Depression in Trauma-Exposed Children and Adolescents: An Exploration of Risk Factors and PTSD-Depression Comorbidity.

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Abstract

Background: Whilst traumatic exposure appears common and the majority remain resilient, some go on to develop depression and PTSD. Childhood and adolescence is a critical period for more deleterious and long-term impacts of trauma exposure; but crucially to date research has been limited. Post-traumatic depression and PTSD-depression comorbidity are particular facets of child and adolescent trauma responses that require increased focus. **Aims:** This portfolio presents two research elements: a synthesis of the literature aims to examine risk factors for post-traumatic depression in children and adolescents; an empirical study aims to investigate cognitive appraisals, cognitive avoidance and rumination as potential shared cognitive vulnerabilities in PTSD and depression. **Methods:** a systematic keyword search of the literature between 1980 and 2016 yielded 647 studies. Fifty-nine studies were identified for inclusion (N=45,688) and meta-analyses were conducted for 12 potential risk factors for post-traumatic depression. A community sample of 280 school-aged adolescents (12-15 years) reporting trauma exposure completed measures of PTSS, depression, trauma-related and depressogenic appraisals, cognitive avoidance and rumination. **Findings:** Pre-trauma and peri-trauma risk factors largely generated small effect sizes (r=.10 – r=.21) whereas post-trauma risk factors largely generated moderate to large effect sizes (r=.29 – r=.58). Comorbid PTSD was the most prominent risk factor. Negative cognitive appraisals, cognitive avoidance and rumination were found to be strong, equivalent correlates of PTSS and depression symptoms; endorsed by all probable diagnostic groups; and significant predictors in hierarchical regression models of PTSS and depression symptoms. **Conclusions:** post-trauma environment and responses appear important in determining post-traumatic depression in children in adolescents. Cognitive appraisals, cognitive avoidance and rumination are found to be shared cognitive vulnerabilities in PTSD and depression and may underlie comorbidity. Targets for assessment, monitoring and treatment are highlighted.

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Risk Factors for Depression in Trauma-Exposed Children and Adolescents: A Meta-analysis.

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Abstract

Whilst Post Traumatic Stress Disorder has been the most frequently studied sequela in the aftermath of trauma, post-traumatic depression is at least as prevalent, if not more so. The impacts of depression are wide-ranging, deleterious and potentially long-term, thus understanding the risk factors for depression following trauma-exposure in children and adolescents appears fundamental. The presented meta-analysis provides pooled effect sizes for 12 risk factors from 59 studies (N=45,688) contributing 135 effect sizes. Small effect sizes were largely found for pre-trauma variables (age, gender, income and prior trauma exposure) and trauma-related risk factors (trauma severity and peri-traumatic distress); whilst moderate to large effect sizes were found for post-trauma variables (comorbid PTSD symptoms, avoidant coping and low social support) and bereavement (considered both a trauma-related and post trauma variable with lasting impacts). These findings suggest that the post-traumatic responses and environment of children and adolescents may be prominent factors in influencing those that experience post-traumatic depression in the aftermath of trauma exposure. This highlights potential targets for assessment and monitoring those most at risk and may also inform treatment.

Keywords: Post-traumatic depression, risk factors, children, adolescents, trauma

The association between childhood exposure to traumatic events and wide-ranging negative emotional, physical, social, developmental and functional impacts is widely acknowledged in the literature (See Fairbank & Fairbank, 2009 for a review). Importantly trauma-exposure and its impacts can have long-term effects into adulthood. Indeed, research looking into the developmental timing of trauma exposure identifies childhood and adolescence as particularly vulnerable to more significant and chronic bio-psycho-social impacts (Ogle, Rubin & Seigler, 2013, Lupien et al., 2009).

Copeland, Keeler, Angold and Costello (2007) found double the rates of psychiatric disorders in children exposed to traumatic events compared to non-exposed children. The most studied of these disorders following trauma has been post-traumatic stress disorder (PTSD). However, rates of comorbid depression were found to be 52% in a recent meta-analysis by Rytwinski, Scur, Feeny and Youngstom (2013). Indeed, findings show depression to be as prevalent, and even more so than PTSD (e.g. Ying, Wu & Chen, 2013, Karam et al., 2014).

Post-Traumatic Depression in Children and Adolescents

In a recent report, the World Health Organisation (WHO) (2014) found depression to be the number one cause of illness and disability in adolescents globally. Childhood and adolescent depression is linked to a range of poorer outcomes that can persist into adulthood. This includes substance misuse (Siennick, Widdowson, Woessner, Feinberg, & Spoth, 2017), cognitive deficits (Wagner, Müller, Helmreich, Huss & Tadić, 2015), academic and social functioning, mental and physical health problems, and suicidality (Maughan, Collishaw & Stringaris, 2013), a global leading cause of death in adolescence (WHO, 2014). These impacts outline the public health concern of depression in children and adolescents and the importance and necessity of effective identification and early-intervention (Avenevoli, Swendsen, He, Burstein & Merikangas, 2015; Lawrence et al., 2016). Additionally consideration must be

made of the impact of comorbid depression symptoms on treatment, which has been related to non-response and dropout in interventions for PTSD (Zayfert et al., 2005, Kar, 2011).

Prevalence rates of depression following trauma appear heterogeneous, a meta-analysis by Tang, Liu, Liu, Xue, and Zhang, 2014 (2014) found a prevalence range of 7.5% - 44.8% in children exposed to natural disasters. Rates may vary according to the type and severity of trauma experienced as well as methodological issues. Nevertheless, these prevalence rates highlight that not everyone exposed to traumatic events develops depression. A recent, worldwide adult population study in 24 countries (N=68,984) found around 70% reported lifetime exposure to at least one traumatic event (Benjet et al., 2016). Similar rates (67.5%) were found in a longitudinal study of children's exposure by the age of 16 (Copeland et al., 2007). Together these findings appear to demonstrate exposure to traumatic events, is in reality, a common part of human experience yet many remain resilient. Therefore ascertaining the risk factors for the development of depression following traumatic exposure is important to enable identification of those most at risk. Furthermore, understanding these risk factors could inform the development of suitable interventions, which may be particularly beneficial in view of the less favorable treatment effects for depression found in current trauma-focused interventions (Morina, Malek, Nickerson & Bryant, 2017). Identification, monitoring and timely intervention appears especially critical for children and adolescents exposed to traumatic events to prevent longer-term debilitating impact.

Risk Factors

A review of the literature revealed a wide array of risk factors investigated in relation to the development of psychopathology following trauma. In an effort to conceptualise these varying risk factors, Sayed, Iacoviello and Charney (2015) identified three categories related to traumatic exposure: pre-trauma, peri-trauma and post-trauma risk factors. Pre-trauma risk factors are those that pre-exist the traumatic event, e.g. demographic factors such as age, gender or

socio-economic status, or predisposing factors such as prior exposure. Peri-trauma risk factors refer to the objective and subjective characteristics related to the trauma itself, such as trauma severity, whether the trauma was direct or indirect (witnessed/occurred to a close family member or friend) and perceived threat. Post-trauma risk factors encompass the biological, psychological and environmental aspects following the traumatic event. This may include coping skills, perceived social support, the family environment (e.g. parental distress, family functioning) and the experience of other mental health difficulties (e.g. PTSD). The risk factors for depression in the present meta-analysis will be explored in line with this conceptualisation. This is consistent with other recent meta-analyses examining risk factors for post-traumatic psychopathology (e.g. Trickey, Siddaway, Meiser-Stedman, Serpell & Field, 2012).

Rationale for the Present Study

As outlined, the identification of risk factors for the development of depression in children and adolescents following traumatic exposure is of critical concern; to ensure young people receive the monitoring and treatment necessary to prevent potential long-term adversity. A review of the existing literature revealed a wide range of investigated risk factors for depression, in various trauma-exposed child and adolescent populations with varying effect sizes. However, the only meta-analysis, to our knowledge, to attempt to synthesis the literature, focused exclusively on those exposed to natural disasters (Tang et al., 2014) and included small study numbers (11 studies investigating risk factors for depression in trauma-exposed children). Therefore the present study will attempt to further our understanding of the risk factors investigated in a wider context, being inclusive of a range of trauma-exposed child and adolescent populations. Drawing on the PTSD literature, a similar meta-analysis was undertaken by Trickey et al (2012), looking at the risk factors for PTSD in trauma-exposed children and adolescents. In consideration of the high level of comorbidity highlighted between PTSD and depression, it may be of further interest to compare our findings.

Method

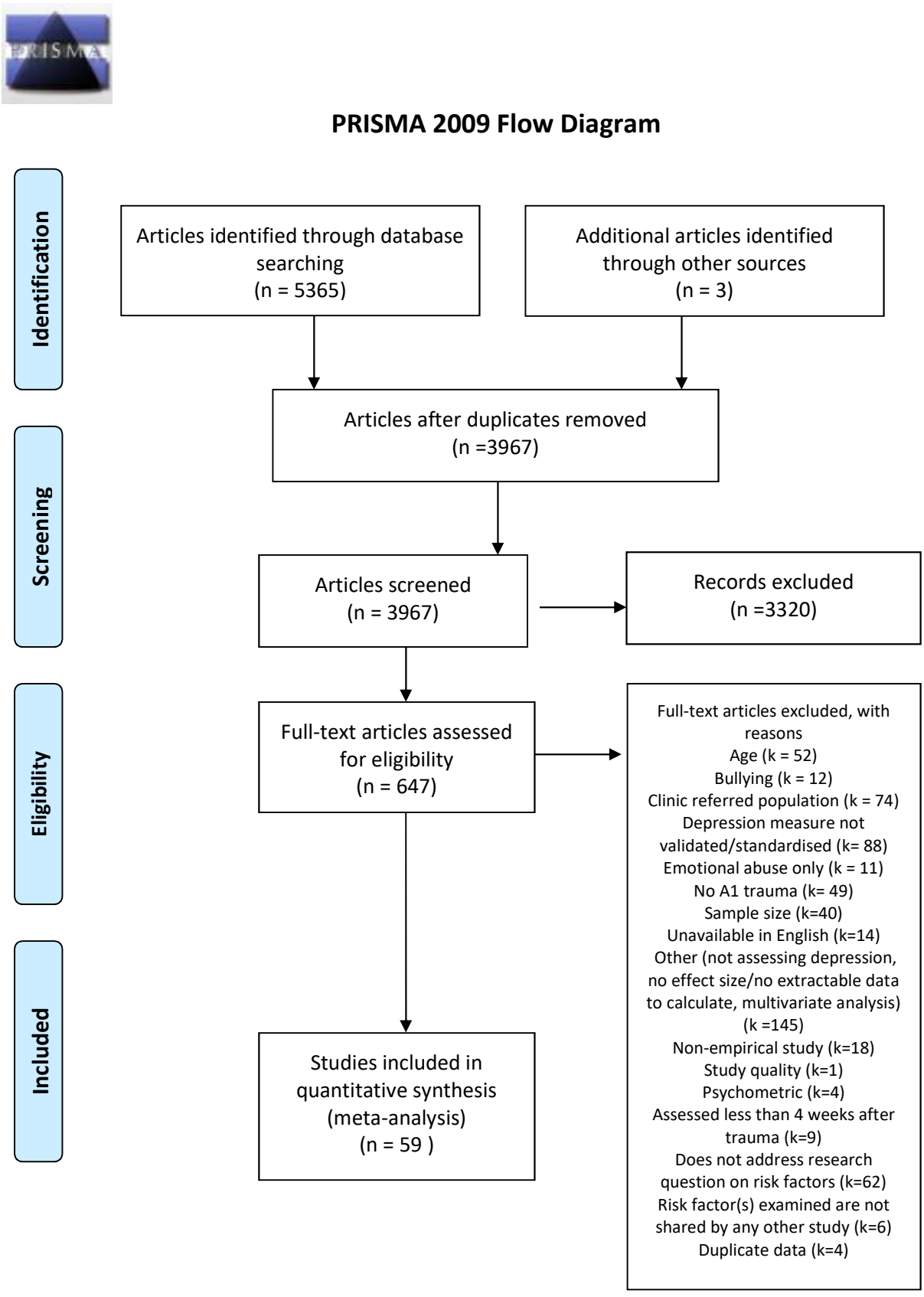
Selection of Studies

This meta-analysis was undertaken as part of a wider research project addressing three research questions relating to the prevalence of, and specifically for this meta-analysis *the risk factors for depression in trauma-exposed children and young people*. The project was registered on PROSPERO in June 2016. Broad database searches of Medline, PsycInfo and PILOTS (National Centre for PTSD) were undertaken to identify relevant English and French language (researchers spoken languages) peer-reviewed articles between 1994 (with the introduction of DSM-IV) and 2016 for all research questions. Articles were selected where the search terms (depress* OR dysthym* OR dysphor*) AND (child* OR teen* OR adolescen* OR youth* or young person*) AND (trauma* OR post-trauma* OR Stress*) OR (disaster OR hurricane OR flood OR tsunami OR earthquake OR violence OR abuse OR maltreatment) was identified in the title, abstract or keywords. The reference section of a key review paper (Montgomery, 2011), yielded through the keyword search, was also reviewed. This literature search identified 3967 articles after duplicates (1398) were removed. Article titles and abstracts were then screened against defined inclusion and exclusion criteria by two researchers, resulting in a shortlist of 647 articles for full text review and coding to each research question. Two researchers undertook the full text reviews for inter-rater agreement and consensus was reached with a third researcher where necessary. A shortlist of 83 articles was then subject to a further full text review by the primary researcher of the present study in line with the inclusion and exclusion criteria resulting in 59 articles for inclusion (see Figure. 1 for PRISMA diagram).

Inclusion and Exclusion Criteria

To be included for review the main (trauma-exposed) sample must have been exposed to a stressor that meets A1 criteria for PTSD, (DSM-IV or DSM-5). We therefore excluded other experiences that would not meet A1 criteria such as bullying/peer victimization (unless explicit

Figure 1. PRISMA flow diagram of included and excluded studies



physical assault); emotional/verbal abuse only and neglect only. Included samples were required to be within the age range of 5-18 years. This age range was selected to promote maximum inclusion for school-aged children. Standardized measures of mental health tend to be validated at a lower age range of 7/8 years old and there is some debate on their validity in younger children. However Trickey, Siddaway, Meiser-Stedman, Serpall and Field (2012) also used a similar age range (6-18) in their meta-analysis of risk factors for PTSD in children and adolescents and found no difference in effect sizes of including articles where the age range was below 8 years old. Where the upper limit of this range was breached a consensus was reached to include the study if the average age fell within the age range (eight studies breaching the upper limit were included in the present study).

Studies must have assessed depression using a standardized and validated measure. Reliability must be demonstrated through peer-reviewed publication of adequate (minimum Cronbach Alpha of .70) psychometric properties or where established measures were minimally adapted for a study (e.g. translation), the minimum Cronbach of .70 must have been verified and reported within the paper. Finally, studies must have investigated at least one risk factor for depression in the trauma-exposed sample (any variable potentially contributing to the severity of depression symptoms or the presence of depression as defined by diagnostic criteria). Studies were excluded on the following criteria:

1) Sample size of N=<50. Caution is advised in the risk of biased estimates from small sample studies in meta-analysis (Harrison, 2010), particularly in random effects models (Morris, 2000). Cohen's (1988) guidelines also suggest a minimum sample size of 50 in a single study to obtain a moderate effect size. Therefore to reduce the risk of bias and increase detection a minimum sample size of 50 was set.

2) The study measured an acute trauma response (i.e. < 1 month post-trauma.).

3) The study had insufficient data to allow for the calculation of an effect size.

4) The study was primarily psychometric in nature.

5) The sample was a treated population OR the sample had been screened based on inclusion for mental health disorders (e.g. intervention studies).

6) Insufficient data was provided to ascertain group membership (exposed vs not-exposed) where risk correlations were not based on a 100% exposed sample.

7) The study reported a single risk factor, which was not also investigated by another article (this was a sole exclusion criteria for the research question presented in this paper).

Coding of Studies

Fifty-nine articles were included in the meta-analysis, generating a comprised sample size of 45,688 with 138 effect sizes, looking at 12 risk factors. Data was extracted and imputed into a standardised form and checked by a second researcher. Extracted data included effect sizes for all reported study risk factors and additional information on study characteristics. This included sample demographics, response rates country of study, trauma type, depression measure, duration between traumatic event and measurement of depression. Key study characteristics on the included articles can be found in Table 1.

Where an article reported a finding as non-significant but provided no effect size, this was recorded as 0 (6% of effect sizes). Whilst conservative, this approach is recommended over exclusion, which can result in the over-estimation of effect size (Rosenthal 1995). Where an article reported multiple effect sizes for a risk factor, the mean was calculated using Fisher transformations. Only effect sizes with single degrees of freedom were deemed suitable for extraction e.g. results from multiple regression models were excluded. Duplicate samples were included as long as the same risk factor was not being studied. Where this did occur, to avoid the risk of bias in the analysis, we used the effect size from primarily a) the largest sample, or if samples were similar b) the study with the most risk factors investigated. Finally, where a study was longitudinal in nature, data from the first time point was extracted.

Table 1. Characteristics of studies included in the meta-analysis

Article	Trauma type	Sample size	Depression measure	Age range	Mean Age (SD)	Female (%)	Country of study
Banks et al., 2014	Hurricane	1098	RCADS	7-18	13.51 (2.44)	53	USA
Betancourt et al, 2011	War	273	HSCL-25	†	16.55 (2.61)	29	Sierra Leone
Brensilver et al., 2011	Maltreatment mixed: Sexual abuse; neglect physical abuse;	454	CDI	9-12	10.48(1.15)	50	USA
Brent et al., 2009	Sudden death of parent: accidental /violent	344	MFQ	7-25	9.0	42	USA
Brown & Goodman, 2005	Terrorist attack	83	BASC	8-18	M-12.8 (2.9)	41	USA
Cénat & Derivois, 2015	Earthquake	872	CDI	7-17	14.91 (1.94)	56	Haiti
Collin-Vézina, 2011	Maltreatment; Sexual abuse, Physical abus	53	TSCC	14-17	15.5 (1.1)	45	Canada
Elbedour et al., 2007	War	229	BDI	15-19	17.13 (1.51)	48	Gaza
Fan et al., 2011	Earthquake	2081	DSRS	Grades 7-10		54	China
Feiring et al., 1999	Sexual abuse	169	CDI	8-15	†	72	USA
Flett et al., 2012	Sexual abuse	58	CES-D	†	15.3	43	Canada
Giannopoulou et al., 2006	Earthquake	2037	DSRS	9-17	12.85 (2.4)	52	Greece
Goenjian et al., 1995	Earthquake	218	DSRS	†	12.99	62	Europe
Goenjian et al., 2011	Earthquake	511	DSRS	13-18	15.6 (1.7)	58	Greece
Graham-Bermann et al., 20	IPV	219	CDI	6-12	8.49 (2.16)	50	USA
Guibord et al., 2011	Maltreatment mixed: Sexual abuse; physica abuse; neglect	122	AAR-C2	12-15	13.75 (1.15)	46	Canada
Hanson et al., 2008	IPV	3906	NSW-DM	12-17	14.49 (1.70)	49	USA
Henrich & Shahar, 2013	War	362	CES-D	12-16	14 (median)	54	Israel
Hodes et al., 2008	Refugee	112	DSRS	13-18	17 (median)	33	UK
Jensen et al., 2015	Refugee	93	HSCL-37	10-16	13.8 (1.4)	19	Norway
Jia et al., 2013	Earthquake	596	CDI	8-16		50	China
Jouriles et al., 2000	IPV	154	CDI	8-12	9.44 (1.39)	46	USA
Kadak et al., 2013	Earthquake	738	CDI	13-17	16.22 (0.88)	45	Turkey
Kaplan et al., 2013	Serious illness	125	CDI	8-17	12.4 (2.9)	50	USA
Kar & Bastia, 2006	Cyclone	108	MINI-KID	†		56	India
Karakaya et al., 2006	Terrorist attack	113	CDI	12-14	12.8 (7.06)	41	Turkey
Kaufman et al., 2004	Maltreatment mixed: Sexual abuse; neglect physical abuse;	101	MFQ	5-15	10.0 (2.3)	54	USA
Khamis, 2008	War	179	BDI	12-18	16.3 (1.64)	0	Palestine
Kiliç et al., 2011	Earthquake	104	TSCC	8-15	12.1 (2.1)	59	Turkey

Article	Trauma type	Sample size	Depression measure	Age range	Mean Age (SD)	Female (%)	Country of study
Kolaitis et al., 2003	Earthquake	163	CDI	†	11.03 (1.03)	52	Greece
Lai et al., 2014	War exposure	151	CDI	9-12	10.62	51	Kuwait
Lehmann, 1997	IPV	84	CDI	9-15	11.0	43	USA
Morgos et al., 2007	War	331	CDI	6-17	12.0 (2.3)	44	Sudan
Nugent et al., 2006	Injury	82	RCADS (8-10) RADS (11–18)	8-18	13.21 (2.94)	32	USA
Olema et al., 2014	War	100	HSCL-25	12-17	14.6 (1.5)	†	Uganda
Paul et al., 2015	Tornado	2000	NSA-DM	†	14.56 (1.75)	49	USA
Rollocks et al., 2013	Mixed: Natural disasters; physical & sexua abuse; violence; other	420	TSCC	10-15	†	46	Trinidad
Runyon & Kenny, 2002	Maltreatment mixed: sexual abuse; physica abuse	98	CDI	8-17	12.09 (2.84)	60	USA
Berthold, 2000	War	144	CES-DC	14-20	16.35 (1.31)	50	Cambodia
Simon et al., 2015	Sexual abuse	160	CDI	8-16	11.36 (2.23)	73	USA
Smith et al., 2002	War	2976	DSRS	9-14	12.11 (1.69)	51	Bosnia
Tebbutt et al., 1997	Sexual abuse	68	CDI	9-21	15.1 (3.2)	77	Australia
Thabet et al., 2004	War	403	MFQ	9-15	9-15	53	Palestine
Tierens et al., 2012	MVA	3007	YSR	11-18	14.62 (1.83)	47	Belgium
Udwin et al., 2000	Shipping disaster	217	DSRS	11-18	14.7 (1.14)	74	UK
Papageorgiou et al., 2013	War	95	DSRS	8-13	9.6	57	Bosnia
Vigil & Geary, 2005	Terrorist attack	8236	DISC-IV	9-21	†	52	USA
Wang et al., 2012	Earthquake	1841	DSRS	11-20	14.26 (1.2)	51	China
Warheit et al., 1996	Hurricane	4978	CES-DC	†	†	10	USA
Wolfe et al., 1994	Sexual abuse	90	CDI	6-16	12.4	77	Canada
Yang et al., 2011	Earthquake	271	DASS-21	12-15	13.4 (1.0)	54	Taiwan
Ying et al., 2013	Earthquake	3052	CES-DC	8-19	13.31 (2.27)	54	China
Ying et al., 2012	Earthquake	200	CES-DC	13-16	15.0	62	China
Zhang et al., 2012	Earthquake	548	BDI	15-18	16.86 (0.58)	57	China

Note: AAR = Assessment and Actions Records, BASC= Behavior Assessment System for Children (depression subscale) BDI = Beck Depression Inventory, CDI = Child Depression Inventory (depression subscale), CES-D = The Center for Epidemiological Studies Depression Scale, CES-DC = The Center for Epidemiological Studies Depression Scale for Children, DASS-21 = Depression and Anxiety Stress Scale (depression subscale), DISC-IV = The Diagnostic Interview Schedule for Children, DSRS = Depression Self Report Scale, HSCL= Hopkins Symptom Checklist IPV= Interpersonal Violence, MINI-KID = Mini International Neuropsychiatric Interview for Children and Adolescents, MFQ= Mood and Feeling Questionnaire, MVA = Motor Vehicle Accident, NSA-DM = NSA Depression Module, NSW-DM= National Study of Women Depression Module, RCADS = The Revised Child Anxiety and Depression Scale, RCDS = Reynold's Child Depression Scale, RADS = Reynold's Adolescent Depression Scale, TSCC = Trauma Symptom Checklist for Children (depression subscale), YSR = Youth Self Report (depression subscale). † = Not reported

Deriving Effect Sizes

The common effect size mode of *r* was selected for several reasons. Firstly many of the studies included in the meta-analysis had undertaken risk factor correlations already reported in *r*, thus reducing the amount of computation required. Secondly r can widely be derived from d, t, F, odds ratio and Chi-square, further allowing computation of raw data (Calculations were based on Borenstein, Hedges, Higgins & Rothstein, 2009; Rosenthal, 1994; Cohen, 1988). Finally *r* is widely recognised and easily interpretable as an effect size. For categorical data effect sizes were computed so that the theoretical risk group was a positive coefficient i.e. female gender, diagnosis of PTSD. Where an article had included a control group or mixed groups in the effect size we derived an effect size from raw, unmixed data; if this was not possible the effect size was excluded.

