diagnosed if symptoms persist into the post-acute period (>1 month post-trauma), with Acute Stress Disorder (ASD) being diagnosed in the acute period (<1 month) (APA, 2013). At both time points, an element of re-experiencing often includes intrusive and involuntary memories of the event that are vivid, sensory-laden, and have a 'here-and-now' quality (Brewin, 2025). Given how distressing and disruptive these memories are, identifying their early predictors is essential in ensuring timely risk assessment and prevention of more chronic, long-term distress.

Cognitive models of PTSD in adults provide a framework to account for these specific memory qualities. They posit that peri-traumatic processes such as dissociation, fear, and data-driven processing impact the encoding process and result in memories that are fragmented, sensory-heavy, disorganised and poorly integrated into autobiographical memory (Brewin & Dalgleish, 1996; Ehlers & Clark, 2000). Because these memories lack temporal context, they are easily triggered, leading to vivid, intrusive re-experiencing that sustains a persistent sense of fear and current threat. This is further maintained by negative appraisals of both the event and resulting symptoms, alongside maladaptive coping strategies like cognitive and behavioural avoidance. Additionally, the role of background factors such as

pre-trauma emotional difficulties, trauma characteristics and post-trauma social support are emphasised as important in shaping post-trauma symptomology (Brewin & Dalgleish, 1996; Ehlers & Clark, 2000).

Due to developmental differences in memory processing and cognitive capacity in children and adolescents compared to adults (Salmon & Bryant, 2002), it cannot be assumed that the core aspects of adult models of PTSD generalise across the lifespan. To date, the associations between pre-trauma emotional difficulties, trauma characteristics and post-trauma social support with trauma memory qualities remains unexplored in children and adolescents. However, their links to PTSD symptoms have been widely investigated. Pre-trauma emotional difficulties (Cox et al., 2008; Trickey et al., 2012) and experiencing an interpersonal trauma (Alisic et al., 2014) have consistently been associated with increased PTSD symptoms. Injury severity (Cox et al., 2008; Trickey et al., 2012) and post-trauma social support (Allen et al., 2021) show weaker associations with PTSD symptoms. Given that cognitive models of PTSD indicate the nature of the trauma memory to be a precursor of PTSD, investigating the ways in which these background factors may also relate to trauma memory qualities is essential in furthering our understanding of the development of PTSD.

In line with cognitive models, meta-analyses have demonstrated that higher levels of peri-traumatic cognitive processing such as threat, dissociation and data-driven processing (Memarzia et al., 2021) as well as problematic trauma memory qualities (Reed et al., 2023) are associated with higher levels of PTSD symptoms in children and adolescents. The Trauma Memory Quality Questionnaire (TMQQ) (Meiser-Stedman et al., 2007b) is the most widely used self-report measure for assessing the qualities of trauma memories in children and adolescents, focusing on sensory elements, verbal accessibility and temporal context. In exploring the relationship between peri-traumatic cognitive processes and trauma memory qualities, medium to large correlations have been identified between pain, fear, panic, data-

driven processing and acute TMQQ scores (Dow et al., 2019; McKinnon et al., 2008; Mckinnon et al., 2017). However, these associations have been determined through simple bivariate correlations which do not reflect the complexity of the peri-traumatic period with multiple interacting cognitive processes occurring at once.

A deeper insight into the trauma trajectory is vital for understanding the specific cognitive mechanisms that place children and young people at risk for sensory-laden, verbally inaccessible, 'here-and-now' trauma memories and subsequent PTSD symptoms. To our knowledge, no studies to date have empirically tested the indirect pathway through which acute trauma memory qualities may mediate the relationship between peri-traumatic cognitive processes and post-acute PTSD symptoms in children and adolescents. In the acute period, McKinnon et al. (2008) found TMQQ scores to mediate the relationship between peri-traumatic data-driven processing and acute intrusive symptoms. Similarly, Meiser-Stedman et al. (2007b) found TMQQ scores to mediate the relationship between peri-traumatic threat and ASD. However, TMQQ scores and ASD symptoms were assessed concurrently, meaning temporal precedence could not be established. This leaves it unclear whether acute problematic trauma memory qualities are an early risk factor for PTSD, or whether the two variables are merely correlated at one point in time.

Despite this limitation, the mediation effects highlight that trauma memory qualities may be a target for reducing PTSD symptoms. However, research on changes in trauma memory qualities as a mechanism of change in treatment in children and adolescents is scarce (Kangaslampi & Peltonen, 2022), with one controlled study to date evidencing pre-post changes in trauma memory characteristics to be associated with cognitive therapy for PTSD's (CT-PTSD) effects on PTSD symptoms (Meiser-Stedman et al., 2017b). However, when changes from pre- to mid-treatment were included to determine temporal precedence, no mediation effect remained. A deeper understanding of the factors associated with acute

trauma memory qualities is key in understanding their subsequent relationship with the onset and maintenance of PTSD.

Aims

The first aim of the current study is to understand the relative roles of pre-trauma factors (gender, age, ethnicity, and emotional difficulties), trauma characteristics (injury severity and interpersonal nature), peri-traumatic processes (dissociation, data-driven processing, panic, pain and threat), and post-trauma social support in predicting trauma memory qualities at 2 weeks post-trauma within a large sample of children and adolescents in the UK. The second aim is to explore whether trauma memory qualities at 2 weeks post-trauma mediate the relationship between peri-traumatic cognitive processes and PTSD symptoms 2 months post-trauma.

Firstly, it was hypothesised that peri-traumatic cognitive processes (dissociation, data-driven processing, threat, panic and pain) will be stronger predictors of trauma memory qualities than background factors including demographics (age, gender, ethnic minority status), trauma characteristics, and post-trauma social support. This is partly exploratory in nature, given the lack of empirical evidence surrounding factors associated with trauma memory qualities outside of peri-traumatic cognitive processes.

Secondly, it was hypothesised that trauma memory qualities assessed at 2 weeks post-trauma will mediate the relationship between peri-traumatic cognitive processes and PTSD symptoms at 2 months post-trauma.

Methods

The current study used data collected from the Acute Stress Programme for Children and Teenagers (ASPECTS) study, which was a prospective longitudinal study on PTSD in children and young people following single-event trauma (Meiser-Stedman et al., 2017a).

Participants

Participants were children and adolescents (8-17 years old) who presented at four emergency departments in the East of England following single-event trauma, between September 2010 and April 2013. 'Single-event trauma' was an event that met the DSM-5 definition of trauma i.e., 'exposure to actual or threatened death, serious injury, or sexual violence' (American Psychiatric Association [APA], 2013), and was unrelated to long term abuse or maltreatment. Exclusion criteria included inability to speak English; intellectual disability; any symptoms of PTSD following previous trauma; moderate-to-severe brain injury (i.e., post traumatic amnesia ≥ 24 hours); deliberate self-harm, and being under the care of social services or the trauma was related to a child protection issue. No participants were excluded due to ongoing trauma.

Seven-hundred and seventy-three eligible children and adolescents were identified from hospital records. 168 (21.7%) were uncontactable; out of the 605 contacted families, 315 (52%) declined participation; 30 (5%) did not meet the eligibility criteria, resulting in 260 (43%) families consenting to participation. There were no significant differences between participants (n= 260) and eligible non-participants (n= 483), with regards to age, gender, ethnicity, number of injuries or hospital treatment. However, non-responders were more likely to experience more pain, be admitted to hospital and intensive care, have lost consciousness and to have experienced an assault (vs. other) trauma.

Of the 260 children and young people, initial assessments at 2 weeks post-trauma (T1) were completed by 226 and the assessments at 9 weeks post-trauma (T2) were completed by 234 (208 (92%) of these also completed the T1 assessment). There were no statistically significant differences between those who did or did not complete the T2 assessment in terms of sex, age or initial traumatic stress symptoms. Both assessment points included interviews

and self-report questionnaires. The current study uses child and adolescent self-report questionnaire data only, which 217 participants completed at T1 and 234 completed at T2.

Measures

Demographics

Information including age, gender and ethnicity were collected at the initial interview or from emergency department records.

Pre-trauma Emotional Difficulties

A 5 item self-report scale was used assessing pre-trauma anxiety, low mood and anger e.g., 'Before the event, I used to feel really sad sometimes'. The five items were derived from the Posttraumatic Adjustment Scale (PAS; O'Donnell et al., 2008). It had good internal consistency in the current sample (Cronbach's α=0.81).

Trauma Characteristics

Objective Injury Severity. This was assessed by measuring: head injury (yes/no), number of injuries, assault (vs. other trauma types) (yes/no), fracture (yes/no), admission to hospital (yes/no), seen in resus (yes/no), and whether injuries resulted in a permanent loss of function (yes/no).

Peri-Traumatic Factors

Threat. This was assessed using a 3 item self-report scale e.g., 'I really thought I was going to die' (Meiser-Stedman et al., 2007a). It had acceptable internal consistency in the current sample (Cronbach's α=0.76).

Data-Driven Processing. This was assessed using the 7 item self-report Child Data-Driven Processing Questionnaire (CDDPQ; Mckinnon et al., 2008) e.g., 'My mind was full of

what I saw, heard, smelled or felt'. It had good internal consistency in the current sample (Cronbach's α= 0.89).

Panic. This was assessed using a 10 item self-report measure e.g., 'Did you shake or tremble?' (Meiser-Stedman et al., 2019). It had acceptable internal consistency in the current sample (Cronbach's α=0.72).

Dissociation. This was assessed using a 4 item measure e.g., 'Feeling like I was in a dream' (Meiser-Stedman et al., 2019). It had questionable internal consistency in the current sample (Cronbach's α=0.67).

Pain. This was assessed with a single question: 'How much pain were you in at the time of the accident?' This was rated from '0 = not at all' to '3 = a lot'.

Post-trauma Factors

Social Support. This was assessed using the 12 item self-report Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988) e.g., 'There is a special person who is around when I am in need'. It had excellent internal consistency in the current sample (Cronbach's α=0.93).

Outcome Factors

Trauma Memory Qualities. This was assessed using the Trauma Memory Quality Questionnaire (TMQQ; Meiser-Stedman et al., 2007b) e.g., 'My memories of the frightening event are very clear and detailed'. It had good internal consistency in the current sample (Cronbach's α=0.80). Higher scores are associated with more problematic/toxic trauma memories.

PTSD Symptoms. This was assessed using the 17 item self-report The Children's PTSD Symptoms Scale (CPSS; Foa et al., 2001) e.g., 'Having upsetting thoughts or pictures

that come into your head when you don't want them to'. It had excellent internal consistency in the current sample (Cronbach's α= 0.92).

Procedure

The original study was approved by the UK National Research Ethics Service, Cambridgeshire 1 Research Ethics Committee (study number 10/H0304/11) (see Appendix J). The current study was approved by the University of East Anglia's FMH S-REC (Faculty of Medicine and Health Sciences Research Ethics Subcommittee) (ID: ETH2425-2472) (see Appendix K).

After presenting at their local emergency department, parents/carers of children who met the eligibility criteria were contacted with basic study details before being contacted by a research assistant to discuss the study further. Information sheets and consent/assent forms were sent, adapted for the age of the child (8-10 years, 11-15 years, and 16-17 years). Additional information on ethical processes can be found in Chapter 4. At approximately 2 weeks post-trauma (T1) and 2 months post-trauma (T2), participants and their parents/carers were interviewed and completed self-report questionnaires. Despite parent/carer data being collected as part of the original ASPECTS study (Meiser-Stedman et al., 2017a), only the self-report measure data completed by the children and young people themselves were relevant for and utilised in the current study. This was the case for all predictor and outcome variables (pre-trauma emotional difficulties, peri-traumatic factors, post-trauma factors, and outcome factors), with the exception of demographics and trauma characteristics, where the data were collected from hospital records after being gathered by nurses in the emergency department at the point of admission. T1 questionnaires were used for hypothesis 1 and T1 and T2 questionnaires were used for hypothesis 2. The procedure and self-report measures utilised within the current study remained the same across all age groups of children and young people.

Analyses

Analyses were conducted in SPSS Statistics (Version 31.0). Zero-order correlation analyses were completed to explore the associations between all predictor and outcome variables. Variables significantly associated with TMQQ scores were explored further. Hierarchical multiple regression and commonality analyses (Nimon, 2010) were completed for hypothesis 1. Due to there being moderate correlations between peri-traumatic cognitive processes, and research suggesting overlaps in their explanatory power (Halligan et al., 2003; Massazza et al., 2021), commonality analyses were completed to explore the unique and shared variance of these predictors on trauma memory qualities. Simple mediation analyses using PROCESS macro (Hayes, 2022) within SPSS (Version 31.0) were completed for hypothesis 2.

Due to variable levels of missing data, Little's MCAR test (Little, 1988) was completed to see if data was Missing Completely At Random (MCAR). Non-MCAR data can introduce bias into parameter estimates reducing the representativeness of the sample (Tabachnick & Fidell, 2019). The non-significant result suggested that data was MCAR ($x^2(44) = 39.65$, $p = .67$). However, as Little's MCAR test is a test of 'global' missingness (Tabachnick & Fidell, 2019), it can sometimes miss localised patterns. T-tests and chi-square tests were completed to assess for any significant differences between complete cases and those with missing data on age, gender, ethnic minority status, a variety of trauma severity measures and initial post-traumatic stress symptoms. When Bonferroni corrections were taken into account, complete cases were significantly older than incomplete cases ($t(258) = -2.73$, $p < .007$) (14.16 years vs. 12.93 years). To account for this and to control for the impact of age, age was added into Step 1 of the hierarchical regression model and complete case analysis was undertaken. For consistency, age was also added as a covariate for each simple mediation analysis.

Checks were made to ascertain if the data met assumptions required for multiple regression and mediation analyses. For the hierarchical regression data, assumptions of normality and homoscedasticity of residuals were met, alongside there being no significant multicollinearity or highly influential outliers. The assumption of independence of errors was also met. For the simple mediation analyses data, all assumptions were met with the exception of heteroscedasticity of residuals and a couple of outliers with high leverage. To account for this, heteroscedasticity-consistent standard error estimators (HCSE) were used within the model. HC4 was chosen over HC3 as this is recommended when data contains some potentially influential points alongside heteroscedasticity (Hayes & Cai, 2007). As five separate mediation analyses were being completed, significant alpha values were reduced from 0.05 to 0.01 to reduce the type 1 error rate. As PROCESS uses bootstrapped (5000 re-samples) confidence intervals over *p*-values to assess the significance of the indirect effect, the models were run with 99% confidence intervals instead of the standard 95% to address multiple testing and to reduce type one error rate (Dunn, 1961; Kloke & McKean, 2024).

Results

Of the total 260 participating children, 118 (45%) had experienced a road traffic accident (RTA), 82 (32%) had an accidental injury, 43 (17%) had been assaulted, 15 (6%) experienced a dog attack, and 2 (1%) had an acute medical emergency. Correlation analyses revealed that female gender, being assaulted (vs. other trauma types), not being seen in resus, not being admitted to hospital, and peri-traumatic panic, threat, dissociation, data-driven processing and pain were associated with higher TMQQ scores. Peri-traumatic cognitive processes had the strongest associations with trauma memory quality. Ethnic minority status, age at trauma, head injury, number of injuries, injuries resulting in permanent loss of function, having a fracture and levels of post-trauma social support were not significantly

correlated with trauma memory quality, so were not investigated further. See Table 5 for sample demographics and correlations between study variables.

Regression Modelling of Trauma Memory Qualities

Predictors were entered into the model in order of temporal occurrence. Step 1 included the demographic variables age at trauma and gender. Despite age at trauma not significantly correlating with TMQQ, this was added due to the regression sample being significantly older than the non-included participants. Age has also been noted to influence post-trauma symptomology and autobiographical memory (Bokszczanin, 2007; Nelson & Fisvush, 2004). Step 2 included pre-trauma emotional difficulties. Step 3 included trauma characteristics. Step 4 included peri-traumatic cognitive processes. In the current study, specific post-trauma factors were not explored due to a non-significant correlation between trauma memory quality and post-trauma social support. Exploratory analyses revealed that adding post-trauma social support as an additional step did not account for any unique variance in any model.

Each successive step in the hierarchical regression accounted for a significant proportion in the variance of trauma memory qualities (see Table 6). However, peri-traumatic cognitive processes added in step 4 accounted for considerably more variance in trauma memory qualities, accounting for 23% additional unique variance. Overall, the final model was significant ($F(11, 198) = 12.86$, $p < .001$), accounting for 42% of the variance in trauma memory qualities (R^2=.42). Being female (β = 0.12), being assaulted (β = *0.12),* not being seen in resus (β = -0.12), peri-traumatic pain (β = 0.13), and peri-traumatic panic (β = 0.23) were significant predictors of trauma memories that are more sensory-laden, verbally inaccessible and lack temporal context.

Commonality analyses decomposed the total variance explained (R^2 = 41.66%) of the final regression model into proportions that are unique to each predictor and portions that are shared (common) among them (see Table 7). Consistent with the hierarchical regression results, pain (2.08%) and panic (2.98%) were shown to explain the largest amount of unique variance in trauma memory qualities. Panic (23.18%), data-driven processing (19.05%), threat (17.64%) and dissociation (15.29%) shared the largest amount of variance amongst predictors.

Mediation Analyses

For consistency with the hierarchical regression model, age and gender were added as covariates in each simple mediation model.

Full Mediation: Pain and Threat

Simple mediation analyses revealed that trauma memory qualities assessed at 2 weeks post-trauma fully mediated the relationship between both pain (Path *ab*: *B* = 1.77, Boot SE = 0.43, 99% CI [0.77, 2.96]) (see Table 8) and threat (Path *ab*: *B* = 0.90, Boot SE = 0.19, 99% CI [0.48, 1.42]) (see Table 9) and subsequent PTSD symptoms measured at 2 months post-trauma. Both peri-traumatic processes significantly predicted the qualities of trauma memories (Path *a*), and trauma memory qualities significantly predicted PTSD symptoms (Path *b*). Once trauma memory qualities were included in the model, there was no significant direct effect of pain or threat on PTSD symptoms (Path *c'*). This suggests that pain and threat are indirectly related to PTSD through their associations with sensory-laden, verbally inaccessible, 'here-and-now' trauma memory qualities.

Partial Mediation: Panic, Data-Driven Processing, and Dissociation

Simple mediation analyses revealed that trauma memory qualities assessed at 2 weeks post-trauma partially mediated the relationship between panic (Path *ab*: *B* = 0.96, Boot SE =

0.18, 99% CI [0.52,1.47]) (see Table 10), data-driven processing (Path *ab*: *B* = 0.36, Boot SE = 0.07, 99% CI [0.19, 0.54]) (see Table 11) and dissociation (Path *ab*: *B* = 0.65, Boot SE = 0.14, 99% CI [0.32, 1.03]) (Table 12) and subsequent PTSD symptoms at 2 months post-trauma. All three peri-traumatic processes significantly predicted trauma memory qualities (Path *a*), and trauma memory qualities significantly predicted PTSD symptoms (Path *b*). Once trauma memory qualities were included in the model, a significant direct effect of all three peri-traumatic cognitive processes on PTSD symptoms remained (Path *c'*). This suggests that panic, data-driven processing and dissociation are directly related to PTSD symptoms, as well as being related to PTSD symptoms through their associations with sensory-laden, verbally inaccessible, 'here-and-now' trauma memory qualities.

Discussion

Overall Findings

The current study aimed to explore the relative roles of pre- , peri- and post-trauma factors on the qualities of acute trauma memories in children and adolescents exposed to a single-event trauma. The current study also aimed to explore whether the qualities of acute trauma memories would mediate the relationship between a variety of peri-traumatic processes and PTSD symptoms 2 months post-trauma.

Our first hypothesis was met, with peri-traumatic cognitive processes explaining the most variance in trauma memory qualities over and above demographics, pre-trauma emotional difficulties and trauma characteristics. Adding peri-traumatic cognitive processes into the final step of the hierarchical regression model explained an additional 23% of variance in trauma memory qualities on top of the 19% explained by all earlier predictors combined. This is in line with Ehlers and Clark's (2000) cognitive model of PTSD which posits that peri-traumatic cognitive processes are key in shaping the nature of trauma

memories. The current findings are also in line with research that found peri-traumatic pain, panic and data-driven processing to be positively associated with acute trauma memory qualities (Dow et al., 2019; McKinnon et al., 2008; McKinnon et al., 2017). The current study extended previous findings by exploring the relative impact of multiple predictors within a single model. This approach offers greater ecological validity, as it reflects the true complexity of the cognitive, somatic and pre-trauma background factors that influence the encoding of the traumatic experience.

Being female (β = 0.12, being assaulted (β = 0.12), not being seen in resus (β = -0.12), peri-traumatic pain (β = 0.13) and peri-traumatic panic (β = 0.23) emerged as unique predictors of trauma memory qualities when all predictors were entered into the model. With regards to peri-traumatic processes, these findings suggest that physiological arousal and somatic experiences (panic and pain) are stronger predictors of the qualities of acute trauma memories in children and adolescents than cognitive-perceptual processes (dissociation and data-driven processing). These findings can be understood in the context of the impact of traumatic events on the nervous system, and subsequent processing of information. Specifically, exposure to a distressing event leads to increases in cortisol and adrenaline (Morris & Rao, 2013), and these elevated stress hormones have been shown to abolish context dependent memory (Sabia & Hupbach, 2020; Schwabe et al., 2009). This is also emphasised in cognitive models of PTSD, with higher arousal and fear during a trauma negatively impacting on conceptual processing (Ehlers & Clark, 2000). In this way, it may be that high levels of physiological arousal, as a consequence of high levels of pain and panic, lead to dissociative processes and data-driven processing, resulting in sensory-based, verbally inaccessible memories with ‘here-and-now’ qualities. Future research should investigate whether data-driven processing and dissociation mediate the link between peri-traumatic

arousal and the nature of trauma memories in order to further clarify how peri-traumatic processes shape trauma memory qualities.

Despite their strong correlations with the qualities of trauma memories, threat, data-driven processing and dissociation did not emerge as significant predictors in the final stage of the hierarchical regression. Commonality analyses revealed that these variables shared a substantial amount of common variance, meaning that they overlap in the qualities of trauma memories that they explain and did not explain enough unique variance to emerge as significant predictors. Given that the standardised Beta coefficients for dissociation (β=.13), threat (β=.13), and data-driven processing (β=.10) were comparable to pain (β=.13) and panic (β=.23), their relationships should not be dismissed but instead they should be viewed as exerting a collective rather than independent influence on trauma memory qualities. Research in adults has found a similar relationship, with dissociation and data-driven processing overlapping in the variance they explain in PTSD symptomology (Halligan et al., 2003).

With regards to background factors, being female, being assaulted and not being seen in resus were found to significantly predict unique variance in the qualities of trauma memories. Pre-trauma emotional difficulties was a unique predictor until peri-traumatic cognitive processes were added to the model. It may be that pre-trauma emotional difficulties predispose individuals to experience higher levels of peri-traumatic distress, which in turn leads to problematic trauma memory qualities. Being female (Trickey et al., 2012) and being exposed to interpersonal traumas (Alisic et al., 2014) are consistently associated with increased PTSD symptomology, so the current findings take this further by identifying that part of this effect may be through their relationship with trauma memory qualities. The finding that not being seen in resus was predictive of more problematic trauma memory qualities was surprising given that resus is often seen to be a frightening experience associated with high levels of arousal and distress (Reiner et al., 2021). The high levels of

care, attention and support received in a resus context may serve as an anchoring point, providing the necessary context for children and adolescents to process and make sense of their traumatic experience. However, on this premise, we would expect post-trauma social support to have a negative association with acute trauma memory qualities which was not the case in the current study. The MSPSS, which was used to assess post-trauma social support, assesses whether young people have a support network to rely upon, but does not explore whether these individuals may help shape a more contextualised and organised trauma narrative. Further research is needed to explore the active ingredients of social support that may be associated with post-trauma outcomes (Morris & Rao, 2013).

Our second hypothesis, that the qualities of trauma memories would mediate the relationships between peri-traumatic cognitive processes and PTSD symptoms at 2 months post-trauma was met. Peri-traumatic pain and threat were found to exert an indirect influence on PTSD symptoms through their impact on the qualities of trauma memories. Dissociation, data-driven processing and panic were found to exert their influence on PTSD symptoms, directly and through their influence on the qualities of trauma memories. These findings extend previous research that highlight how trauma memory qualities mediate the relationship between peri-traumatic cognitive processes and acute PTSD symptoms (McKinnon et al., 2008; Meiser-Stedman et al., 2007). Specifically, the current findings demonstrate that these relationships remain in the post-acute period. Meta-analyses in children and adolescents have consistently demonstrated robust associations between peri-traumatic cognitive processes and PTSD symptoms (Cox et al., 2008; Memarzia et al., 2021; Trickey et al., 2012). The current study expands current understanding of this process by revealing that this association may be driven, in part, by the role peri-traumatic cognitive processes play in shaping trauma memory qualities.

Limitations

The current study has limitations that warrant mention to support in interpretation of the findings. Firstly, the study population was majority White British and all had only experienced single-event traumas. Therefore, our findings cannot be assumed to be generalisable to those from a variety of ethnocultural backgrounds or to those who have experienced more chronic, long-term trauma. For example, the nervous systems of children who have experienced chronic forms of maltreatment have been found to have more blunted responses to distressing situations (Gunnar & Vazquez, 2001; Trickett et al., 2010). Therefore, peri-traumatic physiological arousal may differ and other processes may emerge as significant predictors of acute trauma memory qualities.

Limitations of the current study also relate to the measures used. Measures of pre-trauma emotional wellbeing, peri-traumatic panic and dissociation were created by Meiser-Stedman et al. (2019) in an earlier study exploring the ASPECTS data, meaning that they had unestablished construct validity. In addition, peri-traumatic pain was only measured by one item: 'how much pain were you in at the time of the accident?'. There is a possibility that this could have been interpreted in different ways e.g., emotional or physical pain which may reduce construct validity.

A final limitation of the current study is the 2 month assessment point for PTSD symptoms, which could be argued to be in the middle of the window when many children are still undergoing natural recovery (Hiller et al., 2016). Consequently, the observed relationships may be specific to early PTSD symptomology and might not generalise to the smaller subset of individuals who go on to develop chronic PTSD.

Clinical and Theoretical Implications

The current findings are in support of cognitive models of PTSD, with peri-traumatic cognitive processes explaining the most variance in trauma memories which were sensory-laden, verbally inaccessible and having a 'here-and-now' quality. Ehlers and Clark's (2000) cognitive model of PTSD posit that peri-traumatic dissociation and data-driven processing are key peri-traumatic cognitive processes in influencing the nature of the trauma memories, whereas the current study identified that pain and panic may be more important. It may be that these physiological processes play more of a key role in shaping the nature of the trauma memories in children and adolescents than dissociation and data-driven processing. Models explaining PTSD may benefit from additional emphasis on physiological arousal and somatic processes when discussing the nature of traumatic memories, primarily in children and adolescents. It is important to note that there are differences across age groups with regards to the peri-traumatic processes focused on within the literature. Adult studies tend to focus on data-driven processing and dissociation (Beierl et al., 2020; Ehring et al., 2008; Halligan et al., 2003), whereas child studies tend to focus on threat (Memarzia et al., 2021). It may be that panic and pain would also emerge as important predictors in adults if these were explored in more depth in the literature.

The current findings suggest that interventions based on reducing pain and physiological arousal may be beneficial in the early stages post-trauma, to mitigate against the creation of problematic trauma memories and subsequent PTSD symptoms. A high heart rate upon admission to the emergency department has been found to predict PTSD symptoms 3-12 months post-trauma (Bryant et al., 2008; Kassam-Adams et al., 2005; Zatzick et al., 2005), further reinforcing the potential benefits of reducing physiological arousal in preventing subsequent PTSD symptoms. One avenue to reduce this would be through pharmacological means. However, the success of pharmacological means in preventing later

PTSD is mixed at present (Astill Wright et al., 2019; Bertolini et al., 2024), with some research suggesting that medications aimed at reducing physiological arousal may even impede natural recovery (McCleery & Harvey, 2004). Some psychosocial interventions delivered in the acute period have shown promise in reducing later psychopathology, compared to control groups. This has been found for modified prolonged exposure therapy (Rothbaum et al., 2012) and a memory restructuring intervention (Gidron et al., 2001). The findings from the current study also emphasise the importance of assessing for peri-traumatic processes, such as panic and pain, in the immediate aftermath of a trauma in order to identify those at risk of problematic trauma memories and subsequent PTSD symptoms.

One consideration to note is that children and adolescents may be exposed to a traumatic event but not require immediate medical care, so early presentations associated with high levels of peri-traumatic arousal and intrusive trauma memories may be missed. Children often rely on parents/carers to notice and seek support on their behalf, as they may lack awareness into what they are experiencing and the fact that support is available (Meiser-Stedman et al., 2017b). This emphasises the importance of trauma-informed care across general health and education settings, so that those with close and frequent contact with children and adolescents are able to identify early symptoms and seek support where needed. Trauma-informed care should incorporate the finding that females and survivors of assault may be at greater risk for developing problematic trauma memories.

Future Research

Future research should conduct similar analyses over an extended time period to see if the same predictors and relationships are found within more long-term, chronic cases of PTSD. Future research should further explore the impact of peri-traumatic pain on the qualities of trauma memories and subsequent PTSD symptoms, as the current findings suggest that this may be a key variable. The impact of peri-traumatic pain is currently

unexplored in the child and adolescent literature, with this not being explored as a key risk factor in meta-analyses and reviews in children and adolescents (Memarzia et al., 2021; Trickey et al., 2012). However, acute pain following paediatric injury has been found to predict PTSD symptoms 6 months post-trauma (Hildenbrand et al., 2016) and has been shown to contribute to the over consolidation of trauma memories and conditioned fear responses (McLean et al., 2005), suggesting further exploration of its impact is warranted. Future research should also explore the potential protective impact of being seen in resus on not developing sensory-based, verbally inaccessible, 'here-and-now' trauma memories. Finally, Structural Equation Modelling (SEM) or path analyses could be completed to explore in further detail how specific peri-traumatic processes may relate to different memory qualities and their subsequent relationships with individual PTSD symptom clusters. Distinguishing between these pathways would facilitate a more nuanced understanding of how specific memory qualities e.g., sensory features or sense of 'here-and-now' relate to distinct symptom clusters enabling more targeted clinical interventions.

Conclusions

The current study identified that experiencing higher levels of peri-traumatic pain and panic, being female, being assaulted and not being seen in resus were predictive of more problematic trauma memory qualities in the acute stage post-trauma. Panic presented as the largest predictor of problematic trauma memory qualities. In addition, trauma memory qualities were found to mediate the relationship between peri-traumatic data-driven processing, dissociation, panic, threat and pain and PTSD symptoms 2 months post-trauma. This highlights the importance of screening for these variables in the early stages post-trauma to identify children and young people who are at the most risk for problematic trauma memories and subsequent PTSD symptoms in order for appropriate early intervention to be provided.

References

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: The Journal of Mental Science*, *204*, 335–340. https://doi.org/10.1192/bjp.bp.113.131227

Allen, L., Jones, C., Fox, A., Copello, A., Jones, N., & Meiser-Stedman, R. (2021). The correlation between social support and post-traumatic stress disorder in children and adolescents: A meta-analysis. *Journal of Affective Disorders*, *294*, 543–557. https://doi.org/10.1016/j.jad.2021.07.028

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

Astill Wright, L., Sijbrandij, M., Sinnerton, R., Lewis, C., Roberts, N. P., & Bisson, J. I. (2019). Pharmacological prevention and early treatment of post-traumatic stress disorder and acute stress disorder: A systematic review and meta-analysis. *Translational Psychiatry*, *9*(1), 334. https://doi.org/10.1038/s41398-019-0673-5

Beierl, E. T., Böllinghaus, I., Clark, D. M., Glucksman, E., & Ehlers, A. (2020). Cognitive paths from trauma to posttraumatic stress disorder: A prospective study of Ehlers and Clark's model in survivors of assaults or road traffic collisions. *Psychological Medicine*, *50*(13), 2172–2181. https://doi.org/10.1017/S0033291719002253

Bertolini, F., Robertson, L., Bisson, J. I., Meader, N., Churchill, R., Ostuzzi, G., Stein, D. J., Williams, T., & Barbui, C. (2024). Early pharmacological interventions for prevention of post-traumatic stress disorder (PTSD) in individuals experiencing acute traumatic

stress symptoms. *The Cochrane Database of Systematic Reviews*, *5*(5), CD013613. https://doi.org/10.1002/14651858.CD013613.pub2

Bokszczanin, A. (2007). PTSD symptoms in children and adolescents 28 months after a flood: Age and gender differences. *Journal of Traumatic Stress*, *20*(3), 347–351. https://doi.org/10.1002/jts.20220

Brewin, C. R. (2025). Key concepts, methods, findings, and questions about traumatic memories. *Journal of Traumatic Stress*, *38*(5), 771–780. https://doi.org/10.1002/jts.23164

Brewin, C. R., Dalgleish, T., & Joseph, S. (1996). A dual representation theory of posttraumatic stress disorder. *Psychological Review*, *103*(4), 670–686. https://doi.org/10.1037/0033-295x.103.4.670

Bryant, R. A., Creamer, M., O'Donnell, M., Silove, D., & McFarlane, A. C. (2008). A multisite study of initial respiration rate and heart rate as predictors of posttraumatic stress disorder. *The Journal of Clinical Psychiatry*, *69*(11), 1694–1701. https://doi.org/10.4088/JCP.v69n1104

Copeland, W. E., Keeler, G., Angold, A., & Costello, E. J. (2007). Traumatic events and posttraumatic stress in childhood. *Archives of General Psychiatry*, *64*(5), 577–584. https://doi.org/10.1001/archpsyc.64.5.577

Cox, C. M., Kenardy, J. A., & Hendrikz, J. K. (2008). A meta-analysis of risk factors that predict psychopathology following accidental trauma. *Journal for Specialists in Pediatric Nursing: JSPN*, *13*(2), 98–110. https://doi.org/10.1111/j.1744-6155.2008.00141.x

Dow, B. L., Kenardy, J. A., Long, D. A., & Le Brocque, R. M. (2019). Cognitive/affective factors are associated with children's acute posttraumatic stress following pediatric intensive care. *Psychological Trauma: Theory, Research, Practice, and Policy*, *11*(1), 55–63. https://doi.org/10.1037/tra0000349

Dunn, O. J. (1961). Multiple comparisons among means. *Journal of the American Statistical Association*, *56*(293), 52–64. https://doi.org/10.1080/01621459.1961.10482090

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

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

Foa, E. B., Johnson, K. M., Feeny, N. C., & Treadwell, K. R. (2001). The child PTSD Symptom Scale: A preliminary examination of its psychometric properties. *Journal of Clinical Child Psychology*, *30*(3), 376–384. https://doi.org/10.1207/S15374424JCCP3003_9

Gidron, Y., Gal, R., Freedman, S., Twiser, I., Lauden, A., Snir, Y., & Benjamin, J. (2001). Translating research findings to PTSD prevention: Results of a randomized–controlled pilot study. *Journal of Traumatic Stress*, *14*(4), 773–780. https://doi.org/10.1023/A:1013046322993

Gunnar, M. R., & Vazquez, D. M. (2001). Low cortisol and a flattening of expected daytime rhythm: Potential indices of risk in human development. *Development and Psychopathology*, *13*(3), 515–538. https://doi.org/10.1017/s0954579401003066

Halligan, S. L., Michael, T., Clark, D. M., & Ehlers, A. (2003). Posttraumatic stress disorder following assault: The role of cognitive processing, trauma memory, and appraisals. *Journal of Consulting and Clinical Psychology*, *71*(3), 419–431. https://doi.org/10.1037/0022-006X.71.3.419

Hayes, A. F. (2022). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (3rd ed.). The Guilford Press.

Hayes, A. F., & Cai, L. (2007). Using heteroskedasticity-consistent standard error estimators in OLS regression: An introduction and software implementation. *Behavior Research Methods*, *39*(4), 709–722. https://doi.org/10.3758/BF03192961

Hildenbrand, A. K., Marsac, M. L., Daly, B. P., Chute, D., & Kassam-Adams, N. (2016). Acute pain and posttraumatic stress after pediatric injury. *Journal of Pediatric Psychology*, *41*(1), 98–107. https://doi.org/10.1093/jpepsy/jsv026

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 post-traumatic stress disorder in the year following trauma – a meta-analytic study. *Journal of Child Psychology and Psychiatry*, *57*(8), 884–898. https://doi.org/10.1111/jcpp.12566

Kangaslampi, S., & Peltonen, K. (2022). Mechanisms of change in psychological interventions for posttraumatic stress symptoms: A systematic review with recommendations. *Current Psychology: A Journal for Diverse Perspectives on Diverse Psychological Issues*, *41*(1), 258–275. https://doi.org/10.1007/s12144-019-00478-5

Kassam-Adams, N., Garcia-España, J. F., Fein, J. A., & Winston, F. K. (2005). Heart rate and posttraumatic stress in injured children. *Archives of General Psychiatry*, *62*(3), 335. https://doi.org/10.1001/archpsyc.62.3.335

Kloke, J., & McKean, J. (2024). *Nonparametric statistical methods using r* (2nd ed.). Chapman and Hall/CRC. https://doi.org/10.1201/9781003039617

Little, R. J. A. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association*, *83*(404), 1198–1202. https://doi.org/10.1080/01621459.1988.10478722

Massazza, A., Joffe, H., Hyland, P., & Brewin, C. R. (2021). The structure of peritraumatic reactions and their relationship with PTSD among disaster survivors. *Journal of Abnormal Psychology*, *130*(3), 248–259. https://doi.org/10.1037/abn0000663

McCleery, J. M., & Harvey, A. G. (2004). Integration of psychological and biological approaches to trauma memory: Implications for pharmacological prevention of PTSD. *Journal of Traumatic Stress*, *17*(6), 485–496. https://doi.org/10.1007/s10960-004-5797-5

McKinnon, A. C., Nixon, R. D. V., & Brewer, N. (2008). The influence of data-driven processing on perceptions of memory quality and intrusive symptoms in children following traumatic events. *Behaviour Research and Therapy*, *46*(6), 766–775. https://doi.org/10.1016/j.brat.2008.02.008

McKinnon, A., Brewer, N., Meiser-Stedman, R., & Nixon, R. D. V. (2017). Trauma memory characteristics and the development of acute stress disorder and post-traumatic stress disorder in youth. *Journal of Behavior Therapy and Experimental Psychiatry*, *54*, 112–119. https://doi.org/10.1016/j.jbtep.2016.07.009

McLean, S. A., Clauw, D. J., Abelson, J. L., & Liberzon, I. (2005). The development of persistent pain and psychological morbidity after motor vehicle collision: Integrating the potential role of stress response systems into a biopsychosocial model. *Psychosomatic Medicine*, *67*(5), 783–790. https://doi.org/10.1097/01.psy.0000181276.49204.bb

Meiser-Stedman, R., Dalgleish, T., Smith, P., Yule, W., & Glucksman, E. (2007a). Diagnostic, demographic, memory quality, and cognitive variables associated with acute stress disorder in children and adolescents. *Journal of Abnormal Psychology*, *116*(1), 65–79. https://doi.org/10.1037/0021-843X.116.1.65

Meiser-Stedman, R., McKinnon, A., Dixon, C., Boyle, A., Smith, P., & Dalgleish, T. (2017a). Acute stress disorder and the transition to posttraumatic stress disorder in children and adolescents: Prevalence, course, prognosis, diagnostic suitability, and risk markers. *Depression and Anxiety*, *34*(4), 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. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *60*(8), 875–884. https://doi.org/10.1111/jcpp.13054

Meiser-Stedman, R., Smith, P., McKinnon, A., Dixon, C., Trickey, D., Ehlers, A., Clark, D. M., Boyle, A., Watson, P., Goodyer, I., & Dalgleish, T. (2017b). Cognitive therapy as an early treatment for post-traumatic stress disorder in children and adolescents: A randomized controlled trial addressing preliminary efficacy and mechanisms of action. *Journal of Child Psychology and Psychiatry*, *58*(5), 623–633. https://doi.org/10.1111/jcpp.12673

Meiser-Stedman, R., Smith, P., Yule, W., & Dalgleish, T. (2007b). The Trauma Memory Quality Questionnaire: Preliminary development and validation of a measure of trauma memory characteristics for children and adolescents. *Memory (Hove, England)*, *15*(3), 271–279. https://doi.org/10.1080/09658210701256498

Memarzia, J., Walker, J., & Meiser-Stedman, R. (2021). Psychological peritraumatic risk factors for post-traumatic stress disorder in children and adolescents: A meta-analytic review. *Journal of Affective Disorders*, *282*, 1036–1047. https://doi.org/10.1016/j.jad.2021.01.016

Morris, M. C., & Rao, U. (2013). Psychobiology of PTSD in the acute aftermath of trauma: Integrating research on coping, HPA function and sympathetic nervous system activity. *Asian Journal of Psychiatry*, *6*(1), 3–21. https://doi.org/10.1016/j.ajp.2012.07.012

Nelson, K., & Fivush, R. (2004). The emergence of autobiographical memory: A social cultural developmental theory. *Psychological Review*, *111*(2), 486–511. https://doi.org/10.1037/0033-295X.111.2.486

Nimon, K., & Gavrilova, M. (2010). Regression commonality analysis: Demonstration of an SPSS solution. *Multiple Linear Regression Viewpoints*, *36*(1), 10-17.

O'Donnell, M. L., Creamer, M. C., Parslow, R., Elliott, P., Holmes, A. C. N., Ellen, S., Judson, R., McFarlane, A. C., Silove, D., & Bryant, R. A. (2008). A predictive screening index for posttraumatic stress disorder and depression following traumatic injury. *Journal of Consulting and Clinical Psychology*, *76*(6), 923–932. https://doi.org/10.1037/a0012918

Reed, J., Taylor, J., Randall, G., Burgess, A., & Meiser-Stedman, R. (2023). Associations between the Trauma Memory Quality Questionnaire and posttraumatic stress

symptoms in youth: A systematic review and meta-analysis. *Journal of Traumatic Stress*, *36*(1), 31–43. https://doi.org/10.1002/jts.22903

Reiner, I., Beutel, M. E., Winter, P., Rommens, P. M., & Kuhn, S. (2021). Early posttraumatic stress symptoms and levels of distress in trauma patients treated in the resuscitation room: an exploratory study. *Scandinavian journal of trauma, resuscitation and emergency medicine*, *29*(1), 22. https://doi.org/10.1186/s13049-021-00830-4

Rothbaum, B. O., Kearns, M. C., Price, M., Malcoun, E., Davis, M., Ressler, K. J., Lang, D., & Houry, D. (2012). Early intervention may prevent the development of PTSD: A randomized pilot civilian study with modified prolonged exposure. *Biological Psychiatry*, *72*(11), 957–963. https://doi.org/10.1016/j.biopsych.2012.06.002

Sabia, M., & Hupbach, A. (2020). Stress-induced increase in cortisol negatively affects the consolidation of contextual elements of episodic memories. *Brain Sciences*, *10*(6), 358. https://doi.org/10.3390/brainsci10060358

Salmon, K., & Bryant, R. A. (2002). Posttraumatic stress disorder in children: The influence of developmental factors. *Clinical Psychology Review*, *22*(2), 163–188. https://doi.org/10.1016/S0272-7358(01)00086-1

Schwabe, L., Böhringer, A., & Wolf, O. T. (2009). Stress disrupts context-dependent memory. *Learning & Memory*, *16*(2), 110–113. https://doi.org/10.1101/lm.1257509

Tabachnick, B. G., & Fidell, L. S. (2019). *Using multivariate statistics* (7th ed.). Pearson.

Trickett, P. K., Noll, J. G., Susman, E. J., Shenk, C. E., & Putnam, F. W. (2010). Attenuation of cortisol across development for victims of sexual abuse. *Development and Psychopathology*, *22*(1), 165–175. https://doi.org/10.1017/S0954579409990332

Trickey, D., Siddaway, A. P., Meiser-Stedman, R., Serpell, L., & Field, A. P. (2012). A meta-analysis of risk factors for post-traumatic stress disorder in children and adolescents. *Clinical Psychology Review*, *32*(2), 122–138. https://doi.org/10.1016/j.cpr.2011.12.001

Visser, I., Mheen, M. van der, Dorsman, H., Knipschild, R., Staaks, J., Hein, I., Dongen, N. van, Staal, W., Assink, M., & Lindauer, R. J. L. (2025). Post-traumatic stress disorder rates in trauma-exposed children and adolescents: Updated three-level meta-analysis. *The British Journal of Psychiatry*, 1–9. https://doi.org/10.1192/bjp.2025.30

Zatzick, D. F., Russo, J., Pitman, R. K., Rivara, F., Jurkovich, G., & Roy-Byrne, P. (2005). Reevaluating the association between emergency department heart rate and the development of posttraumatic stress disorder: A public health approach. *Biological Psychiatry*, *57*(1), 91–95. https://doi.org/10.1016/j.biopsych.2004.10.005

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The multidimensional scale of perceived social support. *Journal of Personality Assessment*, *52*(1), 30–41. https://doi.org/10.1207/s15327752jpa5201_2

Table 5

Participant Demographics and Correlations between Predictors and Outcome Variables

	Mean (SD)/ Frequency (%)	Range	TMQQ (2 weeks, T1)	CPSS (2 months, T2)
			r	*r*
Age	13.9 (3.0)	8.01-17.97	-.003	.065
Ethnicity (White British)	242 (93.1%)		-.05	-.005
Gender (female)	108 (41.5%)		.20**	.054
Pre-trauma emotional wellbeing	7.6	5-20	.34**	.31**
Assaulted	43 (16.5%)	-	.14*	.30**
Seen in resus	29 (11.2%)	-	-.20**	-.065
Injuries resulting in permanent loss of function	10 (3.8%)	-	-.11	-.05
Admitted to hospital	73 (28.1%)	-	-.14*	-.121
Head injury	97 (37.3%)	-	.06	.08
Fracture	58 (22.3%)	-	-.10	-.05
Number of injuries	1.7 (0.9)	0-5	.07	.10

Peri-traumatic pain	3.1 (1.1)	1-4	.33**	.18*
Peri-traumatic panic	3.6 (2.4)	0-10	.51**	.53**
Peri-traumatic threat	7.8 (2.6)	3-12	.43**	.36**
Peri-traumatic data-driven processing	15.7 (6.1)	7-28	.44**	.48**
Peri-traumatic dissociation	4.0 (3.1)	0-12	.40**	.46**
T2 Post-trauma social support	69.6 (12.8)	25-84	-.061	-.06
T2 TMQQ	21.9 (6.8)	11-44	1	.62**
T2 CPSS	7.8 (9.6)	0-39	.62**	1

Note. TMQQ = Trauma Memory Quality Questionnaire; T1 = Time 1; CPSS = Child PTSD Symptom Scale; T2 = Time 2.

*$p < 0.05$ *, **$p < 0.01$

Table 6

Hierarchical Regression Modelling of Trauma Memory Qualities as Measured by the TMQQ at 2 Weeks Post-Trauma

	Model			Step		Standardised coefficients (β)
Variable	R^2	*Adj.* R^2	*F* test	ΔR^2	*F* test	
Step 1: Demographics	.04	.03	$F(2, 207) = 4.58$, $p = .011$	.04	$F(2, 207) = 4.58$, $p = .01$	
Age at trauma						-.01
Gender						.21**
Step 2: Pre-trauma emotional difficulties	.15	.14	$F(3, 206) = 12$, $p < .001$	.11	$F(1, 206) = 25.74$, $p = <.001$	
Age at trauma						-.005
Gender						.17*
Emotional difficulties						.33***
Step 3: Trauma characteristics	.19	.17	$F(6,203) = 7.95$, $p < .001$	.04	$F(3,203) = 3.48$, $p = .017$	
Age at trauma						-.05
Gender						.19**
Emotional difficulties						.29***

Assaulted versus non-assault						.15*
Seen in resus						-.12
Admitted to hospital						-.03
Step 4: Peri-traumatic cognitive processes	.42	.38	$F(11, 198) = 12.86$, $p < .001$	.23	$F(5, 198) = 15.36$, $p < .001$	
Age at trauma						-.006
Gender						.12*
Emotional difficulties						.1
Assaulted versus non-assault						.12*
Seen in resus						-.12*
Admitted to hospital						-.03
Pain						.13*
Threat						.13
Data-driven processing						.1
Panic						.23**
Dissociation						.13

Note. TMQQ = Trauma Memory Quality Questionnaire.

*$p < .05$; ** $p < .01$; *** $p < .001$

Table 7

Commonality Analysis Showing the Unique and Shared Variance of Predictors on TMQQ Scores

Variable	Unique variance	Common variance
Age	0%	0%
Admitted to hospital	0.05%	1.85%
Data-driven processing	0.46%	19.05%
Pre-trauma emotional difficulties	0.87%	10.86%
Threat	0.90%	17.64%
Dissociation	0.90%	15.29%
Assaulted versus other trauma	1.17%	0.86%
Gender	1.18%	2.76%
Resus	1.24%	2.72%
Pain	2.08%	9.06%
Panic	2.98%	23.18%

Note. TMQQ = Trauma Memory Quality Questionnaire.

Table 8

Peri-Traumatic Pain Mediation Analysis Results

		Trauma memory qualities					PTSD symptoms			
Variable		*B*	SE	*p*	*β*		*B*	SE	*p*	*β*
Pain	*a*	1.95	0.40	<.001	.31	*c'*	-0.18	0.53	.73	-.02
Trauma memory qualities		-	-	-	-	*b*	0.91	0.10	<.001	.64
		-				*ab*	1.77	0.43	0.77-2.96	.20
		R^2 = .14					R^2 = .39			
		$F(3,198) = 12.11, p < .001$					$F(4,197) = 23.58, p < .001$			

Note. PTSD = post-traumatic stress disorder; *a* = effect of pain on trauma memory qualities; *b* = effect of trauma memory qualities on PTSD symptoms; *c'* = direct effect of pain on PTSD symptoms; *ab* = indirect effect of pain on PTSD symptoms.

Table 9

Peri-traumatic Threat Mediation Analysis Results

		Trauma memory qualities					PTSD symptoms			
Variable		*B*	SE	*p*	*β*		*B*	SE	*p*	*β*
Threat	*a*	1.10	0.18	<.001	.42	*c'*	0.55	0.21	.011	.15
Trauma memory qualities		-	-	-	-	*b*	0.81	0.09	<.001	.58

		-				*ab*	0.90	0.19	0.48-1.42	.24
		R^2 = .20					R^2 = .41			
		$F(3,199) = 17.27, p < .001$					$F(4,198) = 23.59, p < .001$			

Note. PTSD = post-traumatic stress disorder; *a* = effect of threat on trauma memory qualities; *b* = effect of trauma memory qualities on PTSD symptoms; *c'* = direct effect of threat on PTSD symptoms; *ab* = indirect effect of threat on PTSD symptoms.