Selection of the Model and Method

Random effects models are widely considered most suitable and come recommended for meta-analyses such as the present study (Field and Gillett, 2010). Using real-world data (all meta-analyses published in *Psychological Bulletin* between 1997-2002) Field (2005) found the standard deviations of effect sizes in meta-analyses were commonly 0.10-0.16, with a range of 0-0.30. With the nature of such meta-analyses drawing effect sizes from studies with varying sample populations this heterogeneity is hardly surprising, and is in line with the assumption of a fixed effects model. Hedges (1992) described this approach as drawing from a "superpopulation" which allows wider inferences to be made in terms of generalisability compared to fixed effect models. Additionally in the case that our data was homogenous, applying a random effect model to fixed model data has significantly less detrimental impacts than vice versa on Type 1 error (Field, 2003) and confidence intervals (Schmidt, Oh & Hayes, 2009). Two of the most commonly used random effect models are those of Hedges and Vevea (1998) and Hunter-Schmidt (2004). Whilst there is much debate regarding which method is

superior, using Monte Carlo simulations, Field (2005) found bias to be negligible in both methods in practical terms. Field suggested the parameters of the meta-analysis to be conducted should be taken into account with the relative merits of each method in selection. Cross-referencing the tables in Field's paper it the advantage of more accurate confidence intervals found with the Hedge's-Vevea method for smaller amount of studies (based on simulations of 5/10/20 studies) was felt to be preferable for our study which may be likely to yield smaller amounts of studies per risk factor.

Meta-Analysis

Analyses were carried out in SPSS 23 using the syntax and procedures from Field and Gillett (2010). For the main analysis separate meta-analyses were carried out for each risk factor, with any risk factor that had a single effect size excluded, resulting in 14 excluded risk factors (e.g. community acceptance, shame, only child, parenting effectiveness, emotional regulation difficulties, time of disclosure, post-traumatic change, attributions, negative appraisals). Moderator analyses were conducted on risk factors with at least 20 studies to investigate any impact of the following variables on the overall effect size:

1) Mean age.

2) Continuous vs categorical measurement of PTSD. Shown a moderator in previous meta-analyses (Brewin, Andrews &Valentine, 2000; Ozer, Best, Lipsey & Weis, 2003).

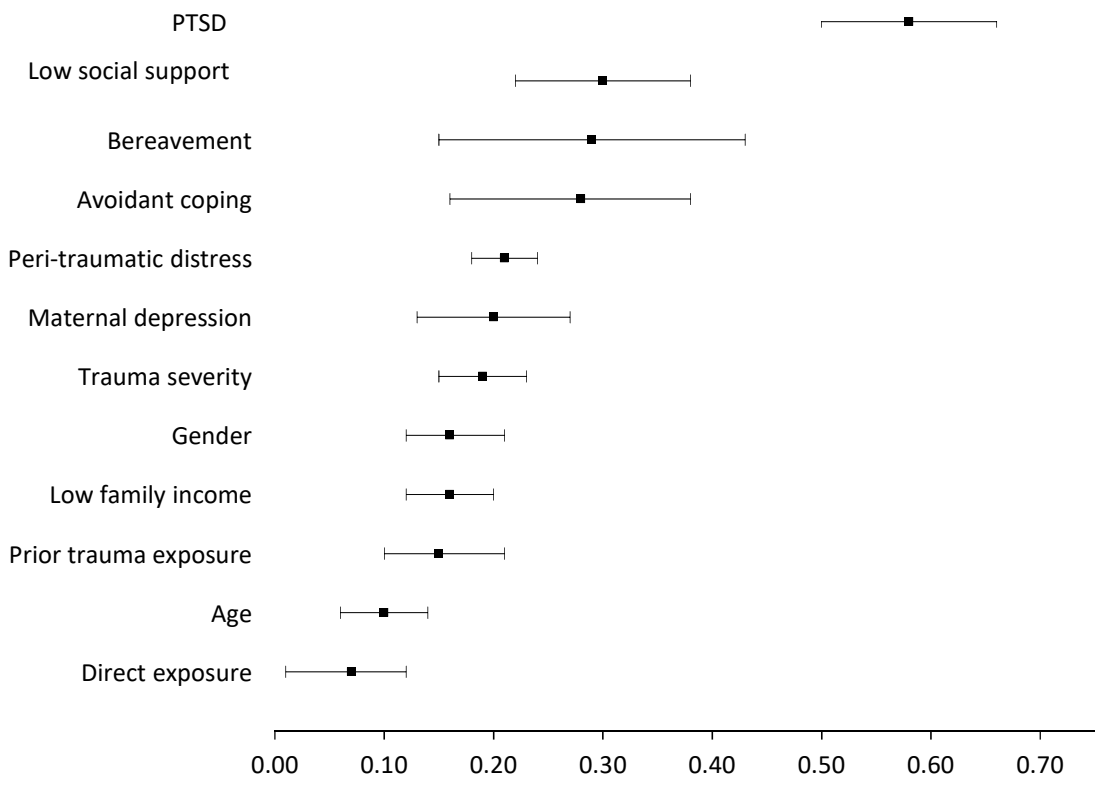
3) Trauma type a) group vs individual b) intended vs unintended. This was based on Trickey et al. (2012) findings of significant moderating effects on several risk factors for PTSD in trauma-exposed children including group trauma (e.g. natural disaster, war-related event) compared to individual trauma. (e.g. physical assault) and whether the trauma was intentional or not. A risk of bias assessment (for further details see results and supplementary material) was carried out on all included studies and sensitivity analyses were undertaken as a result.

Results

Main Analyses of Risk Factors

Meta-analyses were undertaken for each examined risk factor. A forest plot of the overall effect sizes for each risk factor can be seen in Figure 2. Meta-analyses included between 3 and 32 studies, with study sample sizes ranging from 53 to 8236. Table 2 summarises the main results for each risk factor, including effect sizes, number of studies, combined sample size and 95% confidence intervals. Small but significant population effects were found for pre-trauma demographic factors: female gender (*r*=.16), low family income (*r*=.16) and older age (*r*=.10). A small effect size was also found for prior trauma exposure (*r*= 0.15). Peri-traumatic risk factors showed small but significant effect sizes for trauma severity (*r*=.15) and peri-traumatic threat (*r*=.21). A significant moderate effect size was found for bereavement (*r*=0.29) although this meta-analysis consisted of just 5 studies. There effect size found for direct (over indirect) exposure was trivial (*r*=0.07).

Figure 2. Forest plot of all risk factors with overall effect size and 95% confidence intervals



Meta-analyses on post-trauma risk factors revealed significant, small to moderate effect sizes for maternal depression (r=.20), avoidant coping (r=.28), and low social support (r=.30). A significant and large effect size was found for the presence of PTSD symptoms (r=0.58), which appears robust with 25 studies, and a failsafe of 54,350. It is important to note that several of our meta-analyses were based on small study numbers, however the comprised sample sizes for each meta-analysis were generally noteworthy, with a range of 703 – 38816 and averages of 7047 (median) – 11194 (mean) participants.

Table 2. Summarised individual meta-analyses of risk factors

Risk factor	k	Combined *N*	Overall effect size (*r*)	Lower CI	Upper CI	Tau	z	Fail-safe N
Pre-trauma factors								
Female gender	32	38816	.16	.12	.21	0.016	6.82*	8114
Older age	26	27,372	.10	.06	.14	0.012	4.10*	2075
Low family income	3	2398	.16	.12	.20	0.000	7.72*	44
Prior trauma exposure	11	7047	.15	.10	.21	0.006	5.25*	446
Peri-trauma factors								
Direct exposure	4	7399	.07	.01	.12	0.002	2.45	42
Trauma severity	12	13267	.19	.15	.23	0.027	10.14*	1547
Bereavement	5	3484	.29	.15	.43	0.027	3.84*	298
Peri-traumatic distress	4	3348	.21	.18	.24	0.000	12.37*	170
Post-trauma factors								
PTSD symptoms	25	18057	.58	.50	.66	0.081	11.40*	54350
Avoidant coping	6	3710	.28	.16	.38	0.013	4.57*	342
Low social support	9	12220	.30	.22	.38	0.011	7.72*	2737
Maternal depression	4	703	.20	.13	.27	0.000	5.26*	38

Note. k= number of studies, N= sample size, z= test of effect size *significant to p<.001 CI = Confidence Interval (95%).

Heterogeneity

Heterogeneity was explored in several ways. Assessment of the non-significant Cochrane's Q statistics appeared to reveal homogenous results for all risk factors except prior exposure. However non-significant Q statistics should not be taken as evidence for the absence

of heterogeneity. Higgins, Deeks and Altman (2003) highlight the Q test's susceptibility to study numbers in meta-analyses and resulting insensitivity in detecting heterogeneity. Higgins et al. proposes the use of I^2 as a standard to quantify the effect of heterogeneity. Following their procedures, calculation of I^2 showed no significant issues with heterogeneity (values all close to 0%) for any risk factor expect prior exposure, which showed moderate heterogeneity (43%). With the exception of prior exposure these findings appear to suggest a level of homogeneity within our results, although it would be wise to interpret this cautiously in consideration of the small amount of studies drawn upon in several of our meta-analyses. Inspections of the funnel plot for prior exposure revealed a split distribution of larger effect sizes found in small sample studies and smaller effect sizes for studies with large samples, which may be related to publication bias.

Publication Bias

Publication bias is a term delineating the phenomena whereby the outcome of the findings of research may determine whether or not the findings are published (see Dickersin, 2005 for a review). This can cause a significant positive bias in the literature, particularly affecting studies with smaller samples. It is further suggested that as a result researchers may be influenced in selective reporting; to the omission of non-significant results (Chan & Altwood, 2005).

In line with guidance on assessing publication bias (Borenstein et al, 2009), funnel plots were investigated for risk factors with 10 studies or more to ensure adequate detection power (Macaskill, Walter & Irwig, 2001). Aside from prior exposure no other risk factor showed obvious signs of publication bias. We have also reported Rosenthal's (1979) fail-safe N (see Table 2), which defines the amount of studies that would need to be "hidden" to nullify the statistical significance of the effect size found. Although several of our analyses possess large calculated Fail-safe N's, as expected, the analyses reported in the present study based on small

study numbers resulted in low fail-safe N's. Whilst this is a common method in assessing publication bias, it is critiqued for its focus on statistical significance rather than substantive significance, i.e. reducing the bias to a level no longer impactful on the effect size (e.g. Borenstein et al, 2009), thus caution should be heeded in its interpretation.

Moderator Analyses

Moderator analyses are tests of interaction and as such have lower power than main analyses in detecting effects. Therefore consideration of factors pertaining to the power of moderator analyses including participant numbers, expected effect sizes, variability and particularly for random effects models, study numbers, is important (see e.g. Hedges & Pigott, 2004; Thompson & Higgins, 2002; Borenstein et al, 2009). Consequently, in a bid to increase detection power of moderating variables, in line with Hempel et al. (2013) we limited our moderator analysis to risk factor meta-analyses with 20 or more studies (gender, age and PTSD symptoms). Moderator analyses were run for age, Continuous vs categorical measurement of PTSD and trauma type: a) group vs individual b) intended vs unintended.

Consideration of other potential methodological moderating variables highlighted in the literature was made, such as interview vs self-report questionnaires of depression and duration lapse between trauma and assessment of depression, however there was not suitable data to run such analyses (e.g. only 4/59 studies used interview methods).

The only significant moderating effect found was for continuous vs categorical data. Post hoc analysis revealed a significantly lower effect size for measures of categorical PTSD (mean r=0.36) compared to continuous measures (mean r=0.60), $t(25)$= -5.972, p<.001. No significant moderating effect was found for mean age on gender or PTSD. Group vs individual trauma and intended vs unintended showed no significant moderating effects on any of the investigated risk factors.

Risk of Bias Assessment and Sensitivity analysis

The inclusion and exclusion criteria including minimum sample size and standardised and validated measures of depression made some attempt to set a level of quality and reduction in bias for the studies included in the meta-analysis. After analysis, an assessment of quality on all of the included studies was undertaken. With consideration of the volume of studies to be assessed, we found many of the standardised assessment tools to be lengthy, and not every criterion relevant to a meta-analysis such as the present study. Therefore, we created a brief four-item checklist, more feasible and relevant to our study design. A review comparing quality assessment tools for meta-analysis by Zeng et al (2015) recommended the ARHQ Methodology Checklist suitable for cross-sectional studies. The National Institute for Clinical Excellence recommends the NICE Quality Appraisal Checklist for quantitative studies reporting correlations and associations (National Institute for Clinical Excellence, 2012).

Four criterion items were created from the two checklists in line with the Sanderson, Tatt and Higgins (2007) recommendations of key criteria around participant selection, measurement of variables and control of confounding variables. The criteria checklist and scoring employed can be seen in the supplementary material. Items were rated using the rating scale from the NICE checklist. A score of 0, 1 or 2 points could be awarded to each criterion. One researcher carried out the quality assessment and a sample of 15% of the total studies was checked for rating reliability (94.4% inter-rater agreement, $\varkappa$=88.97%). An overall 5/8 points was agreed upon as a standard for studies that met the NICE checklist's overall rating of *"All or most of the checklist criteria have been fulfilled, where they have not been fulfilled the conclusions are very unlikely to alter".* Following this procedure three studies were removed and sensitivity analyses run. No effect size changed more than 0.004. As a further check a stricter standard of 6/8 points was enforced, resulting in nine studies being removed and sensitivity analyses run. Even with the stricter standard, no effect size changed more than 0.02.

Discussion

This paper presents a meta-analysis of 12 risk factors for depression in trauma-exposed children and adolescents from 59 studies published between 1994 -2016. The overall sample size is large (45,688). Our findings revealed 11 of the risk factors investigated to be significant predictors for depression, with effect sizes ranging from small (r=.10) to large (r=.58). Pre and peri-trauma risk factors tended to show small effect sizes, whereas post-trauma risk factors were generally moderate to large. The most notable effect sizes were found for the presence of PTSD symptoms (r= .58), low social support (r= .30), trauma-related bereavement (r=.29) and avoidant coping (r=.28). Our findings in comparison to the literature and the strengths, limitations and implications are further discussed.

Pre-Trauma Factors

The pre-trauma risk factors we examined included age, gender and prior trauma exposure. A consistent and substantial rise in the prevalence of depression in adolescence is recognised (for reviews see Hankin, 2015; Costello, Copeland & Angold, 2011). Therefore we may expect to see older age as a risk factor for the development in depression following trauma-exposure. However Tang et al. (2014) in their meta-analysis of risk factors for depression after natural disasters found no significant effect of older age in their seven included studies. In contrast, our findings from 26 studies suggest older age is a significant but weak predictor of depression following trauma-exposure, which may be more typical of the depression literature. We found no moderating effects of mean age on any other risk factor.

Our main analysis of 32 studies revealed that female gender whilst small in effect size, was a significant and consistent predictor of depression in line with the wider depression literature (e.g. Cyranowski, Frank, Young & Shear, 2000; Hankin & Abramson, 2001). We found a small effect size for low family income suggesting a significant but modest effect. Whilst sparse, some research has suggested low income may be linked to depression through

increased trauma-exposure (Finkelhor, Ormrod, Turner, & Hamby, 2005) and stressful life events have been shown to partially mediate the relationship between low-income and depression in children (Tracy, M., Zimmerman, Galea, McCauley & Vander Stoep (2008). However, only three studies were included for this meta-analysis of low income as a risk factor for post-traumatic depression, warranting further investigation.

We found a small effect size for prior trauma exposure in the 11 included studies, consistent with Tang et al. (2014). Whilst much research attention has been paid to specific single traumatic events, epidemiological studies have linked multiple-trauma to increased mental health symptoms (e.g. Copeland et al 2007), which is in line with our findings, although modest in nature. Much of the literature (including the studies comprised in our meta-analysis) has focused on a categorical measurement of prior trauma exposure rather than a distinction of the frequency or accumulation of prior trauma exposure, which may confound the true effect.

Peri-Traumatic Factors

Peri-traumatic factor relate to the objective and subjective characteristics of the trauma; we examined direct (opposed to indirect) trauma exposure, trauma severity and peri-trauma distress.

To our knowledge no similar meta-analysis has looked at whether direct (as opposed to indirect) trauma exposure is a risk factor in the PTSD or depression literature, preventing comparison. While this effect was significant it was only small, and based on four studies. As such it clearly requires further investigation, but may suggest that both direct and indirect trauma exposure is linked to depression, widening the range of youth that warrant attention post-trauma. The assessment of trauma severity widely differs depending on what can be considered measurable aspects of the trauma; this is particularly variable across trauma types. Due to the extensive variation of what constitutes trauma severity, between and even within trauma types, it is difficult to know whether trauma severity represents a common construct

between studies. Despite this, our findings were homogenous across the 12 studies included, with a small effect size found.

Cognitive models of PTSD relay the importance of peri-traumatic distress (fear and threat) in the development of PTSD (Ehlers & Clarke, 2000). This has been largely based on adult responses to trauma although similar conclusions have been made in children and adolescents (Stallard & Smith, 2007; Meiser-Stedman, 2002). Very little research has investigated peri-traumatic distress in terms of post-traumatic depression with only four studies found for inclusion in our meta-analysis. However, our findings revealed a small effect as a risk factor for depression, which was homogenous across studies.| This replicates Tang et al. (2014) finding in their meta-analysis of children exposed to natural disasters.

Our findings are consistent with the literature on bereavement as a significant risk factor for the development of depression in children and adolescents (Gray, Weller, Fristad, & Weller, 2011; Stikkelbroek, Bodden, Reitz, Vollebergh & van Baar, 2016). The present meta-analysis looked specifically at trauma-related bereavement and although only five studies were included, we found a moderate effect size comparable to Tang et al (2014). We did find some heterogeneity, which on initial exploration appeared to be related to trauma type (i.e. substantially smaller effects in natural disasters compared to intended traumas such as terrorist attacks or suicide), although low study numbers prevented undertaking of moderator analysis thus may suggest differences based on the intent behind the bereavement. This may be in line with literature suggesting the circumstances of the bereavement are important in determining responses including depression (e.g. Claycomb et al., 2016; Kaplow & Layne, 2014, Keyes et al., 2014) and requires further investigation.

Post-Trauma Factors

The post-trauma risk factors examined were maternal depression, avoidant coping, low social support and comorbid PTSD symptoms, and relate to the post-traumatic responses and

environment.

In an effort to quantify the impact of maternal depression on child mental health, a recent large meta-analysis of 121 studies (Goodman et al., 2011) found only a small effect size for maternal depression on children's internalising disorders including depression, comparable with our findings. In consideration of the trauma literature, maternal depression following trauma exposure has been found to predict children's post-traumatic responses including depression (Panter-Brick, Grimon & Eggerman, 2014), with recent a meta-analysis quantifying this as a moderate effect (Morris, Gabert-Quillen & Delahanty, 2012). Interestingly, this is larger than found in the broader depression literature, and the present study.

Although at times adaptive in the short-term (Compas et al., 2001), avoidant coping has been linked to increased and more chronic mental health symptoms including depression in longitudinal studies of adolescents (Seiffge-Krenke & Klessinger, 2000). The trauma literature has tended to focus on avoidant coping in PTSD, with little research investigating its relationship in depression symptoms following trauma. However, a meta-analysis of trauma-exposed adult and child studies found moderate effect sizes for avoidant coping in both depression and PTSD symptoms (Littleton, Horsley, John & Nelson, 2007). This is largely in line with our findings, although the effect they found was slightly higher. These findings suggest that avoidant coping appears to be a risk factor common to both PTSD and depression, and perhaps the lack of attention in post-traumatic depression is unjustified.

In recent meta-analyses across studies in children and adolescents, heterogeneous small to large effect sizes were found for the protective effects of social support in depression (Gariépy, Honkaniemi & Quesnel-Vallée, 2016); whereas a moderate overall effect size was found for the general association between social support and depression in a large recent meta-analysis of 341 studies (Rueger, Malecki, Pyun, Aycock, & Coyle, 2016). The latter authors suggest these findings may fit with a (reverse) stress-buffering model (e.g. Cohen & Wills,

1985), conceivably particularly relevant to trauma-exposure. Our findings yielded a moderate effect of low social support as a risk factor for depression specifically following trauma, and are largely in line with Rueger et al. (2016). Taken together these findings suggest that social support may play a fairly salient role in risk and resilience responses in children and adolescents exposed to trauma.

Although we found no existing related meta-analysis, a review by Lai, Auslander, Fitzpatrick & Podkowirow (2014) found 20 studies showing a positive relationship between PTSD and depression symptoms in children and adolescents. Indeed in our meta-analysis across 25 studies of trauma-exposed children and adolescents we found a large and consistent effect size, notably the most salient effect size of all risk factors investigated. However, Trickey et al (2012) found comorbid mental health problems (including depression) to be a significant risk factor for PTSD in trauma-exposed children and adolescents. This suggests the direction of the relationship may be complex. Disentangling this comorbid relationship has become a more recent focus in the adult literature, particularly due to the associated increased negative outcomes (Campbell et al., 2007). However, further research is needed to understand the nature and the mechanisms underlying this relationship, particularly in child and adolescent populations.

Comparison to Previous Meta-Analysis of risk factors for PTSD

Similar risk factors have been explored in a recent meta-analysis examining the risk factors for PTSD following wide-ranging trauma-exposure in children and adolescents (Trickey, Siddaway, Meiser-Stedman, Serpell & Field, 2012). In view of this and the level of comorbidity consistently between PTSD and depression, we compared our findings. A summary of these comparisons is presented in Table 3.

Similarities are drawn between both meta-analyses in terms of the small effect sizes found for demographic risk factors of gender, low family income/Socio-Economic Status and

prior trauma exposure; although, the latter was slightly higher for PTSD symptoms in Trickey's paper. The trauma literature appears to have focused on younger age as a risk factor in PTSD although Trickey found no significant overall effect size. In contrast, older age has tended to be focused on as a risk factor for depression, and we found a very weak but significant effect size for this.

Table 3. Comparisons with Trickey et al PTSD meta-analysis

	Effect size found in meta-analysis	
Risk Factor	Present study Depression	Trickey et al. (2013) PTSD
Age	0.10 (older)	0.03 (younger)
Female gender	0.16	0.15
Low family income	0.16	0.17
Prior Trauma	0.15	0.21 (life events)
Direct trauma exposure	0.07	-
Trauma severity	0.19	0.29
Peri-traumatic distress (fear/threat)	0.21	0.36
Bereavement	0.29	0.22
Comorbid psychological problems	0.58 (PTSD)	0.40 (any comorbidity)
Avoidant coping	0.28	-
Low social support	0.30	0.33
Maternal depression	0.20	0.29 (any parental psychological problem)

In comparing risk factors related to the trauma itself however we highlight some contrasts. Our meta-analysis generally found small effect sizes for depression whereas Trickey found moderate effect sizes for trauma severity and peri-traumatic fear in PTSD, where the reverse relationship was found for bereavement. Thus whilst this suggests that risk factors are shared and may be of some clinical relevance in both disorder, it also appears to suggest that

peri-traumatic responses may play a more prominent role in PTSD, whereas a relative importance may exist for bereavement in depression.

In comparing post-trauma risk factors we found similar magnitudes of effect sizes for social support and comorbid psychological problems in our meta-analysis of depression and Trickey's meta-analysis of PTSD. Although we found a greater effect size looking specifically at comorbid PTSD in our meta-analysis, where Trickey looked at any comorbid disorder. This may highlight the particularly strong relationship between PTSD and depression symptoms.

Overall both meta-analyses found similar findings in that pre-trauma risk factors appear less important than post-traumatic responses and environment, and to some extent peri-traumatic factors in PTSD and depression. However, when considering this overlap it would be wise to keep in mind the highly comorbid relationship between these disorders. This may question how distinct these constructs truly are, and therefore how much can be inferred from meta-analyses focusing on (but not controlling for) the different disorders.