Table 10

Peri-Traumatic Panic Mediation Analysis Results

		Trauma memory qualities					PTSD symptoms			
Variable		*B*	SE	*p*	*β*		*B*	SE	*p*	*β*
Panic	*a*	1.40	0.19	< .001	.49	*c'*	1.19	0.26	< .001	.29
Trauma memory qualities		-	-	-	-	*b*	0.69	0.10	<.001	.49
		-				*ab*	0.96	0.18	0.52-1.47	.24
		R^2 = .28					R^2 = .46			
		$F(3,199) = 22.13, p < .001$					$F(4,198) = 31.88, p < .001$			

Note. PTSD = post-traumatic stress disorder; *a* = effect of panic on trauma memory qualities; *b* = effect of trauma memory qualities on PTSD symptoms; *c'* = direct effect of panic on PTSD symptoms; *ab* = indirect effect of panic on PTSD symptoms.

Table 11

Peri-Traumatic Data-Driven Processing Mediation Analysis Results

		Trauma memory qualities					PTSD symptoms			
Variable		*B*	SE	*p*	*β*		*B*	SE	*p*	*β*
Data-driven processing	*a*	0.49	0.07	<.001	.43	*c'*	0.42	0.09	<.001	.26
		-	-	-	-	*b*	0.73	0.09	<.001	.52
Trauma memory qualities										
		-				*ab*	0.36	0.07	0.19-0.54	.22
		R^2 = .23					R^2 = .45			
		$F(3,199) = 23.54, p < .001$					$F(4,198) = 29.95, p < .001)$			

Note. PTSD = post-traumatic stress disorder; *a* = effect of data-driven processing on trauma memory qualities; *b* = effect of trauma memory qualities on PTSD symptoms; *c'* = direct effect of data-driven processing on PTSD symptoms; *ab* = indirect effect of data-driven processing on PTSD symptoms.

Table 12

Peri-traumatic Dissociation Mediation Analysis Results

		Trauma memory qualities					PTSD symptoms			
Variable		*B*	SE	*p*	*β*		*B*	SE	*p*	*β*
Dissociation	*a*	0.85	0.15	<.001	.38	*c'*	0.79	0.18	<.001	.25
Trauma memory qualities		-	-	-	-	*b*	0.76	0.09	<.001	.54
		-				*ab*	0.65	0.14	0.32-1.03	.21
		R^2 = .19					R^2 = .45			
		$F(3,199) = 15.73, p < .001$					$F(4,198) = 31.16, p < .001$			

Note. PTSD = post-traumatic stress disorder; *a* = effect of dissociation on trauma memory qualities; *b* = effect of trauma memory qualities on PTSD symptoms; *c'* = direct effect of dissociation on PTSD symptoms; *ab* = indirect effect of dissociation on PTSD symptoms.

Chapter 4: Additional Methodology

Word Count: 1016

The current chapter outlines the equations used for converting raw data and effect sizes into Pearson's *r* for use in the meta-analysis. The current chapter also provides additional detail on the ethical processes and procedures followed as part of the ASPECTS study (Meiser-Stedman et al., 2017).

Calculating Effect Sizes

Spearman's Rho Coefficient to r

When studies reported a Spearman's Rho correlation coefficient, this was converted to *r* using the following equation by Rupinski and Dunlap (1996):

$$r = 2\sin\left(\frac{\pi}{6}r_s\right)$$

Cohen's d to r

When studies reported the means and standard deviations of trauma memory quality scores for a PTSD/depressed and not PTSD/not depressed group, these scores and the sample size of each group were used to calculate Cohen's *d*. Cohen's *d* was then converted to *r* using the following formula by Borenstein et al. (2009):

$$r = d\,\frac{d}{\sqrt{d^2+\alpha}} \text{ where } \alpha = \frac{(n1+n2)2}{n1n2}$$

Beta to r

When studies reported data from multiple regression analyses on whether trauma memory quality predicted PTSD or depression symptoms, the following equation by Peterson and Brown (2005) was used to convert β (standardised regression coefficient) to *r*:

$$r = \beta + .05\lambda$$

Where β is positive, $\lambda = 1$, and where β is negative, $\lambda = 0$

ANOVA F Statistic to r

When studies reported an *F* statistic from an ANOVA, the following equation was used to convert the F statistic into Cohen's *d* using the equation by Rosnow and Rosenthal (1996):

$$d = 2\sqrt{\frac{df_n \times F}{df_d}}$$

Where df_n = degrees of freedom of the numerator, and df_d = degrees of freedom of the denominator. The equation by Borenstein et al. (2009) stated above was then used to convert Cohen's *d* to *r*.

T Statistic to r

When studies reported a *t*-statistic from a t-test, the following equation by Cohen (1965) was used to convert this to *r:*

$$r = \sqrt{\frac{t^2}{t^2 + df_{within}}}$$

Combining r Values

When multiple *r* values were provided for multiple trauma memory qualities, these were combined in order to provide a single effect size for use in the main analyses. Values were first transformed into Fisher's Z values using the equation by Borenstein et al. (2009):

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

The accuracy of measures depend on the number of items in the scale (Wells & Wollack, 2003), so the weighted mean of the Fisher's Z values was calculated with each value being weighted by the number of items in the trauma memory quality subscale. The weighted mean of the Fisher's Z scores was then transformed back to *r* using the equation by Borenstein et al. (2009):

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

Combining Cohen's d Values

When studies reported the means and standard deviations of a PTSD/depressed group and a non-PTSD/non-depressed group of multiple trauma memory quality subscales, Cohen's *d* was calculated for each and combined. The weighted mean of the Cohen's *d* values was calculated by weighting each value by the number of items in the subscale. Due to the subscales not being independent, the inter-correlations between the subscales were taken into account in the correlation (Rosenthal & Rubin, 1986). Where intercorrelations were not reported, an intercorrelation of 0.5 was used. This weighted mean of Cohen's *d* taking account of the intercorrelations between subscales was then converted to *r* using the equation by Borenstein et al. (2009) above.

Ethical Procedures: ASPECTS

The ASPECTS study (Meiser-Stedman et al., 2017), which the empirical study data was drawn from, adhered to rigorous ethical procedures designed to minimise harm and mitigate risk throughout the recruitment and study process. Eligible children and families

were sent detailed information sheets on the study if they indicated they would like more information after their initial contact with a research nurse. In line with the British Psychological Society (BPS, 2021) Code of Human Research Ethics, the information sheet content was adapted for different age groups to ensure that sufficient and understandable information was provided in order for valid informed consent to be provided. Information sheets provided information on the purpose of the study; what the study would involve; who was involved in running the study; confidentiality of and storage of data and who to contact if participants became distressed during the study or have any questions. It was also made explicit that withdrawing from the study, or deciding not to take part from the start, would not have any impact on future care or legal rights. Consent forms for parents/carers and assent forms for children and adolescents were provided if families indicated that they would like to take part. The consent forms asked if the child or parent/carer had understood the information sheet and had any questions answered, alongside re-iterating that participation was voluntary and withdrawal could happen at any time, without explanation. An assent form completed by the child or adolescent, and a consent form completed by a parent/carer were both required for participation. Researchers checked in with participants throughout the study and participants were provided with details of who they could reach out to for further support if needed, both during and after study completion.

References

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis* (1st ed.). Wiley. https://doi.org/10.1002/9780470743386

British Psychological Society. (2021). *BPS code of human research ethics*. https://explore.bps.org.uk/content/report-guideline/bpsrep.2021.inf180

Cohen, J. (1965). Some statistical issues in psychological research. *Handbook of clinical psychology*, 95-121.

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 and Anxiety*, *34*(4), 348–355. https://doi.org/10.1002/da.22602

Peterson, R. A., & Brown, S. P. (2005). On the use of beta coefficients in meta-analysis. *Journal of Applied Psychology*, *90*(1), 175–181. https://doi.org/10.1037/0021-9010.90.1.175

Rosenthal, R., & Rubin, D. B. (1986). Meta-analytic procedures for combining studies with multiple effect sizes. *Psychological Bulletin*, *99*(3), 400–406. https://doi.org/10.1037/0033-2909.99.3.400

Rosnow, R. L., & Rosenthal, R. (1996). Computing contrasts, effect sizes, and counternulls on other people's published data: General procedures for research consumers. *Psychological Methods*, *1*(4), 331–340. https://doi.org/10.1037/1082-989X.1.4.331

Rupinski, M. T., & Dunlap, W. P. (1996). Approximating pearson product-moment correlations from kendall's tau and spearman's rho. *Educational and Psychological Measurement*, *56*(3), 419–429. https://doi.org/10.1177/0013164496056003004

Wells, C. S., & Wollack, J. A. (2003). *An instructor's guide to understanding test reliability*. University of Wisconsin-Madison. https://testing.wisc.edu/Reliability.pdf

Chapter 5: Thesis Portfolio Discussion and Critical Evaluation

Word count: 5426 (inc. references)

Overall Findings

The meta-analysis and complimentary empirical study added to the current research base by identifying the factors associated with self-reported trauma memory qualities and the size of the associations between trauma memory qualities and both PTSD and depression symptoms. It is acknowledged that neither study provides evidence of causality, but has shed some light on relevant risk factors of problematic trauma memories and the relevance of these memories in post-trauma psychopathology.

The meta-analysis demonstrated a significant medium effect between self-reported trauma memory qualities and PTSD symptoms. It is important to note that heterogeneity levels were high across studies, with regards to traumas experienced, memory qualities assessed and the measures used to do so. With the exception of coherence, the effect sizes across all included studies showed a consistent direction of effect, with higher scores on measures of sensory features, vividness, fragmentation, disorganisation and having a 'here-and-now' quality being associated with higher levels of PTSD symptoms. This lack of variance reinforces a clear clinical conclusion that problematic trauma memories are associated with poorer mental wellbeing post-trauma. Disorganisation and having a 'here-and-now' quality demonstrated the largest effect sizes, suggesting that these may be the most suitable targets during treatment. Small negative and positive correlations were found for studies of coherence, suggesting its relationship with PTSD symptoms is unclear at present. As discussed, Brewin and Field (2024) identified that the effect of language plays a role in whether an effect size was found between coherence and PTSD symptoms, with measures of coherence/organisation finding no association, but measures of incoherence/disorganisation finding a positive association. This mixed picture was mirrored within the current review. This has implications for future research and assessments within clinical practice, as

measures assessing for coherence over disorganisation may miss problematic trauma memories.

The effect size for the association between trauma memory qualities and PTSD symptoms was larger in the acute period (<1 month post-trauma) compared to the post-acute period, suggesting that trauma memory qualities may be more relevant to acute stress symptomology than PTSD. This fits current research in children and adolescents where the strength of the relationship between trauma memory qualities and PTSD symptoms has been found to reduce over time, especially when other cognitive factors are considered (McGuire et al., 2021; McKinnon et al., 2017). Risk of bias was a significant moderator of the effect size between trauma memory qualities and PTSD symptoms with lower risk studies yielding larger effect sizes. This emphasises the importance of robust, standardised research procedures in increasing the likelihood of true effects being identified.

The meta-analysis demonstrated a significant medium association between self-reported trauma memory qualities and depression symptoms post-trauma. Fewer studies reported the effect sizes for the association between trauma memory qualities and depression, with a small to medium effect size being revealed between disorganisation and depression symptoms. It is important to note that because of this, conclusions on the qualities of trauma memories and depression symptoms in adults can only be commented on with regards to disorganisation. One possible reason for the lack of exploration of other qualities in depression could be the fact that sensory re-experiencing and having a ‘here-and-now’ quality, are reported to be particularly relevant to ‘flashbacks’ which are involuntary memories said to be specific to PTSD (Brewin, 2025). Studies researching memory qualities in post-trauma depression therefore may have seen these qualities as less relevant and thus left them unexplored. However, six of the 10 studies within the depression meta-analysis which were completed with children found moderate to large effect sizes between depressive

symptomology and TMQQ scores, which assesses the sensory features, verbal accessibility and temporal context of trauma memories. This suggests that characteristics often associated with intrusive, flashback memories may actually be important in post-trauma depression so should be a point of further exploration in future research. There is some evidence to suggest that PTSD and depression symptoms post-trauma may not necessarily be different diagnoses but just part of a common post-traumatic distress response (Armour et al., 2015; Au et al., 2013). Age group, Criterion A trauma status, interpersonal trauma status and risk of bias were not significant moderators of the effect. However, it is important to note that there was a small number of studies within each meta-regression, reducing its power to detect any potential effects.

The empirical study aimed to explore the pre-, peri- and post-traumatic factors predictive of trauma memory qualities in children and adolescents exposed to single-event trauma. A previous meta-analysis identified a large effect size for the relationship between TMQQ scores and both acute and post-acute PTSD symptoms in children and adolescents (Reed et al., 2023), making the study of factors predicting these problematic trauma memories important in risk assessment and treatment planning in children and adolescents. Being female, being assaulted (vs. other trauma types), not being seen in resus, and experiencing higher levels of peri-traumatic panic and pain were significant predictors of higher TMQQ scores. Whilst demographic factors, pre-trauma emotional difficulties and trauma characteristics accounted for 19% of the variance in trauma memory qualities, the inclusion of peri-traumatic cognitive processes explained a substantial 23% additional variance. This highlights that the ways in which the trauma is processed within the mind and body is a larger risk factor for problematic trauma memories, than a variety of pre-trauma factors. To our knowledge, this is the first study to explore a variety of predictors of acute trauma memory qualities, and their mediating effect on the relationships between peri-

traumatic cognitive processes and PTSD symptoms. Our findings suggest a possible mechanism through which peri-traumatic cognitive processes may exert their influence on PTSD symptoms, which has consistently been noted in meta-analyses in the child and adolescent literature (Cox et al., 2008., Memarzia et al., 2021; Trickey et al., 2021). Finding panic and pain to be significant predictors of trauma memory qualities is in line with research showing that physiological arousal contributes to the over-consolidation of memories (McLean et al., 2005) and interrupts the encoding leading to impaired intentional recall and fragmented and disorganised memories (Ehlers & Clark, 2000). Overall, this finding suggests that somatic-sensory factors may be more important than cognitive-perceptual factors in their prediction of problematic trauma memories.

The commonality analyses revealed that data-driven processing, dissociation and threat shared a substantial amount of variance in their prediction of trauma memory quality scores, which may in part explain their non-significant results. Research to date indicates that there is an unclear and complex interaction between peri-traumatic cognitive processes (Massazza et al., 2021). In addition to assessing individual peri-traumatic processes, composite measures such as the Peri-Traumatic Distress Inventory (PDI; Brunet et al., 2001) offer a way to capture overlapping cognitive processes such as panic, threat and negative emotions experienced during traumatic experiences within one measure. Implementing a unified scale may have benefits for clinical practice and research, with this reducing participant burden and reducing multicollinearity within statistical models.

Our mediation analyses revealed that trauma memory qualities mediated the relationship between all peri-traumatic processes and PTSD symptoms, with significant direct pathways also being present for data-driven processing, dissociation and panic. Pain and threat did not have a direct effect on PTSD symptoms, suggesting that their influence on PTSD symptoms is fully exhibited through their impact on trauma memory qualities. The

findings that trauma memory qualities mediate the relationship between peri-traumatic processes and subsequent PTSD is in line with research in adults, with Beierl et al. (2020) finding that dissociation and data-driven processing indirectly predicted PTSD symptoms via disjointed trauma memories. With regards to interpreting the results of the mediation analyses, Hayes et al. (2022) advise caution when interpreting 'full' mediation. They note that this should not imply that the entire relationship is captured through one variable, particularly in cases where omitted variables are likely to have an influence. Additional theoretically relevant mediators will be discussed in future research below.

Strengths and Limitations

A significant strength of this thesis portfolio lies in the complimentary relationship between the meta-analysis and empirical study. Whilst the meta-analysis established a robust, medium relationship between trauma memory qualities and longer term psychopathology, the empirical study extended these findings by identifying the specific factors associated with the formation of such memories. Recent meta-analyses revealed the importance of peri-traumatic cognitive processes (Memarzia et al., 2021) and trauma memory qualities (Reed et al., 2023) in relation to PTSD symptoms, with the current portfolio supporting to bridge the gap between these two areas of research. Together, the empirical study and meta-analysis provide a comprehensive mapping of the traumatic trajectory from pre- to post-trauma.

To our knowledge, this is the first meta-analysis to explore the associations between a wide variety of trauma memory qualities and both PTSD and depression symptoms across the lifespan. These findings complement the findings by Gómez de La Cuesta et al. (2019) and Mitchel et al. (2017) who identified large effect sizes between negative appraisals and PTSD. Together, these reviews provide meta-analytic evidence for the two central components of cognitive models of PTSD across children and adults. A further strength of the current meta-analysis lies in the rigorous literature search and screening processes employed. An initial

exploration of the literature revealed that a wide variety of search terms were used to describe trauma memory qualities, so relevant systematic reviews and meta-analyses were screened to identify the most relevant and commonly used terminology. Although this approach resulted in a large volume of initial records for screening, it provided confidence that all relevant literature was likely to be identified. The comprehensive search enabled the identification of papers exploring a wide variety of trauma memory qualities which supported a comprehensive meta-analysis to be conducted.

A strength of the empirical paper was the use of the pre-existing data set from the ASPECTS study (Meiser-Stedman et al., 2017a), which involved the longitudinal exploration of acute and post-acute risk factors for PTSD in children and adolescents exposed to single-event trauma. This was a strength for multiple reasons. Firstly, the large sample size of 260 allowed for well powered analyses to be completed, leading to confidence that true effects could be identified. Secondly, the use of a validated and standardised measure like the TMQQ ensured that our results were directly comparable to existing child and adolescent research, allowing our findings to be interpreted within the context of the broader literature. Thirdly, by data being gathered shortly after the traumatic event, the reports of pre- and peri-traumatic processes would have been less susceptible to the memory distortions that can arise with longer intervals between trauma and participation in research studies. A final strength of the empirical paper was the examination of multiple pre- and peri-traumatic factors within the same model. This enabled the identification of the ways in which peri-traumatic processes work together, with commonality analyses revealing further insight into the ways in which peri-traumatic processes may exert their influence on trauma memory qualities uniquely or through a shared influence with other processes.

The exclusive reliance on self-report measures of trauma memory qualities across both the empirical study and meta-analysis pose as both a strength and weakness within the

current portfolio. It could be argued that self-report measures are assessing the perception of the nature of the trauma memory instead of the objective qualities themselves e.g., my memory *feels* disorganised. However, in a recent systematic review by Patronick et al. (2025), it was noted that self-report measures of trauma memory qualities were more closely associated with post-traumatic stress symptoms than the objective measurement of qualities from a child's trauma narrative. This suggests that the subjective appraisal of trauma memory qualities may hold greater predictive value for subsequent PTSD symptoms than objective markers, making this a strength of the current portfolio.

There are additional limitations of the portfolio that warrant mention. Firstly, whether our empirical study and meta-analytic findings can be fully applied to those experiencing clinically significant levels of PTSD and depression. The current meta-analysis and empirical study included participants with a mix of symptom severity in order to increase the generalisability of the findings. However, this may mean that the risk factors and relationships identified are not generalisable to those with higher levels of post-trauma psychopathology who are likely to seek treatment and support post-trauma. In the ASPECTS sample, 14.2% were found to meet criteria for ASD and 9% met the criteria for PTSD at 2 months. Brewin (2025) notes that cognitive models of PTSD are based on individuals that have been 'traumatised', and that research on subclinical samples may actually be applying cognitive models to 'healthy' individuals. However, it is also important to note that many individuals reporting subclinical levels of symptomology still experience significant levels of functional impairment (Stein et al., 1997). In addition, there was a lack of specificity with regards to the type of trauma memories that were being captured i.e., voluntarily recalled autobiographical memories or intrusive flashback style memories across the empirical paper and meta-analysis. It is therefore not entirely clear whether the predictors identified within the empirical paper or the effect sizes within the meta-analysis relate to voluntarily recalled

autobiographical memories, intrusive memories or both. Within the papers of the meta-analysis, some studies reported explicitly measuring intrusive memories and others mentioned measuring voluntarily recalled autobiographical memories, but this was inconsistent. This distinction may be important for future research as there may be differences in the levels of distress and associated post-traumatic psychopathology with these different memory types.

Some limitations can be noted with regards to the construct validity of the measures used across both the empirical study and meta-analysis. Measures used to assess a variety of peri-traumatic cognitive processes were created by Meiser-Stedman et al. (2019) for the purpose of the ASPECTS study so had unestablished construct validity. Without rigorous validation, there is the risk of high conceptual overlap between concepts and between each concept and outcome, leading to the risk of inflated effect sizes. Similarly, multiple single memory quality items were aggregated into a single composite score for use in the main PTSD meta-analysis. This occasionally resulted in total scores which were not based on any pre-existing validated instrument. This also poses a risk to internal validity due to the composite not reflecting a unidimensional latent construct. However, due to the high levels of heterogeneity in the measures used across studies, this was necessary in order to maximise the number of papers included within the current review.

Theoretical and Clinical Implications

Overall, the findings from the empirical study and meta-analysis are in line with Ehlers and Clark's (2000) cognitive model of PTSD with peri-traumatic processes influencing the nature of trauma memory qualities, and trauma memory qualities being found to mediate the relationship between peri-traumatic cognitive processes and PTSD symptoms. In addition, trauma memories which were disorganised, fragmented, vivid, sensory-laden and had 'here-and-now' qualities were associated with higher levels of PTSD symptoms.

However, the current findings suggest that some peri-traumatic processes not explicitly mentioned in cognitive models of PTSD, namely pain and panic, may contribute to memories with these problematic qualities in children and adolescents. This suggests that models consisting of cognitive and biophysiological factors may provide a more comprehensive account of how different trauma memory qualities are created.

Cognitive models posit that trauma memories will be vivid and sensory with a 'here-and-now' quality for involuntary memories, and that voluntarily recalled memories would be disorganised and fragmented as they are not properly integrated into the autobiographical context (Brewin et al., 1996; Ehlers & Clark, 2000). However, as noted within the meta-analysis, an alternative view based on general memory systems propose that traumatic memories associated with PTSD will actually be more organised and coherent due to the emotional valence of the event leading to increased consolidation of the traumatic memory and the memory becoming central to the individual's life story (Rubin et al., 2008). Our findings that PTSD symptoms were associated with memories which were more fragmented and disorganised does not support this general memory systems view and provides support for core cognitive models of PTSD (Brewin et al., 1996; Ehlers & Clark, 2000). This is not to say that one theory is superior to another, but that the findings of the current meta-analysis found increased fragmentation and disorganisation to be associated with increased PTSD symptoms.

However, the finding that there is a similar effect size between problematic trauma memory qualities and both PTSD and depression symptoms post-trauma challenges the view that sensory-based, vivid, and fragmented trauma memories are specific to cognitive models of PTSD. Potential reasons for these comparable effect sizes were discussed in Chapter 1. This suggests the potential utility of a model explaining overall post-trauma psychopathology, rather than disorder specific models being used. In line with this, Brewin et al. (2010)

updated their original Dual Representation Theory (DRT) model of PTSD to explain how distressing visual intrusions can be associated with a number of disorders, including PTSD and depression. A recent systematic review identified rumination, intolerance of uncertainty and emotional dysregulation to be transdiagnostic factors associated with depression and PTSD (Hernández-Posadas et al., 2023). The current meta-analysis suggests that trauma memory qualities should be explored as a transdiagnostic maintenance factor across PTSD and depression.

The findings of the meta-analysis suggest that interventions focusing on organising and re-integrating traumatic memories may be beneficial in reducing PTSD and depression symptoms post-trauma. Research to date on changes in memory qualities as a mechanism of change in treatment is limited in the PTSD literature (Kangaslampi & Peltonen, 2022), with only two studies to date in children and adolescents assessing this (Kangaslampi & Peltonen, 2020; Meiser-Stedman et al., 2017b). However, research has demonstrated imagery rescripting to be successful in reducing intrusive memories of distressing events in those with depression (Brewin et al., 2009; Pile et al., 2021; Stavropoulos et al., 2023), evidencing the potential of re-integrating trauma memories being beneficial in reducing depressive symptoms post-trauma.

The results of the empirical study suggest that peri-traumatic pain and panic are risk factors for acute problematic trauma memories and subsequent PTSD, suggesting their assessment in the acute stage post-trauma may be beneficial. It may be that emergency department staff are best placed to do this, but it is important to note that complex measures of risk are not feasible to be completed within fast-based, busy hospital settings (Olsson et al., 2008). A simple measure capturing early aspects of pain and panic may be sufficient. Linked to panic, research suggests that a higher heart rate in the acute stage is related to a higher risk of PTSD 3 months later (Bryant et al., 2008). This further suggests the benefits of the

objective assessment of panic in predicting subsequent post-trauma psychopathology. Olsson et al. (2008) found that the Child Trauma Screening Questionnaire (CTSQ) (Kenardy et al., 2006) completed within 2 weeks post-trauma in combination with heart rate measured within 24 hours of the trauma was efficient in identifying children likely to develop PTSD symptoms at 1 and 6 months post-injury. This suggests the feasibility and utility of short measures completed in the acute period in identifying those at risk of subsequent PTSD symptoms.

Future Research

The first recommendation for future research comes from a portfolio limitation relating to the question of whether our findings relate to those experiencing more chronic symptoms of PTSD. Future research should employ longitudinal designs to examine the mediating role of trauma memory qualities in the relationship between peri-traumatic cognitive processing and long-term, chronic outcomes. By comparing individuals with a formal PTSD/depression diagnosis against those who experience natural recovery, researchers can identify which risk factors are associated with persistent distress versus symptoms that may naturally attenuate over time.

Another future research recommendation based on current limitations is to investigate whether the same risk factors and relationships identified in the current portfolio apply to those who have experienced long term, more chronic forms of trauma. All participants within the empirical study and the majority of those in the meta-analysis studies had experienced single-event traumas. Kube et al. (2023) identified that the number of traumatic events experienced did not directly predict PTSD symptom severity, but there was an indirect effect through maladaptive cognitions. Future research could explore whether this relationship is also mediated through trauma memory qualities, as negative appraisals and trauma memory

qualities are both identified as key factors in the aetiology of PTSD according to cognitive models (Ehlers & Clark, 2000).

Further to the above, future research should investigate how the interaction between negative cognitive appraisals and memory qualities influence the development of PTSD and depression. According to Ehlers and Clark's (2000) cognitive model of PTSD, it is the combination of negative appraisals and the nature of the trauma memory that maintain a current sense of threat and subsequent PTSD. The current findings highlight disorganised, sensory-based, 'here-and now' trauma memory qualities as a shared vulnerability for PTSD and depression symptoms, a result that mirrors the role of negative appraisals identified by Claxton et al. (2025). Given that these two cognitive processes both appear to drive symptoms of PTSD and depression, future research should investigate their additive effects on post-trauma psychopathology.

Additional exploration of whether changes in trauma memory qualities are a mechanism of change in trauma focused treatment is warranted. As noted, only one controlled study exists to date in children and adolescents that has investigated this (Meiser-Stedman et al., 2017). According to a recent review by Alpert et al. (2023), no studies to date have explored trauma memory qualities as a mechanism of change in adults. Given that both Reed et al. (2023) and the current meta-analysis have identified robust associations between trauma memory qualities and PTSD symptoms across the lifespan, this research would help to clarify whether changes to trauma memory qualities are an 'active ingredient' in the success of trauma focused therapies.

Determining which specific components of an intervention are most effective is crucial for streamlining treatment and informing the design of future clinical protocols. Based on the findings from the empirical study, the suggestion of secondary prevention strategies in

the acute stage post-trauma was discussed. The International Society for Traumatic Stress Studies (ISTSS, 2018) note that there is currently insufficient evidence to support the routine implementation of universal prevention strategies, such as psychological debriefing and psychoeducation. Future research should continue to explore early prevention strategies for those experiencing heightened physiological arousal and pain. The empirical study highlighted the roles of peri-traumatic pain and panic in the formation of problematic trauma memories and subsequent PTSD, so identifying ways to disrupt this trajectory is important to explore.

Finally, future research should further explore the emotional qualities of trauma memories and their subsequent relationship with post-trauma psychopathology. In the meta-analysis, a limited number of studies included items assessing different elements of emotional qualities associated with trauma memories i.e., intensity and valence. Due to only two studies assessing each specific emotion quality, a subgroup analysis was not completed. As both diagnoses of PTSD and Major Depressive Disorder are associated with negative alterations in mood (American Psychiatric Association [APA], 2013), it is important to explore the potential impact of emotional memory qualities on the potential onset and maintenance of post-traumatic psychopathology.

Conclusion

Through the complimentary studies, this portfolio has facilitated a comprehensive exploration of the trauma trajectory, from pre-trauma risk factors through to the longer term psychological consequences of trauma exposure. Traumatic memories characterised by perceived disorganisation, fragmentation, sensory intensity, vividness and ‘here-and-now’ reliving were found to be significantly associated with increased PTSD and depression symptoms. Furthermore, the portfolio has identified risk factors for experiencing higher

levels of these memory qualities including being female, being assaulted, not being seen in resus and experiencing higher levels of peri-traumatic pain and panic. However, these findings must be interpreted in light of the limitations detailed throughout the portfolio. Future research should focus on strengthening the evidence base by investigating the longitudinal stability of these associations and their generalisability across trauma types.

References

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

Alpert, E., Shotwell Tabke, C., Cole, T. A., Lee, D. J., & Sloan, D. M. (2023). A systematic review of literature examining mediators and mechanisms of change in empirically supported treatments for posttraumatic stress disorder. *Clinical Psychology Review*, *103*, 102300. https://doi.org/10.1016/j.cpr.2023.102300

Armour, C., Contractor, A., Elhai, J. D., Stringer, M., Lyle, G., Forbes, D., & Richardson, J. D. (2015). Identifying latent profiles of posttraumatic stress and major depression symptoms in Canadian veterans: Exploring differences across profiles in health related functioning. *Psychiatry Research*, *228*(1), 1–7. https://doi.org/10.1016/j.psychres.2015.03.011

Au, T. M., Dickstein, B. D., Comer, J. S., Salters-Pedneault, K., & Litz, B. T. (2013). Co-occurring posttraumatic stress and depression symptoms after sexual assault: A latent profile analysis. *Journal of Affective Disorders*, *149*(1), 209–216. https://doi.org/10.1016/j.jad.2013.01.026

Beierl, E. T., Böllinghaus, I., Clark, D. M., Glucksman, E., & Ehlers, A. (2020). Cognitive paths from trauma to posttraumatic stress disorder: A prospective study of Ehlers and Clark's model in survivors of assaults or road traffic collisions. *Psychological Medicine*, *50*(13), 2172–2181. https://doi.org/10.1017/S0033291719002253

Brewin, C. R. (2025). Key concepts, methods, findings, and questions about traumatic memories. *Journal of Traumatic Stress*, *38*(5), 771–780. https://doi.org/10.1002/jts.23164

Brewin, C. R., & Field, A. P. (2024). Meta-analysis shows trauma memories in posttraumatic stress disorder lack coherence: A response to Taylor et al. (2022). *Clinical Psychological Science*, *12*(5), 1027–1033. https://doi.org/10.1177/21677026241240456

Brewin, C. R., Dalgleish, T., & Joseph, S. (1996). A dual representation theory of posttraumatic stress disorder. *Psychological Review*, *103*(4), 670–686. https://doi.org/10.1037/0033-295x.103.4.670

Brewin, C. R., Gregory, J. D., Lipton, M., & Burgess, N. (2010). Intrusive images in psychological disorders: Characteristics, neural mechanisms, and treatment implications. *Psychological Review*, *117*(1), 210–232. https://doi.org/10.1037/a0018113

Brewin, C. R., Wheatley, J., Patel, T., Fearon, P., Hackmann, A., Wells, A., Fisher, P., & Myers, S. (2009). Imagery rescripting as a brief stand-alone treatment for depressed patients with intrusive memories. *Behaviour Research and Therapy*, *47*(7), 569–576. https://doi.org/10.1016/j.brat.2009.03.008

Brunet, A., Weiss, D. S., Metzler, T. J., Best, S. R., Neylan, T. C., Rogers, C., Fagan, J., & Marmar, C. R. (2001). The peritraumatic distress inventory: A proposed measure of PTSD criterion a2. *The American Journal of Psychiatry*, *158*(9), 1480–1485. https://doi.org/10.1176/appi.ajp.158.9.1480

Bryant, R. A., Creamer, M., O'Donnell, M., Silove, D., & McFarlane, A. C. (2008). A multisite study of initial respiration rate and heart rate as predictors of posttraumatic stress disorder. *The Journal of Clinical Psychiatry*, *69*(11), 1694–1701. https://doi.org/10.4088/jcp.v69n1104

Claxton, J., Alberici, A., Meiser-Stedman, R., & Chiu, H. T. S. (2025). Cognitive appraisals, cognitive avoidance and rumination as shared vulnerabilities for PTSD and depression in trauma-exposed adolescents. *European Journal of Psychotraumatology*, *16*(1), 2527550. https://doi.org/10.1080/20008066.2025.2527550

Cox, C. M., Kenardy, J. A., & Hendrikz, J. K. (2008). A meta-analysis of risk factors that predict psychopathology following accidental trauma. *Journal for Specialists in Pediatric Nursing: JSPN*, *13*(2), 98–110. https://doi.org/10.1111/j.1744-6155.2008.00141.x

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

Gómez 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*, *10*(1), 1620084. https://doi.org/10.1080/20008198.2019.1620084

Hayes, A. F. (2022). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (3rd ed.). The Guilford Press.

Hernández-Posadas, A., Lommen, M. J. J., de la Rosa Gómez, A., Bouman, T. K., Mancilla-Díaz, J. M., & Del Palacio González, A. (2023). Transdiagnostic factors in symptoms of depression and post-traumatic stress: A systematic review. *Current Psychology (New Brunswick, N.J.)*, 1–16. https://doi.org/10.1007/s12144-023-04792-x

International Society for Traumatic Stress Studies. (2018). *Adult prevention and early treatment for PTSD guidelines summary*. https://istss.org/clinical-resources/trauma-treatment/adult-prevention-and-early-treatment-for-ptsd/

Kangaslampi, S., & Peltonen, K. (2020). Changes in traumatic memories and posttraumatic cognitions associate with PTSD symptom improvement in treatment of multiply traumatized children and adolescents. *Journal of Child & Adolescent Trauma*, *13*(1), 103–112. https://doi.org/10.1007/s40653-019-00255-3

Kangaslampi, S., & Peltonen, K. (2022). Mechanisms of change in psychological interventions for posttraumatic stress symptoms: A systematic review with recommendations. *Current Psychology*, *41*(1), 258–275. https://doi.org/10.1007/s12144-019-00478-5

Kenardy, J. A., Spence, S. H., & Macleod, A. C. (2006). Screening for posttraumatic stress disorder in children after accidental injury. *Pediatrics*, *118*(3), 1002–1009. https://doi.org/10.1542/peds.2006-0406

Kube, T., Elssner, A. C., & Herzog, P. (2023). The relationship between multiple traumatic events and the severity of posttraumatic stress disorder symptoms – evidence for a cognitive link. *European Journal of Psychotraumatology*, *14*(1), 2165025. https://doi.org/10.1080/20008066.2023.2165025

Massazza, A., Joffe, H., Hyland, P., & Brewin, C. R. (2021). The structure of peritraumatic reactions and their relationship with PTSD among disaster survivors. *Journal of Abnormal Psychology*, *130*(3), 248–259. https://doi.org/10.1037/abn0000663

McGuire, R., Hiller, R. M., Ehlers, A., Fearon, P., Meiser-Stedman, R., Leuteritz, S., & Halligan, S. L. (2021). A longitudinal investigation of children's trauma memory characteristics and their relationship with posttraumatic stress disorder symptoms. *Research on Child and Adolescent Psychopathology*, *49*(6), 807–816. https://doi.org/10.1007/s10802-021-00773-5

McKinnon, A., Brewer, N., Meiser-Stedman, R., & Nixon, R. D. V. (2017). Trauma memory characteristics and the development of acute stress disorder and post-traumatic stress disorder in youth. *Journal of Behavior Therapy and Experimental Psychiatry*, *54*, 112–119. https://doi.org/10.1016/j.jbtep.2016.07.009

McLean, S. A., Clauw, D. J., Abelson, J. L., & Liberzon, I. (2005). The development of persistent pain and psychological morbidity after motor vehicle collision: Integrating the potential role of stress response systems into a biopsychosocial model. *Psychosomatic Medicine*, *67*(5), 783–790. https://doi.org/10.1097/01.psy.0000181276.49204.bb

Meiser-Stedman, R., McKinnon, A., Dixon, C., Boyle, A., Smith, P., & Dalgleish, T. (2017a). Acute stress disorder and the transition to posttraumatic stress disorder in children and adolescents: Prevalence, course, prognosis, diagnostic suitability, and risk markers. *Depression and Anxiety*, *34*(4), 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. *Journal of Child Psychology and Psychiatry*, *60*(8), 875–884. https://doi.org/10.1111/jcpp.13054

Meiser-Stedman, R., Smith, P., McKinnon, A., Dixon, C., Trickey, D., Ehlers, A., Clark, D. M., Boyle, A., Watson, P., Goodyer, I., & Dalgleish, T. (2017b). Cognitive therapy as an early treatment for post-traumatic stress disorder in children and adolescents: A randomized controlled trial addressing preliminary efficacy and mechanisms of action. *Journal of Child Psychology and Psychiatry*, *58*(5), 623–633. https://doi.org/10.1111/jcpp.12673

Meiser-Stedman, R., Smith, P., Yule, W., & Dalgleish, T. (2007). The Trauma Memory Quality Questionnaire: Preliminary development and validation of a measure of trauma memory characteristics for children and adolescents. *Memory*, *15*(3), 271–279. https://doi.org/10.1080/09658210701256498

Memarzia, J., Walker, J., & Meiser-Stedman, R. (2021). Psychological peritraumatic risk factors for post-traumatic stress disorder in children and adolescents: A meta-analytic review. *Journal of Affective Disorders*, *282*, 1036–1047. https://doi.org/10.1016/j.jad.2021.01.016

Mitchell, R., Brennan, K., Curran, D., Hanna, D., & Dyer, K. F. W. (2017). A meta-analysis of the association between appraisals of trauma and posttraumatic stress in children and adolescents. *Journal of Traumatic Stress*, *30*(1), 88–93. https://doi.org/10.1002/jts.22157

Olsson, K. A., Kenardy, J. A., De Young, A. C., & Spence, S. H. (2008). Predicting children's post-traumatic stress symptoms following hospitalization for accidental injury: Combining the Child Trauma Screening Questionnaire and heart rate. *Journal of Anxiety Disorders*, *22*(8), 1447–1453. https://doi.org/10.1016/j.janxdis.2008.02.007

Patronick, J., Molloy, K. R., Bothwell, S. J., & Wade, S. L. (2025). Applying the cognitive model of post-traumatic stress to examine the role of appraisals, trauma memory, and coping strategies following pediatric injury: A systematic review. *Journal of Child & Adolescent Trauma*, *18*(2), 331–348. https://doi.org/10.1007/s40653-025-00695-0

Pile, V., Smith, P., & Lau, J. Y. F. (2021). Using imagery rescripting as an early intervention for depression in young people. *Frontiers in Psychiatry*, *12*, 651115. https://doi.org/10.3389/fpsyt.2021.651115

Reed, J., Taylor, J., Randall, G., Burgess, A., & Meiser-Stedman, R. (2023). Associations between the Trauma Memory Quality Questionnaire and posttraumatic stress symptoms in youth: A systematic review and meta-analysis. *Journal of Traumatic Stress*, *36*(1), 31–43. https://doi.org/10.1002/jts.22903

Rubin, D. C., Boals, A., & Berntsen, D. (2008). Memory in posttraumatic stress disorder: Properties of voluntary and involuntary, traumatic and nontraumatic autobiographical memories in people with and without posttraumatic stress disorder symptoms. *Journal of Experimental Psychology: General*, *137*(4), 591–614. https://doi.org/10.1037/a0013165

Stavropoulos, A., Brockman, R., Hayes, C., Rogers, K., & Berle, D. (2023). A single case series of imagery rescripting of intrusive autobiographical memories in depression. *Journal of Behavior Therapy and Experimental Psychiatry*, *81*, 101854. https://doi.org/10.1016/j.jbtep.2023.101854

Stein, M. B., Walker, J. R., Hazen, A. L., & Forde, D. R. (1997). Full and partial posttraumatic stress disorder: Findings from a community survey. *The American Journal of Psychiatry*, *154*(8), 1114–1119. https://doi.org/10.1176/ajp.154.8.1114

Trickey, D., Siddaway, A. P., Meiser-Stedman, R., Serpell, L., & Field, A. P. (2012). A meta-analysis of risk factors for post-traumatic stress disorder in children and adolescents. *Clinical Psychology Review*, *32*(2), 122–138. https://doi.org/10.1016/j.cpr.2011.12.001

Thesis Portfolio References

References marked with an asterisk indicate studies included in the meta-analysis.

Abramson, L. Y., Seligman, M. E., & Teasdale, J. D. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology*, *87*(1), 49–74. https://doi.org/10.1037/0021-843X.87.1.49

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: The Journal of Mental Science*, *204*, 335–340. https://doi.org/10.1192/bjp.bp.113.131227

Allen, L., Jones, C., Fox, A., Copello, A., Jones, N., & Meiser-Stedman, R. (2021). The correlation between social support and post-traumatic stress disorder in children and adolescents: A meta-analysis. *Journal of Affective Disorders*, *294*, 543–557. https://doi.org/10.1016/j.jad.2021.07.028

Alpert, E., Shotwell Tabke, C., Cole, T. A., Lee, D. J., & Sloan, D. M. (2023). A systematic review of literature examining mediators and mechanisms of change in empirically supported treatments for posttraumatic stress disorder. *Clinical Psychology Review*, *103*, 102300. https://doi.org/10.1016/j.cpr.2023.102300

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

Armour, C., Contractor, A., Elhai, J. D., Stringer, M., Lyle, G., Forbes, D., & Richardson, J. D. (2015). Identifying latent profiles of posttraumatic stress and major depression symptoms in

Canadian veterans: Exploring differences across profiles in health related functioning. *Psychiatry Research*, *228*(1), 1–7. https://doi.org/10.1016/j.psychres.2015.03.011

Ashbaugh, A. R., Marinos, J., & Bujaki, B. (2018). The impact of depression and PTSD symptom severity on trauma memory. *Memory (Hove, England)*, *26*(1), 106–116. https://doi.org/10.1080/09658211.2017.1334801

Astill Wright, L., Sijbrandij, M., Sinnerton, R., Lewis, C., Roberts, N. P., & Bisson, J. I. (2019). Pharmacological prevention and early treatment of post-traumatic stress disorder and acute stress disorder: A systematic review and meta-analysis. *Translational Psychiatry*, *9*(1), 334. https://doi.org/10.1038/s41398-019-0673-5

Au, T. M., Dickstein, B. D., Comer, J. S., Salters-Pedneault, K., & Litz, B. T. (2013). Co-occurring posttraumatic stress and depression symptoms after sexual assault: A latent profile analysis. *Journal of Affective Disorders*, *149*(1), 209–216. https://doi.org/10.1016/j.jad.2013.01.026

Beck, A. T. (1967). *Depression: Clinical, experimental, and theoretical aspects*. Hoeber Medical Division, Harper & Row.

*Beierl, E. T., Böllinghaus, I., Clark, D. M., Glucksman, E., & Ehlers, A. (2020). Cognitive paths from trauma to posttraumatic stress disorder: A prospective study of Ehlers and Clark's model in survivors of assaults or road traffic collisions. *Psychological Medicine*, *50*(13), 2172–2181. https://doi.org/10.1017/S0033291719002253

*Berntsen, D., & Rubin, D. C. (2008). The reappearance hypothesis revisited: Recurrent involuntary memories after traumatic events and in everyday life. *Memory & cognition*, *36*(2), 449-460. https://doi.org/10.3758/mc.36.2.449

*Berntsen, D., Willert, M., & Rubin, D. C. (2003). Splintered memories or vivid landmarks? Qualities and organization of traumatic memories with and without PTSD. *Applied Cognitive*

Psychology: The Official Journal of the Society for Applied Research in Memory and Cognition, *17*(6), 675-693. https://doi.org/10.1002/acp.894

Bertolini, F., Robertson, L., Bisson, J. I., Meader, N., Churchill, R., Ostuzzi, G., Stein, D. J., Williams, T., & Barbui, C. (2024). Early pharmacological interventions for prevention of post-traumatic stress disorder (PTSD) in individuals experiencing acute traumatic stress symptoms. *The Cochrane Database of Systematic Reviews*, *5*(5), CD013613. https://doi.org/10.1002/14651858.CD013613.pub2

Birrer, E., Michael, T., & Munsch, S. (2007). Intrusive images in PTSD and in traumatised and non-traumatised depressed patients: A cross-sectional clinical study. *Behaviour Research and Therapy*, *45*(9), 2053–2065. https://doi.org/10.1016/j.brat.2007.03.005

*Blix, I., Birkeland, M. S., & Thoresen, S. (2019). Vivid memories of distant trauma: Examining the characteristics of trauma memories and the relationship with the centrality of event and posttraumatic stress 26 years after trauma. *Applied Cognitive Psychology*, *34*(3), 678-684. https://doi.org/10.1002/acp.3650

Bokszczanin, A. (2007). PTSD symptoms in children and adolescents 28 months after a flood: Age and gender differences. *Journal of Traumatic Stress*, *20*(3), 347–351. https://doi.org/10.1002/jts.20220

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2010). A basic introduction to fixed-effect and random-effects models for meta-analysis. *Research Synthesis Methods*, *1*(2), 97–111. https://doi.org/10.1002/jrsm.12

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis* (1st ed.). Wiley. https://doi.org/10.1002/9780470743386

*Bray, J., Brewer, N., Cameron, K., & Nixon, R. D. (2018). Comparing children's memories for negative versus positive events in the context of posttraumatic stress symptoms. *Behavior therapy*, *49*(1), 32-45. https://doi.org/10.1016/j.beth.2017.03.006

Brewin, C. R. (2025). Key concepts, methods, findings, and questions about traumatic memories. *Journal of Traumatic Stress*, *38*(5), 771–780. https://doi.org/10.1002/jts.23164

Brewin, C. R., & Field, A. P. (2024). Meta-analysis shows trauma memories in posttraumatic stress disorder lack coherence: A response to Taylor et al. (2022). *Clinical Psychological Science*, *12*(5), 1027–1033. https://doi.org/10.1177/21677026241240456

Brewin, C. R., Dalgleish, T., & Joseph, S. (1996). A dual representation theory of posttraumatic stress disorder. *Psychological Review*, *103*(4), 670–686. https://doi.org/10.1037/0033-295x.103.4.670

Brewin, C. R., Gregory, J. D., Lipton, M., & Burgess, N. (2010). Intrusive images in psychological disorders: Characteristics, neural mechanisms, and treatment implications. *Psychological Review*, *117*(1), 210–232. https://doi.org/10.1037/a0018113

Brewin, C. R., Wheatley, J., Patel, T., Fearon, P., Hackmann, A., Wells, A., Fisher, P., & Myers, S. (2009). Imagery rescripting as a brief stand-alone treatment for depressed patients with intrusive memories. *Behaviour Research and Therapy*, *47*(7), 569–576. https://doi.org/10.1016/j.brat.2009.03.008

British Psychological Society. (2021). *BPS code of human research ethics*. https://explore.bps.org.uk/content/report-guideline/bpsrep.2021.inf180

Brunet, A., Weiss, D. S., Metzler, T. J., Best, S. R., Neylan, T. C., Rogers, C., Fagan, J., & Marmar, C. R. (2001). The peritraumatic distress inventory: A proposed measure of PTSD criterion a2.

The American Journal of Psychiatry, *158*(9), 1480–1485. https://doi.org/10.1176/appi.ajp.158.9.1480

Bryant, R. A., Creamer, M., O'Donnell, M., Silove, D., & McFarlane, A. C. (2008). A multisite study of initial respiration rate and heart rate as predictors of posttraumatic stress disorder. *The Journal of Clinical Psychiatry*, *69*(11), 1694–1701. https://doi.org/10.4088/JCP.v69n1104

Bryant, R. A., O'Donnell, M. L., Creamer, M., McFarlane, A. C., & Silove, D. (2011). Posttraumatic intrusive symptoms across psychiatric disorders. *Journal of Psychiatric Research*, *45*(6), 842–847. https://doi.org/10.1016/j.jpsychires.2010.11.012

Chan, D., Cheadle, A. D., Reiber, G., Unützer, J., & Chaney, E. F. (2009). Health care utilization and its costs for depressed veterans with and without comorbid PTSD symptoms. *Psychiatric Services*, *60*(12), 1612–1617. https://doi.org/10.1176/ps.2009.60.12.1612

Claxton, J., Alberici, A., Meiser-Stedman, R., & Chiu, H. T. S. (2025). Cognitive appraisals, cognitive avoidance and rumination as shared vulnerabilities for PTSD and depression in trauma-exposed adolescents. *European Journal of Psychotraumatology*, *16*(1), 2527550. https://doi.org/10.1080/20008066.2025.2527550

Cohen, J. (1965). Some statistical issues in psychological research. *Handbook of clinical psychology*, 95-121.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Routledge. https://doi.org/10.4324/9780203771587

Copeland, W. E., Keeler, G., Angold, A., & Costello, E. J. (2007). Traumatic events and posttraumatic stress in childhood. *Archives of General Psychiatry*, *64*(5), 577–584. https://doi.org/10.1001/archpsyc.64.5.577

Cox, C. M., Kenardy, J. A., & Hendrikz, J. K. (2008). A meta-analysis of risk factors that predict psychopathology following accidental trauma. *Journal for Specialists in Pediatric Nursing: JSPN*, *13*(2), 98–110. https://doi.org/10.1111/j.1744-6155.2008.00141.x

Cuijpers, P. (2016). *Meta-analyses in mental health research: A practical guide.* https://www.researchgate.net/publication/301815425_Meta-analyses_in_mental_health_research_A_practical_guide

*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., Landolt, M. A., Fried, E. I., Kleinke, K., Alisic, E., Bryant, R., ... & Meiser-Stedman, R. (2020). Dysfunctional posttraumatic cognitions, posttraumatic stress and depression in children and adolescents exposed to trauma: A network analysis. *Journal of child psychology and psychiatry*, *61*(1), 77-87. https://doi.org/10.1111/jcpp.13101

Dettori, J. R., Norvell, D. C., & Chapman, J. R. (2022). Fixed-effect vs random-effects models for meta-analysis: 3 points to consider. *Global Spine Journal*, *12*(7), 1624–1626. https://doi.org/10.1177/21925682221110527

*Dow, B. L., Kenardy, J. A., Le Brocque, R. M., & Long, D. A. (2023). Cognitive predictors of posttraumatic stress in children 6 months after paediatric intensive care unit admission. *Trauma Care*, *3*(2), 82-92. https://doi.org/10.3390/traumacare3020009

Dow, B. L., Kenardy, J. A., Long, D. A., & Le Brocque, R. M. (2019). Cognitive/affective factors are associated with children's acute posttraumatic stress following pediatric intensive care.