Moderators

We found no moderating effects of mean age on PTSD symptoms or gender risk factors in depression, and no moderating effect of group vs individual trauma or intended vs unintended trauma on PTSD symptoms, gender or age in depression. Our findings are somewhat in opposition to those from Trickey et al., who found effects of group trauma on age (younger), mean age on gender (female) and unintended trauma on age and gender in relation to PTSD symptoms.

We did how ever find a moderating effect of whether the measure of PTSD was continuous or categorical, with substantially higher effect sizes found in continuous data. This is in line with findings from other meta-analyses in the PTSD literature (e.g. Brewin, Andrews & Valentine, 2000) and is conceivably the result of the greater sensitivity that continuous

measures enjoy. It is noteworthy to mention that we only ran moderator analyses on those with 20 of more studies thus many of our risk factors were not explored.

Strengths and Limitations

To our knowledge this is the first synthesis of the literature and effect sizes on risk factors for depression in trauma-exposed children across all trauma types. The strengths of the present meta-analysis include a large number of studies (59) that were assessed for risk of bias, a large overall sample size (45,688), and a comprehensive examination of different pre-, peri- and post-trauma risk factors for depression. The latter strength appears particularly important in consideration of the dearth of research for some of these risk factors in the child and adolescent depression and trauma literature bases. We found notable, and significant, moderate to large effects in four of our risk factors, and significant small to moderate effect sizes in the remaining risk factors, except for direct vs indirect exposure, which was negligible. However these smaller effect sizes are by no means trivial in that they may help to clarify the relative contributions of these risk factors. Some interesting contrasts to the PTSD literature are also provided in terms of the relative and shared risk factors for depression vs risk factors for PTSD in trauma-exposed children and adolescents.

One of the main limitations of this meta-analysis is the small amount of studies included in several of the analyses. Only around half of the risk factors investigated were based on 10 or more studies. This clearly limits the inferences that can be made from these particular analyses. Additionally, due to the nature of observational studies, one school of thought would rate any such study automatically as high risk of bias, thus some may view our risk of bias ratings as too generous. Notwithstanding these points, our results represent the data available, present some exploratory findings and highlight the need for further research in these areas.

An additional limitation is the cross-sectional nature of the studies we assessed, from which any assumptions of causation, or direction of relationships of the risk factors investigated

cannot be made. Thus meta-analyses to assess the longitudinal relationships of these risk factors would be highly informative. Furthermore, only four of the included studies used interview assessments of depression. Accordingly, it is a possibility the predominant self-report nature of the assessment of depression may have differential impacts on the relationships of the risk factors.

A further limitation of the literature we drew on in general is the lack of consideration of pre-trauma mental health histories. This appears to underscore a significant gap in the literature and our understanding of risk factors for depression following trauma, considering the significant impact this may have. Finally our moderator analyses were limited due to study numbers, thus there may have been important moderating variables that were not explored in our risk factors.

Implications and further research

Implications

Notwithstanding the identified limitations, the present paper delineates some interesting clinically and theoretically relevant findings, in relation to depression in trauma-exposed children and adolescents. We find overall modest effects of pre-trauma variables including demographic variables and prior trauma as risk factors for depression. Interestingly age and gender seem to be some of the most studied risk factors, which in light of our findings may not be justified. Indeed, our findings suggest that the child's subsequent reactions and environment following trauma that may play the largest role in depression. Thus, the attention of researchers, clinicians and support systems around trauma-exposed children and adolescents may be better served here.

Interestingly in comparing our findings to Trickey et al. (2012) and the trauma literature more widely, several risk factors appeared shared in both PTSD and depression with largely congruent effect sizes. However, differences also emerge in the degree of effect for

some risk factors, particularly around the higher effect sizes of peri-traumatic factors for PTSD and trauma-related bereavement for depression. Although tentative, these findings may help further our understanding of potentially shared risk factors and relative importance of some risk factors in depression and PTSD. This may have theoretical implications in terms of models of post-traumatic depression (and potentially PTSD) in children and adolescents and seems a promising avenue of further research. Perhaps particularly salient in view of our finding of PTSD with a large effect size and the most prominent risk factor for depression symptoms, and high levels of comorbidity found widely. Thus further research investigating the underlying mechanisms of this relationship would be of great value, both theoretically, and also clinically in determining targeted and effective interventions.

Our findings also suggest that although avoidant coping showed a moderate effect size as a risk factor for depression, the focus in the trauma literature appears to be on PTSD. Likely in accordance with avoidance being key in PTSD models (e.g. Ehlers & Clark, 2000). However, with comparable effect sizes found in our meta-analysis and Trickey et al's similar meta-analysis for PTSD, this neglect in the research appears unwarranted thus further research is required to increase our theoretical understanding of depression and adapt clinical interventions.

Conclusion

Overall our findings suggest that comorbid PTSD, trauma-related bereavement, low social support and avoidant coping are particularly relevant risk factors in depression in trauma-exposed children and adolescents. Thus factors related to post-traumatic environment and responses may be particular targets for monitoring, support and treatment to reduce post-traumatic depression symptoms in children and adolescents. This calls for further research to increase out understanding and develop targeted interventions in response.

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Supplementary Material

Risk of Bias Assessment Criteria and Scoring

1. **Was the study population well specified and defined?** e.g. clear description of country, setting and population demographics and lists appropriate inclusion and exclusion criteria for exposed and unexposed participants.
2. **Was the number of participants that agreed to participate representative?** Was there risk of non-response bias? e.g. were response rates at least 40% or were tests of representativeness/attrition biases carried out to compare non-participants/responders.
3. **Were the outcome measures employed reliable?** e.g were standardised and validated measures used? Do they show good internal consistency? (i.e at least 0.7 Cronbach's Alpha, reported either within the paper or by other peer reviewed papers)
4. **Does the study describe how confounding variables were identified and/or controlled?** E.g were sources identified (may have been identified/addressed in method, analysis or discussion), were there likely other confounding factors not considered, is there risk of significant bias?

NICE guidelines Appendix G Quality appraisal checklist rating – quantitative studies reporting correlations and associations

++ (Two points)	Indicates that for that particular aspect of study design, the study has been designed or conducted in such a way as to minimise the risk of bias.
+ (one point)	Indicates that either the answer to the checklist question is not clear from th way the study is reported, or that the study may not have addressed all potential sources of bias for that particular aspect of study design.
- (0 points)	Should be reserved for those aspects of the study design in which significan sources of bias may persist.
Not reported (NR) (0)	Should be reserved for those aspects in which the study under review fails t report how they have (or might have) been considered.
Not applicable (NA) (Two points)	Should be reserved for those study design aspects that are not applicable given the study design under review (for example, allocation concealment would not be applicable for case–control studies).

Overall study rating criterion

5+ points (Stricter criterion 6+ points): All or most of the checklist criteria have been fulfilled, where they have not been fulfilled the conclusions are very unlikely to alter.

Table 1. Summary of risk of bias assessment scoring of studies included in the meta-analysis

Authors	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Overall Rating
Feiring et al., 1999	++	NR	++	++	6
Kaplan et al., 2013	++	++	++	++	8
Brown & Goodman, 2005	++	+	++	+	5
Warheit et al., 1996	++	++	+	NR	5
Kiliç et al., 2011	++	++	++	+	7
Henrich & Shahar, 2013	++	+	++	++	7
Nugent et al., 2006	++	++	++	++	8
Wolfe et al., 1994	++	++	++	++	8
Graham-Bermann et al., 2009	++	NR	++	++	6
Banks et al., 2014	+	++	++	++	7
Tebbutt et al., 1997	++	++	++	+	7
Salloum et al., 2011	++	++	++	++	8
Ying et al., 2012	+	+	++	+	5
Brensilver et al., 2011	++	++	++	++	8
Goenjian et al., 2011	+	+	+	+	4
Bokszczanin et al., 2002	+	++	++	+	6
Cénat & Derivois, 2015	++	NR	++	++	6
Paul et al., 2015	++	+	++	++	7
Lai et al., 2014	+	NR	++	++	5
Flett et al.,2012	++	++	++	++	8
Simon et al., 2015	++	++	++	++	8
Khamis, 2008	++	NR	++	+	5
Yang et al., 2011	++	++	++	++	7
Kar & Bastia, 2006	++	NR	++	+	5
Elbedour et al., 2007	+	++	++	+	5
Karakaya et al., 2006	+	++	++	+	6
Kolaitis et al., 2003	++	NR	++	++	6
Giannopoulou et al.,2006	++	++	++	++	8
Ying et al., 2013	+	++	++	++	7
Zhang et al., 2012	+	NR	++	+	4
Wang et al., 2012	+	++	++	++	7
Goenjian et al., 1995	+	+	+	NR	3
Hoven et al., 2005	++	++	++	++	8
Morgos et al., 2007	++	NR	++	++	6
Hanson et al., 2008	++	++	++	++	8
Runyon & Kenny, 2002	++	NR	++	++	6
Guibord et al., 2011	++	NA	+	+	6
Hodes et al., 2008	++	++	++	+	7
Udwin et al., 2000	++	++	++	++	8
Kadak et al., 2013	+	++	++	+	6
Betancourt et al, 2011	+	+	++	+	5

Authors	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Overall Rating
Jensen et al., 2015	+	+	++	++	6
Fan et al., 2011	+	++	++	++	7
Rollocks et al., 2013	++	++	++	+	7
Lehmann, 1997	++	NR	++	++	6
Olema et al., 2014	++	NR	++	+	5
Brent et al., 2009	++	++	++	+	7
Tierens et al., 2012	+	++	++	++	7
Collin-Vézina, 2011	++	NR	++	+	5
Jia et al., 2013	++	++	++	+	7
Jouriles et al., 2000	++	++	++	+	7
Smith et al., 2002	++	++	++	+	7
Smith et al., 2001	+	++	++	+	6
Papageorgiou et al., 2013	++	++	++	NR	6
Berthold, 2000	++	++	++	+	7
Thabet et al., 2004	++	++	++	+	7

Notes: Orange highlights indicate studies scoring below five points criterion, yellow highlights indicate additional studies scoring below six points criterion. Sensitivity analyses performed using both criteria.

Cognitive Appraisals, Cognitive Avoidance and Rumination as Shared Vulnerabilities for PTSD and Depression in Trauma-Exposed Adolescents.

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Conflict of Interest: The authors declare that they have no conflict of interest.

Abstract

Background: Depression and Post Traumatic Stress Disorder (PTSD) are found to be highly comorbid disorders following trauma exposure, with their combined presence being associated with a more deleterious and long-term impairment. However, this relationship is poorly understood, particularly in adolescence, despite this being highlighted as a critical period for trauma exposure. Cognitive processes such as appraisals, avoidance and rumination have been implicated in both disorders separately and could be potential shared mechanisms underlying this comorbidity. **Method**: In a cross-sectional design, 280 secondary school pupils (12-15 years) who had reported some trauma exposure completed self-report measures of Post Traumatic Stress Symptoms (PTSS), depression and maladaptive cognitive processes (trauma-related and depressogenic appraisals, cognitive avoidance and rumination). **Results**: PTSS and depression symptoms were highly correlated (r=0.79) and 60-65% of all probable diagnostic cases of PTSD or depression were comorbid. Strong positive correlations were found for negative trauma appraisals, depressogenic appraisals, cognitive avoidance and rumination, with statistically comparable strengths found for both PTSS and depression symptoms. Comparisons of probable diagnostic groups showed all groups endorsed all maladaptive processes although the comorbid group showed the greatest endorsement (and symptomology). Hierarchical regression models of the maladaptive processes explained 75-77% of the variance. Trauma-related appraisals were found most prominent in predicting both PTSS and depression symptoms although a commonality analysis suggested the interplay between all cognitive variables explained the vast amount of variance. **Conclusions:** Cognitive appraisals, cognitive avoidance and rumination appear to be shared cognitive vulnerabilities in PTSD and depression, which may underlie PTSD-depression comorbidity and provide targets for intervention.

Keywords: Depression, PTSD, Comorbidity, Adolescents, Cognitive Mechanisms

With 80% comorbidity rates found in epidemiological studies of post-traumatic stress disorder (PTSD) (Breslau, Davis, Andreski & Peterson, 1991; Kessler, 1995), comorbidity for this disorder has been shown to be the rule rather than the exception (Macdonald, Danielson, Resnick, Saunders & Kilpatrick, 2010). Depression is seen to be the most common comorbidity in PTSD, with comorbidity rates of 52% observed in adults and 62% in adolescents (Rytwinski, Scur, Feeny &Youngstom, 2013; Kilpatrick et al., 2003).

The adult literature evidences PTSD-depression comorbidity as particularly problematic, with increased severity of symptoms, disability, chronicity, and suicidality above and beyond that predicted by PTSD or depression alone (e.g. Campbell at et., 2007). Adolescence is a critical developmental period found particularly sensitive to trauma exposure. Despite vulnerability to more chronic and deleterious bio-psycho-social impacts of trauma exposure, with long-term effects that extend into adulthood (Ogle, Rubin & Seigler, 2013; Lupien et al., 2009), adolescence in the comorbidity literature base is greatly neglected. Greater suicidality (Sher, 2008) and health problems (Seng et al., 2005) have been found in comorbid PTSD-depression in adolescents. Depression symptoms have also been implicated in poorer treatment gains (see review Angelakis & Nixon, 2015), non-response (Zayfert et al., 2005) dropout (Kar, 2011) and poorer quality of life ratings (Araújo et al., 2014) in adult PTSD interventions.

Understanding Comorbidity

In consideration of the high prevalence rates and adverse impacts of comorbid PTSD-depression, it appears critical to further our understanding of this facet of adolescent responses to trauma. We review key hypotheses attempting to explain PTSD-depression comorbidity.

Causative pathways. PTSD and depression are found to be risk factors for one another in the adult (Bromet, Sonnega & Kessler, 1998; Breslau, Davis, Peterson & Schultz, 2000) and adolescent trauma literature (Ying, Wu & Lin, 2012: Roussos et al., 2005). Exploring the

temporal order of development, Kessler et al (1995) found PTSD preceded the onset of depression in 78% of comorbid adult cases. However, Bleich, Koslowsky, Dolev and Lerer (1997) found PTSD and depression onset together in 65% of their adult clinical sample, with a mixed picture in the remaining 35%. More recently Schindel-Allon at al. (2010) investigated longitudinal relationships between PTSD and depression in a veteran sample, finding that the onset of depression promoted PTSD, but PTSD did not promote depression. However, recent evidence from an adult prospective study (Nickerson et al., 2013) and an adolescent intervention study (McLean, Su, Carpenter & Foa, 2015) demonstrate PTSD symptoms have a stronger influence on changes in depression symptoms than vice versa. Taken together these highly discrepant findings demonstrate at the very least, complex bi-directional relationships from which causation cannot be assumed. Moreover, it does not provide an adequate explanation for PTSD-depression comorbidity.

A product of diagnostic overlap. Three DSM-IV diagnostic symptoms overlap between PTSD and depression (anhedonia/diminished interest, sleep difficulties and concentration difficulties). Frueh, Elhai and Alcierno (2010) highlight the heterogeneity of PTSD symptoms and concerns regarding symptom overlap and comorbidity. However, Ford, Elhai, Ruggiero and Frueh (2009) demonstrated PTSD-depression comorbidity in adolescents remained fundamentally unchanged after removal of the overlapping symptoms. Furthermore, despite the DSM-5 introducing a new cognition and mood symptom cluster that may be considered characteristic of depression, O'Donnell and colleagues (2014) found no significant differences in PTSD-depression comorbidity rates between DSM-IV and DSM-5.

A subset of dysphoria PTSD symptoms is suggested to be more related to depression than other subsets (Gros, Simms and Aceirno, 2010; Contractor et al, 2014) and is hypothesized to account for PTSD-depression comorbidity (Yufik & Simms, 2010). However, contrary evidence demonstrates no difference between the subsets (Horesh et al., 2017; Charak, Armour,

Elklit, Koot, & Elhai, 2014). Furthermore, Elhai et al. (2011) found PTSD and depression symptoms represented a single underlying construct, remaining unchanged when the dysphoria subset was removed. The general empirical picture now recognizes that comorbidity between PTSD and depression goes beyond mere symptom overlap, although highlights diagnostic problems.

Shared vulnerability. Whilst some postulate PTSD and depression to be distinct and independent sequelae (Post, Zoellner, Youngstrom & Feeny, 2011; Cao et al., 2015), evidence of frequent common predictors (Stander, Thomsen & Highfill-McRoy, 2014) and similar courses of pathology and recovery may support a shared vulnerability (Dekel, Solomon, Horesh & Ein-Dor, 2014; O'Donnell, Creamer and Pattison, 2004). Furthermore, recent reviews highlight genetic and neurobiological similarities that may underpin a shared vulnerability in comorbid PTSD-depression (Flory & Yehuda, 2015; Lockwood & Forbes, 2014). The concept of a single latent construct of general traumatic distress has been proposed (Elhai et al., 2011). In support of this, O'Donnell et al. (2004) found predictors of symptom severity and diagnostic category for PTSD and comorbid PTSD-depression largely indistinguishable, whilst Breslau, et al. (2000) found a marked increased risk for depression in exposed individuals with PTSD, but not without PTSD. Studies employing Confirmatory Factor Analysis and latent profile analysis suggest although PTSD and depression may be different manifestations, symptoms reflect a single latent construct longitudinally (Dekel et al., 2014; Au et al., 2013). Whilst the literature base is inconsistent and limited in its findings, particularly in the seeming absence of adolescent literature, shared vulnerability appears to be a promising avenue to further understanding of PTSD-depression comorbidity.

Research into the underlying mechanisms of this shared vulnerability is vital to address the lacking literature, moreover to apply this clinically; reducing the long-term adverse, and indeed fatal, impacts on adolescents.

Shared Cognitive Vulnerabilities

A recent review by Angelakis and Nixon (2015) identified maladaptive cognitive processes implicated in PTSD and depression separately that may be candidates underlying shared vulnerability. We review the evidence base for cognitive appraisals, cognitive avoidance and rumination as potential shared cognitive vulnerabilities.

Cognitive appraisals. Cognitive appraisals are defined as a process of evaluation in a framework of meaning-making; particularly in the context of stressful events, where negative appraisals are hypothesised to impact distress and adjustment (Park, 2010). Beck (1979) proposed depressogenic appraisals about the self, world and future, which have been shown predictive of depressive symptoms in adolescents (Braet, Wante, Van Beveren & Theuwis, 2015). Positioned within a stress-diathesis model, traumatic events may activate negative appraisals, promoting depression. Within PTSD, Ehlers and Clarks' (2000) cognitive model posits negative cognitive appraisals of trauma (influenced by pre-trauma vulnerability) as integral to the onset and maintenance of PTSD, engendering a current sense of threat and promoting the use of maladaptive control strategies. Negative appraisals have been consistently implicated in both acute and chronic posttraumatic reactions including PTSD and depression symptoms in adolescents (Ellis, Nixon & Williamson, 2009; Meiser-Stedman, Dalgleish, Glucksman, Yule & Smith, 2009). Furthermore, changes in negative appraisals are seen to drive change in PTSD and depression symptoms, but not vice versa (McLean, Yeh, Rosenfield & Foa, 2015; Zalta et al., 2014), suggesting negative appraisals play a key and causal role in both PTSD and depression.

Cognitive avoidance. Cognitive avoidance is a coping mechanism employing mental control or disengagement strategies to orient away from threatening thoughts or affect. Cognitive avoidance strategies are hypothesized to interfere with the ability to evaluate or update negative appraisals as well as impede emotional processing; theorized as important in

the maintenance of PTSD and depression (Ehlers & Clark, 2000; Ottenbreit & Dobson, 2004; Teasdale, 1999). Cognitive avoidance strategies have been shown predictive of acute trauma reactions and chronic PTSD in adults, children and adolescents (Dunmore, Clark, & Ehlers, 2001; Ehlers, Mayou, & Bryant, 2003; Meiser-Stedman et al., 2014). Although Blalock and Joiner (2000) found cognitive avoidance predictive of depression following stressful life events, research exploring trauma and cognitive avoidance in depression is limited.

Rumination. Rumination is implicated in a wide-range of psychopathology and is a process characteristically repetitive, passive and/or relatively uncontrollable and with negative focus, although with suggestion of disorder-specific content (Ehring & Watkins, 2008). Rumination is considered multifaceted with several proposed mechanisms underlying its role in PTSD and depression, such as cognitive avoidance, exacerbating negative affect and strengthening negative appraisals (Ehlers & Clark, 2000; Michael, Halligan, Clark, & Ehlers, 2007; Nolen-Hoeksema, Wisco & Lyubomirsk, 2008). Rumination has been consistently implicated in the development and maintenance of both PTSD and depression separately in adolescents (Michl, McLaughlin, Shepherd & Nolen-Hoeksema, 2013; Roelofs et al., 2009; Jenness et al., 2016; Meiser-Stedman et al., 2014).

Study Aims

Although negative appraisals, cognitive avoidance and rumination have been studied to varying degrees in PTSD and depression in the adult literature, paucity exists in the adolescent literature. Furthermore no study to our knowledge has explored these variables in PTSD and depression in the same study comparatively, in adolescents, or indeed largely in the adult literature. The present study will address four aims:

1) establish the strength of the association between PTSS and depression symptoms and the prevalence of probable comorbidity in a community adolescent sample;

2) establish the associations of negative appraisals (both trauma-related and depressogenic), cognitive avoidance and rumination in PTSS and depression symptoms and any specificity in comparative strength between the disorders;

3) investigate group differences in the proposed cognitive processes and PTSD and depression symptoms in probable diagnostic groups of PTSD, depression and comorbid PTSD-depression; and

4) investigate the specificity and commonality of the proposed cognitive processes as predictors of PTSS and depression symptoms.

Method

Sample

Three hundred and ninety-one pupils from two UK secondary schools (years eight and nine) completed questionnaire batteries, representing 71.5% of the eligible population. The mean age of the sample was 13.7 years (range 12-15 years old), 51.2% of the sample was female and 97.4% identified their ethnicity as White British. Three children from the eligible sample were excluded from participation following the parental opt-out consent procedure and a further three children chose not to provide assent on the day of data-collection. Any participant questionnaire pack returned with over 20% of missing data overall was excluded (N=45), resulting in a study sample of 346 participants. This excluded sample did not differ significantly from the study sample in age ($t(383)=0.97$ $p=.92$, gender ($\chi^2(1) = .375$ $p=.541$) ethnicity ($\chi^2(2) = 1.21$ $p=.547$), trauma exposure status ($\chi^2(1) = 2.64$ $p=.104$ or number of trauma types endorsed ($t(388)=1.74$ $p=.082$). Exposure to potentially traumatic events was reported in 79.9% of the sample; the present study focused principally on these 280 participants.

Measures

Child and Adolescent Trauma Screening (CATS). The CATS (Sachser et al., 2017) is a novel screening measure for trauma exposure and PTSD symptoms in children and adolescents aged 7-17 years old, accommodating the recent DSM-5 and upcoming ICD-11 modifications. The child-report version employed in the present study has demonstrated good to excellent psychometric properties (e.g. Cronbach α.90 - 94) in child and adolescent samples (Sachser et al., 2017). The two-part measure consists of a lifetime checklist of 15 possible trauma items and 20 items denoting PTSD symptoms experienced in the past two weeks on a "never" (0), "once in a while" (1), "half the time" (2) or "almost always" (3) scale. Impairment of relationships, hobbies/fun, school/work and general happiness is assessed on a dichotomous yes/no scale. Higher scores on part-two equate to increased PTSD symptoms. Currently the CATS does not have published cut-offs for determining clinical caseness, therefore a threshold algorithm based on a symptom presentation consistent with a DSM-5 diagnosis of PTSD was employed to determine caseness. Reliability in the current sample was excellent (Cronbach's α = 0.95).

Revised Child Anxiety and Depression Scale (RCADS). The RCADS-25 (Muris, Meesters & Schouten, 2002) is a modified and shortened version of the original RCADS (Chorpita, Yim, Moffitt, Umemoto, & Francis, 2000) with comparable psychometric properties (Muris., et al 2002). The measure assesses sub-scales of DSM-defined symptoms of anxiety and depression. The present study employs the 10-item depression subscale; symptoms are assessed on a 4-point response scale of "how often does this happen to you" (never = 0, sometimes = 1, often = 2, always = 3). The depression subscale has demonstrable good to excellent psychometric properties including internal consistency (Cronbach's α= 0.87), test–retest reliability (r =0.77), and a reliable cut-off for determining "caseness" (Chorpita, Moffitt and Gray, 2005). Reliability in the present sample was excellent at Cronbach's α = 0.90.