Psychological Trauma: Theory, Research, Practice, and Policy, *11*(1), 55–63. https://doi.org/10.1037/tra0000349

*Duffy, M., Bolton, D., Gillespie, K., Ehlers, A., & Clark, D. M. (2013). A community study of the psychological effects of the omagh car bomb on adults. *PLOS ONE*, *8*(9), e76618. https://doi.org/10.1371/journal.pone.0076618

Dunn, O. J. (1961). Multiple comparisons among means. *Journal of the American Statistical Association*, *56*(293), 52–64. https://doi.org/10.1080/01621459.1961.10482090

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://doi.org/10.1111/j.0006-341x.2000.00455.x

Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *BMJ*, *315*(7109), 629–634. https://doi.org/10.1136/bmj.315.7109.629

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

*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

*Engelhard, I. M., Van Den Hout, M. A., Kindt, M., Arntz, A., & Schouten, E. (2003). Peritraumatic dissociation and posttraumatic stress after pregnancy loss: A prospective study. *Behaviour Research and Therapy*, *41*(1), 67-78. https://doi.org/10.1016/s0005-7967(01)00130-9

*Evans, C., Ehlers, A., Mezey, G., & Clark, D. M. (2007). Intrusive memories and ruminations related to violent crime among young offenders: Phenomenological characteristics. *Journal of Traumatic Stress*, *20*(2), 183–196. https://doi.org/10.1002/jts.20204

Farchione, T. J., Fairholme, C. P., Ellard, K. K., Boisseau, C. L., Thompson-Hollands, J., Carl, J. R., Gallagher, M. W., & Barlow, D. H. (2012). Unified protocol for transdiagnostic treatment of emotional disorders: A randomized controlled trial. *Behavior Therapy*, *43*(3), 666–678. https://doi.org/10.1016/j.beth.2012.01.001

Foa, E. B., Johnson, K. M., Feeny, N. C., & Treadwell, K. R. (2001). The child PTSD Symptom Scale: A preliminary examination of its psychometric properties. *Journal of Clinical Child Psychology*, *30*(3), 376–384. https://doi.org/10.1207/S15374424JCCP3003_9

*Freeman, D., Thompson, C., Vorontsova, N., Dunn, G., Carter, L. A., Garety, P., ... & Ehlers, A. (2013). Paranoia and post-traumatic stress disorder in the months after a physical assault: a longitudinal study examining shared and differential predictors. *Psychological medicine*, *43*(12), 2673-2684. https://doi.org/10.1017/s003329171300038x

Gallagher, M. W. (2017). Transdiagnostic mechanisms of change and cognitive-behavioral treatments for PTSD. *Current Opinion in Psychology, Traumatic Stress*, *14*, 90–95. https://doi.org/10.1016/j.copsyc.2016.12.002

Gidron, Y., Gal, R., Freedman, S., Twiser, I., Lauden, A., Snir, Y., & Benjamin, J. (2001). Translating research findings to PTSD prevention: Results of a randomized–controlled pilot study. *Journal of Traumatic Stress*, *14*(4), 773–780. https://doi.org/10.1023/A:1013046322993

Giuliani, A., De Haan, A., Sharp, T., Chideya, Y., Nixon, R. D., Kangaslampi, S., ... & Halligan, S. L. (2026). Understanding the relationship of trauma memory characteristics to symptoms of PTSD and depression in trauma-exposed children and adolescents: a comprehensive network

analysis. *European journal of psychotraumatology*, *17*(1), 2631357. https://doi.org/10.1080/20008066.2026.2631357

Gómez 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*, *10*(1), 1620084. https://doi.org/10.1080/20008198.2019.1620084

Gunnar, M. R., & Vazquez, D. M. (2001). Low cortisol and a flattening of expected daytime rhythm: Potential indices of risk in human development. *Development and Psychopathology*, *13*(3), 515–538. https://doi.org/10.1017/s0954579401003066

Gutner, C. A., Galovski, T., Bovin, M. J., & Schnurr, P. P. (2016). Emergence of transdiagnostic treatments for PTSD and posttraumatic distress. *Current Psychiatry Reports*, *18*(10), 95. https://doi.org/10.1007/s11920-016-0734-x

*Hagenaars, M. A., van Minnen, A., Hoogduin, C. A. L., & Verbraak, M. (2009). A transdiagnostic comparison of trauma and panic memories in PTSD, panic disorder, and healthy controls. *Journal of Behavior Therapy and Experimental Psychiatry*, *40*(3), 412–422. https://doi.org/10.1016/j.jbtep.2009.04.001

*Halligan, S. L., Michael, T., Clark, D. M., & Ehlers, A. (2003). Posttraumatic stress disorder following assault: The role of cognitive processing, trauma memory, and appraisals. *Journal of Consulting and Clinical Psychology*, *71*(3), 419–431. https://doi.org/10.1037/0022-006X.71.3.419

Hayes, A. F. (2022). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (3rd ed.). The Guilford Press.

Hayes, A. F., & Cai, L. (2007). Using heteroskedasticity-consistent standard error estimators in OLS regression: An introduction and software implementation. *Behavior Research Methods*, *39*(4), 709–722. https://doi.org/10.3758/BF03192961

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *The Behavioral and Brain Sciences*, *33*(2–3), 61–83; discussion 83-135. https://doi.org/10.1017/S0140525X0999152X

Hernández-Posadas, A., Lommen, M. J. J., de la Rosa Gómez, A., Bouman, T. K., Mancilla-Díaz, J. M., & Del Palacio González, A. (2023). Transdiagnostic factors in symptoms of depression and post-traumatic stress: A systematic review. *Current Psychology (New Brunswick, N.J.)*, 1–16. https://doi.org/10.1007/s12144-023-04792-x

Higgins, J. P. T., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in meta-analyses. *BMJ : British Medical Journal*, *327*(7414), 557–560. https://doi.org/10.1136/bmj.327.7414.557

Hildenbrand, A. K., Marsac, M. L., Daly, B. P., Chute, D., & Kassam-Adams, N. (2016). Acute pain and posttraumatic stress after pediatric injury. *Journal of Pediatric Psychology*, *41*(1), 98–107. https://doi.org/10.1093/jpepsy/jsv026

*Hiller, R. M., Creswell, C., Meiser-Stedman, R., Lobo, S., Cowdrey, F., Lyttle, M. D., ... & 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., Elliott, E., Banting, R., & Halligan, S. L. (2021). A longitudinal study of cognitive predictors of (complex) post-traumatic stress in young people in out-of-

home care. *Journal of Child Psychology and Psychiatry*, *62*(1), 48-57. https://doi.org/10.1111/jcpp.13232

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 post-traumatic stress disorder in the year following trauma – a meta-analytic study. *Journal of Child Psychology and Psychiatry*, *57*(8), 884–898. https://doi.org/10.1111/jcpp.12566

Holm S. (1979). A simple sequentially rejective multiple test procedure. *Scandinavian Journal of Statistics*, 6, 65–70.

*Hyland, P., Broughill, M., Shevlin, M., & Brewin, C. R. (2025). Memory and identity processes in ICD-11 complex posttraumatic stress disorder: Tests of a new theory. *Journal of Anxiety Disorders*, 103055. https://doi.org/10.1016/j.janxdis.2025.103055

*Hyland, P., Shevlin, M., Martsenkovskyi, D., Ben-Ezra, M., & Brewin, C. R. (2024). Testing predictions from the memory and identity theory of ICD-11 complex posttraumatic stress disorder: Measurement development and initial findings. *Journal of Anxiety Disorders*, *105*, 102898. https://doi.org/10.1016/j.janxdis.2024.102898

International Society for Traumatic Stress Studies. (2018). *Adult prevention and early treatment for PTSD guidelines summary*. https://istss.org/clinical-resources/trauma-treatment/adult-prevention-and-early-treatment-for-ptsd/

Kangaslampi, S., & Peltonen, K. (2020). Changes in traumatic memories and posttraumatic cognitions associate with PTSD symptom improvement in treatment of multiply traumatized children and adolescents. *Journal of Child & Adolescent Trauma*, *13*(1), 103–112. https://doi.org/10.1007/s40653-019-00255-3

Kangaslampi, S., & Peltonen, K. (2022). Mechanisms of change in psychological interventions for posttraumatic stress symptoms: A systematic review with recommendations. *Current Psychology*, *41*(1), 258–275. https://doi.org/10.1007/s12144-019-00478-5

Kassam-Adams, N., Garcia-España, J. F., Fein, J. A., & Winston, F. K. (2005). Heart rate and posttraumatic stress in injured children. *Archives of General Psychiatry*, *62*(3), 335. https://doi.org/10.1001/archpsyc.62.3.335

Kenardy, J. A., Spence, S. H., & Macleod, A. C. (2006). Screening for posttraumatic stress disorder in children after accidental injury. *Pediatrics*, *118*(3), 1002–1009. https://doi.org/10.1542/peds.2006-0406

Kessler, R. C., Aguilar-Gaxiola, S., Alonso, J., Benjet, C., Bromet, E. J., Cardoso, G., Degenhardt, L., de Girolamo, G., Dinolova, R. V., Ferry, F., Florescu, S., Gureje, O., Haro, J. M., Huang, Y., Karam, E. G., Kawakami, N., Lee, S., Lepine, J.-P., Levinson, D., … Koenen, K. C. (2017). Trauma and PTSD in the world mental health surveys. *European Journal of Psychotraumatology*, *8*(sup5), 1353383. https://doi.org/10.1080/20008198.2017.1353383

Keyan, D., Garland, N., Choi-Christou, J., Tran, J., O'Donnell, M., & Bryant, R. A. (2024). A systematic review and meta-analysis of predictors of response to trauma-focused psychotherapy for posttraumatic stress disorder. *Psychological Bulletin*, *150*(7), 767–797. https://doi.org/10.1037/bul0000438

*Kleim, B., Ehlers, A., & Glucksman, E. (2007). Early predictors of chronic post-traumatic stress disorder in assault survivors. *Psychological medicine*, *37*(10), 1457-1467.

Kloke, J., & McKean, J. (2024). *Nonparametric statistical methods using r* (2nd ed.). Chapman and Hall/CRC. https://doi.org/10.1201/9781003039617

Kube, T., Elssner, A. C., & Herzog, P. (2023). The relationship between multiple traumatic events and the severity of posttraumatic stress disorder symptoms – evidence for a cognitive link. *European Journal of Psychotraumatology*, *14*(1), 2165025. https://doi.org/10.1080/20008066.2023.2165025

Little, R. J. A. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association*, *83*(404), 1198–1202. https://doi.org/10.1080/01621459.1988.10478722

Massazza, A., Joffe, H., Hyland, P., & Brewin, C. R. (2021). The structure of peritraumatic reactions and their relationship with PTSD among disaster survivors. *Journal of Abnormal Psychology*, *130*(3), 248–259. https://doi.org/10.1037/abn0000663

McCleery, J. M., & Harvey, A. G. (2004). Integration of psychological and biological approaches to trauma memory: Implications for pharmacological prevention of PTSD. *Journal of Traumatic Stress*, *17*(6), 485–496. https://doi.org/10.1007/s10960-004-5797-5

McGuire, R., Hiller, R. M., Ehlers, A., Fearon, P., Meiser-Stedman, R., Leuteritz, S., & Halligan, S. L. (2021). A longitudinal investigation of children's trauma memory characteristics and their relationship with posttraumatic stress disorder symptoms. *Research on Child and Adolescent Psychopathology*, *49*(6), 807–816. https://doi.org/10.1007/s10802-021-00773-5

*McKinnon, A. C., Nixon, R. D. V., & Brewer, N. (2008). The influence of data-driven processing on perceptions of memory quality and intrusive symptoms in children following traumatic events. *Behaviour Research and Therapy*, *46*(6), 766–775. https://doi.org/10.1016/j.brat.2008.02.008

*McKinnon, A., Brewer, N., Meiser-Stedman, R., & Nixon, R. D. V. (2017). Trauma memory characteristics and the development of acute stress disorder and post-traumatic stress disorder

in youth. *Journal of Behavior Therapy and Experimental Psychiatry*, *54*, 112–119. https://doi.org/10.1016/j.jbtep.2016.07.009

McLean, S. A., Clauw, D. J., Abelson, J. L., & Liberzon, I. (2005). The development of persistent pain and psychological morbidity after motor vehicle collision: Integrating the potential role of stress response systems into a biopsychosocial model. *Psychosomatic Medicine*, *67*(5), 783–790. https://doi.org/10.1097/01.psy.0000181276.49204.bb

*Megías, J. L., Ryan, E., Vaquero, J. M., & Frese, B. (2007). Comparisons of traumatic and positive memories in people with and without PTSD profile. *Applied Cognitive Psychology*, *21*(1), 117-130. https://psycnet.apa.org/doi/10.1002/acp.1282

*Meiser-Stedman, R., Dalgleish, T., Smith, P., Yule, W., & Glucksman, E. (2007). Diagnostic, demographic, memory quality, and cognitive variables associated with acute stress disorder in children and adolescents. *Journal of Abnormal Psychology*, *116*(1), 65–79. https://doi.org/10.1037/0021-843X.116.1.65

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: Meiser-Stedman et al. *Depression and Anxiety*, *34*(4), 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. *Journal of Child Psychology and Psychiatry*, *60*(8), 875–884. https://doi.org/10.1111/jcpp.13054

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, and Allied Disciplines, *50*(4), 432–440. https://doi.org/10.1111/j.1469-7610.2008.01995.x

Meiser-Stedman, R., Smith, P., McKinnon, A., Dixon, C., Trickey, D., Ehlers, A., Clark, D. M., Boyle, A., Watson, P., Goodyer, I., & Dalgleish, T. (2017). Cognitive therapy as an early treatment for post-traumatic stress disorder in children and adolescents: A randomized controlled trial addressing preliminary efficacy and mechanisms of action. *Journal of Child Psychology and Psychiatry*, *58*(5), 623–633. https://doi.org/10.1111/jcpp.12673

Meiser-Stedman, R., Smith, P., Yule, W., & Dalgleish, T. (2007). The Trauma Memory Quality Questionnaire: Preliminary development and validation of a measure of trauma memory characteristics for children and adolescents. *Memory (Hove, England)*, *15*(3), 271–279. https://doi.org/10.1080/09658210701256498

*Memarzia, J., Lofthouse, K., Dalgleish, T., Boyle, A., McKinnon, A., Dixon, C., ... & 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*, *54*(12), 3407-3416. https://doi.org/10.1017/s0033291724001648

Memarzia, J., Walker, J., & Meiser-Stedman, R. (2021). Psychological peritraumatic risk factors for post-traumatic stress disorder in children and adolescents: A meta-analytic review. *Journal of Affective Disorders*, *282*, 1036–1047. https://doi.org/10.1016/j.jad.2021.01.016

Mitchell, R., Brennan, K., Curran, D., Hanna, D., & Dyer, K. F. W. (2017). A meta-analysis of the association between appraisals of trauma and posttraumatic stress in children and adolescents. *Journal of Traumatic Stress*, *30*(1), 88–93. https://doi.org/10.1002/jts.22157

*Mooren, N., de la Rie, S. M., & Boelen, P. A. (2025). Trauma memories with and without moral conflict: characteristics, centrality, and associations with posttraumatic stress. *Memory*, *33*(7), 816-827. https://doi.org/10.1080/09658211.2025.2529284

*Mordeno, I. G., Galela, D. S., Nalipay, M. J. N., & Cue, M. P. (2018). Centrality of event and mental health outcomes in child and adolescent natural disaster survivors. *The Spanish Journal of Psychology*, *21*, E61. https://doi.org/10.1017/sjp.2018.58

Morris, M. C., & Rao, U. (2013). Psychobiology of PTSD in the acute aftermath of trauma: Integrating research on coping, HPA function and sympathetic nervous system activity. *Asian Journal of Psychiatry*, *6*(1), 3–21. https://doi.org/10.1016/j.ajp.2012.07.012

*Murray, J., Ehlers, A., & Mayou, R. A. (2002). Dissociation and post-traumatic stress disorder: Two prospective studies of road traffic accident survivors. *The British Journal of Psychiatry, 180*(4), 363–368. https://doi.org/10.1192/bjp.180.4.363

Nair, A. S., & Borkar, N. K. (2025). Various biases in systematic review and meta-analysis and their assessment. *Indian Journal of Anaesthesia*, *69*(1), 138–142. https://doi.org/10.4103/ija.ija_1212_24

National Heart, Lung, and Blood Institute. (2014). *Quality assessment tool for observational cohort and cross-sectional studies.* https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools

National Institute for Health and Care Excellence. (2012). *Quality appraisal checklist for studies reporting correlations and associations (Methods guide).* https://www.nice.org.uk/process/pmg4/chapter/appendix-h-quality-appraisal-checklist-for-studies-reporting-correlations-and-associations

National Institute for Health and Care Excellence. (2018). *Post-traumatic stress disorder* (NICE Guideline NG116). https://www.nice.org.uk/guidance/ng116

Nelson, K., & Fivush, R. (2004). The emergence of autobiographical memory: A social cultural developmental theory. *Psychological Review*, *111*(2), 486–511. https://doi.org/10.1037/0033-295X.111.2.486

Nimon, K., & Gavrilova, M. (2010). Regression commonality analysis: Demonstration of an SPSS solution. *Multiple Linear Regression Viewpoints*, *36*(1), 10-17.

O'Donnell, M. L., Creamer, M. C., Parslow, R., Elliott, P., Holmes, A. C. N., Ellen, S., Judson, R., McFarlane, A. C., Silove, D., & Bryant, R. A. (2008). A predictive screening index for posttraumatic stress disorder and depression following traumatic injury. *Journal of Consulting and Clinical Psychology*, *76*(6), 923–932. https://doi.org/10.1037/a0012918

O'Donnell, M. L., Lau, W., Chisholm, K., Agathos, J., Little, J., Terhaag, S., Brand, R., Putica, A., Holmes, A. C. N., Katona, L., Felmingham, K. L., Murray, K., Hosseiny, F., & Gallagher, M. W. (2021). A pilot study of the efficacy of the unified protocol for transdiagnostic treatment of emotional disorders in treating posttraumatic psychopathology: A randomized controlled trial. *Journal of Traumatic Stress*, *34*(3), 563–574. https://doi.org/10.1002/jts.22650

*Ogle, C. M., Rubin, D. C., & Siegler, I. C. (2015). The relation between insecure attachment and posttraumatic stress: Early life versus adulthood traumas. *Psychological Trauma: Theory, Research, Practice, and Policy*, *7*(4), 324. https://doi.org/10.1037/tra0000015

*O'Kearney, R., Hunt, A., & Wallace, N. (2011). Integration and organization of trauma memories and posttraumatic symptoms. *Journal of Traumatic Stress*, *24*(6), 716-725. https://doi.org/10.1002/jts.20690

Olsson, K. A., Kenardy, J. A., De Young, A. C., & Spence, S. H. (2008). Predicting children's post-traumatic stress symptoms following hospitalization for accidental injury: Combining the Child Trauma Screening Questionnaire and heart rate. *Journal of Anxiety Disorders*, *22*(8), 1447–1453. https://doi.org/10.1016/j.janxdis.2008.02.007

*Parry, L., & O'Kearney, R. (2014). A comparison of the quality of intrusive memories in post-traumatic stress disorder and depression. *Memory*, *22*(4), 408-425. https://doi.org/10.1080/09658211.2013.795975

Patel, T., Brewin, C. R., Wheatley, J., Wells, A., Fisher, P., & Myers, S. (2007). Intrusive images and memories in major depression. *Behaviour Research and Therapy*, *45*(11), 2573–2580. https://doi.org/10.1016/j.brat.2007.06.004

Patronick, J., Molloy, K. R., Bothwell, S. J., & Wade, S. L. (2025). Applying the cognitive model of post-traumatic stress to examine the role of appraisals, trauma memory, and coping strategies following pediatric injury: A systematic review. *Journal of Child & Adolescent Trauma*, *18*(2), 331–348. https://doi.org/10.1007/s40653-025-00695-0

*Peltonen, K., Kangaslampi, S., Saranpää, J., Qouta, S., & Punamäki, R.-L. (2017). Peritraumatic dissociation predicts posttraumatic stress disorder symptoms via dysfunctional trauma-related memory among war-affected children. *European Journal of Psychotraumatology*, *8*(sup3), 1375828. https://doi.org/10.1080/20008198.2017.1375828

Peterson, R. A., & Brown, S. P. (2005). On the use of beta coefficients in meta-analysis. *Journal of Applied Psychology*, *90*(1), 175–181. https://doi.org/10.1037/0021-9010.90.1.175

Pile, V., Smith, P., & Lau, J. Y. F. (2021). Using imagery rescripting as an early intervention for depression in young people. *Frontiers in Psychiatry*, *12*, 651115. https://doi.org/10.3389/fpsyt.2021.651115

Post, L. M., Zoellner, L. A., Youngstrom, E., & Feeny, N. C. (2011). Understanding the relationship between co-occurring PTSD and MDD: Symptom severity and affect. *Journal of Anxiety Disorders*, *25*(8), 1123–1130. https://doi.org/10.1016/j.janxdis.2011.08.003

Reed, J., Taylor, J., Randall, G., Burgess, A., & Meiser-Stedman, R. (2023). Associations between the Trauma Memory Quality Questionnaire and posttraumatic stress symptoms in youth: A systematic review and meta-analysis. *Journal of Traumatic Stress*, *36*(1), 31–43. https://doi.org/10.1002/jts.22903

Reiner, I., Beutel, M. E., Winter, P., Rommens, P. M., & Kuhn, S. (2021). Early posttraumatic stress symptoms and levels of distress in trauma patients treated in the resuscitation room: an exploratory study. *Scandinavian journal of trauma, resuscitation and emergency medicine*, *29*(1), 22. https://doi.org/10.1186/s13049-021-00830-4

Rodríguez-Violante, M., Hernández-Medrano, A. J., & Cervantes-Arriaga, A. (2024). The importance of standardized assessment. *Movement Disorders Clinical Practice*, *11*(Suppl 3), S15–S20. https://doi.org/10.1002/mdc3.14085

*Ronayne, E. (2014). *Trauma-centred identity and autobiographical memory in posttraumatic stress disorder (PTSD)* (Doctoral dissertation, University of East Anglia). https://ueaeprints.uea.ac.uk/id/eprint/49477/1/Emma_Ronayne__Final_Thesis_28_05_14_with_Viva_amendments.pdf

Rosenthal, R., & Rubin, D. B. (1986). Meta-analytic procedures for combining studies with multiple effect sizes. *Psychological Bulletin*, *99*(3), 400–406. https://doi.org/10.1037/0033-2909.99.3.400

Rosnow, R. L., & Rosenthal, R. (1996). Computing contrasts, effect sizes, and counternulls on other people's published data: General procedures for research consumers. *Psychological Methods*, *1*(4), 331–340. https://doi.org/10.1037/1082-989X.1.4.331

Rothbaum, B. O., Kearns, M. C., Price, M., Malcoun, E., Davis, M., Ressler, K. J., Lang, D., & Houry, D. (2012). Early intervention may prevent the development of PTSD: A randomized pilot civilian study with modified prolonged exposure. *Biological Psychiatry*, *72*(11), 957–963. https://doi.org/10.1016/j.biopsych.2012.06.002

Rousson, V. (2014). Measuring an effect size from dichotomized data: Contrasted results whether using a correlation or an odds ratio. *Journal of Educational and Behavioral Statistics*, *39*(2), 144-163. https://doi.org/10.3102/1076998614524597

*Rubin, D. C. (2011). The coherence of memories for trauma: Evidence from posttraumatic stress disorder. *Consciousness and cognition*, *20*(3), 857-865. https://doi.org/10.1037/a0013397

Rubin, D. C., Berntsen, D., & Bohni, M. K. (2008a). A memory-based model of posttraumatic stress disorder: evaluating basic assumptions underlying the PTSD diagnosis. *Psychological review*, *115*(4), 985.