Children's Post-Traumatic Cognitions Inventory Short-Form (CPTCI-S). The CPTCI-S (McKinnon et al., 2016) is a 10-item self-report measure assessing trauma-related negative appraisals in children and adolescents aged 6-18 years. This is a shortened version of the original CPTCI (Meiser-Stedman et al., 2009) and has shown excellent internal consistency (α = 0.92) and acceptable test-retest reliability (r =0.78), (McKinnon et al, 2016). Respondents are asked to rate how much they agree or disagree with each maladaptive appraisal statement since the "frightening event" on a 4 point scale from "Don't agree at all" to "Agree a lot". Higher scores relate to increased negative trauma-related appraisals. Reliability in the current sample was excellent (Cronbach's α = 0.94).

Cognitive Triad Inventory for Children (CTI-C). Depressogenic-related negative appraisals were assessed using the CTI-C (Kaslow et al., 1992). This is a 36 item measure, consisting of three 12-item subscales assessing cognitive appraisals along the three domains of Beck's cognitive triad: view of self, world and future (Beck, 1976). Items are rated on a 3-point scale (Yes, Maybe or No) based on how the child feels "today". Internal consistency has been demonstrated as good to excellent for the three subscales (α =0.80– 0.94) and excellent overall (α =0.92 - 0.96) with acceptable test-retest reliability in a range of child and adolescent samples aged between 9 and 18 years (Greening, Stoppelbein, Dhossche & Martin, 2005; Kaslow et al., 1992). Higher scores relate to more positive appraisals.

Cognitive Avoidance Questionnaire (CAQ). The CAQ (Sexton & Dugas, 2008) assesses cognitive avoidance strategies using a 5-point Likert scale ranging from "not at all like me" (1) to "always like me" (5). Good to excellent internal consistency (α =0.83– 0.95) and acceptable test–retest reliability (r =0.70– 0.85) has been demonstrated in adolescent and adult samples (Sexton & Dugas, 2008). Higher scores represent increased use of cognitive avoidance. The measure consists of five (5-item) sub-scales of cognitive avoidance strategies; thought suppression, distraction, thought substitution, avoidance of threatening stimuli and

transformation of images into thoughts. Uncertainly has been raised regarding conscious accessibility of the latter subscale (Sexton & Dugas, 2008). In view of this and developmental considerations of the target sample, this subscale was excluded and some minor wording simplifications made e.g. happening instead of occurring. Reliability for the overall scale in the current sample was excellent at Cronbach α 0.97 and good to excellent reliability for the subscales (0.84 – 0.92).

Children's Response Styles Questionnaire (CRSQ). The CRSQ **(**Abela, Rochon & Vanderbilt, 2000) assesses responses in children and adolescents based on Nolen-Hoeksema's (1991) proposed Response Styles Theory, of which rumination is central. The CRSQ consists of three subscales of problem-solving, distraction and rumination, the latter 13-item subscale is used in the present study. Items are rated on a 4-point scale from almost never (0) to almost always (3). The rumination sub-scale has good internal consistency α = 0.78- 0.84 (Abela, Brozina & Haigh, 2002) and acceptable test-retest reliability r =0.78 (Abela, Aydin & Auerbach, 2007). Higher scores correspond to increased use of rumination. Reliability in the present sample was excellent at (Cronbach's α = 0.96).

Procedure

Secondary schools in East Anglia were contacted to register interest in participation; from this two large interested schools with feasibility for data collection within study timescales were recruited. To maximize participation, representativeness and therefore generalizability, a parental opt-out and participant informed assent process was employed. This opt-out consent process was approved by the appointed ethics committee and participating schools. Pupils who provided their assent on the day (and whom had not been opted out by their parents/guardians) were given a paper-based questionnaire pack of the study measures. All participants were provided an aftercare sheet detailing support options, and a wellbeing screen flagged any concerns raises.

Data Analysis

All analyses were carried out using SPSS 23.0. Although continuous variables were positively skewed these values fell outside acknowledged thresholds (+/-1.5) delineating concerns (e.g. Tabachnick & Fidell, 2013) and sample sizes were large (N=220-280) suggesting robustness for parametric testing. Despite no concerning violations of normality in the diagnostic groups, caution was taken due to varying degrees of skewness and small sample sizes in some groups. Therefore one-way GLM ANOVA's and Bonferroni post-hoc tests were undertaken with Bias-Corrected and accelerated bootstraps (1000 samples), shown to increase robustness of statistics for small samples and adequately adjust for non-normality of skewness (Efron, 1987; DiCiccio & Efron, 1996; Neal & Simons, 2007). Pearson Coefficient correlations and statistical comparisons of correlational strengths between PTSD and depression symptoms (Lee and Preacher, 2013) were undertaken. Hierarchical regressions were carried out to investigate predictors of symptoms of PTSD and depression. To aid interpretation structure coefficients were calculated using syntax from Lorenzo-Seva, Ferrando and Chico (2010). Finally, syntax (Nimon, 2010) for Commonality Analysis (CA) was employed to explore the unique and common variances in the predictor variables regressed on symptoms of PTSD and depression.

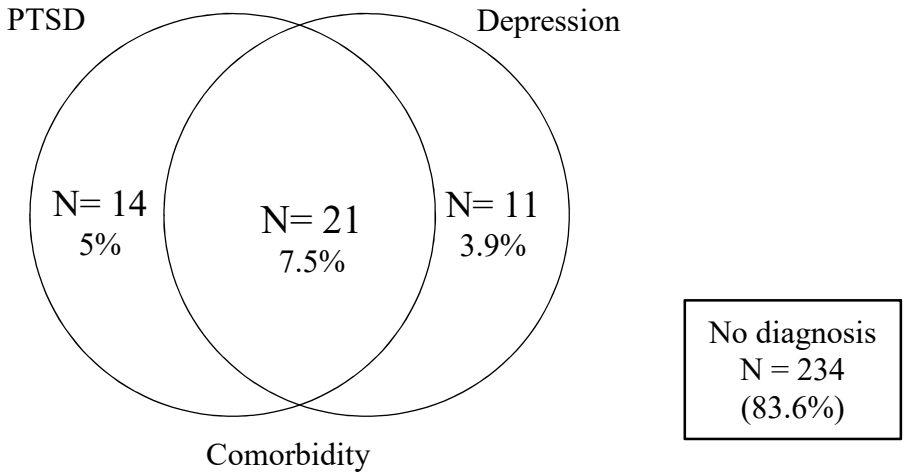
Results

Comorbidity Prevalence

Of 280 adolescents reporting lifetime exposure to potentially traumatic events the prevalence of probable PTSD and depression was 12.5% (N=35) and 11.4% (N=32) retrospectively. Figure 1 presents the composition of the exposed sample in terms of unique and comorbid diagnostic cases. Our findings reveal that comorbid PTSD-depression made up 45.7% of all diagnostic cases, representing 60% of all PTSD cases and 65.6% of all depression

cases in the sample. PTSD and depression symptoms were found to be highly correlated in the sample (r=.79, N=267, *p*=.001).

Figure 1. Venn diagram delineating unique and comorbid diagnostic cases



Associations Between Cognitive Variables and Symptoms of PTSD and Depression

The zero-order correlations for all variables can be found in Table 1. Correlations between negative cognitive appraisals (trauma-related and depressogenic appraisals) and PTSS and depression symptoms were very high (*r*=.72-.82). There were no significant differences in correlation strength between PTSD or depression for trauma-related (*r*=.82 vs .79 respectively, N= 262) or depressogenic appraisals (*r*=.72 vs .74, N =237). Correlations for trauma-related negative appraisals were significantly higher than depressogenic negative appraisals in PTSD (*r*=.82 vs .72, N=224, *p*=.001) but not depression (*r*=.78 vs .74, N=236). Cognitive avoidance showed no significant difference in the correlation strength between PTSS and depression (r=.72 vs .71,

N=270, *p*=.59). However, the strength of the correlation for rumination was significantly higher in depression (r=.77) than in PTSD (r=.71), *t*(246)=2.05, *p*=.04. Also of note was the degree of intercorrelation between all of the cognitive variables (ranging from r=.57 - .76).

Table 1. Zero-order correlations

	1	2	3	4	5	6	7	8
1. Age	-							
2. Gender	.05^{NS}	-						
3. No. of trauma types	.06^{NS}	.04**	-					
4. Depression symptoms	.11*	.35**	.31**	-				
5. PTSS symptoms	.04^{NS}	.36**	.41**	.79**	-			
6. Trauma appraisals	.04^{NS}	.33**	.35**	.78**	.82**	-		
7. Depressogenic appraisals	.001^{NS}	.26**	.33**	.74**	.72**	.76**	-	
8. Cognitive avoidance	.005^{NS}	.32**	.26**	.71**	.73**	.68**	.57**	-
9. Rumination	.03^{NS}	.36**	.24**	.77**	.71**	.75**	.73**	.73**

Note: variable measures = 3. Child and Adolescent Trauma Screen (CATS) part 1: trauma checklist; 4. RCADS = Revised Child And Depression Scale – Depression Subscale; 5. CATS Trauma Screen part 2; 6. Child Post Traumatic Cognitions Inventory Scale (CPTIC-S); 7. Children's Cognitive Triad Inventory (CTI-C); 8. Children's Response Style Questionnaire - Rumination Subscale (CRSQ); 9. Cognitive Avoidance Questionnaire (CAQ). *p<.05 **p<.001.

Diagnostic Group Differences

To address the third study aim, the sample was split into four probable diagnostic groups (no diagnosis, depression only, PTSD only and comorbid PTSD/depression) based on clinical thresholds on the RCADS depression subscale and the CATS part 2. The comorbid group met threshold on both measures. Demographic characteristics of each group can be seen in Table 2. The groups significantly differed in gender and number of endorsed trauma types (p<.001). Z-tests with Bonferroni correction of the alpha level revealed significantly higher proportions of females in the depression only and comorbid groups (p<.05). Bonferroni pairwise post hoc comparisons revealed a significantly greater number of endorsed trauma types in the comorbid diagnosis group compared to the no diagnosis (p<.0001) and depression only (p=.005) groups.

Table 2. Demographic characteristics of diagnostic groups and their differences

	Diagnostic groups					
Demographics	No Diagnosis (1) (N=234)	Depression only (2) (N=11)	PTSD only (3) (N=14)	Comorbid (4) (N=21)	Test statistic[a]	Pairwise tests
Mean age (SD)	13.73 (0.47)	13.84 (0.54)	13.77 (0.33)	13.84 (0.73)	$F(3,276) = 0.55^{NS}$	-
% Female	44%	90.9%	71.4%	76.2%	$\chi^2(3) = 20.63$**	4,2>1*, 3*
% White British	98.5%	100%	81.7%	95%	$\chi^2(6) = 4.44^{NS}$	-
Mean endorsed trauma types (SD)	2.56 (1.57)	2.64 (1.21)	3.5 (1.91)	4.76 (2.62)	F (3,276) = 11.94**	4>1**,2**

Note: [a]ANOVA tests are reported for continuous variables and χ^2 tests for categorical variables, [NS] Not significant **significant to p<.001, *significant to p<.05

ANOVAs with Bias Corrected and accelerated (BCa) bootstraps showed significant differences between groups on all variables with moderate to large effect sizes (partial η^2 ranging from .34 - .65, p<.001) (see Table 3). A series of bootstrapped post-hoc Bonferroni pairwise comparisons were undertaken (see Table 3). The no diagnosis group had significantly less severe scores on all variables compared to all other diagnostic groups (p<.001). The PTSD only and depression only groups significantly differed only on symptoms of depression (depression only group endorsed higher depression scores p=.001) and rumination (depression only group endorsed higher rumination scores p<.045). The comorbid group showed significantly higher PTSS symptoms (p<.001) and negative trauma-related appraisals (p=.03) scores than the depression only group, but no other significant differences. Finally, the comorbid group had more severe scores than the PTSD group on all measures (p<.001).

Cognitive Predictors of PTSD and Depression

To address study aim four, cognitive predictors of continuous depression and post-traumatic stress symptoms were investigated. Age was the only non-significant variable in univariate linear

Table 3. Mean scores, ANOVA results and group comparisons on appraisals, cognitive avoidance, rumination and symptomology

	Group means (SD)				Post hoc pairwise comparisons[a]				
Variable	No diagnosis (1) (N=234)	Depression only (2) (N=11)	PTSD only (3) (N=14)	Comorbid group (4) (N=21)	1 vs 2, 3, 4	2 vs 3	2 vs 4	3 vs 4	Test statistic
Depression (RCADS)	4.6 (3.9)	18.8 (3.3)	10.8 (3.5)	21.0 (4.0)	1< 2,3,4**	2>3**	NS	4>3**	F (3, 276) = 161.24** η_p^2= .65
PTSD severity (CATS)	10.0 (8.4)	23.2 (11.1)	30.2 (5.3)	41.7 (7.8)	1< 2,3,4**	NS	4>2**	4>3**	F (3, 263) = 108.39** η_p^2= .55
Trauma appraisals (CPTCI)	3.8 (4.8)	15.9 (5.8)	12.2 (6.3)	21.3 (6.4)	1< 2,3,4**	NS	4>2*	4>3**	F (3, 258) = 76.96** η_p^2= .47
Depressive appraisals (CTI-C)[†]	54.3 (4.8)	27.7 (13.2)	36.4 (9.6)	22.1 (10.9)	1< 2,3,4**	NS	NS	4>3**	F (3, 233) = 55.72** η_p^2= .42
Rumination (CRSQ)	8.10 (8.2)	27.2 (6.9)	17.6 (10.0)	29.1 (8.0)	1< 2,3,4**	2>3*	NS	4>3**	F (3, 253) = 55.86** η_p^2= .40
Cognitive avoidance (CAQ)	35.2 (14.9)	62.9 (17.9)	55.3 (11.9)	71.5 (16.3)	1< 2,3,4**	NS	NS	4>3**	F (3, 273) = 45.81** η_p^2= .34

Note: *p<.05 **p<.001 [†] Lower scores represent more negative appraisals. [a] Bonferroni post hoc tests. RCADS = Revised Child And Depression Scale – Depression Subscale; CATS = Child and Adolescent Trauma Screen; CPTCI = Child Post Traumatic Cognitions Inventory; CTI-C = Cognitive Triad Inventory – Child; CRSQ = Children's Response Style Questionnaire - Rumination Subscale; CAQ = Cognitive Avoidance Questionnaire.

regressions and thus was not retained for further analysis. Using the Enter method, predictor variables were inputted in three blocks into hierarchical multiple regression models of PTSS and depression symptoms. Block one controlled for demographic variables of gender and number of endorsed trauma types; negative appraisals (trauma related and depressogenic appraisals) were entered in block two; and maladaptive cognitive coping strategies were added in block three. Table 4 presents our results. A comparison of structure coefficients and standardized beta weights can be seen in Table 5 to aid interpretation of the regression results (Courville & Thompson 2001; Nathans, Oswald & Nimon, 2012).

The predictors in the regression model accounted for a great degree of variance in both depression (R^2 = .75, p=.000) and PTSS symptoms (R^2 = .78, p=.000). Entry of negative cognitive appraisals resulted in the largest change in R^2, explaining 47-48% of the variance in PTSS (ΔR^2 =.48 (F(4,215) =208.03, p=.000) and depression symptom (ΔR^2 =.47, F(4, 220) = 182.41, p=.000). Adding cognitive coping strategies resulted in small but significant changes in R^2 explaining a further 3%-4% of the variance in depression (F(6,218) =17.63, p=.001) and PTSS symptoms (F(6,213) = 14.80, p=.001) respectively.

Unique and Shared Predictors

Findings appeared to reveal unique (predicting variance in one disorder) and shared predictors (both disorders) for PTSS and depression symptoms. Number of endorsed trauma types (β=.10, t(220)=2.75 p=.006) was the only unique predictor of PTSS symptoms. Gender (β=.08, t(225)= 2.03 p=.044) and rumination (β=.15, t(225)= 2.26 p=.025) were found unique predictors of depression symptoms.

Cognitive avoidance, negative trauma-related appraisals and depressogenic appraisals were shared predictor variables in PTSS and depression symptoms. Cognitive avoidance showed similar standings in PTSD (β=.23, p=.000) and depression (β=.20, p=.000), also reflected in structure coefficients. Negative trauma-related appraisals was the strongest predictor in the

Table 4. Summary of hierarchical regression analysis: predictors of PTSS and depression symptoms

	PTSD symptoms (N=220)						Depression symptoms (N=225)					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
Variables	B(SE)	β	B(SE)	β	B(SE)	β	B(SE)	β	B(SE)	β	B(SE)	β
Gender	8.94 (2.50)	.35**	2.15 (0.93)	.08*	1.51	.06	4.73 (0.76)	.37**	1.49 (0.50)	.12*	0.97 (0.48)	.08*
No. of endorsed trauma types	2.74 (0.40)	.39**	0.65 (0.26)	.09*	0.67 (0.24)	.10*	1.06 (0.21)	.30**	0.21 (0.14)	.01	0.05 (0.13)	.01
Trauma appraisals			1.19 (0.10)	.68**	0.93 (0.11)	.53**			0.56 (0.05)	0.52**	0.29 (0.06)	.33**
Depressogenic appraisals			-0.12 (0.04)	-0.15*	-0.08 (0.04)	-.10*			-0.14 (0.02)	0.33**	-.010 (0.02)	-.25**
Cognitive avoidance					0.16 (0.03)	.23**					0.07 (0.02)	.20**
Rumination					0.04 (0.08)	.03					0.09 (0.04)	.15*
R^2	.28**		.75**		.78**		.24**		.71**		.75**	
F	44.36		168.52		131.71		34.59		136.76		110.83	
$^{\Delta}R^2$	.28**		.47**		.03**		.24**		.48**		.04**	

Notes: * p<.05 ** p<.001. B = Unstandardised Beta Coefficient, SE = Standard Error, β = standardised Beta Coefficient. $^{\Delta}R^2$ = Adjusted R Squared, F = F-statistic (ANOVA)

regression model for both PTSS and depression symptoms, supported by the highest ranked zero-order correlations and structure coefficients. However, the relative importance appeared higher in PTSS symptoms compared to depression (β=.53, p=.000 vs β=.33, p=.000). Negative depressogenic appraisals appeared to be a more salient predictor in depression symptoms (β=.25, p=.000) compared to PTSD symptoms (β=.10, p=.049) where it only just reached significance.

Table 5. Comparison of predictor regression beta weights and structure coefficients

	Depression symptoms		PTSD symptoms	
	Beta (standardised)	Structure coefficients	Beta (standardised)	Structure coefficients
Trauma related negative appraisals	.33	.97	.53	.98
Depressogenic negative appraisals	.25	.89	.08	.82
Cognitive avoidance	.20	.86	.16	.87
Rumination	.15	.90	.03 ^{NS}	.86
No. of endorsed trauma types	.01^{NS}	.37	.10	.47

The finding that rumination was not a significant predictor in PTSS appeared contrary to its high zero-order correlation and structure coefficient (r_s=.86), ranked the third highest significant predictor in PTSS symptoms. A further interesting finding was the relative importance of trauma appraisals in PTSS when no differences were found in correlation strengths and both had comparable structure coefficients. These contrasts suggest interplay between the variables, the underlying dynamics of which are not explicitly revealed in multiple regression models. Indeed, multiple regression models are critiqued in the presence of intercorrelation between predictor variables for being misleading in their interpretation of beta-weights (Courville & Thompson 2001). For instance a given variable's beta-weight may receive the credit for variance shared with another variable, which is then withheld from the

latter variable's beta-weight. Mitigating some of the limitations of multiple regression, Commonality Analysis (CA) specifically decomposes R^2 into non-overlapping partitions of variance for each variable and subsets of variables. This reveals how much variance each variable uniquely contributes to the model and the underlying patterns of shared variance between the variables contributing to the model. CA is also independent of variable order, which can cause differences and errors in interpretation in multiple regression methods (Nathans, Oswald & Nimon, 2012; Ray-Mukherjee et al., 2014). CA is recommended as a particularly advantageous tool for aiding interpretation of regression in correlated variables and theory building (Ray-Mukherjee et al., 2014; Kraha, Turner, Nimon, Zientek, & Henson, 2012; Nimon & Reio, 2011) and was therefore used in conjunction with the regression models.

Commonality Analysis: Unique and Common Variance

Table 6 summarises the total unique and common variances contributed by the cognitive predictors for PTSS and depression symptoms. With the exception of trauma-related appraisals in PTSS symptoms, which showed a moderate effect size (R^2 = 10, 12.3%), the unique variances of all cognitive predictors were small in effect (R^2 = .003 (0.04%) - .04 (5.5%)) in models of PTSS and depression symptoms. Trauma-related appraisals also explained the most unique variance in depression symptoms (R^2 = .04, 5.5%). Depressogenic appraisals was the second ranked predictor explaining the most unique variance in PTSS (R^2 =.03, 4.3%) and depression (R^2 =.02, 3.1%) symptoms. The common variance shared between the cognitive predictors was very high, particularly in rumination for depression (R^2 =.58) and PTSD symptoms (R^2 = .51) , equating to 92.1% - 99.9% of the total variance trumination contributed to the regression models. Table 7 delineates the variance partitions resulting from the commonality analysis. Similar patterns were seen in PTSS and depression symptoms in terms of the largest contributing third- and second-order commonality partitions. The largest partition contributing to R^2 overall was the third-order commonality of all predictors which explained 43.4 – 44.8% of the variance (R^2 =.34) in PTSS and depression symptoms.

Table 6. Summary of unique and common variances of predictors in PTSD and depression symptoms

	Depression Symptoms			PTSD symptoms		
	R^2			R^2		
Variable	Unique	Common	Total	Unique	Common	Total
Trauma related appraisals	.04	.56	.60	.10	.58	.68
Depressogenic appraisals	.02	.53	.55	.03	.48	.52
Cognitive avoidance	.02	.49	.51	.02	.50	.53
Rumination	.01	.58	.59	.003	.51	.51

Table 7. Commonality analysis: variance partitions in depression and PTSD symptoms

	Depression Symptoms		PTSD symptoms	
Variance partitions	R^2	% variance	R^2	% variance
Unique to CTI-C	0.02	3.14	0.03	4.29
Unique to CPTCI-S	**0.04**	5.52	**0.10**	12.34
Unique to CRSQ	0.01	1.04	0.00	0.04
Unique to CAQ	0.02	2.34	0.02	2.83
First-order commonality				
Common to CTI-C, CPTCI-S	**0.04**	4.80	**0.05**	6.34
Common to CTI-C, CRSQ	**0.06**	7.52	0.02	2.56
Common to CPTCI-S, CRSQ	0.02	2.47	0.02	2.49
Common to CTI-C, CAQ	0.00	0.40	0.01	1.63
Common to CPTCI-S, CAQ	0.02	2.99	**0.03**	3.63
Common to CRSQ, CAQ	0.02	2.86	0.01	1.21
Second-order commonality				
Common to CTI-C, CPTCI-S, CRSQ	**0.06**	8.09	**0.03**	4.40
Common to CTI-C, CPTCI-S, CAQ	0.02	2.36	0.03	3.45
Common to CTI-C, CRSQ, CAQ	0.02	2.52	0.00	0.19
Common to CPTCI-S, CRSQ, CAQ	**0.07**	9.11	**0.09**	11.26
Third-order commonality				
Common to CTI-C, CPTCI-S, CRSQ, CAQ	**0.34**	44.82	**0.34**	43.35
Total R^2	0.75		0.78	

Note: values in bold represent the largest contributing partitions to R^2 for PTSD and depression symptoms.

Discussion

The present study aimed to explore negative cognitive appraisals, cognitive avoidance and rumination as shared cognitive vulnerabilities in PTSD and depression. This was explored in probable diagnostic group differences as well at continuous symptom level, where we employed multiple approaches of correlation, regression and commonality analysis to better understand the relationships.

Comorbidity Prevalence

Our first aim examined the case prevalence of comorbid PTSD-depression in adolescents exposed to potentially traumatic events. Findings revealed 47.5% of cases meeting thresholds for probable PTSD and/or depression were comorbid; demonstrating comorbidity was more prevalent than either disorder singularly. These findings are in keeping with a national U.S. sample of adolescents (Kilpatrick et al 2003) and a meta-analysis of the adult trauma literature (Rytwinski et al., 2013) and may justify an increased focus on comorbidity.

Correlations of Maladaptive Cognitive Processes

Our second aim assessed the associations of negative cognitive appraisals (trauma-related and depressogenic), cognitive avoidance and rumination in PTSS and depression symptoms, finding all constructs highly correlated to both symptomologies. Furthermore only rumination showed a significantly stronger association in one disorder (depression) over another, highlighting shared cognitive processes. These results provide support to findings in the literature implicating these constructs in PTSD and depression in isolation (e.g. Meiser-Stedman et al., 2009, 2014; Dunmore et al 2001; Braet et al., 2015; Felton, Cole & Martin, 2013), but further the literature in demonstrating equivocal strengths of relationships when PTSS and depression symptoms are concurrently compared. Whilst our results endorse the suggestion that rumination is a transdiagnostic process in PTSS and depression symptoms (Ehring & Watkins, 2008; Birrer

& Micheal, 2011), the stronger association with depression symptoms compared to PTSS may suggest that rumination plays a somewhat more important role in depression severity.

A noteworthy finding was the similar correlation strengths of depressogenic and trauma-related appraisals, seemingly suggesting little specificity in the content of negative appraisals between PTSS and depression. This is consistent with findings in the adult literature (Gonzalo, Kleim, Donaldson, Moorey & Ehlers, 2012; Raab, Mackintosh, Gros, & Morland, 2015). This may be a reflection of both measures of negative appraisals tapping into similar latent constructs; indeed the correlation between the measures was high (r=.76) Possibly due to both disorders highly overlapping / a dimension of the same response or perhaps both types of appraisals are just separately very important in both disorders.

Diagnostic Group Differences

Our third aim explored probable diagnostic group differences in symptomology, negative cognitive appraisals, cognitive avoidance and rumination. All diagnostic groups endorsed levels of all cognitive processes and endorsement was significantly greater than the no diagnosis group, suggesting commonality in the cognitive processes employed, in line with a shared vulnerability hypothesis of comorbidity (see review Angelakis & Nixon, 2015). The PTSD and depression only groups were largely similar except for the depression group's significantly greater endorsement of depression symptoms and rumination. This appears to further highlight the more salient role of rumination in depression in line with our correlational results, but contrasts with Birrer and Michael's (2011) finding of no significant group differences in their adult sample. This disparity may be generated by methodological differences, as the authors did not define a comorbid group.

Some distinctions were underlined between the single disorders in comparisons to the comorbid group, where the PTSD group showed significantly less endorsement on all measures, but the depression group only significantly differed to the comorbid group on trauma appraisals and PTSD symptoms. Whilst the literature is scarce, similar group patterns were found for

negative appraisals in an adult sample (Gonzalo et al., 2012). One interpretation of this profile of findings could be that a more depressive response may generally encourage more depressogenic cognitive appraisals, cognitive avoidance, rumination or vice versa. Whilst this could lead to assumptions around specificity, the commonality of the endorsement of all maladaptive cognitive processes and both PTSS and depression symptoms in all diagnostic groups is more akin to a shared vulnerability hypothesis. Another interpretation could be that the PTSD only group is characteristic of a presentation reflecting a more low-level response, whereas the comorbid group may reflect a presentation of a more severe response promoting more adverse depression and PTSS symptomology. This may support the emerging concept of a single general traumatic stress latent construct (Dekel et al., 2014, O'Donnell, Creamer and Pattison, 2004; Elhai et al., 2011) with shared cognitive vulnerabilities that may promote broader symptomology to a greater or lesser extent.

Specificity and Commonality of Cognitive Predictors in PTSS and Depression Symptoms

Our final aim was to explore the specificity and commonality of negative cognitive appraisals, cognitive avoidance and rumination as predictors of PTSS and depression symptoms. The findings from our regression analyses revealed firstly, that the cognitive predictors appeared important, explaining a large (and similar) degree (75-78%) of the variance in models or PTSS and depression symptoms in adolescents, with cognitive appraisals explaining the majority of this variance. This is largely in line with other studies in the adult and adolescent literature demonstrating firstly the importance of cognitive predictors (Ehring et al., 2006; 2008; Kleim, Ehlers & Glucksman, 2012; Meiser-Stedman et al., 2009), and secondly that maladaptive appraisals may be a particularly important predictor of post-traumatic reactions (e.g. Ponnamperuma & Nicolson, 2016). The present study adds to the current literature by firstly extending these findings in predicting depression symptoms in adolescents, furthermore including

depressogenic appraisals, and finally comparing both PTSS and depression symptoms in the same study.

Interestingly, trauma-related appraisals appeared the most important predictor in both PTSS and depression symptoms suggesting a crucial role in both disorders. This is consistent, with the central role of trauma appraisals in models of PTSD (e.g. Ehlers and Clark, 2000) while we also find that the same appraisals appear central in depression in trauma-exposed adolescents even over depressogenic appraisals. This is supportive of research questioning the specificity of trauma appraisals to PTSD (e.g. Gonzalo, Kleim, Donaldson, Moorey & Ehlers, 2012). However the increased *unique* variance found for trauma-related appraisals in PTSS over depression helped to clarify the somewhat higher predictive power found in regression models, despite trivial differences in correlation strength and structure coefficients, suggesting some relative importance. We also find support for cognitive avoidance as shared a vulnerability of equivalent magnitude. One interpretation could be that cognitive avoidance may be a response to trauma-related content/intrusions shared in both PTSD and depression.

An interesting finding was rumination as a non-significant predictor in our regression model of PTSS symptoms, compared to wider findings in the adolescent PTSD literature (e.g. Meiser-Stedman et al., 2014; Michl, McLaughlin, Shepherd & Nolen-Hoeksema, 2013) and our high correlations and structure coefficients. Commonality analysis was able to further clarify the dynamics underlying this. Rumination was shown to contribute negligible *unique* variance in predicting PTSS symptoms but contributed greatly to the *common* variance. Thus rumination appears to play a crucial role in the interplay with the other maladaptive cognitive processes in predicting PTSS symptoms. Further research is required to better understand this interplay. Conversely, it is possible that this high common variance was artificially bolstered by the nature of the CSRQ combining items of rumination process and content, the latter could be similar to

items in the appraisal measures thus a measure of pure rumination process may be beneficial in future investigations.

The commonality analysis findings overall highlight that the unique variance contributed by any one cognitive predictor pales in comparison to its common variance, and a combination of all cognitive variables explained the most variance in both PTSS and depression symptoms. Furthermore, whilst cognitive appraisals may contribute the most unique variance in both disorders, and there appears to be some relative importance for trauma-related appraisals in PTSS symptoms, largely we find similar dynamics of shared cognitive processes predicting both PTSS and depression symptoms suggestive of shared vulnerability. These findings may add further understanding to previous research highlighting the overlap of PTSD and depression, high comorbidity rates and findings of a single latent general traumatic stress construct by identifying some of the underlying mechanisms and highlighting their interplay.

Implications and Further Research

Several implications may be drawn from our findings. Our findings confirm that comorbidity appears more prevalent with a more adverse presentation, than either depression or PTSD singularly in adolescents exposed to potentially traumatic events.

Comorbidity should routinely be assessed in adolescents exposed to potentially traumatic events, and that treatment should address PTSD-depression comorbidity. Furthermore, our finding of comparable PTSS symptomology in both the probable depression and PTSD only groups suggests that clinicians should pay specific attention to PTSS symptomology in adolescents presenting to services with depression. This is salient in view of suggestions that PTSD is often under-identified and untreated in adolescents, where depression may be more recognized (Havens et al., 2012; Gerson & Rappaport, 2013). Our findings highlight high comorbidity rates and shared underlying cognitive mechanisms; raising questions around the validity and meaningfulness of commonly used categorical diagnostic approaches. These findings

are aligned to calls in the literature and emerging models for dimensional approaches to assessment (Kotov et al., 2017; Cuthbert & Insel, 2013; Krueger & Markon, 2006; Riboni & Belzung, 2017).

A further implication comes from our findings based on a novel checklist (CATS part 1) of *potentially* traumatic events that may not necessarily meet the DSM A1 "traumatic stressor" diagnostic criterion, but nonetheless PTSS and depressive responses still emerged in our adolescent sample. Indeed, models of PTSD are found unchanged using subthreshold stressors (Zelazny & Simms, 2015). Controversy also exists around the subjective nature of assessment of the A1 criterion (Van Hoof et al, 2009; Brewin et al., 2009). Furthermore, whilst a recent meta-analysis of the adult trauma literature found a very small effect for a stronger relationship for A1 congruent events (over incongruent events) and PTSS symptoms (Larsen & Pacella, 2016), comparable and higher prevalence rates of probable PTSD are found in the adult (e.g. Long et al, 2008; Alessi, Meyer & Martin, 2013) and child and adolescent trauma literature (Verlinden et al., 2013).

Implications for the treatment of both singular disorder presentation and comorbidity are raised. Our findings identify cognitive appraisals, cognitive avoidance and rumination as shared vulnerabilities important in both PTSS and depression symptoms in adolescents. Thus interventions targeting these cognitive processes, particularly negative appraisals, may be beneficial. The finding that trauma-related appraisals were more important than depressogenic appraisals as a predictor of depression symptoms, is suggestive that current treatments for depression symptoms may need tailoring towards more trauma-related content of appraisals.

Limitations

The findings of the present study should be considered in line with the limitations. Firstly the cross-sectional nature and use of lifetime potentially traumatic events means the study is exploratory and causation cannot be assumed; prospective studies are required to further

corroborate these findings. Secondly, the probable diagnostic groups were established using thresholds of self-report clinically relevant symptoms rather than based on a structured diagnostic interview, thus probable diagnostic groups were merely indicative, limiting the generalizability. We also measured exclusively PTSS and depression symptoms and no other possible psychopathology that is frequently comorbid with PTSD and depression such as anxiety. Furthermore, we did not assess *history* of mental health difficulties, which may have been a significant confounding variable. An additional limitation comes from the use of community sampling, in that sample sizes of probable diagnostic cases were naturally small (N=11-21), thus further research employing larger sample sizes would be needed to draw stronger conclusions. Research employing clinical samples may also provide useful comparisons. It is also important to note that a wide range of risk factors have been implicated in both PTSD and depression and that the studied predictors are by no means exhaustive.

Conclusion

This study is the first examination of cognitive appraisals, cognitive avoidance and rumination in PTSD and depression simultaneously in an adolescent sample. We found evidence for transdiagnostic maladaptive cognitive processes in PTSD and depression, providing preliminary support for a shared vulnerability hypothesis in explaining the high level comorbidity between the disorders. The findings may also have clinical implications in the assessment and treatment of PTSD, depression and comorbidity. Future research may explore the cognitive predictors in prospective designs and clinical samples.

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Extended Methodology

This chapter presents further consideration of methodological issues outside of the scope of the empirical paper. Additional information and rationale is provided for the study's sample size, measures, procedure and ethical approval process. The chapter concludes with a discussion on the ethical considerations in relation to the study.

Considerations of Sample Size

The present study looked to recruit a minimum of 400 participants to increase the likelihood that participants with exposure to trauma and symptoms of PTSD, depression and comorbid PTSD/depression are detected in a community sample. This is in consideration of established rates of trauma exposure being around two thirds in similar samples (e.g. Copeland, Keeler, Angold & Costello, 2007) and prevalence rates of depression (around 12%) and PTSD (5%) in large community samples of adolescents (e.g. Merikangas et al., 2010). This decision was further informed by the supervising researcher's previous trauma research in a community sample of adolescents (Meiser-Stedman et al., 2009). Research question four utilizing multiple regressions with several predictors, likely required the largest sample size of all planned analyses therefore power analysis to determine minimum sample size were carried out. G*Power calculations (Appendix A) for multiple regression with seven predictor variables and small effect size (0.15) indicated a sample of 153, similar to the 150 suggested by power tables (Clark-Carter, 2010, pg. 659). Thus the targeted sample size provides more than sufficient power for all planned analyses, as well as secondary analyses.

Collaborative Working with Another ClinPsyD Trainee

To maximise data collection and minimise disruption to local schools, which are managing increasing multi-faceted burdens, elements of the empirical study employed collaborative working with another ClinPsyD Trainee at the University of East Anglia, Alice Alberici (names as a co-author, contributions can be seen on the empirical paper title page).

This involved two separate theses with different research questions and differences in the measures utilised to investigate these research, using one sample of participants with a joint ethics application and consent and data collection procedure. These projects shared measures of PTSD and depression but differed in that the other Trainee's empirical study looked at developing a novel measure of safety behaviours in PTSD and comparing sensitivity in PTSD, anxiety and depression in adolescents. The present empirical study looked at cognitive mechanisms of negative appraisals, cognitive avoidance and rumination comparatively in PTSD, depression and comorbid PTSD-depression in adolescents. Therefore in the questionnaire pack found in Appendix B additional measures not used in the present empirical study are included. This includes the anxiety subscale of the Revised Children's Anxiety and Depression Scale (RCADS) and the novel Child Safety Behaviour Questionnaire (CBSQ).

Supplementary Information on Measures

All measures were developmentally appropriate self-report questionnaires with proven good to excellent psychometric properties. Copies of the questionnaire pack employed in the study can be seen in Appendix B. Short versions of measures were considered most apt to minimise the burden of completion. Demographic information including age, gender and ethnicity was also collected. Measures used in the present study also were required to be freely accessible. The RCADS was specifically chosen as it is widely used in UK clinical settings and provides a short 10 item assessment of depression symptoms, with established cut-off scores with proven caseness sensitivity (Chorpita, Moffitt and Gray, 2005). Cut-off scores were calculated based on a T score of 70 or more (Chorpita, Ebesutani & Spence, 2015); this equated to a raw score of 17 for females and 15 for males.

The CATS (Sachser et al., 2017) was specifically chosen due to being the first measure based on the recent DSM-5 diagnostic criteria and upcoming ICD-11 criteria, with developmentally appropriate language for children and adolescents. The measure also expands

on the potentially traumatic events covered compared to previous available measures, which was considered beneficially for our community sample (as opposed to a specific trauma-exposed population) to capture the widest possible range of potential traumas.

Supplementary Procedural Information

Parents were sent information regarding the study and opt-out consent forms (see Appendix C) 2-4 weeks prior to proposed data collection as per approved protocol. Parents could opt-out their child from the study by the methods (detailed in the opt-out consent information discussed in this chapter later) up until data-collection and had a further three-eight months (before data anonymisation) to withdraw their child's data. Participant information sheets (Appendix D) and assent forms (Appendix E) were given to participants on the day of data-collection and participants were informed that participation was voluntary, and informed of their right to withdraw. Only pupils who provided their assent on the day (and for whom an opt-out request had not been received) were given a paper-based questionnaire pack. Questionnaires were completed using pen and paper in form time or during PSHE lessons taking around 20-30 minutes to complete. Teachers provided any non-participating pupil options of other activities during this time (e.g. reading). All participants were provided an aftercare sheet that named support contacts within the school and listed wider support such as GP, helplines and online support options (Appendix F). A wellbeing screen (discussed in detail below) was also conducted identifying any participants meeting or approaching "caseness" for mental health difficulties or where any concerning issues were raised (e.g. safeguarding). Questionnaires were then anonymised and responses entered into a password-protected database for analysis.

Participant Wellbeing Screen

Data from participant questionnaires was entered into a password-protected database using only identifier numbers and date of birth converted to numeric data (years and months).

Identifying names where contained in a separate, password-protected database. A wellbeing screen was then conducted where syntax was run in SPSS to identify any score that met threshold as stated by the authors of the measure or that approached threshold.

Meeting thresholds. The threshold for the RCADS was based on the clinical cut off of a T score of 70 or above for females and males aged 12-15 years (Chorpita, Ebesutani & Spence, 2015). This was then converted to a raw score for the age groups for boys and girls and any scores meeting these thresholds were flagged. The raw depression score cut-offs were 15 for males and 17 for females and raw anxiety score cut-offs were 21 for males and 25 for females. Total RCADS raw scores of over 34 for males and 40 for females were also flagged up.

The Child and Adolescent Trauma Screening (CATS) is a novel measure of PTSD symptoms based on the DSM-5 with recent validation of its psychometric properties (Sachser et al., 2017). As such there were no published cut-off scores available during the undertaking of the present study. In contacting the authors, a cut off of 21 was noted as being used clinically based on the authors ROC analysis with the CATS measure. This however led to what was felt a sensitive analysis, with prevalence rates of around 20% found within our community sample which is substantially higher than suggested by the literature (e.g. Marianas et al., 2010). We therefore established an SPSS algorithm in accordance with DSM-5 symptoms of a diagnosis of PTSD, which resulted in more conservative prevalence rates in line with the literature. We acknowledge the limitations of this method in that this is not benchmarked against a DSM-5 diagnostic interview. However, the CATS measure is meant as a screening tool for post-traumatic stress symptoms and potential PTSD, and as the authors note (Sachser et al., 2017), the measure does not replace a structured diagnostic interview. In the present study we primarily investigate continuous symptom severity, however where we have made diagnostic

group we refer to these groups as probable, to reflect the measure and the lack of diagnostic interview.

Approaching thresholds. The nature of cut off scores and self-report questionnaires mean that individual's responses on a given day scoring just below threshold may not be flagged, despite the potential for significant difficulties being present. In light of this, and as part of our commitment to the wellbeing of our participants, a decision was agreed to also identify participants with scores "approaching threshold". For the RCADS measure a sub-threshold cut-off was used of 1 point below cut-off for depression scores, 2 points below for anxiety scores and 3 points below for total RCADS scores in line with sub-clinical T-scores. In respect of the CATS measure an algorithm was established to identify subsyndromal PTSD in line with the DSM-5 where at least 5 of 6 of the symptom clusters and impairment were met.

Processes following the wellbeing screen. In addition to thresholds for symptoms of mental health difficulties, any participant whose responses indicated potentially concerning issues were also identified (e.g. safeguarding). A password-protected anonymised database was then created, with the flagged participant numbers, indicating which thresholds they had met or were approaching. This was also anonymised in the sense that a code was used (i.e. threshold 1, 2 or 3 to denote depression, anxiety or PTSD and colours red, orange, yellow to denote safeguarding, meets threshold or approaching threshold) to protect the database being interpreted without further information. The necessary key of information was provided in a separate password-protected document, as was the document containing the identifiers of the participants. All of this information was provided in succession to the named contact within the school to be used in line with the protocol and schools policies (e.g. safeguarding). In line with our protocol we provided a letter to be given to parents explaining that their child had been identified within our wellbeing screen with signposting to further support services (see Appendix G).

Ethical Considerations

Ethical approval and amendments. Ethical approval for the study was granted by East Midlands - Derby NHS Research Ethics Committee (REF/16/EM/009 – 8th February 2016) (see Appendix H). Although we recruited a non-clinical sample, advice from the local R&D team recommended the study was best considered by an NHS ethics process due to the procedure of screening for "caseness" of mental health difficulties. During the study two substantial amendments were submitted to the appointed Research Ethics Committee (REC). The first amendment was driven during the recruitment stage due to the uncertainty of being unable to predict the response rate of participants, which is often fairly low in similar studies (e.g. 40% in a similar study by Meiser-Stedman., 2009). Having an approved sample size of 400 would therefore restrict the number of participants that could be approached at a school at one time. The study had also received interest from three schools at the time and with a restricted sample size would need to wait to see how many participants responded from the first round of data-collection. This would potentially cause extra burden and disruption within schools. Increasing the approached sample size to 1000 would accommodate a low response rate as well as allowing us to simultaneously recruit increases samples from schools/ multiple interested schools. This amendment was approved by the REC on 24th April 2016 (see Appendix I).

The second amendment was to reduce the approved notice period between providing parents information sheets and opt-out consent forms to data collection from four weeks to two weeks. In the original protocol we provided weeks notice and also a reminder at two weeks. This was for two reasons; firstly one of the schools we were working with were concerned a four week lapse in time may be unhelpful for parents. In that it may increase forgetting and the process of sending information out twice to parents was considered potentially unnecessarily burdensome for both parents and the school. Secondly a four-week lapse caused issues with

timing around the school terms and half term breaks for both the school and the researchers. Thus reducing this lapse would reduce the burden on parents and the school and would make the process of data collection easier for the researchers and for the school. The two-week time frame was considered ample timeframe, particularly in light of the assent process on the day of data-collection. This amendment was approved by the REC on 2nd November 2016 (see Appendix J).

Use of opt-out consent. Careful consideration was made around the consent process in the present study, specifically in terms of opt-out vs opt-in consent. This is a widely debated issue in the literature around research methods in children and young people. Opt-in consent requires the parent to opt their child into a research study, usually by return of completed consent form. This is considered to be the most fail-safe way of ensuring that parents have provided informed consent, as it requires an active process, i.e. the consent form must be actively returned in order for the child to participate; however this process is criticized for several reasons.

Firstly a form may not be returned for a multitude of reasons that may not relate to a lack of consent. Secondly significantly poorer response rates are inherent in opt-in consent compared to opt-out consent is widely recognized (e.g. Doumas, Esp & Hausheer, 2015; Johnson, Morris, Rew & Simonton, 2016; Shaw, Cross, Thomas & Zubrick, 2015; Totura, Kutash, Labouliere & Karver, 2017). Poor response rates are particularly harmful to research, such as the present study, which investigates prevalence rates. Prevalence rates of depression and PTSD are already low in community samples thus a relatively large sample would be required to foster adequate detection. Furthermore samples tend to be biased and under-representative of problematic or risky behaviours, physical and emotional health problems, and adversity (Courser, Shamblen, Lavrakas, Collins & Ditterline, 2009; Douman et al., 2015; Shaw et al., 2015; Wolfenden, Kypri, Freund & Hodder, 2009). This could be particularly

important in the adolescent sample and topic investigated in the present study, which appears highly neglected in the literature, necessitating much needed exploration. Thus opt-in response bias would be particularly detrimental to the quality of the present study, indeed, poor quality research itself can be considered unethical. Opt-in procedures, and attempts to encourage returning of consent forms can also be burdensome for schools. Particularly in light of the already high level multiple demands on schools and teachers this can have serious impacts on the feasibility of undertaking research within schools.

A further factor to consider around opt-in vs opt-out consent is the issue of children's rights. The UN convention on the rights of the child (United Nations, 1989) delineates the rights of children and young people to have a voice on matters that affect them, which is developmentally considered. A growing literature focuses on translating these rights to research participation and how a traditional "done to" approach may violate these rights particularly for adolescents (e.g. Balen et al., 2006; Dockett, Perry & Kearney, 2013; Lundy & McEvoy, 2012; Maguire, Byrne & Kehoe, 2016). Gatekeeper control (e.g. parents, schools, guardians) around consent has been criticized as blocking access to research participation for young people who may have the capacity to make informed decisions themselves (Heath, Charles, Crow & Wiles, 2007). In consideration of the importance of gaining the views and experiences of young people affected by trauma, Carroll-Lind, Chapman, Gregory and Maxwell (2006) employed opt-out consent procedures in their study on children's experience of violence. The authors warranted this process to reduce the restrictions put upon young people by the "adult filter", essentially increasing young people's choice to participation, whilst also giving parents the informed choice to opt their child out.

We felt that a similar process of an opt-out parental informed consent process with a participant informed assent process on the day of data-collection would be most suitable for several reasons. Our target sample were adolescents aged between 12 and 16 years old;

considering their developmental stage and capacity to make informed decisions we felt it important to ensure a balance between parent informed consent whilst also promoting the rights of the adolescents. We felt this was particularly important in consideration of access to the mental health screening for PTSD, depression and anxiety, which was part of the study. In line with ethical principles to maximize benefit and reduce risk and harm for participants it was felt the screening could be valuable to the wellbeing of affected young people. An opt-out consent process would also increase the size and representativeness of the sample, increasing the ability to detect PTSD and depression symptoms and reduce selection bias to increase the quality and wider value of the research.