Rubin, D. C., Boals, A., & Berntsen, D. (2008b). Memory in posttraumatic stress disorder: Properties of voluntary and involuntary, traumatic and nontraumatic autobiographical memories in people with and without posttraumatic stress disorder symptoms. *Journal of Experimental Psychology: General*, *137*(4), 591–614. https://doi.org/10.1037/a0013165

*Rubin, D. C., Deffler, S. A., Ogle, C. M., Dowell, N. M., Graesser, A. C., & Beckham, J. C. (2016). Participant, rater, and computer measures of coherence in posttraumatic stress disorder. *Journal of Abnormal Psychology*, *125*(1), 11. https://doi.org/10.1037/abn0000126

Rupinski, M. T., & Dunlap, W. P. (1996). Approximating pearson product-moment correlations from kendall's tau and spearman's rho. *Educational and Psychological Measurement*, *56*(3), 419–429. https://doi.org/10.1177/0013164496056003004

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

Sabia, M., & Hupbach, A. (2020). Stress-induced increase in cortisol negatively affects the consolidation of contextual elements of episodic memories. *Brain Sciences*, *10*(6), 358. https://doi.org/10.3390/brainsci10060358

*Sachschal, J. (2017). *Information updating and autobiographical memory in posttraumatic stress disorder* [Http://purl.org/dc/dcmitype/Text, University of Oxford]. https://ora.ox.ac.uk/objects/uuid:fc44da03-7847-4bab-b06e-9c8d162493c8

Salmon, K., & Bryant, R. A. (2002). Posttraumatic stress disorder in children: The influence of developmental factors. *Clinical Psychology Review*, *22*(2), 163–188. https://doi.org/10.1016/S0272-7358(01)00086-1

*Salmond, C. H., Meiser-Stedman, R., Glucksman, E., Thompson, P., Dalgleish, T., & Smith, P. (2011). The nature of trauma memories in acute stress disorder in children and adolescents. *Journal of child psychology and psychiatry*, *52*(5), 560-570. https://doi.org/10.1111/j.1469-7610.2010.02340.x

Schincariol, A., Orrù, G., Otgaar, H., Sartori, G., & Scarpazza, C. (2024). Posttraumatic stress disorder (PTSD) prevalence: An umbrella review. *Psychological Medicine*, *54*(15), 1–14. https://doi.org/10.1017/S0033291724002319

*Schönfeld, S., & Ehlers, A. (2017). Posttraumatic stress disorder and autobiographical memories in everyday life. *Clinical Psychological Science*, *5*(2), 325–340. https://doi.org/10.1177/2167702616688878

Schwabe, L., Böhringer, A., & Wolf, O. T. (2009). Stress disrupts context-dependent memory. *Learning & Memory*, *16*(2), 110–113. https://doi.org/10.1101/lm.1257509

Stavropoulos, A., Brockman, R., Hayes, C., Rogers, K., & Berle, D. (2023). A single case series of imagery rescripting of intrusive autobiographical memories in depression. *Journal of Behavior Therapy and Experimental Psychiatry*, *81*, 101854. https://doi.org/10.1016/j.jbtep.2023.101854

Stein, M. B., Walker, J. R., Hazen, A. L., & Forde, D. R. (1997). Full and partial posttraumatic stress disorder: Findings from a community survey. *The American Journal of Psychiatry*, *154*(8), 1114–1119. https://doi.org/10.1176/ajp.154.8.1114

*Su, Y. J. (2023). PTSD and depression in adult burn patients three months postburn: the contribution of psychosocial factors. *General hospital psychiatry*, *82*, 33-40. https://doi.org/10.1016/j.genhosppsych.2023.03.004

Sumner, J. A., Griffith, J. W., & Mineka, S. (2010). Overgeneral autobiographical memory as a predictor of the course of depression: A meta-analysis. *Behaviour Research and Therapy*, *48*(7), 614–625. https://doi.org/10.1016/j.brat.2010.03.013

Tabachnick, B. G., & Fidell, L. S. (2019). *Using multivariate statistics* (7th ed.). Pearson.

*Taylor, A., Jordan, K., Zajac, R., Takarangi, M. K., & Garry, M. (2020). Judgments of memory coherence depend on the conditions under which a memory is retrieved, regardless of reported PTSD symptoms. *Journal of Applied Research in Memory and Cognition*, *9*(3), 396-409. https://doi.org/10.1016/j.jarmac.2020.07.003

Thielemann, J. F. B., Kasparik, B., König, J., Unterhitzenberger, J., & Rosner, R. (2022). A systematic review and meta-analysis of trauma-focused cognitive behavioral therapy for

children and adolescents. *Child Abuse & Neglect*, *134*, 105899. https://doi.org/10.1016/j.chiabu.2022.105899

Trickett, P. K., Noll, J. G., Susman, E. J., Shenk, C. E., & Putnam, F. W. (2010). Attenuation of cortisol across development for victims of sexual abuse. *Development and Psychopathology*, *22*(1), 165–175. https://doi.org/10.1017/S0954579409990332

Trickey, D., Siddaway, A. P., Meiser-Stedman, R., Serpell, L., & Field, A. P. (2012). A meta-analysis of risk factors for post-traumatic stress disorder in children and adolescents. *Clinical Psychology Review*, *32*(2), 122–138. https://doi.org/10.1016/j.cpr.2011.12.001

Valentine, J. C., Pigott, T. D., & Rothstein, H. R. (2010). How many studies do you need? : A primer on statistical power for meta-analysis. *Journal of Educational and Behavioral Statistics*, *35*(2), 215–247. https://doi.org/10.3102/1076998609346961

Viechtbauer, W. (2010). Conducting meta-analyses in r with the metafor package. *Journal of Statistical Software*, *36*, 1–48. https://doi.org/10.18637/jss.v036.i03

Visser, I., Mheen, M. van der, Dorsman, H., Knipschild, R., Staaks, J., Hein, I., Dongen, N. van, Staal, W., Assink, M., & Lindauer, R. J. L. (2025). Post-traumatic stress disorder rates in trauma-exposed children and adolescents: Updated three-level meta-analysis. *The British Journal of Psychiatry*, 1–9. https://doi.org/10.1192/bjp.2025.30

Wang, S.-K., Feng, M., Fang, Y., Lv, L., Sun, G.-L., Yang, S.-L., Guo, P., Cheng, S.-F., Qian, M.-C., & Chen, H.-X. (2023). Psychological trauma, posttraumatic stress disorder and trauma-related depression: A mini-review. *World Journal of Psychiatry*, *13*(6), 331–339. https://doi.org/10.5498/wjp.v13.i6.331

Wells, C. S., & Wollack, J. A. (2003). *An instructor's guide to understanding test reliability*. University of Wisconsin-Madison. https://testing.wisc.edu/Reliability.pdf

*Wiseman, H. (2018) Why do some young adults develop post-traumatic stress disorder (PTSD) following intimate partner violence? (Doctoral dissertation, University of Bath). https://purehost.bath.ac.uk/ws/files/192844161/H_Wiseman_final_version_amended_21.8.18_v1_Redacted.pdf

Zatzick, D. F., Russo, J., Pitman, R. K., Rivara, F., Jurkovich, G., & Roy-Byrne, P. (2005). Reevaluating the association between emergency department heart rate and the development of posttraumatic stress disorder: A public health approach. *Biological Psychiatry*, *57*(1), 91–95. https://doi.org/10.1016/j.biopsych.2004.10.005

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The multidimensional scale of perceived social support. *Journal of Personality Assessment*, *52*(1), 30–41. https://doi.org/10.1207/s15327752jpa5201_2

Appendices

Appendix A

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Updated 25 February 2026

Appendix B

Risk of Bias and Quality Appraisal Tool

Studies were rated ‘high risk’ or ‘low risk’ for each item. Prospective studies were rated as low risk if they scored ‘low risk’ on 6, 7 or 8 items (5, 6 or 7 for cross-sectional studies); medium risk if they scored ‘low risk’ on 3, 4 or 5 items (2, 3 or 4 for cross-sectional studies); and high risk if they scored ‘low risk’ on 0, 1 or 2 items (0 or 1 for cross-sectional studies). This method of scoring has been used in other published meta-analyses in the PTSD literature (Gómez de La Cuesta et al., 2019; Reed et al., 2023).

Quality Appraisal and Risk of Bias Item	Item Scoring
Was the study population clearly specified and defined? e.g. clear description of location and setting, mean age and range, gender split, ethnicity & trauma types experienced	Y (low risk) N (high risk) Unclear N/A
Was some form of random selection used to select the sample that was appropriate to the study design which minimised sampling bias as far as possible? e.g. low risk = random sampling of those exposed to traumatic event, inviting sequential emergency department admissions to participate; high risk = self-referral to study, convenience sampling	Y (low risk) N (high risk) Unclear N/A
Was a sample size justification and power calculation provided? i.e., showing sample size was large enough so study was powered enough to detect effect	Y (low risk) N (high risk) Unclear N/A
Was the likelihood of non-response bias minimized as far as possible? e.g. was the response rate at least 40% OR was an analysis performed that showed no significant difference in relevant	Y (low risk) N (high risk) Unclear

demographic characteristics between responders and non-responders?	N/A
For prospective studies only: was loss to follow-up 20% or less?	Y (low risk) N (high risk) Unclear N/A
Was the trauma memory quality measure used reliable? i.e. internal consistency (Cronbach's alpha) is at least 0.7 (either reported in the paper, or the measure has adequate IC reported in other peer reviewed papers). If no internal consistency given, score N (high risk). If trauma memory quality was assessed with just a single item question, then score N (high risk)	Y (low risk) N (high risk) Unclear N/A
Was the post-traumatic stress symptoms/ depression measure/ interview used reliable? i.e. internal consistency (Cronbach's alpha) is at least 0.7 (either reported in the paper, or the measure has adequate IC reported in other peer reviewed papers). If no internal consistency given, score N (high risk)	Y (low risk) N (high risk) Unclear N/A
Was a correlation between the variables of interest provided? If r had to be converted from another effect size or calculated from other data, score N	Y (low risk) N (high risk) Unclear N/A

Appendix C

Study Characteristics

Article	Trauma Type	*N*	Age Range	Mean Age (SD)	% Female	Country	Study Design	Time Since Trauma (Baseline, follow up)	Memory Qualities Assessed (measure if relevant)	PTSD Measure (baseline, follow up)	Depression Measure	Criterion A	Risk of Bias	*r* (memory and PTSD)	*r* (memory and depression)
Beierl et al. (2020)	Physical assault/road traffic accident (RTA)	696	18-65	37.29	37	UK	PL	1 month (memory), 6 months (PTSD)	4 items on disjointedness/disorganisation	PDS & PSSI (combined)	N/A	Full	L	Disorganisation = 0.27	N/A
Berntsen & Rubin (2008)[1]	Natural disaster-tsunami	40	18-87	45.9	50.85	Denmark	CS	10 months	1 item on vividness and 1 on coherence	PCL	N/A	Full	M	Combined = 0.24 Vividness = 0.33 Coherence = 0.14	N/A
Berntsen et al. (2003)	Variety	103	NP	26.05 (5.22)[2]	79[2]	Denmark	CS	Approx. 6 months	1 item each on emotion (same as time of trauma), smell/taste, travel in time, bodily sensations, vision, like a video, coherence	PDS	N/A	Full	H	Combined = 0.18 Sensory (smell/taste, bodily and vision combined) = 0.19 Coherence = 0 Here and now = 0.21	N/A
Blix et al. (2019)	Fire on ship	185	NP	55.37[3]	50.81[3]	Norway	CS	26 years	Scales on sensory vividness, emotional experience, sense of reliving to get total vividness score (from AMQ)	PCL-S	N/A	Full	L	Combined = 0.49	N/A
Bray et al. (2018)	Accidental injury	25	7-17	12.63[4]	31.43	Australia	PL	1 week, 2 months	Sensory qualities, temporal context and verbal accessibility (TMQQ)	ASC-Kids, CPSS	N/A	Part	M	Combined 1 week = 0.30 Combined 2 months = 0.41	N/A
Davis et al. (2023)	Abuse/neglect	120	10-18	13.5 (13.5)	53	UK	PL	Baseline[5] (memory), 12 months (depression)	Sensory qualities, temporal context, verbal accessibility, disorganisation (ATMQQ)	N/A	RCADS	Part	L	N/A	Baseline = 0.58 12 months = 0.34
Dow et al. (2023)	Illness/injury (PICU)	55	6-16	10.78	42	Australia	PL	3 weeks (memory), 6 months (PTSD)	TMQQ	CPTSDI	N/A	Part	L	Combined = 0.42	N/A
Duffy et al. (2013)	Bomb explosion	437	16-92	41.9	62.8	Northern Ireland	CS	9 months	1 item on unclear/muddled (disorganised) and 1	PDS	N/A	Full	M	Combined = 0.5 Here and now quality = 0.56	N/A

								on having a 'here and now' quality					Disorganisation= 0.43	
Ehring et al. (2008)	RTA	147	NP	35.17 (10.6)	33.3	UK	PL	2 weeks, 1 month, 3 months, 6 months (memory only at 2 weeks)	5 items on disorganisation (from the TMQ)	PDS	BDI	Full	L	Disorganisation 2 weeks = 0.28 Disorganisation = 3 months = 0.41	2 weeks = 0.3 3 months = 0.27
Engelhard et al. (2003)	Pregnancy loss	104	NP	30.7 (4)	100	Netherlands	PL	1 month (memory and PTSD), 4 months later (PTSD)	1 item on fragmentation, 5 on sensory, and 1 on emotional intensity	PSS	N/A	Part	M	Combined 1 month = 0.33 4 months later = 0.2 Fragmented 1 month = 0.32 4 months later = 0.27 Sensory 1 month = 0.3 4 months later = 0.15	N/A
Evans et al. (2007)	Perpetrators of violent crime	48	NP	19.9 (0.91)	0	UK	CS	22.6 months	1 item on vividness, 1 on clarity/detail, 1 on distress and 1 on 'here and now'	PSSI	N/A	Full	L	Combined = 0.31 Vividness = 0.24 Here and now = 0.36	N/A
Freeman et al. (2013)	Physical assault	94	18-65	34.4	25.47	UK	PL	4-6 weeks (memory), 6 months later (PTSD)	1 item on vividness, 1 on distress, 1 on 'here and now', 1 on lack of context/disjointed (IMQ)	PDS	N/A	Full	L	Combined across both memory measures = 0.27	N/A
Hagenaars et al. (2009)	Variety	194	NP	26.95[6] (9.86)	78.22[6]	Netherlands	CS	>1 month	5 items on disorganisation and 8 on intrusive qualities (TMQ) 6 items on disorganisation and 8 items on re-experiencing (based on TMQ)	MINI	N/A	Full	M	Combined = 0.52 Sensory (image and body) = 0.44 Disorganisation= 0.19	N/A
Halligan et al. (2003a)[7]	Physical or sexual assault	62	18-75	37.5 (11.69)[8]	40.7[8]	UK	CS	< 3 months	Unclear- reports 'disorganisation' rated 0-4	PDS	N/A	Full	M	Disorganisation = 0.39	N/A
Halligan et al. (2003b)[7]	Physical or sexual assault	73	18-74	40.2 (14.8)[9]	43.84[9]	UK	PL	2-12 weeks, 3 months later, 6 months later, 9 months later[10]	Mention of using TMQ earlier in text Unclear- reports 'disorganisation' Mention of using TMQ earlier in text	PDS	BDI	Full	M	Disorganisation 2-12 weeks = 0.29 Disorganisation 3 months later = 0.48	2-12 weeks = 0.28[12]

Hiller et al. (2019)	Accidents, medical incidents, and assault	132	6-13	9.9	38	UK	PL	1 month, 6 months later	ATMQQ	PTSD-RI	RCADS	Full	L	1 month = 0.75 6 months later = 0.39	1 month = 0.58 6 months later = 0.30
Hiller et al. (2021)	Abuse/neglect	120	10-18	13.5	53	UK	PL	Baseline[5], 12 months	ATMQQ	CATS	N/A	Part	L	Combined baseline = 0.65 Combined 12 months = 0.5	N/A
Hyland et al. (2025)	Variety	707	18-89	46.28	51.5	UK	CS	NP	8 items on re-living experiences (ETMQ)	ITQ (re-experiencing, avoidance, and threat subscales)	N/A	Part	L	Combined = 0.63	N/A
Hyland et al. (2024)	Variety	2048	18-60+	41.9[11]	48.3	Ukraine	CS	> 1 month	8 items on re-living experiences (ETMQ)	ITQ (re-experiencing, avoidance, and threat subscales)	N/A	Part	L	Combined = 0.64	N/A
Kleim et al. (2007)	Assault	205	NP	35 (11.5)	32	UK	PL	2 weeks (memory), 6 months (PTSD)	1 item on 'nowness' (from TMQ)	SCID	N/A	Full	M	Here and now = 0.43	N/A
McKinnon et al. (2017)	Injury/accidents	67	7-16	11.8	37	Australia	PL	4 weeks (memory and PTSD), 8-12 weeks (PTSD	TMQQ	CASQ, CPSS	N/A	Part	M	Combined 4 weeks = 0.67 Combined 8-12 weeks = 0.5	N/A
McKinnon et al. (2008)	Injuries/accidents	75	7-16	11	31	Australia	CS	Within 4 weeks	TMQQ	ASC-Kids	CDI-S	Part	L (PTSD) M (depression)	Combined = 0.76	0.21
Megías et al. (2007)	Variety	210	18-51	22.2	76.7	Spain	CS	> 1 month	10 items on clarity, 3 on non-visual sensory, 1 on detailed feelings, absorbs me, happening again, can't express with words, like a video and non-control 9 (some from the MCQ)	PDS	N/A	Full	M	Combined = 0.31 Non-visual sensory = 0.25 Here and now = 0.47	N/A
Meiser-Stedman et al. (2007)[13]	Assault/RTA	88 (2-4 weeks) 43 (3 months)	11-16	14	36.8	UK	PL	2-4 weeks (only time memory was assessed), 3 months, 6 months	TMQQ	RIES-C	N/A	Full	M	Combined 2-4 weeks = 0.78 Combined 3 months = 0.5	N/A

Memarzia et al. (2024)	Variety	234	8-17	13.9 (2.9)	43.5	UK	PL	2 weeks (memory), 9 weeks (PTSD)	TMQQ	CPSS	SMFQ	Full	L	Combined = 0.58	0.49
Mooren et al. (2025)	Variety	459	18-30	22.30	73.4	Netherlands	CS	1 week – 5 years	1 item each on vividness, sensory details and coherence (from MEQ)	PCL-5	N/A	Part	M	Combined = 0.12 Vividness = 0.17 Coherence = -0.07 Sensory = 0.25	N/A
Mordeno et al. (2018)	Natural disaster-typhoon	225	9-17	14.17	55.1	Philippines	CS	Within 1 month	TMQQ (excluding two items on verbal accessibility)	ASDI	Depression Self-Rating Scale for Children	Full	M	Combined = 0.51	0.39
Murray et al. (2002)	RTA	203	17-76	33.81	41.87	UK	PL	Within 48 hours, 4 weeks and 6 months	1 item on whether memory is unclear or jumbled-fragmentation	PDS	N/A	Full	M	Fragmentation initial memory and 4 week PTSD = 0.32 Fragmentation 4 week memory and 6 month PTSD = 0.24	N/A
O'Kearney et al. (2011)	Variety	47	NP	22.83 (8.19)	80.85	Australia	CS	54.24 months	5 items on disorganisation (TMQ disorganisation subscale)	PDS	DASS (depression subscale)	Full	M	Disorganisation = 0.33	0.45
Ogle et al. (2015)	Variety	1033	NP	63.47 (2.76)	38.45	USA	CS	NP	1 item each on emotional intensity, physical reaction and involuntary recall (from the AMQ)	PCL-S	N/A	Full	L	Combined = 0.44	N/A
Parry & O'Kearney (2014)	Variety	58	NP	35.67 (16.42)	57.47	Australia	CS	Approx. 12 years	1 item each on distress and vividness	PDS	N/A	Part	M	Combined = 0.25 Vividness = 0.02	N/A
Peltonen et al. (2017)	War exposure	197	10-12	11.4	49.4	Palestine/ Israel	PL	3 months, 9 months	TMQQ	CRIES-13	N/A	Full	L	Combined = 0.30	N/A
Ronayne (2013)	Variety	72	NP	36.1	70.31	UK	CS	1 month – 5 years	1 item on fragmentation, 2 items on sensory, 2 items on re-living and 2 items on coherence	PDS	N/A	Full	M	Combined = 0.21 Fragmentation = 0.31 Sensory = 0.25 Coherence = -0.01 Here and now= 0.27	N/A
Rubin (2011)	Variety	30	18-22	NP	NP	USA	CS	< 1 month	6 items assessing coherence (from the AMQ)	CAPS	N/A	Full	H	Coherence = 0.22	N/A
Rubin et al. (2016)	Variety	60	NP	37.85 (10.23)[15]	61.67[15]	USA	CS	> 1 month	1 item each on remembering the setting, memory as a coherent story, and	CAPS	N/A	Full	M	Combined = 0.12	N/A

								memory come in pieces with bits missing (reverse scored)[14]						
Sachschal (2017)[16]	Variety	147	NP	45[17]	32.39[17]	UK	CS	> 1 month	4 items from the TMQ on disorganisation and 4 additional items on disjointedness (overall disorganisation)	CAPS-5	N/A	Full	M	Combined = 0.42	N/A
Salmond et al. (2011)	Assault/RTA	50	8-17	13.5 (2.51)	50	UK	CS	2-4 weeks	TMQQ	CPSS	DSRS	Full	M	Combined = 0.17	0.74
Schönfeld & Ehlers (2017)	Variety	52	NP	38.5[18]	57.7[18]	Germany	CS	<6 months – over 5 years	1 item each on vividness and remoteness (reverse scored)[19]	PDS	N/A	Full	M	Combined = 0.31 Vivid = 0.38 Here and now[19] = 0.15	N/A
Su (2023)	Burns	100	NP	41.8	24.6	China	PL	In hospital , 3 months later	5 items on disorganisation (from TMQ)	PDS-5	PHQ-9	Part	L	Disorganisation both in hospital = 0.54 Disorganisation 3 months = 0.24	0.21
Taylor et al. (2020)	Variety	886	NP	37.87 (18.13)	63	USA	CS	> 1 month	1 item on memory as a coherent story and one as memory comes in pieces with bits missing (reverse scored by authors) (from AMQ)	IES-R	N/A	Part	M	Coherence = 0.04	N/A
Wiseman (2018)	Intimate partner violence	399	NP	21.68 (2.22)	100	UK	CS	Present day - < 1 year ago	TMQQ	PDS-5	N/A	Full	L	Combined = 0.52	N/A

Note. PL = prospective longitudinal; CS = cross-sectional; PDS = Posttraumatic Diagnostic Scale; PSS-I = PTSD Symptom Scale-Interview; PCL = The Posttraumatic Stress Disorder Checklist; NP = not provided; Approx. = approximately; AMQ = Autobiographical Memory Questionnaire; TMQQ = Trauma Memory Quality Questionnaire; ASC-Kids = Acute Stress Checklist for Children; CPSS = Child PTSD Symptom Scale; ATMQQ- Adapted Trauma Memory Quality Questionnaire; RCADS = Revised Child; CPTSDI = The Children's PTSD Inventory; TMQ = Trauma Memory Questionnaire; BDI = Beck's Depression Inventory; PSS = PTSD Symptom scale; IMQ = Intrusive Memory Questionnaire; MINI = Mini-International Neuropsychiatric Interview; CATS = Child and Adolescent Trauma Screen; ITQ = International Trauma Questionnaire; ETMQ = Experiences of Traumatic Memories Questionnaire; SCID = Structured Clinical Interview for DSM-IV; CDI-S

= Children's Depression Inventory Short Form; MCQ = Memory Characteristics Questionnaire; RIES-C = Revised Impact of Events Scale; MEQ = Memory Experiences Questionnaire; PCL-5 = PTSD Checklist for DSM-5; ASDI = Acute Stress Disorder Interview; DASS = Depression Anxiety Stress Scale; CRIES-13 = Children's Revised Impact of Events Scale; CAPS = Clinician Administered PTSD Scale; CAPS-5 = Clinician Administered PTSD Scale DSM-5; DSRS = Birleson Depression Self-Rating Scale; PDS-5 = Posttraumatic Diagnostic Scale DSM-5; IES-R = Impact of Events Scale- Revised; SMFQ = Short Mood and Feelings Questionnaire

[1]Study 1. [2]Weighted average across two sample groups. [3]Weighted average across two sample groups. [4]Weighted across a low PTSS and high PTSS groups. [5]Not possible to determine time since trauma at baseline due to chronic nature of trauma. [6]weighted average across PTSD and control groups.[7]Halligan et al. (2003a) is a cross sectional study and Halligan et al. (2003b) is a prospective longitudinal study. Authors note that there is no overlap in the two samples. [8] Weighted mean across PTSD and no PTSD group. [9]Weighted average across PTSD and no-PTSD group.[10]Memory was assessed during the initial assessment and at 6 months follow up. [11]Average of midpoint across all age group categories. [12] Only initial symptoms reported for depression. [13]Only sample 2 as sample 1 was not exposed to A1 criterion traumas. [14]This item correlation was flipped for the combined correlation, so it matched the direction of the other two items in terms of higher scores indicating higher coherence levels.[15]Weighted average across PTSD and no-PTSD group. [16]Study 5. [17]Weighted average across PTSD group and traumatised control group. [18]Weighted across PTSD and no-PTSD group. [19]Remote item was reverse scored so that higher scores related to more here and now quality.