Further provisions to carefully consider the use of opt-out consent included: advice sought from local Research and Development teams and the university on viably using an opt-out process in the study, The primary research supervisor was also experienced in this consent methodology in similar samples (e.g. Meiser-Stedman, Dalgliesh, Yule and Smith, 2012, Meiser-Stedman et al 2009) thus experience and confidence could be drawn. Furthermore endorsement from the recruited schools for this consent process was sought (see Appendix K.). To maximize the ease of which parents could opt-out their child from the study, various methods were facilitated; returning the opt-out form to a designated point of contact (predetermined by the school) within the child's school, informing a designated member of staff in person, contacting the school or researchers by telephone or email. This opt-out consent process was approved by the appointed ethics committee and participating schools.

Confidentiality and Withdrawal. Participants and their parents were informed in the information sheets that confidentiality may be breached where concerns around risk of harm are raised; in which case school safeguarding procedures may be undertaken. Furthermore in line with the wellbeing screening procedure, it was outlined in the consent forms, assent forms and information sheets that parents and the school would be informed if a participants

responses indicated potential mental health difficulties.

Names, identification numbers and electronic data were stored separately on password-protected databases only accessible to the research team. Paper-based data was secured in a locked filing cabinet at the university, where they remain until study completion, when it will be destroyed. Participants were informed of their right to withdraw, without repercussion, verbally immediately before the assent process, and again in written form on the assent form. Parents were also informed of their right to withdraw their child from participation or to withdraw their child's data, without repercussion.

Consideration of potential risks for participants and researchers. Although this topic of the present study may include potentially sensitive topics such as trauma and mental health in adolescents, similar topics and methodology have been studied in adolescent samples in many large-scale epidemiological studies. A recent meta-analysis across 70 samples found that although a minority experienced some distress immediately following trauma research, this was mild and transient and did not lead to regret in participation (Jaffe, DiLillo, Hoffman, Haikalis & Dykstra, 2015). Indeed of the 6000 adolescents Landolt et al (2013) surveyed on trauma exposure and PTSD, only two were noted to have stopped data-completion due to distress. Therefore risk of distress may, contrary to perception, be low; nevertheless careful consideration was made around the issues of managing potential distress. Firstly, researchers underwent training on managing potential distress; a named person within each school with experience around pastoral support was also identified and made known and available to participants; the researchers were also on-hand to support participants and staff. An aftercare sheet was also given to participants providing sign-posting to available support mechanisms within the school, community and also helplines and online resources.

Extended Results

The present chapter reviews the assumptions of the planned analyses in the study; how there were examined and steps taken to manage any violations in the data, as well delineating the method of regression used.

Assumptions of Normality: Skewness, Kurtosis and Normality Tests

To investigate whether the data met the assumption of normally distributed data for relevant planned analyses (Pearson's correlation, t-test and ANOVA), checks for normality were made for each variable for the overall exposed sample as well as for each diagnostic group (no diagnosis, depression only, PTSD only and comorbidity). Histograms and q-q plots of the raw data and residuals were inspected visually. Outputs from normality tests (Kolmogorov-Smirnov) and skewness and kurtosis values were also reviewed.

Exposed sample. All sample distributions of variables for the overall exposed sample appeared visually skewed on the histograms towards the "normal" or non-pathological end of the variable scales. Q-Q plots revealed a general following of the normal distribution line but with a slight snake indicating a positive skew. This is reflective of using psychological measures in community sample where skewness towards the lower (non-pathological/maladaptive) values may be expected. However, upon inspection of the skewness statistics, summarised in Table 1., no value was higher than the +/-2 (George, 2011; Gravetter & Wallnau, 2014) or the more conservative +/- 1.5 rule of thumbs (Tabachnick & Fidell, 2013), which indicate permitted bounds of normality. However rules of thumb appear to differ and larger rules of thumbs around skewness of 3 perhaps reflect more real world data and robustness of parametric tests (Kline, 2015). Indeed, Blanca, Arnau, López-Montiel, Bono and Bendayan (2013) looked at 693 samples and found only 5.5% of sample distributions were close to expected values under normality. They found the skewness and kurtois ranges of sample data used in parametric tests to be -2.49 – 2.33 and -1.92 –

7.41. Kurtosis statistics were also examined and no value exceed the rule of thumb of 7 (Byrne, 2010).

Table 1. Summary of Skewness and Kurtosis Statistics for overall exposed sample

Variable	Skewness	Kurtosis
CATS (PTSD symptoms)	1.09	0.47
RCADS-depression	1.26	1.12
CPTCI-S (Trauma appraisals)	1.32	0.93
CTI-C (depressogenic appraisals)	-0.81	-0.16
CAQ (cognitive avoidance)	0.88	-0.01
CSRQ (rumination)	0.90	-0.18

Additionally the normal distribution assumption of parametric tests that were planned for the data corresponds to normally distributed sample means or put another way, the sampling distribution should be normal. This is distinguishable from the shape of the distribution of the raw data (Field, p134). Central Limit Theory (CLT) states the sampling distribution will approach the normal distribution as sample size increases. Furthermore in large samples the sampling distribution should always be normal regardless of the shape of the distribution. Authors suggest different rules of thumb for quantifying a 'large sample' in line with central limit theory. Clark-Carter (2010, p189) suggests N>40 whereas Mordkoff, (2011) suggests sample of N>30 will benefit from CLT in that the sampling distribution above this threshold can safely be assumed normal. Smith and Wells (2006) tested CLT in a range of non-normal data, proposed to represent the distributional characteristics of "real world" psychometric data. Simulations were run in various samples from 5 to 300 under increasing levels of heavy skew and kurtosis and found that a sample size of 175 was the point at which normality became consistent.

Kolmogorov-Smirnov (K-S) tests were run for all variables in the overall exposed sample (N=220-276 depending on missing data for each variable), which were all significant. This highlights a well-known limitation of the normality tests; validity of these tests is limited by sample size (Field, 2005 p144). Where power to detect even minor deviations from normality increases as a function of sample size, thus large sample sizes ultimately generate significant values. Thus it is not surprising that the large overall sample size in the present study generated significant non-normality values. Therefore, interpretation of normality tests is not recommended in large samples (Field, 2005 p148).

In consideration of the above, particularly in terms of the large size of the sample and no kurtosis or skewness values outside of widely acknowledged bounds, we considered the exposed sample data in the present study to meet the normal distribution assumption for analyses.

Diagnostic groups. The sample was split into four probable diagnostic groups (no diagnosis (N=234), depression only (N=11), PTSD only (N=14) and comorbid PTSD/depression N=21) based on cut-off scores on the RCADS depression subscale and the CATS PTSD symptom scale. Inspection of histograms and Q-Q plots showed some visual differences in skewness between the diagnostic groups. Although there were individual differences in each variable for each diagnostic group, broadly the most evident differences came from the no diagnosis groups being skewed positively towards non-pathological/maladaptive scores and the comorbid group being negatively skewed in the inverse relationship.

Skewness and kurtosis statistics were examined and showed no values outside of widely acknowledged bounds discussed previous (see Table 2). Tests of normality (K-S tests) tests were non-significant for all variables in the depression only, PTSD only and comorbidity groups for all variables suggesting no concerns with non-normality. Although normality tests for the no

diagnosis group (N=234) were significant this is related to the large sample size and cannot be validly interpreted (Field, 2005 p148). Despite suggestions of no problematic deviations from normality in terms of normality tests, skewness and kurtosis statistics and inspection of normality plots for each diagnostic group in isolation, caution was heeded due to the skewness differences between groups and the smaller sample sizes of some of the groups. This was considered in line with other ANOVA assumptions below.

Table 2. Summary of Skewness and Kurtosis Statistics for diagnostic groups

	No diagnosis		Depression only		PTSD only		Comorbidity	
	Skew	Kurtosis	Skew	Kurtosis	Skew	Kurtosis	Skew	Kurtosis
RCADS - depression	0.80	-0.04	-1.51	3.42	-1.04	0.74	0.21	-1.34
CATS	1.30	2.22	-0.90	0.27	0.01	0.52	-0.59	-0.62
CPTCI-S	1.77	2.12	-0.81	0.26	-0.94	-0.63	-1.52	2.26
CTI-C	-0.86	0.24	0.82	-0.25	0.79	1.28	0.54	0.16
CAQ	1.01	0.24	0.14	0.15	0.62	0.29	-0.73	1.26
CRSQ	1.11	0.73	-0.65	-0.39	0.25	-0.43	-1.43	2.94

Further Assumptions in One-Way ANOVA

Assumptions of level of measurement and independence were met in the independent and dependent variables. The no diagnosis group was substantially larger than the other diagnostic groups. Unequal sample sizes can impact on the assumption of homogeneity of variances in ANOVA. On inspection of Homogeneity of variance tests (Levene's) all statistics were non-significant suggesting no significant problems with unequal variances. However to be conservative we decided to employ a GLM (regression) method of ANOVA instead of a variance-ratio method, where unequal sample sizes are substantially less problematic (Field, 2005 p350). In using the GLM model this also permitted the use of bootstrapping as an add-on,

which could be useful for our concerns around small samples in some groups and potential issues with skewness.

Bootstrapping is considered to increase robustness of distributional sampling and creates more robust and valid confidence intervals and parameter estimates (particularly in small samples) (Wilcox, 2005; Efron, 1987). Furthermore bootstrapping does not rely on a normally distributed data set, and retains the units of data to avoid the problems found in interpretation of transformation methods. Bias Corrected and accelerated (BCa) is a particular method of bootstrap that also corrects for skewness in the bootstrapped data (Efron, 1987; Neal & Simons, 2007;). BCa is a newer method shown to be more reliable and provide better coverage of confidence intervals and considered superior to percentile bootstrapping (Wichmann & Hill, 2001). The procedure corrects in an inverse nature thus is useful for both positive and negative skews.

Assumptions in Regression Analyses

Several procedures were undertaken to check for violations in assumptions inherent in the regression model. Histograms of the models were inspected (Figure1-2) which followed a bell curve indicative of normal distribution of residuals. Scatter-plots of the standardized residual and standardized predicted values were inspected for linearity and homoscedasticity. The plots appeared to meet assumptions with no funneling (indicative of heteroscedasticity) or curving (indicative of linearity violations). Durbin-Watson tests of autocorrelation, relating to the assumption of independent errors, were performed. Test statistics were 2.01 in the regression model for PTSD symptoms and 1.82 in the regression model for depression symptoms. These values are very close to 2, which is considered the normal value and well within rules of thumb of 1-3, exceeding which would be cause for concern (Field, 2005 p221). Finally Variance Inflated Factor (VIF) values were examined to check for multicollinerity and no variable

exceeded the widely acknowledge critical value of 10 (extreme multicollinerity) or the more conservative value of 5 (O'brien, 2007; Menard, 1995;).

Hierarchical Regression

Multiple regression was employed to investigate which cognitive variables, in the presence of each other, best predicted models of PTSD and depression symptoms, as well as evaluating the contribution of each of the predictors in the models. Hierarchical regression was chosen instead of other multiple regression methods such as stepwise regression for several reasons. Stepwise regression makes decisions about which variables best predict a model based on statistical criterion, whereas the decision process is researcher-led in hierarchical regression, based on theoretical knowledge. A common consensus is quoted by Kerlinger (1987):

" there is no substitute for depth of knowledge of the research problem . . . the research problem and the theory behind the problem should determine the order of entry of variables in multiple regression analysis"

Therefore, stepwise procedures may be best suited to situations in the absence of a theoretical foundation. Drawing on the theoretical base the different roles of cognitive appraisals and cognitive coping strategies can be differentiated. Cognitive appraisals can be considered as a process of evaluation of a situation or occurrence in a framework of sense making. In terms of exposure to stressful and potentially traumatic events appraisals are understood as the evaluations of the meaning of the event (determinations of threat and control; attributions of why and how the event took place; implications of the event) in line with an individual's global belief system (beliefs about self, world, others; goals; subjective sense of self and purpose) where discrepancies are hypothesised to impact distress and adjustment (see Park, 2010 for review). Cognitive avoidance strategies on the other hand, are considered a mechanism of maladaptive coping (Blalock & Joiner, 2000; Skinner, Edge, Altman & Sherwood, 2003; Roth & Cohen, 1986). Further distinction could conceivably be drawn in the sense that appraisals are likely

primary to the response of coping. Ehlers and Clark in their model of PTSD also highlight appraisals as a distinct process from avoidance strategies (coping), although these strategies in the model may maintain the appraisals.

For these reasons variables were separated into three blocks; demographic variables; cognitive appraisals (trauma appraisals and depressogenic appraisals) and cognitive avoidance strategies (cognitive avoidance as defined by the CAQ suppression (suppression, substitution, distraction and avoidance of stimuli) and rumination). And entered in this order to reflect the primary nature of appraisals compared to coping strategies.

Hierarchical regression is also particularly useful for predictors that are correlated (Pedhazur, 1997) and is suggested to minimise pitfalls of stepwise regression such as issues around degrees of freedom, dependence on sampling error and situational-specific results and replicability (Lewis, 2007; Thompson, 1995).

Figure 1. Histogram depiction of regression model residuals for depression symptoms

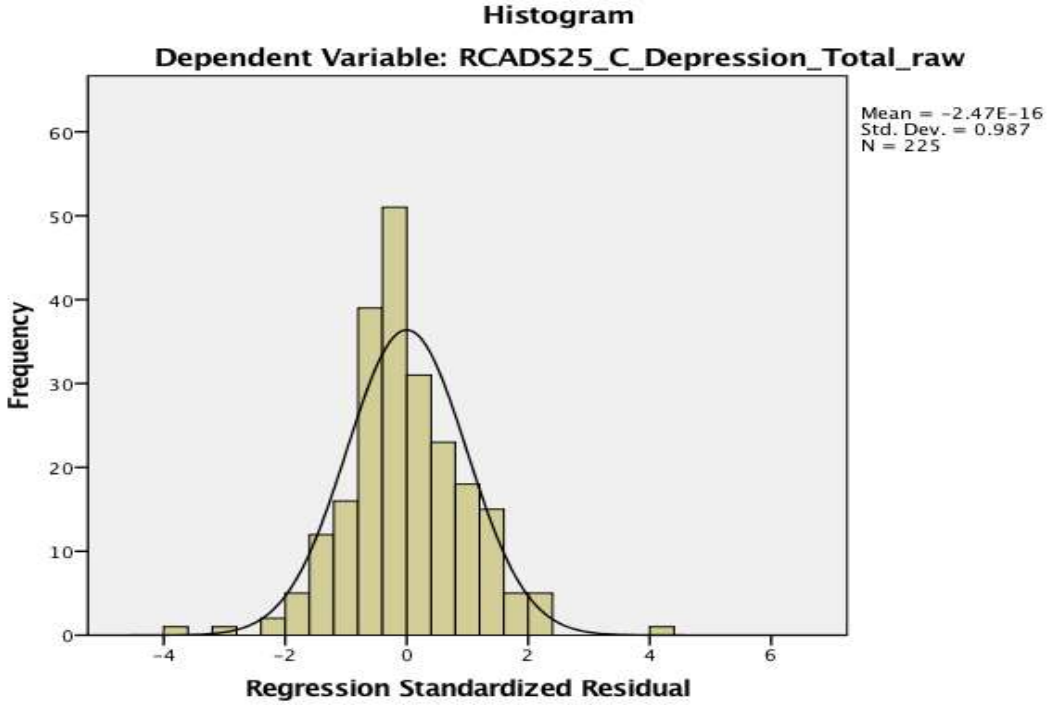
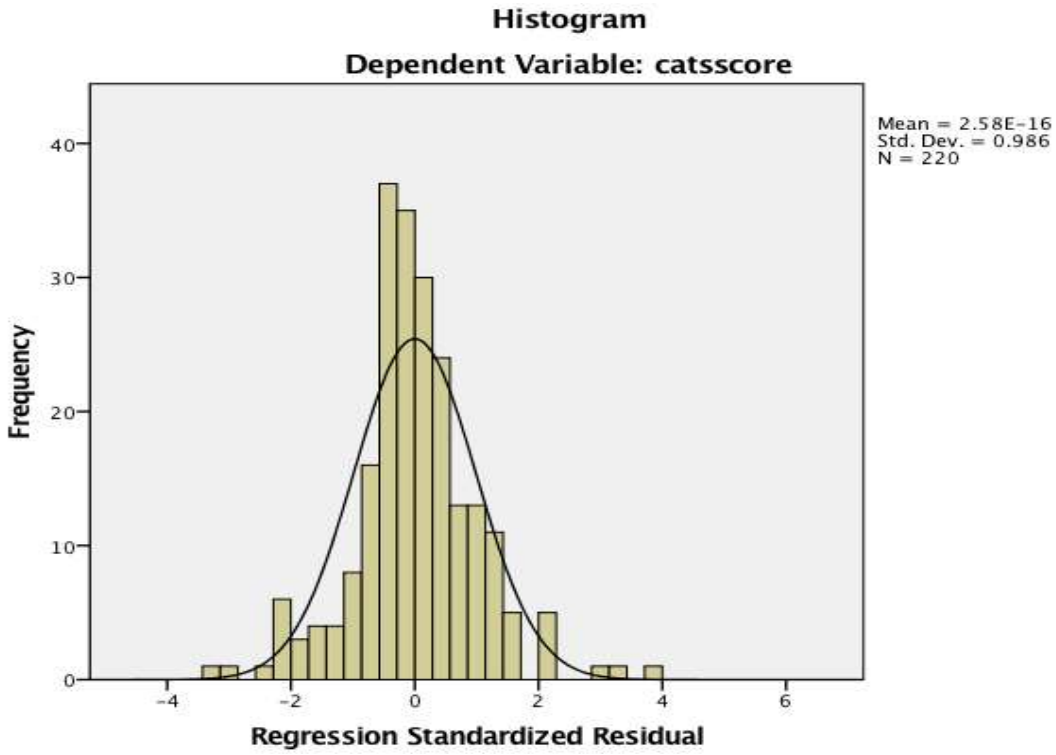


Figure 2. Histogram depiction of regression model residuals for PTSS symptoms



General Discussion

This chapter presents firstly an overview of the results from both the meta-analysis and empirical paper and considers these findings in context of the wider literature relevant to the field. An account of the strengths and limitations of the study will then be delineated. A discussion of the theoretical and clinical implications in view of the findings will follow. Finally, the chapter will present suggestions for future avenues of research and overall conclusions highlighted.

Overview of Findings

Of 12 risk factors explored in 59 studies in the presented meta-analysis, 11 were found to be significant predictors for depression in trauma-exposed children and adolescents. Direct vs indirect exposure was the only non-significant predictor. Small effect sizes were found for the majority of risk factors (age, prior trauma exposure, low family income, gender, trauma severity, peri-traumatic distress and maternal depression). The most prominent finding, and the only large effect size found, was for the presence of PTSD symptoms (r=.58), however notable moderate effect sizes were found for bereavement, avoidant coping and low social support.

Differences between the categories of risk factor (pre-,peri-, post-) were found in the effect sizes. Small effects were largely found for pre-trauma demographics and variables related to the trauma itself, whilst our most prominent effect sizes came from variables related to post-trauma variables. This suggests an individual's post-traumatic reactions and environment may be the most important factors in the development of depression in children and adolescents.

The findings from the presented empirical study highlight the high degree of association between PTSD and depression symptoms (r= .79) and high levels of comorbidity. Indeed we found higher rates of probable comorbid PTSD-depression cases than either singular disorder. We also found evidence for the negative appraisals, cognitive avoidance and rumination as shared vulnerabilities in PTSD and depression, at symptom level and in probable diagnostic

categories. Furthermore we found negative appraisals, in particular trauma-related appraisals, to be the most important predictor of both PTSD and depression symptoms in regression models. Commonality analysis also allowed us to explore the interplay of unique and common variance contributed to the regression by the predictors. We found that the unique variance of any single predictor was generally small, particularly in comparison to its common variance with the other predictors. This suggests that the interplay between the variables appears important. We found this especially true for rumination, which showed negligible unique variance, particularly in the model of PTSD symptoms.

Probable diagnostic group comparisons highlighted that all groups endorsed PTSS and depression symptoms and all maladaptive cognitive processes. However the comorbid PTSD-depression group showed a more severe profile of increased symptomology and greater endorsement of maladaptive cognitive processes. Despite the PTSD and depression only groups being largely similar in their profiles of symptomology and maladaptive cognitive processes, there were differential patterns compared to the comorbid group. The PTSD only appeared to have the least severe symptomology and the least endorsement of maladaptive cognitive processes.

Links with Previous Research

Pre-trauma risk factors for depression.

Age, gender and low family income. Older age was shown to be a particularly weak but significant effect size across 26 studies (r=.10) in our meta-analysis. This may be a surprising finding when the depression literature emphasizes adolescence as a key developmental age of depression compared to childhood. For example Hankin et al. (2015) found longitudinal increases from 5% prevalance rates in 8-14 year olds to 20% in 14-17 year olds. However our findings appear to show that in a range of trauma-exposed samples, although a significant effect as a risk factor for depression appears to exist, this effect is weak. Additionally, another small

meta-analysis of older age in disaster-exposed children and adolescents found no significant effect (Tang et al., 2014). In consideration of the specific trauma type examined by Tang it is possible that there may be differences between trauma types. Our empirical study also demonstrated age to have no predictive power in linear regressions of depression symptoms (or PTSS), providing further evidence regarding the weak effect of age. An important consideration is the suggested interplay between age and gender; where gender differences in the onset of depression appear to emerge in adolescence (e.g. Nolen-Hoeksema, 2001; Hankin et al., 1998). We were not able to explore gender as a moderating variable of age in our meta-analysis.

Theoretical models to explain gender differences in depression have focused on a stress-diatheses framework where developmental, biological, cognitive and social vulnerabilities (particularly emergent in adolescence) interact with stressful events, which may support an increased risk in trauma-exposed females (Girgus & Yang, 2015; Cyranowski, Frank, Young & Shear, 2000; Hankin & Abramson, 2001). However, the effect of female gender on depression in exposed-samples in the presented work appears modest. One consideration is that in our empirical study the age range was 12-15 years, however dramatic gender differences have been found to take affect most prominently in adolescents aged 15-18 years (Hankin et al., 1998). Thus is possible that both age and gender may have been more influential in our empirical study as a predictor if our age range was wider. However the effects found may be considered in line with the findings of our meta-analysis based on 26 effect sizes for age and 32 effect sizes for gender.

Low income is suggested to impact mental health through the barriers faced by low-resource settings. This may include reduced access to mental health services due to funding or a lack of qualified clinicians, increased exposure to trauma and increased trauma-related loss (e.g. property damage) due to reduced preparedness/responses (Davidson, Price, McCauley & Ruggiero, 2013; Divan, 2017; MeriKangas et al., 2010). Although low-resource settings may

particularly relate to low-income countries, this is also in line with a more general hypothesis: the family investment model (Conger & Donnellan, 2007). This posits poorer families are subject to more adverse environments and barriers to accessing adequate services, thus children may be exposed to increased hardship, trauma and receive less support/treatment. Indeed increased exposure has been found in lower-income families (Finkelhor, Ormrod, Turner & Hamby, 2005). Although a small effect size was found for low family income as a risk factor for depression, this was only based on three studies. This further highlights the paucity of literature in this area, and as such requires further investigation.

Prior trauma exposure. A small effect size was found for prior trauma exposure in the presented meta-analysis, in line with a meta-analysis of children and adolescent samples in the disaster trauma literature (Tang et al., 2014) and a wider epidemiological study in the adolescent literature (Copeland, Keeler, Angold & Costello, 2007). Our results for prior trauma exposure were found to be subject to heterogeneity, with widely ranging effect sizes (r=.001 – r=.44), thus caution must be taken in their interpretation. Methodological differences in the way prior trauma is distinguished may contribute to such disparities, such as binary measurement, several categories, or experience of specific trauma exposure (e.g. sexual abuse, diasters). This is important as evidence suggests that resilience to depression may be similar in groups that have had 1 or no prior exposures, but substantially decreases with two or three prior exposures and further decreased with four or more exposures (Bonanno, Galea, Bucciarelli & Vlahov, 2007). Indeed this notion is increasingly receiving attention under two concepts; poly-traumatization (Gustafsson, Nilsson & Svedin, 2009) and cumulative trauma (Cloitre et al., 2009, Hodges et al., 2013) found to predict the level and complexity of mental health symptomology superseding the specifics of the trauma type itself. Therefore consideration of the small effect size we found in terms of these methodological issues may be wise, and further research in this area is necessary to draw any conclusions.

Peri-trauma risk factors for depression.

Direct trauma, trauma severity and peri-traumatic distress. The effect size found in our meta-analysis for direct (as opposed to indirect) trauma as a risk factor for depression was approaching zero (r=.007). This was however only based on four studies highlighting the dearth of research examining this. In contrast, a recent systematic review of the adult literature has explored direct and indirect trauma in the development of PTSD symptoms and suggests PTSD can develop in response to indirect trauma although the probability of this may be lower than the risk of developing PTSD from direct exposure (May & Wisco, 2016).

Peri-traumatic distress has been implicated widely as a risk factor for PTSD and this effect was quantified as moderate in a meta-analysis of the child and adolescent literature (Trickey et al., 2012). However a lack of research exists in consideration of peri-traumatic distress as a risk factor for depression with only four studies included in our meta-analysis. In contrast to the PTSD literature, we found a homogenous small effect size suggesting that peri-traumatic distress is less important in depression symptoms. However prior to the introduction of the DSM-5 in 2013, peri-traumatic distress was part of the essential criteria for PTSD diagnosis under criterion A2 (the person's response involved intense fear, helplessness, or horror). Therefore the stronger relationship found in PTSD could in part reflect this diagnostic relationship.

Trauma-severity may be particularly difficult to quantify and the assessment of which can vary between trauma types. For example an injury-related trauma might afford more objectively measureable criteria than the experience of sexual abuse or war. Therefore questions may be raised about whether different assessments of trauma severity tap into a common construct. Furthermore Ying, Wu, Lin and Jiang (2014) in their study of adolescent survivors of the Wenchuan earthquake highlight the multi-faceted nature of trauma severity requiring the consideration of multiple factors. However their findings were also small in effect consistent

with our meta-analysis suggesting, this may be a modest risk factor for depression in trauma-exposed children and adolescents.

Bereavement. Bereavement is linked to increases in depression symptoms in the acute periods and long-term following loss of parents or siblings in young people (e.g. Gray, Weller, Fristad, & Weller, 2011; Stikkelbroek, Bodden, Reitz, Vollebergh & van Baar, 2016). However evidence suggests only 1 in 5 adolescents develop a mental health disorder (Dowdney, 2008). However, the circumstances surrounding the loss such as traumatic loss, have been found particularly important in predicting the development of disorders such as depression and PTSD (Kaplow & Layne, 2014; Keyes et al., 2014; Brent, Melhem, Donohoe & Walker, 2009). Traumatic loss is shown to produce a more intense, prolonged and pervasive impact compared to non-traumatic loss (Barlé, Wortman & Latack, 2015). In line with these findings, our meta-analysis reveals trauma-related bereavement to be a risk factor of moderate effect size for depression in trauma-exposed child and adolescent samples, comparable to Tang et al. (2014). In fact this was the third largest effect size of our 12 risk factors examined, highlighting its prominence.

Although trauma-related bereavement may be a characteristic of the traumatic event, its impacts are pervasive post-trauma including continuing distress through grief, impacts to the family dynamics and availability of care and support from bereaved family members. Indeed absence of the deceased family member as frequent trauma and loss reminders and post-trauma family conflict have been linked to avoidant coping and more adverse post-trauma adjustment (Howell et al., 2015). The effect size found for bereavement also appeared more in-line with the greater effects found for post-trauma risk factors.

Post-trauma risk factors.

Maternal depression. Most studies have focused on impacts of maternal depression on children stemming from ante or postnatal periods. In contrast, Halligan, Murray, Martins and

Cooper (2007) found episodes of depression later in the child's life to be important in predicting later adolescent psychiatric outcomes. Indeed maternal depression following trauma has been found to predict children's post-traumatic responses including depression (Panter-Brick, Grimon & Eggerman, 2014). Our meta-analysis found a small effect size (r=.20) for maternal depression as a risk factor for depression in trauma-exposed children and adolescents although only four studies were included due to the lacking literature base.

The trauma literature has generally focused on maternal depression and PTSS in children and adolescents, which has been quantified as a moderate effect (Morris, Gabert-Quillen & Delahanty, 2012). Interestingly, this is larger than found in the broader depression literature and our own meta-analysis. Looking at the more general depression literature a meta-analysis examining 193 studies exploring the association between maternal depression and children's emotional and behavioural functioning, found all associations to be small in effect (Goodman et al., 2011). The effect size found for child internalizing problems (including depression) was highly similar to our own findings. Thus whilst substantially more research is clearly required, it appears there may be a modest effect of maternal depression on child and adolescent post-traumatic depression.

In comparing our findings to the broader depression and PTSD literature reviewed, it appears maternal depression following trauma may not be an increased risk compared to depression more generally in mothers, with similar effect sizes found. Furthermore, larger effect sizes are found child PTSS symptoms compared to depression. It is noteworthy to mention that the association between child and parent mental health is likely not straightforward; indeed child engagement in trauma interventions is shown to improve maternal depression symptoms, suggesting complex interactions (Neill, Weems & Scheeringa, 2016; Holt, Jensen & Wentzel-Larsen, 2014).

Low social support. Studies investigating low social support as a predictor for depression

have found main and mediating effects, in a range of child and adolescent trauma populations (e.g. Ellis, Nixon & Williamson, 2009; Oppedal & Idsoe, 2015; Cheng et al., 2014; Pina et al., 2008; Banks & Weems; 2014). Our meta-analysis finds an overall moderate (r=.30) effect size for low social support as a risk factor for depression in children and adolescents following trauma exposure. This was the second largest effect size of any risk factor and suggests that social support may play a fairly salient role in depressive responses following trauma in children and adolescents. This may be consistent with a stress-buffering model of social support, which hypothesizes social support to play a protective role in buffering against the adverse impacts of stress (Cohen & Wills, 1985.

In line with our findings, a meta-analysis by Tang et al. (2014) also found a moderate effect size for social support as a risk factor for depression in post-disaster child populations. Comparatively Tang's effect size was somewhat larger (r=.39) than our finding. This may reflect our meta-analysis combining effect sizes from a wider range of traumas, and it may be that social support is particularly important in some types of trauma over others. Interestingly Tang's meta-analysis examined this risk factor in both adult and child samples but did not find a significant overall effect in adult samples, suggesting social support may be a particularly important risk factor for trauma-exposed youth populations.

The magnitude of our effect size also appears largely consistent with a large meta-analysis from the adolescent depression literature of 341 studies (Rueger, Malecki, Pyun, Aycock, & Coyle, 2016). Our finding also appears similar to the effect found for low social support as a risk factor for PTSD symptoms in children and adolescents (Trickey et al., 2012), suggesting social support may be similarly important in both depressive and PTSD responses to trauma.

Avoidant coping. Although at times adaptive in the short-term (Compas et al., 2001), avoidant coping has been linked to increased and more chronic mental health symptoms

including depression in longitudinal studies of adolescents (Seiffge-Krenke & Klessinger, 2000; Compas et al., 2014). However likely due to avoidance being a central concept of trauma models (e.g. Ehlers & Clarke, 2000), the trauma literature has tended to focus on avoidant coping in PTSD, with this relationship in depression following trauma largely neglected. Our meta-analysis found a moderate effect (r=.28) for avoidant coping. However only six studies were included in this meta-analysis, limiting the interpretability of the findings.

One meta-analysis of trauma-exposed adult and child studies also found a moderate effect size for the association between avoidant coping and depression symptoms (Littleton, Horsley, John & Nelson, 2007). Although largely in line with our findings, their effect size appears somewhat higher (*r*=.39) than our own findings (*r*=.29). This variance in magnitude may have been generated by methodological differences in that Littleton used both adult and child samples and included traumas were limited to individual interpersonal violence traumas and injury.

Avoidant coping appeared as one of the largest effect sizes examined in our meta-analysis, questioning the justification of the increased focus on PTSD and subsequent neglect in depression, when avoidant coping appears to be a risk factor for both disorders. Indeed in Littleton's meta-analysis equivalent effect sizes were found for the association between avoidant coping and PTSD and depression. Thus further research appears warranted. Our empirical study provides evidence for cognitive avoidance, a subtype of avoidant coping (Blalock & Joiner, 2000) as a shared and equivalent predictor of PTSS and depression symptoms and is further discussed.

The presence of PTSD symptoms. Our meta-analysis finding that PTSD comorbidity was the most prominent risk factor examined for post-traumatic depression with a large effect size, synthesizes findings from 25 studies (N=18057) across the child and adolescent trauma literature; suggesting a robust and consistent finding. However, Trickey et al. (2012) also found that

comorbid psychopathology including depression was a risk factor of large effect for the development of PTSD in children and adolescents. This highlights a complex relationship and is consistent with findings in the adult trauma literature where PTSD and depression have been found risk factors for each other (Bromet, Sonnega & Kessler, 1998; Breslau, Davis, Peterson & Schultz, 2000). We found a greater effect size for comorbid PTSD as a risk factor for depression (r=.58) than the comorbidity of *any* psychopathogy as a risk factor for PTSD examined by Trickey (r=.40). This variance is effect size may be related to our focus specifically on the comorbidity of PTSD, whereas Trickey's meta-analysis included a range of comorbid psychopathologies which may have diluted the effect. This may support findings demonstrating the comorbidity between PTSD and depression may be particularly prominent as the most comorbid disorder with PTSD (e.g. Rytwinski et al., 2013; Rabie, El-Sheikh, ElSayed, Fekry & Saad, 2015).

Comparisons of pre-, peri- and post-trauma risk factors. We generally found small effect sizes for pre and peri-trauma risks factors but moderate to large effect sizes for post-trauma risk factors for depression in trauma-exposed children and adolescents. These findings suggest that the post-trauma environment and responses of trauma-exposed children and adolescents appear to be the most important risk factors associated with depression. Tang et al. (2014) also found small effect sizes for the pre- and peri- trauma risk factors for depression in disaster exposed samples, generally in line with our findings, although Tang's study did not adequately consider post trauma factors (i.e. examination of social support included just one study).

In line with our findings, Trickey et al. (2012) also found small effects in pre-trauma risk factors for PTSD in trauma-exposed children and adolescents in their meta-analysis. Similarly to our findings, Trickey also found moderate – large effect sizes for post-trauma risk factors but also found a moderate effect size for peri-traumatic fear; higher than the small effect we found.

We also found an effect size somewhat larger than Trickey's effect size for bereavement (*r*=.29 vs *r*=.22).. This suggests that whilst post-trauma risk factors appear to be the most prominent risk factors compared to pre-trauma risk factors for both PTSD and depression, some differences appeared to exist in terms of peri-traumatic risk factors (where bereavement appears more salient in depression and peri-traumatic fear appears more salient in PTSD). However, these are subtle and tentative findings, the effect sizes difference where not large and research comparing the same risk factors directly in both PTSD and depression is very limited. Few studies have compared peri-traumatic distress and bereavement in both PTSD and depression in the same sample. However Cenat and Derivois (2015) found that whilst peri-traumatic distress was predictive of both PTSD and depression, the predictive power was substantially higher for PTSD compared to depression. This supports the importance that cognitive models of PTSD place on peri-traumatic distress (e.g. Ehlers & Clark, 2000). In consideration of bereavement the literature has been mixed. Eksi et al. (2007) found although significantly higher rates of bereavement were found in PTSD and depression diagnostic groups compared to groups without PTSD or depression, loss of a family member was predictive of depression symptoms, whereas *witnessing* the death of a family member, but not the actual loss, predicted PTSD symptoms. Goenjian et al., (2009) in a longitudinal study found bereavement a risk factor for development of depression but not PTSD. These mixed findings are also largely based on earthquake survivors where high death tolls are more common. Therefore more research is required comparatively in PTSD and depression and in wider trauma populations.

PTSD-depression comorbidity. In summary, our meta-analysis found that PTSD comorbidity showed a large magnitude effect size; was the only large effect size; and was the most prominent risk factor for depression in trauma-exposed child and adolescent populations. Our findings from the presented empirical study reiterate the well-acknowledged association and high degree of comorbidity between depression and PTSD in line with the adult (O'Donnell,

Creamer and Pattison, 2004; for reviews see Lockwood & Forbes, 2014; Angelakis & Nixon, 2015) and adolescent literatures (Kilpatrick et al, 2003). Indeed we found more comorbid cases than either singular disorder. While Kilpatrick found this to be the case for PTSD (69% were comorbid with depression) only 29% of depression cases were found to be comorbid with PTSD in their community sample of adolescents. Our findings appear to show roughly similar rates of comorbidity in PTSD and depression cases (60% vs 65.6%). This disparity may be due to the differences in the samples targeted, where we used data from a community sample of participants whom reported exposed to potentially traumatic events, compared to Kilpatrick's community sample where exposure was not a prerequisite. Indeed rates of overall PTSD-depression comorbidity in Kilpatrick's sample (1.3%) were much lower than our sample (7.5%). However in a later study using the same National Adolescent Survey data as Kilpatrick's study, when the data was separated to identify those with trauma histories, similar PTSD-depression comorbidity rates (7.4%) to our findings were found (Ford, Elhai, Connor & Frueh, 2010). In line with our findings the authors also found higher levels of comorbid cases, than singular disorders. Thus it may be that within exposed samples, similarly to findings for PTSD (Macdonald, Danielson, Resnick, Saunders & Kilpatrick, 2010), comorbidity is the rule rather than the exception in depression too.

Shared cognitive vulnerabilities. Parallels are established in the risk factors found for post-traumatic depression examined in our meta-analysis and a similar meta-analysis examining risk factors for PTSD (Trickey et al., 2012). Furthermore PTSD comorbidity was the largest risk factor for post-traumatic depression in our meta-analysis. Thus our empirical study aimed to identify potential mechanisms shared in PTSD and depression that may underlie these parallels and comorbidity. Our comparative findings in PTSD and depression appear in line with a shared vulnerability pathway to comorbidity (Angelakis &Nixon, 2015) providing some empirical evidence for the mechanisms of rumination and negative appraisals identified by the authors as

shared cognitive vulnerabilities studied comparatively. We also examined cognitive avoidance in line with finding from our meta-analysis and evidence suggesting cognitive avoidance but not behavioral avoidance predicted depression symptoms (Blalock & Joiner, 2000) Our empirical findings identify cognitive avoidance as a further cognitive vulnerability shared in PTSD and depression, consistent with our meta-analysis and research implicating cognitive avoidance in PTSD and depression (e.g. Ehlers & Clark, 2000; Ehlers, Mayou, & Bryant, 2003; Blalock & Joiner, 2000).

Overall the identified cognitive mechanisms explained a large and similar proportion of variance in regression models of PTSS and depression symptoms in our adolescent sample (75-78%). This suggests cognitive predictors appear important in adolescent reactions following trauma-exposure and is consistent with adult and child studies drawing similar conclusions (Ehring, Ehlers & Glucksman, 2006; 2008; Kleim, Ehlers & Glucksman, 2012; Meiser-Stedman et al., 2009). Our findings support studies in the child and adolescent literature that implicate negative cognitive appraisals, cognitive avoidance and rumination separately in PTSD and depression (e.g. Mitchell, Brennan, Curran, Hanna & Dyer, 2017; Meiser-Stedman et al., 2009, 2014; Dunmore et al 2001; Braet et al., 2015; Felton, Cole & Martin, 2013), but appear to further the field in broadening understanding about these associations comparatively in an adolescent sample. This appears to be an important contribution to the literature base as studies examining adolescent responses to trauma, particularly in terms of comorbidity, are lacking. This seems particularly precarious when adolescence is considered a critical period of vulnerability to the impacts of trauma-exposure (Ogle, Rubin & Seigler, 2013; Lupien et al., 2009) and half of all lifetime mental disorders are shown to onset by mid-adolescence (Kessler et al, 2005; 2007).

The presented empirical study appears to provide novel examinations of cognitive appraisals (trauma-related and depressogenic), cognitive avoidance and rumination comparatively in PTSD and depression. We find largely similar strengths of correlations (all of

which were large in magnitude) for the cognitive mechanisms (except rumination which was somewhat greater in depression) in both disorders; that all diagnostic groups (PTSD only, depression only and comorbid PTSD-depression) endorse the use of all mechanisms; and all mechanisms predict PTSS and depression symptoms in linear regressions. These findings suggest shared processes and do not support specificity in the cognitive mechanisms involved in the disorders. This may be consistent with a single latent construct hypothesis of traumatic distress (Breslau et a, 2000; O'Donnell et al, 2004; Dekel, Solomon, Horesh & Ein-Dor, 2014; Elhai et al., 2011), which may explain high levels of comorbidity.

The importance of cognitive appraisals. Our results suggest cognitive appraisals contributed by far the most variance to regression models of PTSS and depression symptoms. Furthermore trauma appraisals was the strongest predictor for both models. This appears to question the *specificity* of the role of trauma appraisals in PTSD, suggesting that in trauma exposed samples trauma appraisals are also important in predicting depression. This appears further supported by the finding that depressogenic appraisals are predictive of both PTSS and depression symptoms. Indeed the PTSD only and depression only diagnostic groups both endorsed trauma appraisals and depressogenic appraisals, with no significant between group differences found. This appears in line with adult studies that have questioned the specificity of trauma appraisals (Gonzalo, Kleim, Donaldson, Moorey & Ehlers, 2012; Raab, Mackintosh, Gros, & Morland, 2015) but replicates similar finding regarding depressogenic appraisals. Our findings may suggest that both measures tap into a similar construct of negative appraisals, alternatively it may suggest that both trauma appraisals and depressogenic appraisals are important in PTSD and depression in trauma-exposed samples. This may be a notable finding in view of current models and studies of PTSD focusing on trauma-appraisals, which may be missing a facet of depressogenic appraisals, and where studies focus solely on depressogenic appraisals in post-traumatic depression, when our findings suggest trauma appraisals may be

just, if not more important to assess.

Commonality and distinctions in shared cognitive vulnerabilities. While we found similarities there were also differences in levels of symptomology and maladaptive cognitive processes between diagnostic groups and in the predictive power of some of the cognitive predictors in models of PTSS and depression symptoms. It has been suggested that a single construct of general traumatic stress may manifest in different presentations (Dekel et al., 2014). Thus information regarding the dynamics of the identified mechanisms within PTSD and depression presentations would be beneficial in furthering our understanding. Findings from our multiple regression models and commonality analysis may begin to explore these dynamics.

Cognitive avoidance. Cognitive avoidance was the only predictor that appeared to contribute equivalently to both regression models of PTSS and depression symptoms. This was also seen in the commonality analysis where the unique contribution of cognitive avoidance to the variance explained was the same. This is a noteworthy finding as currently theoretical models of PTSD (e.g. Ehlers and Clark, 2000) consider cognitive avoidance central. Aside from a recent model of approach and avoidant coping of depression (Trew, 2011), depression models historically have not included cognitive avoidance, nor has cognitive avoidance been considered a core feature of depression symptomology. Our findings appear to echo studies that have questioned the specificity of cognitive avoidance as a core feature of anxiety but not depression, when in fact the association has been demonstrated equally as strong in both anxiety and depression (e.g. Ottenbreit & Dobson, 2004). Importantly our findings are based on a trauma-exposed sample and it may be that cognitive avoidance is particularly prevalent as a response to traumatic exposure. Perhaps congruent with this are the stronger correlations between cognitive avoidance and depression found in our trauma-exposed sample compared to those found in community samples where participants may or may not have trauma-histories (e.g. Ottenbreit & Dobson, 2004).

Negative appraisals. Whilst negative trauma appraisals emerged as the strongest predictor of any cognitive mechanism for both PTSS and depression symptoms, greater predictive power was found for the model of PTSS symptoms suggesting a relative importance in PTSS symptoms. Our commonality analysis further clarified this in highlighting the increased *unique* variance contributed to the PTSS model. This may be in line with the theoretical models of PTSD (e.g Ehlers & Clark, 2000) which places negative trauma appraisals central in the development of PTSD, as well as more recent research into neurobiological processes, where negative appraisals are hypothesized crucial in instigating a neurobiological response to trauma that may perpetuate into post-trauma psychopathology (Olff, Langeland & Gersons, 2005). However it is important to note that whilst there appears to be some relative importance in our findings the literature available to compare our findings is lacking. We find no existing study that has investigated models of PTSD and depression concurrently with multiple cognitive predictors including negative trauma appraisals in the adolescent literature. A recent study by Ponnamperuma and Nicolson (2016) compared models of PTSS and internalizing symptoms including trauma appraisals and post-traumatic environment predictors and found negative trauma appraisals were predictive of PTSS but not internalizing symptoms. While drawing on the adult literature, Kleim, Ehlers and Glucksman (2012) negative trauma appraisals were more strongly predictive of depression than PTSD in their cognitive models of PTSD and depression outcomes 6 months following trauma. This research area considering both PTSD and depression/comorbidity is still exploratory with a small evidence base and contrary findings, suggesting further research is required.

Rumination. Despite strong correlations, structure coefficients and linear regressions between rumination and PTSS, rumination was a unique predictor of depression in our regression models (although this was only just significant) and the depression only group showed greater endorsement than the PTSD only group. This appears to suggest there may be some

relative importance for rumination in depression. Indeed rumination has been implicated widely in depression as a hallmark feature (e.g. Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008) and has been shown to be transdiagnostic, but shows some increased endorsement in those with depression compared to anxiety in a recent meta-analysis (Olatunji, Naragon-Gainey & Wolitzky-Taylor, 2013). However rumination has empirical support for its role in PTSD (e.g. Michael, Halligan, Clark & Ehlers, 2007), which seems in opposition to our findings as a non-significant predictor of PTSD in regression models.

Results from our commonality analysis appeared to shed some light on this dynamic, in revealing rumination contributed negligible unique variance to either model although less to PTSD. Importantly rumination contributed highly to the common variance between all mechanisms suggesting that rumination particularly may play a crucial role with other cognitive mechanisms such as negative appraisals and cognitive avoidance in PTSS and depression symptoms. This is more in-line with research implicating rumination in both PTSD and depression (Michl, McLaughlin, Shepherd & Nolen-Hoeksema, 2013; Roelofs et al., 2009; Jenness et al., 2016; Meiser-Stedman et al., 2014), research emphasizing the transdiagnostic nature of rumination in PTSD and depression (e.g. Ehring & Watkins, 2008; Birrer & Micheal, 2011) and research finding support for rumination as a mediator between PTSD and depression (Roley et al., 2015). Further research is required to explore these relationships and structural equation models of longitudinal data would be beneficial in furthering our understanding.

However, an important point to note is the possibility that this high level of common variance could be an artefact of the rumination measure used. The CRSQ consists of items relating to both the process and the content of rumination. It may be that similar content is also mirrored in the measures of cognitive appraisals. Thus a measure of rumination focusing purely on rumination process may be helpful for future studies.

Strengths of the Presented Research

The body of research presented has a number of strengths to be acknowledged. Firstly the large sample sizes employed are noteworthy. The meta-analysis included 59 studies with an overall sample of 45,688; the empirical paper recruited a sample size of 346 after missing data cases (>80%) were excluded, with 280 of these participants reporting exposure to potentially traumatic events. Compared to smaller samples, this improves the reliability of our samples reflecting the population means, and therefore the representativeness of our results. Our large sample sizes also increased our power to detect statistically significant effects in parametric tests, enabling rich results in a greatly neglected population. Furthermore, the large sample size in the empirical paper enabled us to detect 46 cases presenting with clinically relevant symptoms of probable diagnoses in our community sample. In addition to investigating at the continuous symptom level, this enabled us to explore and compare differences in the variables of interest across probable diagnostic categories, including a comorbid group. Due to lower prevalence rates inherent in community samples, a smaller sample may have not captured this to a useful degree.

Secondly the use of a community sample is a further strength, in that it allowed us to use a no diagnosis control group for group comparisons, and at a continuous symptom level where it provided a good range of normal to more maladaptive or clinically relevant responses.

Methodological strengths of the meta-analysis included the use of an inclusion criterion (N<50) to reduce biased estimates from small samples (Harrison, 2011; Morris 2000); an exclusion criterion to ensure valid and reliable measures were employed in the studies included; and the undertaking of a quality assessment and a sample of these checked for inter-rater reliability, which was showed excellent inter-rater agreement (94.4%: $\varkappa$=88.97%).