Appendix D

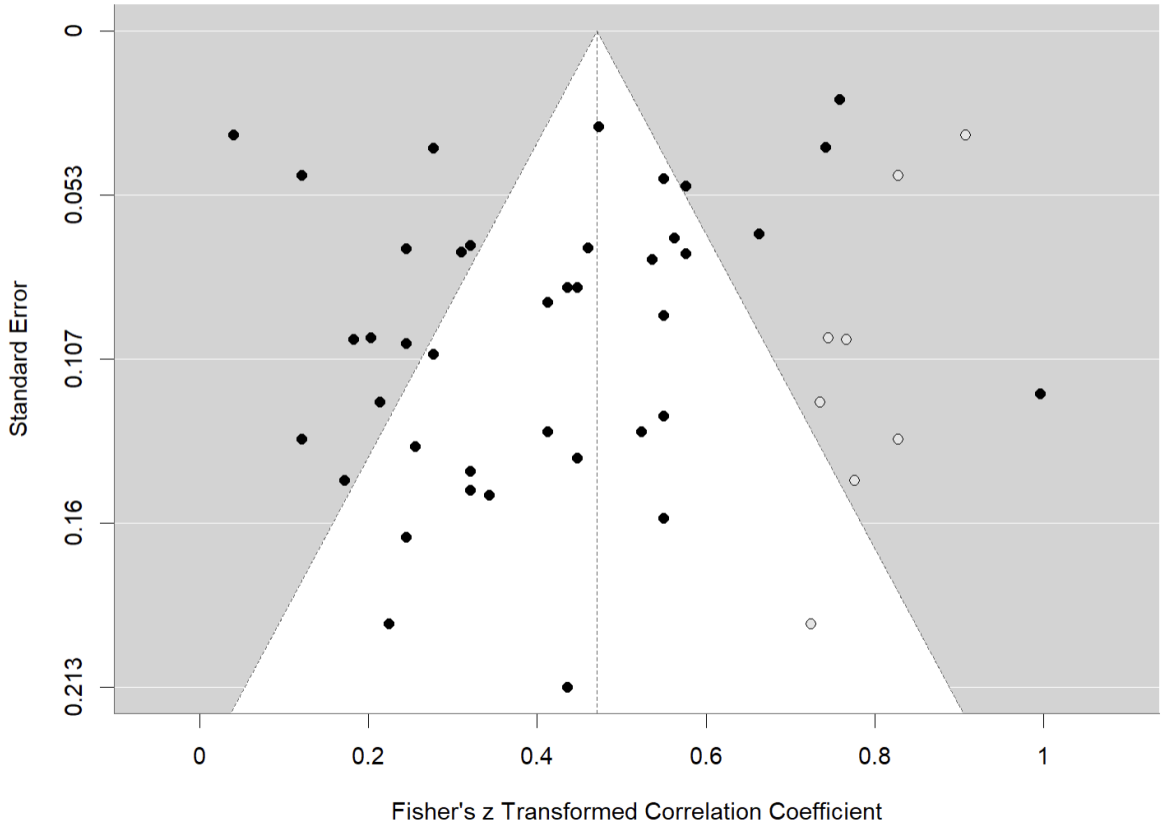
PTSD Symptoms Leave-One-Out Analysis

Study excluded	Q	I^2 (%)
Beierl et al. (2020)	549.33*	88.54
Berntsen et al. (2008)	575.88*	89.23
Berntsen et al. (2003)	569.31*	88.97
Blix et al. (2019)	577.03*	89.16
Bray et al. (2018)	577.77*	89.30
Dow et al. (2023)	577.77*	89.34
Duffy et al. (2013)	575.07*	88.84
Ehring et al. (2008)	577.61*	89.30
Engelhard et al. (2003)	570.41*	89.03
Evans et al. (2007)	576.76*	89.30
Freeman et al. (2013)	574.31*	89.22
Hagenaars et al. (2009)	575.67*	89.05
Halligan et al. (2003a)	577.58*	89.34
Halligan et al. (2003b)	577.64*	89.29
Hiller et al. (2019)	577.33*	89.32
Hiller et al. (2021)	577.09*	89.20
Hyland et al. (2025)	522.75*	87.49
Hyland et al. (2024)	366.95*	85.77
Kleim et al. (2007)	577.77*	89.24
Mckinnon et al. (2017)	577.41*	89.26
Mckinnon et al. (2008)	557.85*	87.35
Megías et al. (2007)	572.96*	89.18
Meiser-Stedman et al. (2007)	577.56*	89.27
Memarzia et al. (2024)	569.2*	88.69
Mooren et al. (2025)	518.86*	88.07
Mordeno et al. (2018)	575.92*	89.05
Murray et al. (2002)	567.28*	89.01
O'Kearney et al. (2011)	577.06*	89.31
Ogle et al. (2015)	577.8*	88.34
Parry et al. (2014)	575.21*	89.22
Peltonen et al. (2017)	572.59*	89.17
Ronayne (2013)	573.15*	89.12
Rubin (2011)	576.13*	89.22
Rubin (2016)	570.73*	88.92
Sachschal (2017)	577.71*	89.30
Salmond et al. (2011)	573.54*	89.09
Schönfeld et al. (2017)	576.67*	89.30
Su (2023)	572.75*	89.15
Taylor et al. (2020)	397.22*	86.73
Wiseman (2018)	573.29*	88.81

Note. *significant at $p < .01$

Appendix E

Trim and Fill Funnel Plot for PTSD Symptoms Meta-Analysis



Appendix F

Figure F1

PTSD Symptoms and Disorganisation Forest Plot

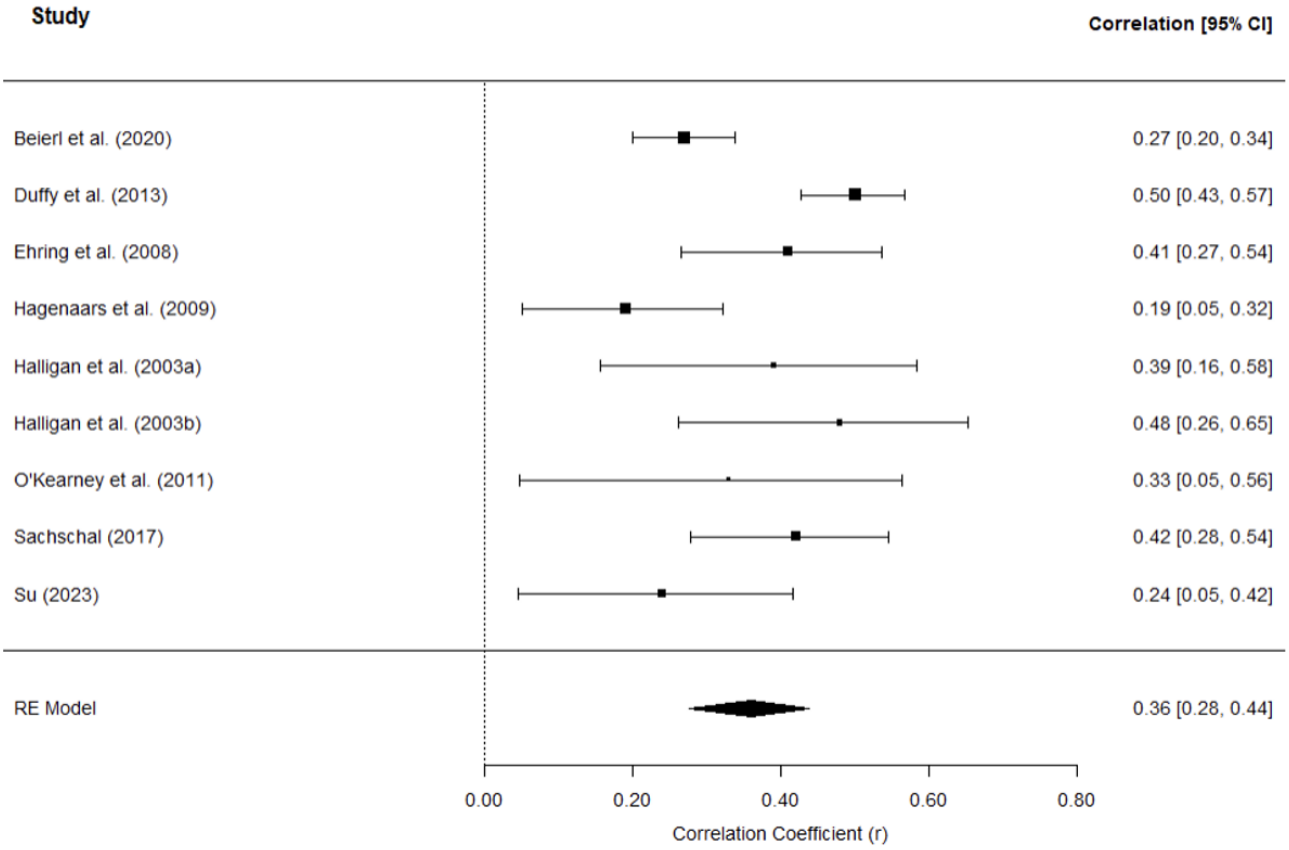


Figure F2

PTSD Symptoms and 'Here-and-Now' Quality Forest Plot

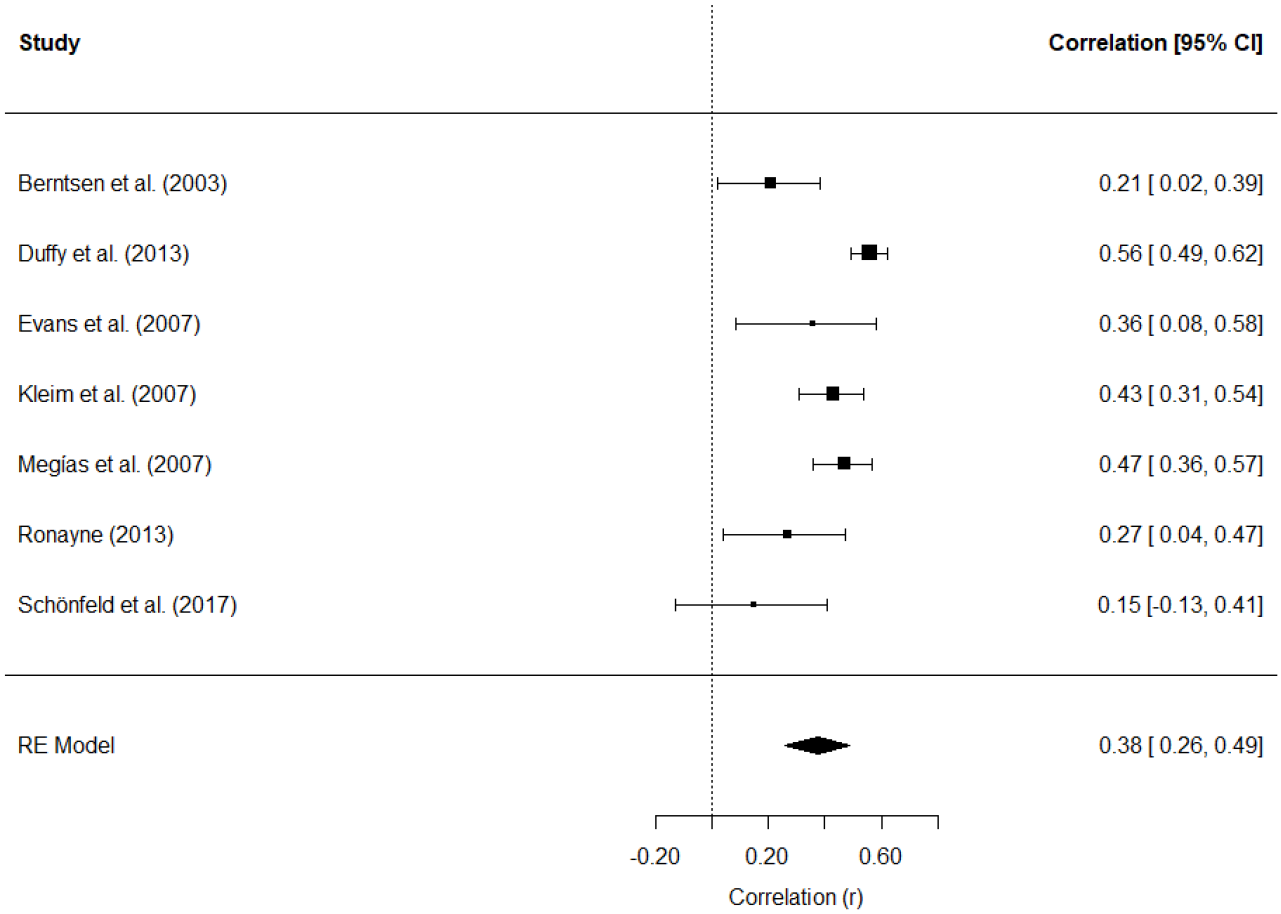


Figure F3

PTSD Symptoms and Fragmentation Forest Plot

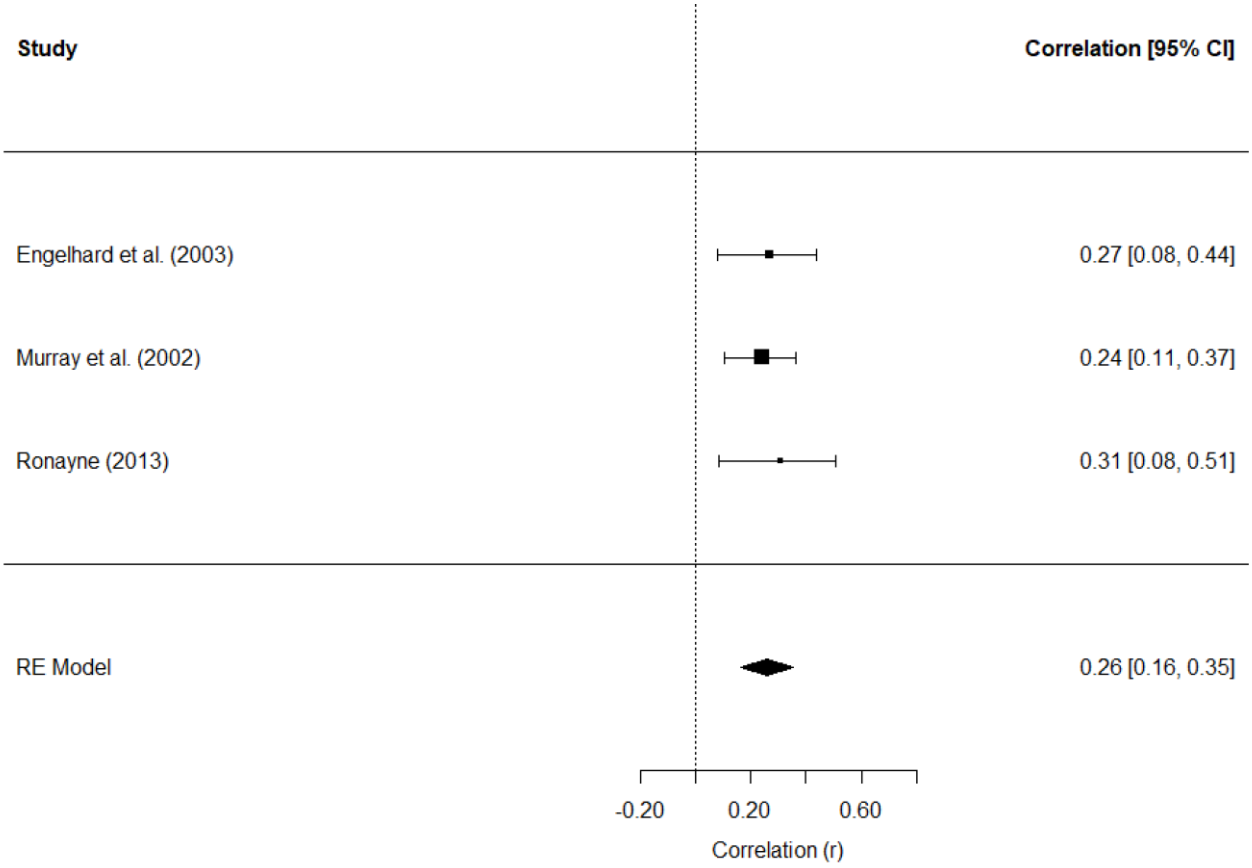


Figure F4

PTSD Symptoms and Sensory Quality Forest Plot

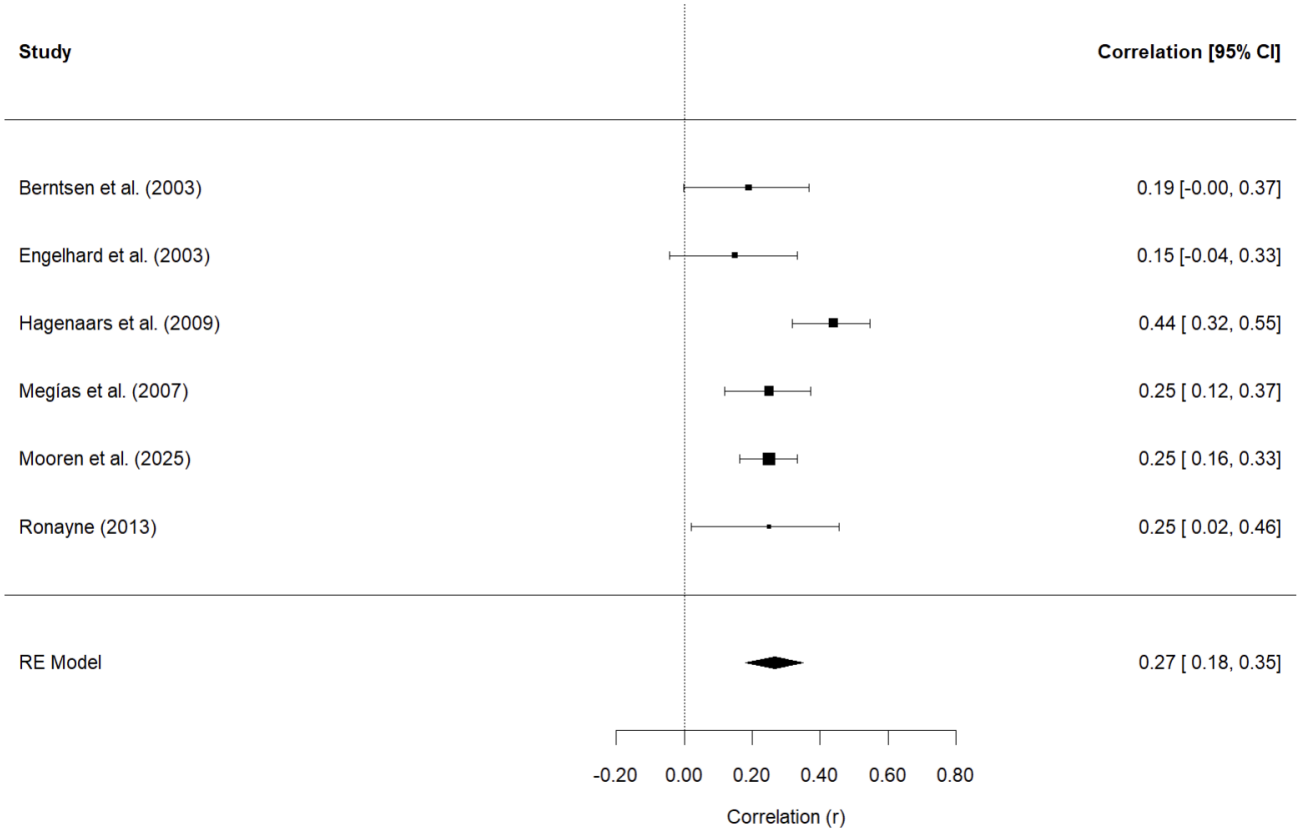


Figure F5

PTSD Symptoms and Vividness Forest Plot

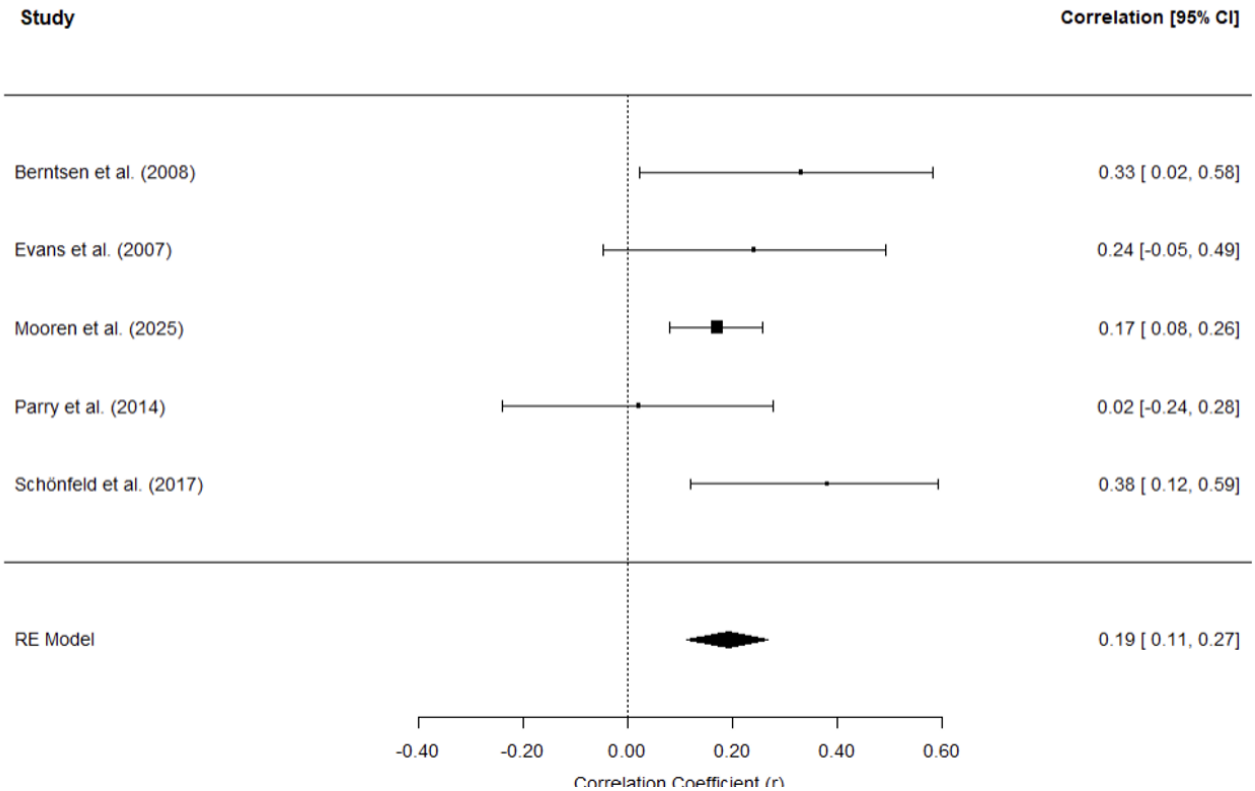


Figure F6

PTSD Symptoms and Coherence Forest Plot

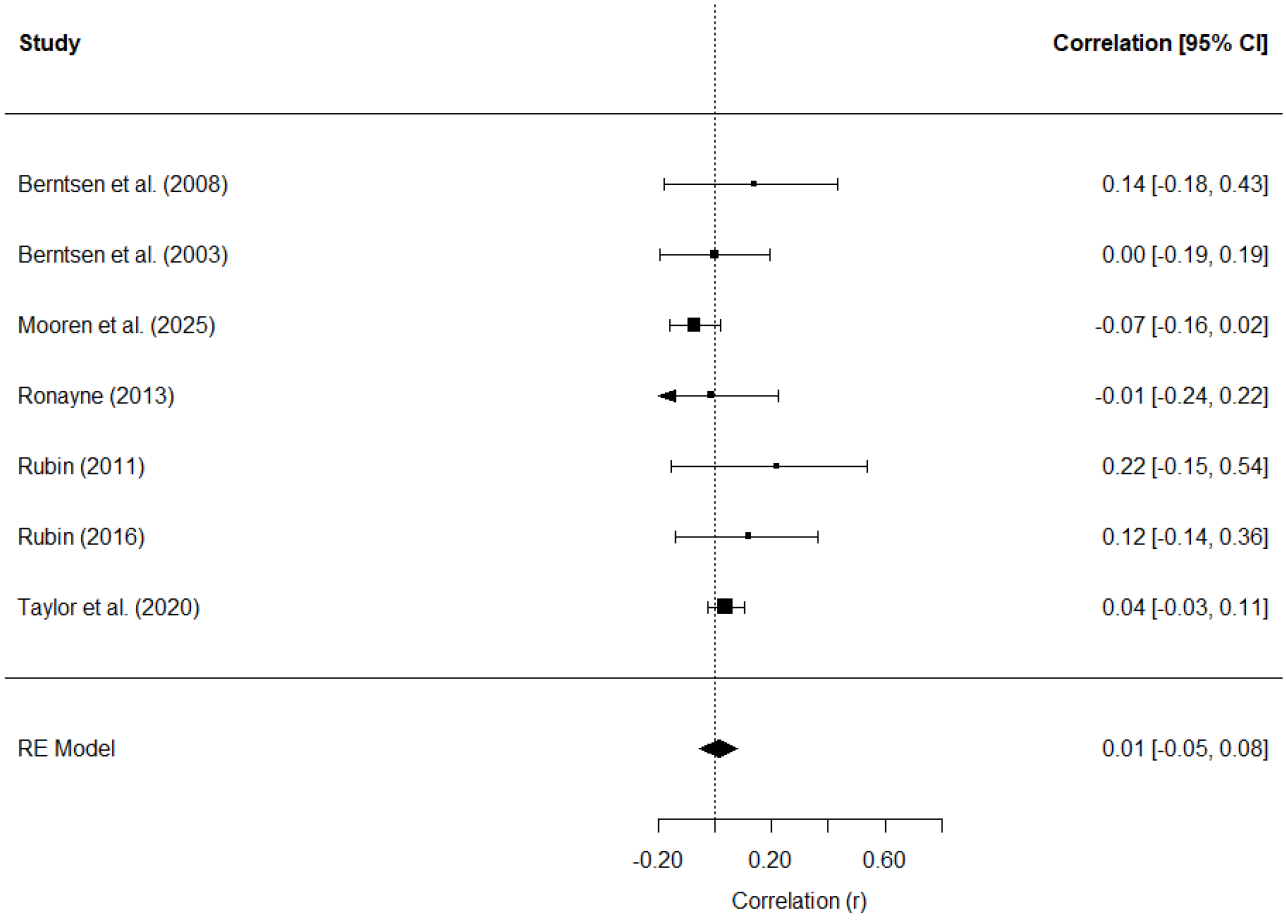


Figure F7

Trauma Memory Qualities and Acute PTSD Symptoms Forest Plot

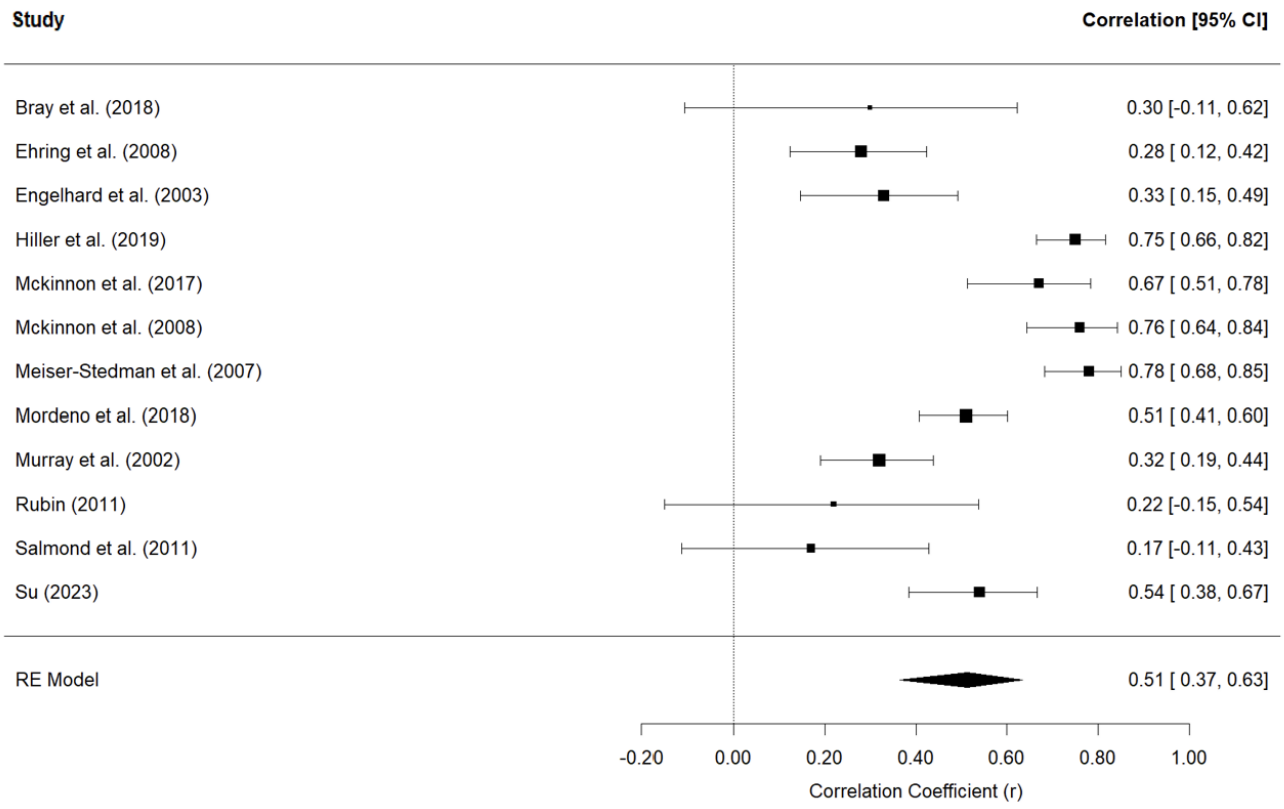
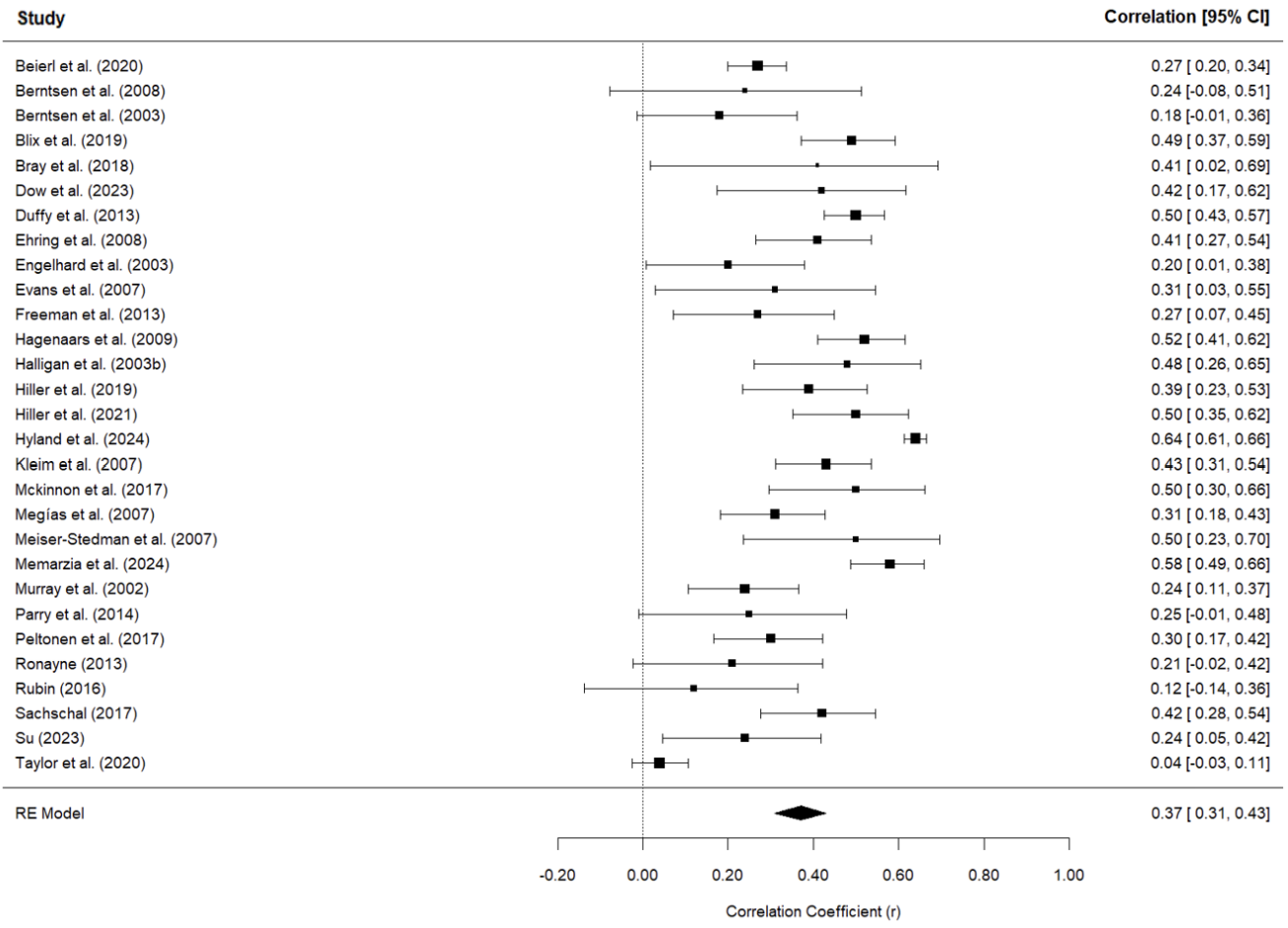


Figure F8

Trauma Memory Qualities and Post-Acute PTSD Symptoms Forest Plot



Appendix G

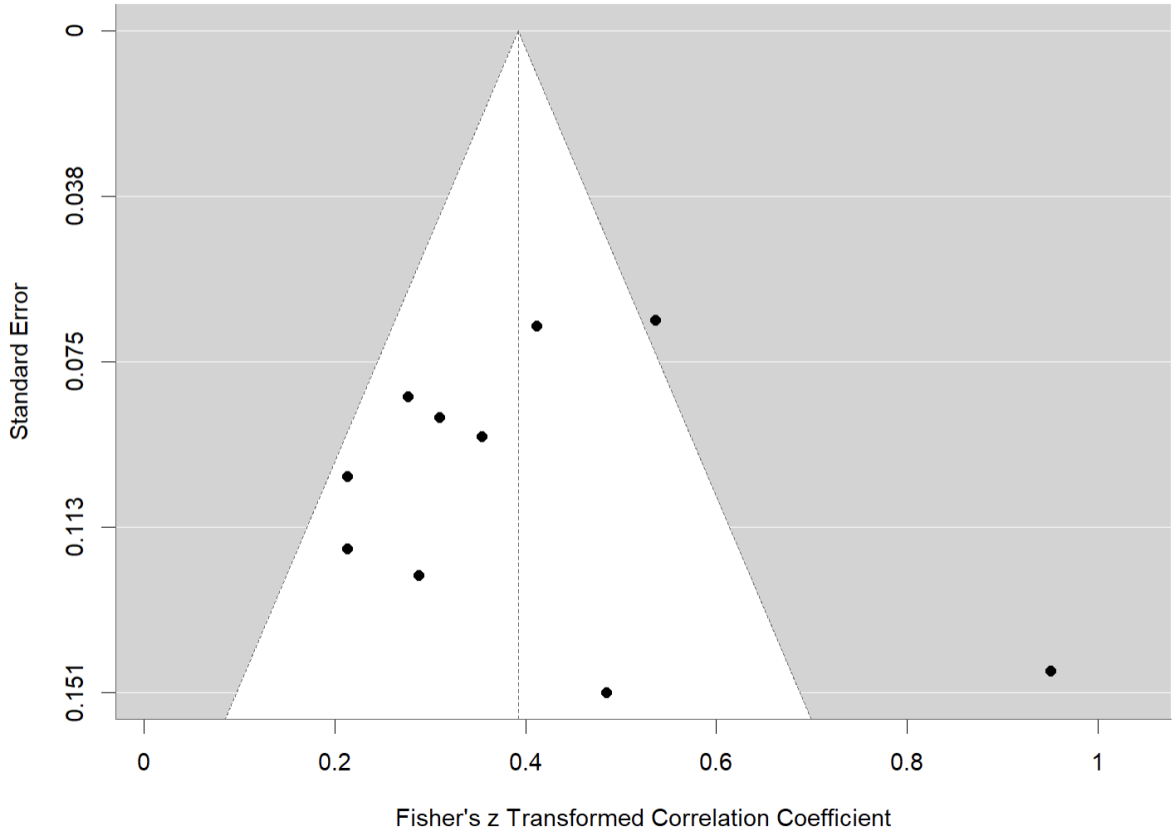
Depression Symptoms Leave-One-Out Analysis

Study excluded	Q	I^2 (%)
Davis et al. (2023)	28.8*	77.26
Ehring et al. (2008)	26.83*	75.35
Halligan et al. (2003b)	28.24*	76.97
Hiller et al. (2019)	28.01*	76.48
Mckinnon et al. (2008)	26.55*	74.76
Memarzia et al. (2024)	22.96*	71.36
Mordeno et al. (2018)	28.87*	75.93
O'Kearney et al. (2011)	28.59*	77.06
Salmond et al. (2011)	13.68	42.97
Su (2023)	25.62*	73.77

Note. *significant at $p < .01$

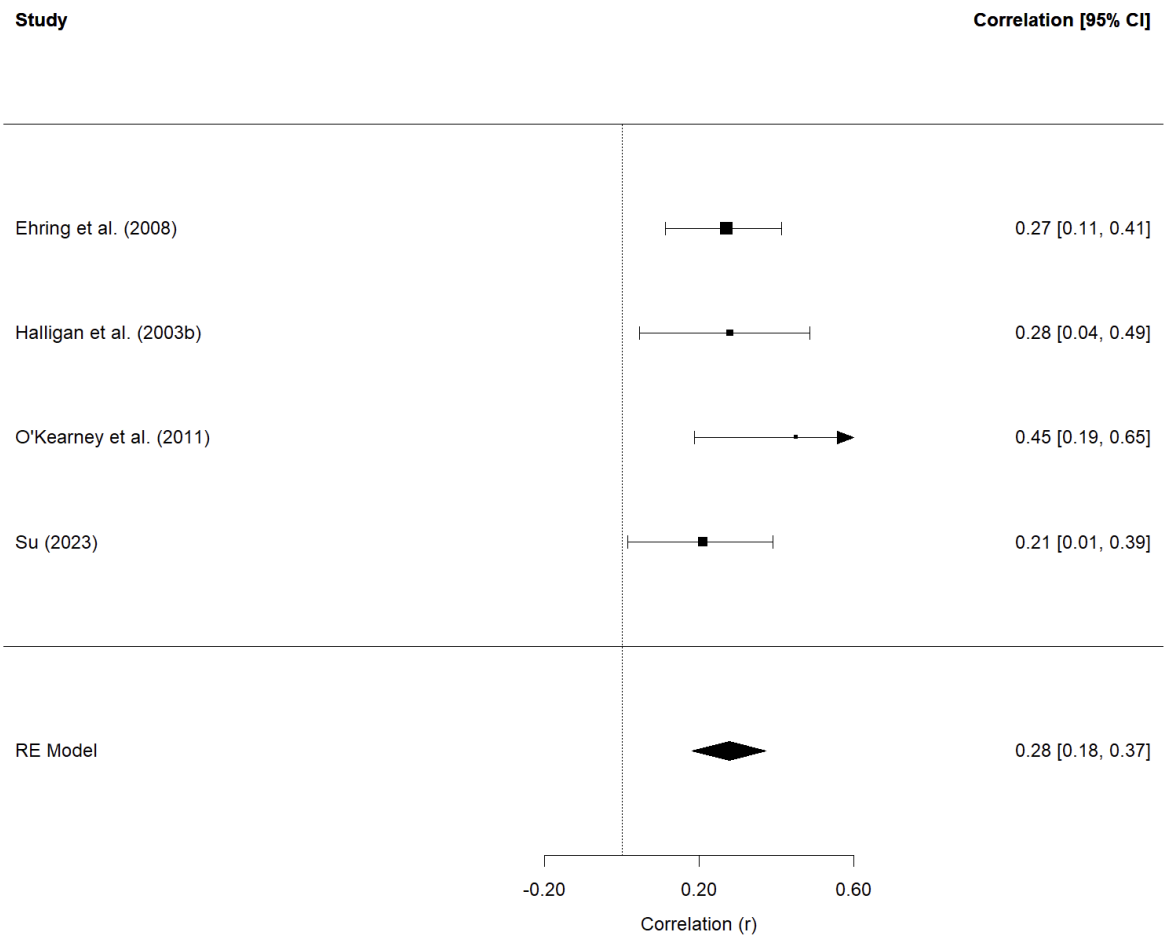
Appendix H

Trim and Fill Funnel Plot for Depression Symptoms Meta-Analysis



Appendix I

Disorganisation and Depression Symptoms Forest Plot



Appendix J

ASPECTS Study Ethical Approval

NHS
National Research Ethics Service
Cambridgeshire 1 Research Ethics Committee

Victoria House
Capital Park
Fulbourn
Cambridge
CB21 5XB

Telephone: 01223 597653
Facsimile: 01223 597645

29 April 2010

Dr Richard Meiser-Stedman
MRC Clinician Scientist Fellow
MRC Cognition & Brain Sciences Unit
15 Chaucer Road
Cambridge CB2 7EF

Dear Dr Meiser-Stedman

Study Title: **Cognitive behavioural therapy (CBT) as an early intervention for post-traumatic stress disorder (PTSD) in youth: preliminary efficacy and mechanisms of action**
REC reference number: **10/H0304/11**
Protocol number: **Version 2**

Thank you for your letter of 19 April 2010, responding to the Committee's request for further information on the above research and submitting revised documentation.

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

Confirmation of ethical opinion

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

Ethical review of research sites

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

The Committee has not yet been notified of the outcome of any site-specific assessment (SSA) for the non-NHS research site(s) taking part in this study. The favourable opinion does not therefore apply to any non-NHS site at present. I will write to you again as soon as one Research Ethics Committee has notified the outcome of a SSA. In the meantime no study procedures should be initiated at non-NHS sites.

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

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

For NHS research sites only, management permission for research ("R&D approval") should be obtained from the relevant care organisation(s) in accordance with NHS research governance arrangements. Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk. *Where the only involvement of the NHS organisation is as a Participant Identification Centre, management permission for research is not required but the R&D office should be notified of the study. Guidance should be sought from the R&D office where necessary.*

Sponsors are not required to notify the Committee of approvals from host organisations.

Other conditions specified by the REC

- The following statement on the Information Sheets for the 8-10 year old children appears to have a superfluous 'to complete': "*We would like you and a parent to complete to speak to us on the telephone or face-to-face.*" You are asked to remove this.
- The Parent Information Sheets now include the details: "*We will record our sessions using a video or audio recording device*". You need to also include information that the recording will be stored in a secure location and destroyed within a set period of time once the information has been transcribed. The set period of time will need to be detailed.
- The Information for Children (8-10) about the Study (control, trauma-exposed) is missing the version number and date, you are asked to include this detail.

Final versions of documents should be provided to the Committee for information; please be advised that dates and version numbers of these documents will need to be revised.

Authority is delegated to the Co-ordinator to ensure compliance with the above request.

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

Approved documents

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

Document	*Version*	*Date*
Covering Letter from Dr Richard Meiser-Stedman, MRC Clinician Scientist Fellow		29 January 2010
REC application	Code: 38523/94073/1/925	29 January 2010
Investigator CV - Dr Richard Meiser-Stedman		29 January 2010
Participant Consent Form: Youg person (trial)	Version 1	29 January 2010
Letter of invitation to participant - for school parents	Version 1	29 January 2010
GP/Consultant Information Sheets - GP letter	Version 1	29 January 2010
Participant Consent Form: Young person (control)	Version 1	29 January 2010
Letter from Sponsor, email from Tanya Izzard		13 January 2010
MRC Fellowship award to Mr R A Meiser-Stedman		
Peer Review Assessment Form - Referee 1		
Peer Review Assessment Form - Referee 2		
Peer Review Assessment Form - Referee 3		

Peer Review Assessment Form - Referee 4		
Letter from Statistician - letter from Dr Tim Croudace		19 November 2008
Questionnaire: CPSS		
Questionnaire: RIES-C		
Questionnaire: SPENCE Children's Anxiety Scale		1994
Questionnaire: Mood and Feelings		
Trial flow diagram		27 January 2010
Questionnaire cover sheet		
Questionnaire: CPTCI		2003
Questionnaire: MMQ		2003
Questionnaire: Multidimensional Scale of Perceived Social Support		1988
Questionnaire: Thoughts during the frightening event		
Questionnaire: Autobiographical Memory Questionnaire		
Protocol	Version 1	29 January 2010
Questionnaire: The centrality of events scale		
Questionnaire: Self-Control Scale		
Questionnaire: Working Alliance Inventory		1989
GP Postcard 'Exposure to a terrifying event?'		
Protocol	Version 2	15 April 2010
Participant Information Sheet: Information for Parents about the study (screening)	v2	15 April 2010
Participant Information Sheet: Information for Parents about the study (trial)	v2	15 April 2010
Participant Information Sheet: Information for Parents about the study (control, non-trauma)	v2	15 April 2010
Participant Information Sheet: Information for Parents about the study (control, trauma-exposed)	v2	15 April 2010
Participant Information Sheet: Information for Young People (8-10) about the study (screening)	v2	15 April 2010
Evidence of insurance or indemnity - MRC Statement of Indemnity	Version 1	October 2008
Questionnaire: Spence Children's Anxiety Scale	1994 - Susan H. Spence	1994
Questionnaire: Short Mood and Feelings Questionnaire - Child Version		
Response to Request for Further Information from Dr Richard Meiser-Stedman		19 April 2010
Participant Information Sheet: Information for Children (8-10) about the Study (trial)	v2	15 April 2010
Participant Information Sheet: Information for Children (8-10) about the Study (control, non-trauma)	v2	15 April 2010
Participant Information Sheet: Information for Children (8-10) about the Study (control, trauma-exposed)	v2	15 April 2010
Participant Information Sheet: Information for Young People (11-15) about the Study (screening)	v2	15 April 2010
Participant Information Sheet: Information for Children (11-15) about the Study (trial)	v2	15 April 2010
Participant Information Sheet: Information for Young People (11-15) about the Study (controls, non-trauma)	v2	15 April 2010
Participant Information Sheet: Information for Young People (11-15) about the Study (controls, trauma-exposed)	v2	15 April 2010
Participant Information Sheet: Information for Young People	v2	15 April 2010

(16-17) about the Study (screening)		
Participant Information Sheet: Information for Children (16-17) about the Study (trial)	v2	15 April 2010
Participant Information Sheet: Information for Young People (16-17) about the Study (controls, non-trauma)	v2	15 April 2010
Participant Information Sheet: Information for Young People (16-17) about the Study (controls, trauma exposed)	v2	15 April 2010
Participant Consent Form: Parent Consent Form - screening	v2	15 April 2010
Participant Consent Form: Parent Consent Form - trial	v2	15 April 2010
Participant Consent Form: Parent Consent Form - control	v2	15 April 2010
Participant Consent Form: Young person consent form - screening	v2	15 April 2010
Letter of invitation to participant - Initial contact letter from hospital	v2	15 April 2010
Advertisement - 'Would you like to help with a research study?'	v1	15 April 2010
A76 and A77 of Application Form detailing indemnity arrangements		01 February 2010
D1 Declaration by the Sponsor's representative		19 April 2010

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Now that you have completed the application process please visit the National Research Ethics Service website > After Review

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

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

- Notifying substantial amendments
- Adding new sites and investigators
- Progress and safety reports
- Notifying the end of the study

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

We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email referencegroup@nres.npsa.nhs.uk.

10/H0304/11	**Please quote this number on all correspondence**

Yours sincerely



Dr Daryl Rees
Chair

Email: susan.davies@eoe.nhs.uk

Enclosures: "After ethical review – guidance for researchers"

Copy to: Mr Brien Patel
R & D Depart
Box 277 – Addenbrooke's Hospital

Professor William Marslen-Wilson
Director of Cognition and Brain Sciences Unit
MRC Cognition & Brain Sciences Unit
15 Chaucer Road
Cambridge CB2 7EF

Appendix K

UEA FMH S-REC Ethical Approval

University of East Anglia
Norwich Research Park
Norwich. NR4 7TJ

Email: ethicsmonitor@uea.ac.uk
Web: www.uea.ac.uk

Study title: Factors Associated with the Quality of Trauma Memories in Children and Adolescents Following Single-event Trauma.

Application ID: ETH2425-2472

Dear Maya,

Your application was considered on 2nd August 2025 by the FMH S-REC (Faculty of Medicine and Health Sciences Research Ethics Subcommittee).

The decision is: **approved**.

You are therefore able to start your project subject to any other necessary approvals being given.

If your study involves NHS staff and facilities, you will require Health Research Authority (HRA) governance approval before you can start this project (even though you did not require NHS-REC ethics approval). Please consult the HRA webpage about the application required, which is submitted through the IRAS system.

This approval will expire on **5th October 2026**.

Please note that your project is granted ethics approval only for the length of time identified above. Any extension to a project must obtain ethics approval by the FMH S-REC (Faculty of Medicine and Health Sciences Research Ethics Subcommittee) before continuing.

It is a requirement of this ethics approval that you should report any adverse events which occur during your project to the FMH S-REC (Faculty of Medicine and Health Sciences Research Ethics Subcommittee) as soon as possible. An adverse event is one which was not anticipated in the research design, and which could potentially cause risk or harm to the participants or the researcher, or which reveals potential risks in the treatment under evaluation. For research involving animals, it may be the unintended death of an animal after trapping or carrying out a procedure.

Any amendments to your submitted project in terms of design, sample, data collection, focus etc. should be notified to the FMH S-REC (Faculty of Medicine and Health Sciences Research Ethics Subcommittee) in advance to ensure ethical compliance. If the amendments are substantial a new application may be required.

Approval by the FMH S-REC (Faculty of Medicine and Health Sciences Research Ethics Subcommittee) should not be taken as evidence that your study is compliant with the UK General Data Protection Regulation (UK GDPR) and the Data Protection Act 2018. If you need guidance on how to make your study UK GDPR compliant, please contact the UEA Data Protection Officer (dataprotection@uea.ac.uk).

Please can you send your report once your project is completed to the FMH S-REC (fmh.ethics@uea.ac.uk).

I would like to wish you every success with your project.

On behalf of the FMH S-REC (Faculty of Medicine and Health Sciences Research Ethics Subcommittee)

Yours sincerely,

Dr Paul Linsley