One methodological strength of the empirical study is the use of multiple approaches to explore the research area including, correlation and regression at continuous symptom level and

group comparisons at probable diagnostic level. A further strength is the use of correlation coefficients and commonality analysis to aid interpretation of our regression results. This is recommended to avoid interpretational issues in the reliance on beta-weights alone (Courvile & Thompson 2001; Nathans, Oswald & Nimon, 2012). In doing so we were able to account for our findings of high correlational strength and structure coefficient but non-significant beta weight in the regression model for rumination in PTSS and further clarify the dynamics of this. Without these additional tools we may have erroneously interpreted the regression results to mean than rumination is not important in predicting PTSS symptoms, where the commonality analysis allowed us to understand the large contribution rumination has in its common variance in PTSS.

Finally, a notable strength of the empirical study was its consideration of the wellbeing of participants with the employment of a wellbeing screen. This enabled us to identify a proportion of participants in each school whose responses may have indicated difficulties or safeguarding concerns, as a result these participants were offered support, signposting or safeguarding procedures followed as appropriate. Following data-collection we also provided all participants with an aftercare sheet of support services within school and the wider community and online resources. We hoped this could provide immediate access to support options following participation where needed, but also raise wider awareness of the support options available to young people should there be necessity in the future. The schools reported that they valued the wellbeing screen as an addition to data-collection in considering their pupil's wellbeing.

Limitations of the Presented Research

Whilst several strengths of the presented research are outlined, it is also important to consider the limitations of the presented research.

The cross-sectional nature of the empirical study and of the studies assessed in the meta-analysis is a considerable limitation. Assumptions cannot be drawn around causation and direction of the relationships from our findings. For example, maladaptive cognitive processes

may be implicated in the development of PTSS and depression symptoms but also the inverse relationship may be true; where the presence of PTSS or depression symptoms may promote maladaptive cognitive processes. Furthermore the cross-sectional nature also precludes us from determining whether the endorsement of maladaptive cognitive processes existed prior to the trauma-exposure. It could be that a preexisting trait tendency to employ negative cognitive appraisals, rumination and cognitive avoidance predating the trauma-exposure may predispose these individuals to a vulnerability towards depression and PTSD following trauma exposure. Thus prospective studies are required.

The findings from the empirical study must also be taken in the context of the sample. The age range of our sample was somewhat narrow (12-15 years) and there may be differences in older adolescents. Furthermore, the sample was predominately White British (97.4%), reflective of the geographical region the sample was drawn from. Although we found no *significant* overall difference between diagnostic groups for ethnicity and group, there were lower rates of White British ethnicity (81.7%) in the PTSD group which may indicate a higher incidence of trauma-exposure or trauma severity in other ethnicities. Therefore samples that are more ethnically diverse may produce different results.

Our empirical study did not assess *history* of mental health difficulties. Whilst the lack of the assessment of mental health history across the studies included in the meta-analysis, suggests this appears to be a wider methodological issue in the field, this may have been a significant confounding variable in both the empirical study and meta-analysis. Indeed in the adolescent disaster literature Ying, Wu and Lin (2012) found pre-event history of depression was the strongest predictor of post-event PTSD symptoms and in an adult prospective study of trauma in paramedics history of mental disorders predicted episodes of both PTSD and depression with a six-fold and five-fold increase in risk (Wild et al., 2016).

Our group comparisons in the empirical study are limited in their interpretation and

generalizability by the small sample sizes for the PTSD and depression only groups (N=11-14). Additionally, it is important to note that the findings of our empirical study are limited in their generalizability to community samples of school-aged adolescents, and differences may exist in clinical samples. However, it is noteworthy that 16.4% of our sample reported symptoms that met thresholds for clinically relevant symptoms, and likely more of the sample may have been experiencing sub-threshold symptoms of depression, thus the results may not be entirely dissimilar to a clinical sample. Indeed Vredenburg, Flett and Krames (1993) highlighted largely similar findings across clinical and non-clinical samples investigating depression. Subthreshold depression has also been shown to equate to similar outcomes as diagnostic thresholds of depression in adolescents (Fergusson, Horwood, Ridder, & Beautrais, 2005).

A limitation of our meta-analysis was that only half of the risk factors were based on analyses of 10 or more studies. Whilst this is a reflection of the paucity in the current literature base, caution should be taken in the inferences drawn from these particular analyses. For this reason, it was prudent to only run moderator analyses on risk factors with sufficient study numbers, thus there may be moderating effects we were not able to explore. For the areas of both the empirical study and meta-analysis where sample sizes/study numbers were small, our results represent the available data and present some interesting exploratory finding, whilst highlighting the need for further research.

A further limitation comes from the reliance on self-report measures in both the empirical study almost all of the studies drawn on in the meta-analysis. Furthermore the probable diagnostic groups in the empirical study were based on thresholds of clinically relevant symptoms and were not compared against a clinical diagnostic interview, thus are at best indicative. Furthermore issues around social desirability, willingness and cognitive ability to report accurately symptoms of psychological distress and discordance with parent reports are raised (e.g. De Los Reyes et al., 2015; Kazdin & Peiti, 1982). Taken together these issues may

result in different outcomes to clinician led structured clinical interviews and limit the generalizability.

A further drawback of the empirical study was the use of a fairly large battery of questionnaires. It is possible that participants may have become bored or lost concentration and not answered questions reflectively or at all, or alternatively may have not had sufficient time to complete the questionnaire in the allocated slot. This may have been reflected in the significant participant loss (20%) we experienced due to packs returned with more than 80% of missing data (although analyses revealed no significant differences in the missing data group). However we also noticed a substantial loss of completed questionnaires for the final two measures (up to 60 participants). The burden of completing batteries therefore appeared to reduce the sample size. Accordingly it is possible that responses may have been affected in the later questionnaires; in terms of concentration, motivation and therefore how truly representative they may be.

Clinical Implications

The findings of the presented meta-analysis and empirical study may be of clinical importance. The results from our meta-analysis, firstly suggest it is the responses and environment following trauma that may play the most prominent role in depression in children and adolescents, rather than pre-trauma or trauma-related factors. This appears a fundamental distinction to enable identification of those most at risk following traumatic exposure and further may help inform assessment processes, particularly for early intervention.

Secondly, particular risk factors were highlighted which may warrant increased attention from clinicians and support systems around children and adolescents: traumatic-bereavement; low social support; tendencies for avoidant coping; and PTSD symptoms. The latter appears to be a particularly robust finding and the most prominent risk factor, thus our findings reiterate the frequent comorbidity between PTSD and depression suggesting routine screening and monitoring of PTSD and depression symptoms may be clinically valuable.

Findings from our empirical paper may provide further contributions of clinical importance regarding this relationship between PTSD and depression and comorbidity.

Our findings underscore the high comorbidity between PTSD and depression; moreover comorbidity was more common than either disorder singularly and showed a more severe presentation. We also found no significant difference in reported PTSS symptoms in both singular disorder groups, suggesting those in the depression only group may be just below the threshold for PTSD. These findings have implications for clinical practice in the assessment, monitoring and treatment of adolescents affected by trauma. Routine assessment for comorbidity appears crucial, regardless if an individual presents with PTSD or depression. Particular should be paid to PTSS symptomology in adolescents presenting to services with depression, which is found to be under-identified and under-treated in adolescents (Havens et al., 2012; Gerson & Rappaport, 2013) and adults (Kostaras, Bergiannaki, Psarros, Ploumbidis, & Papageorgiou, 2017). Consideration of comorbid sub-threshold symptoms in assessment may also be important, particularly when research has identified sub-diagnostic threshold levels of PTSD and depression as clinically relevant (Fergusson, Horwood, Ridder, & Beautrais, 2005; Naylor et al, 2013; Bergman, Kline, Feeny & Zoellner, 2015; Perkonigg et al., 2005). This may also be relevant clinically in terms of early intervention, as trauma intervention studies have shown poorer outcomes in individuals with higher levels of pre-treatment PTSD and depression symptoms (Nixon, Sterk & Pearce, 2012; Wamser-Nanney, Scheeringa & Weems, 2014).

Implications for treatment include the need to address PTSD-depression comorbidity, and trauma focused interventions should be routinely offered to adolescents who present with depression following trauma. Although one meta-analysis in the adult literature suggests trauma interventions for PTSD work just as well on depression symptoms (Ronconi, Shiner, Watts, 2015), another recent meta-analysis in children and adolescents revealed poorer treatment outcomes for depression in trauma interventions (Morina et al., 2017). Thus current interventions

may require adapting particularly for depression, for example greater emphasis on behavioural activation and reducing rumination. Additionally, in line with our findings for PTSD and depression following trauma, avoidance has been hypothesized as fundamental in a model of persistent depression (Moore & Garland, 2004) and is highlighted as a key process to be targeted in clinical work. Our findings appear to support this and would advocate for adaptions of current interventions for depression to target avoidance.

Secondly our empirical study findings suggest that even with *potentially* traumatic events that may not necessarily meet the DSM A1 "traumatic stressor" diagnostic criterion, PTSS and depressive responses still emerge. Previous research highlighting comparable PTSD prevalence rates for events not meeting A1 criterion may support this (Verlinden et al., 2013). Notable, also are these responses in a community sample providing a different facet of trauma exposure compared to the typically more 'high-level' traumas studied in the literature (e.g. war, natural disasters, sexual abuse). Thus broadening the traditional traumatic events criteria, and increasing attention for more 'low-level' traumas may be clinically relevant in capturing and providing support to a demographic of adolescents that may be currently missed due to diagnostic bounds.

Thirdly, targets for intervention are identified from our findings with clinical implications for the treatment of PTSD, depression and comorbidity in trauma-exposed adolescents. Negative trauma appraisals may be particularly important to target in trauma interventions, indeed recent evidence have shown changes in negative appraisals mediate change in PTSD and depression symptoms in adolescents in several types of trauma interventions (McLean, Yeh, Rosenfield & Foa, 2015; Meiser-Stedman et al, 2017).

Finally the empirical study employed a wellbeing screen in our school population, which identified around 16% of the total sample (including exposed and non-exposed participants) reporting difficulties with depression, anxiety, PTSS or safeguarding issues. These participants were provided with access to support, which may have not occurred without participation in the

wellbeing screen. Given the recent focus on improving child and adolescent mental health in the Department of Health and NHS England's (2015) taskforce report and the guidance set for schools, schools are strategically placed to monitor wellbeing and provide support. In response to our findings, a clinical implication for schools is to provide wellbeing screens. Indeed Public Health England (2016) in conjunction with the Anna Freud Centre, have recently launched a toolkit to aid schools to measure and monitor pupil wellbeing. However this toolkit does not consider trauma-exposure, which appears an important but perhaps neglected facet of child and adolescent mental health.

Overall these findings have clinical implications for the care pathway. This could increase the more timely detection of impacted individuals through improved assessment and monitoring (e.g. broadening the A1 criteria to screening for those impacted by *potentially* traumatic events with the CATS; screens being carried out by first-line community contact (e.g. schools) identifying risk factors; clinicians routinely and actively assessing for comorbidity) and provides targets for treatment focus that could promote earlier and more effective intervention for PTSD and depression comorbidity.

Theoretical Implications

The findings from the present meta-analysis and empirical study have theoretical implications in furthering our understanding of PTSD and depression in trauma-exposed children and adolescents as well as considering this more widely.

The findings from our meta-analysis suggest the most prominent risk factors for posttraumatic depression appear to be related to the post-trauma responses and environment of the child/adolescent rather than pre-trauma factors. This appears somewhat at odds with the attention the latter line of inquiry has received in the literature and perhaps suggests a shift in focus to post-trauma factors is warranted. However, the pre-trauma variables that have tended to be explored in the literature are demographic in nature. Our findings of factors such as low

social support and avoidant coping as particularly noteworthy risk factors may well be present prior to the trauma. Indeed Wild et al (2016) found pre-trauma factors including cognitive and coping styles predictive of later PTSD and depression in a prospective study of Paramedics. Furthermore, our findings from our empirical study implicate rumination, avoidant coping and negative appraisals in both PTSD and depression symptoms. All of which are cognitive mechanisms that have been implicated in various cognitive models of PTSD and depression (e.g. Ehlers & Clark, 2000; Ehlers & Steil, 1995; Brewin, Dalgleish & Joseph, 1996; Beck, 1976; Nolen-Hoeksema, Wisco & Lyubomirsky, 2008; Moore & Garland, 2004), but also may be characteristic cognitive and coping styles present prior to the trauma. This could be conceptualised within a vulnerability framework such has been explored, for example, for depression (e.g. Beevers, 2005). Further prospective studies that model this relationship specifically for PTSD-depression comorbidity could be valuable.

The presented research demonstrates high levels of comorbidity and broad similarities in the risk factors and maladaptive cognitive processes implicated in PTSD and depression following trauma exposure in young people, suggesting strong parallels between the disorders. These findings raise issues around the distinctiveness of these disorders, particularly when PTSS and depression symptoms showed elevation in all diagnostic groups compared to the no diagnosis group in our empirical study. Indeed, the marginal differences in continuous PTSS symptom scores were not significant between the PTSD and depression only groups. This adds support to similar findings in the adult literature (O'Donnell et al., 2004; Au et al., 2013) but extends to an adolescent sample. Our findings may support an emerging theoretical conceptualisation of PTSD-depression comorbidity as a general latent post-traumatic stress response in the adult trauma literature (Breslau et al, 2000; O'Donnell et al, 2004; Dekel, Solomon, Horesh & Ein-Dor, 2014; Elhai et al., 2011; Au et al, 2013). Indeed wider efforts to re-conceptualise comorbidity across psychopathology have proposed a liability spectrum model

where comorbidity may be the manifestation of latent liabilities that overarch multiple diagnostically categorised disorders (Krueger, 2008). Further research is required to understand the specific latent constructs that may underlie PTSD-depression comorbidity. The research presented here identifies shared cognitive mechanisms (cognitive appraisals, cognitive avoidance and rumination) that may underlie a shared vulnerability perpetuating PTSD and depression comorbidity. These may be suitable targets for future research that could be key in integrated models of post-traumatic responses.

The vast majority of models looking at post-traumatic response focus on PTSD specifically, which likely do not explicitly capture the extensity of post-traumatic responses and comorbidity. Some researchers have successfully applied PTSD models such as the dual representation model of PTSD (Brewin, Dalgleish & Joseph, 1996) and the cognitive appraisals model of PTSD (Ehlers & Steil, 1995) to depression in the context of intrusive memories. Which have been identified as a shared core feature implicated in the onset and maintenance of the disorders (Brewin, 1998; Brewin, Gregory, Lipton & Burgess, 2010; Starr & Molds; 2006; Williams & Moulds, 2007). The shared vulnerabilities we find in PTSD and depression of cognitive avoidance, negative appraisals and rumination in the present research, have also been identified as candidate mechanisms in triggering and exacerbating the frequency and distress of intrusive memories in these models of PTSD and depression (Williams & Moulds, 2007; Brewin et al., 2010). These models have not to our knowledge been applied and compared in the context specifically of post-traumatic depression and PTSD comorbidity, which could be one valuable avenue of research. Further models of PTSD such as Elhers and Clark (2000) that also include the shared vulnerabilities we highlight as mechanisms in PTSD could also be considered in light of post-traumatic depression. Moreover, this research should also be replicated in adolescent populations.

Our findings appear to call in to question the validity of current categorical diagnostic approaches to assessment and may suggest that a dimensional approach may be a more meaningful and useful conceptualisation. Research is currently emerging to develop models that step away from distinct pathology categories and the well-known pitfalls this presents, in favour of dimensional frameworks (e.g. Kotov et al., 2017; Cuthbert & Insel, 2013).

Finally our findings have implications in contributing to the adolescent literature base, whilst the research base is dominated by adult studies, our findings demonstrate that traumatic events are common in young people and that even with *potentially* traumatic events, depressive, PTSD and comorbid responses emerge. We also demonstrate that risk factors and maladaptive cognitive processes identified in the adult literature also have importance in young people. However, research has identified some differences in the composition of endorsed trauma cognitions between adults and young people (e.g. Meiser-Stedman et al, 2009) thus further research is required.

Future Directions for Research

Suggestions for future research have been made throughout this discussion chapter and are also delineated in the meta-analysis and empirical paper. To summarise; calls for increased research to understand trauma-responses in children and adolescent populations, particularly for post-traumatic depression and PTSD-depression comorbidity are made. Further research into the risk factors for post-traumatic depression would help to clarify some of our findings of our meta-analysis due to the current lacking literature. Further research is also required to further examine and confirm the shared maladaptive cognitive processes identified in our empirical study, particularly due to the cross-sectional nature of our study. Prospective studies and examinations of mediation models would therefore help clarify and extend the presented empirical study and additionally address some of our limitations. Exploring these factors in child and adolescent clinical samples, particularly with the use of diagnostic interviews may also be a valuable

extension of the current work. Controlling for factors that may be confounding variables in the presented research would also address the potential bias that may be present in the current work such as mental health history and models that can control for comorbidity to see if this changes the results. Models such as Structural Equation Modelling may also provide more sophisticated explorations, particularly to better understand the potential latent construct of general traumatic response and in theory building, to develop models that capture comorbidity and post-traumatic depression.

Conclusions

Our findings are largely in line with the existing literature conducted primarily in investigations of PTSD and depression separately and in adult populations, although the literature is lacking for post-traumatic depression. We provide contributions to the literature base in synthesizing the child and adolescent literature and quantifying the effects of risk factors for post-traumatic depression. We generally find post-trauma factors to be the most prominent in determining post-traumatic depression. Our empirical study further adds to the comorbidity and trauma literature in providing an examination of cognitive appraisals, cognitive avoidance and rumination comparatively in PTSD and depression. We demonstrate these mechanisms to be shared cognitive vulnerabilities largely in line with findings of PTSD and depression separately. We postulate these shared vulnerabilities may underlie and aid our understanding of the high levels of comorbidity found in our empirical study and the wider literature. Finally the presented research highlights targets for assessment, monitoring and treatment, and provides important insights into child and adolescent responses to trauma-exposure. Further research is required to clarify the roles and interplay of the identified cognitive vulnerabilities in PTSD-depression comorbidity thus mediation and more comprehensive modeling methods using prospective data would be valuable for theory building. Research translating the identified targets into adaptions for trauma-interventions may also be beneficial.

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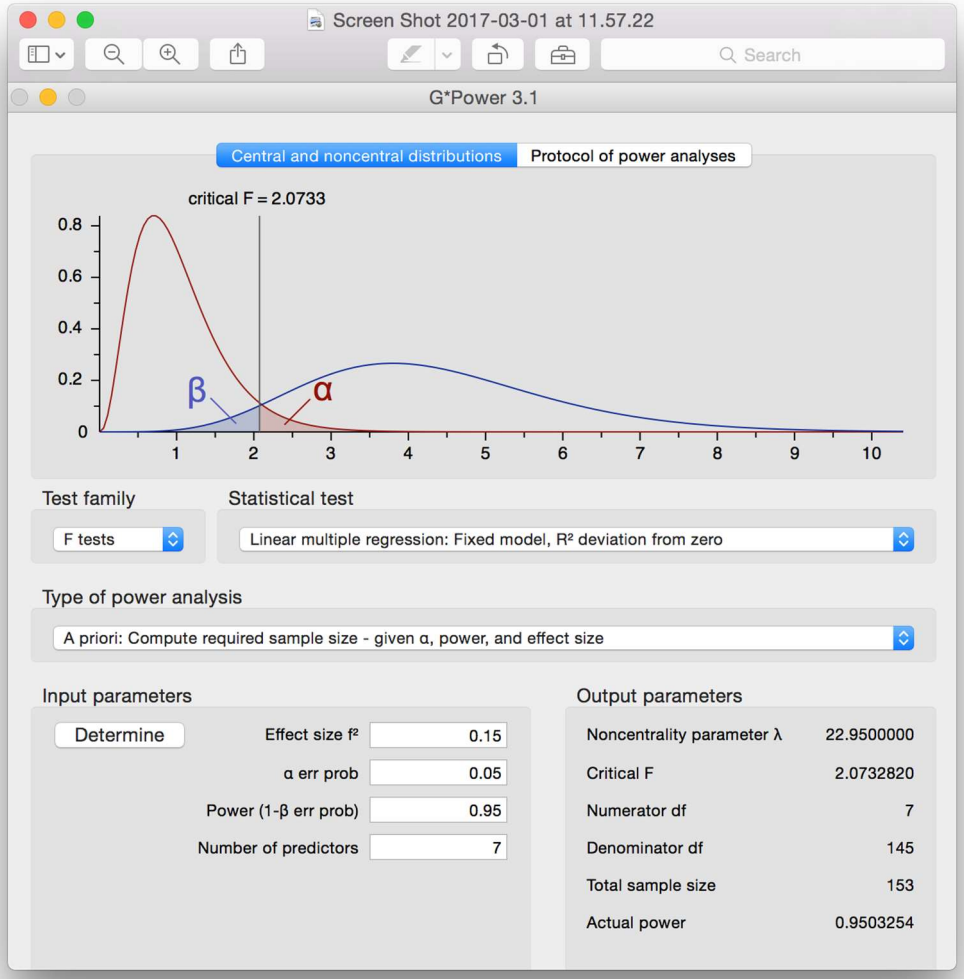
Appendices

Appendix A:

G*Power Sample Size Calculation



Appendix B:

Participant Questionnaire Pack

ID_____

Young Person's Questionnaire Pack

Name_____

Class_____

Date_____

Thank you very much for agreeing to take part in this study.

In this survey we will be asking you some questions about how you think, feel and act.

We are especially interested in how young people think, feel and act after experiencing frightening events. A frightening event might be a situation that you found particularly scary, stressful or worrying.

We know that some young people will have experienced frightening events and some will not. It is equally as important for us to have young people fill in our survey whether they have experienced a frightening event or not.

These questions will take 20-30 minutes to complete.

We know that young people think, feel and act differently to each other, so we are interested in your own individual answers. **There are no right or wrong answers to these questions** so try and answer these questions as honestly as you can.

Thank you

ID_____

Demographic questions

Date of Birth_____

Sex_____

Ethnicity_____

***CATS** 7-17 Years*

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

1. Serious natural disaster like a flood, tornado, hurricane, or fire. □ Yes □ No

2. Serious accident or injury like a car/bike crash, dog bite, sports injury. □ Yes □ No

3. Robbed by threat, force or weapon. □ Yes □ No

4. Slapped, punched, or beat up in your family. □ Yes □ No

5. Slapped, punched, or beat up by someone not in your family. □ Yes □ No

6. Seeing someone in your family get slapped, punched or beat up. □ Yes □ No

7. Seeing someone in the community get slapped, punched or beat up. □ Yes □ No

8. Someone older touching your private parts when they shouldn't. □ Yes □ No

9. Someone forcing or pressuring sex, or when you couldn't say no. □ Yes □ No

10. Someone close to you dying suddenly or violently. □ Yes □ No

11. Attacked, stabbed, shot at or hurt badly. □ Yes □ No

12. Seeing someone attacked, stabbed, shot at, hurt badly or killed. □ Yes □ No

13. Stressful or scary medical procedure. □ Yes □ No

14. Being around war. □ Yes □ No

15. Other stressful or scary event? Describe: _____ □ Yes □ No

_____

Which one is bothering you most now?

_____

If you marked any stressful or scary events, turn the page and answer the next questions.

		Never	*Once in a while*	*Half the time*	*Almost always*
1.	Upsetting thoughts or pictures about what happened that pop into your head.	0	1	2	3
2.	Bad dreams reminding you of what happened.	0	1	2	3
3.	Feeling as if what happened is happening all over again.	0	1	2	3
4.	Feeling very upset when you are reminded of what happened.	0	1	2	3
5.	Strong feelings in your body when you are reminded of what happened (sweating, heart beating fast, upset stomach).	0	1	2	3
6.	Trying not to think about what happened. Or to not have feelings about it.	0	1	2	3
7.	Staying away from people, places, things, or situations that remind you of what happened.	0	1	2	3
8.	Not being able to remember part of what happened.	0	1	2	3
9.	Negative thoughts about yourself or others. Thoughts like I won't have a good life, no one can be trusted, the whole world is unsafe. □	0	1	2	3
10.	Blaming yourself for what happened. Or blaming someone else when it isn't their fault	0	1	2	3
11.	Bad feelings (afraid, angry, guilty, ashamed) a lot of the time.	0	1	2	3
12.	Not wanting to do things you used to do.	0	1	2	3
13.	Not feeling close to people.	0	1	2	3
14.	Not being able to have good or happy feelings. □	0	1	2	3
15.	Feeling mad. Having fits of anger and taking it out on others.	0	1	2	3
16.	Doing unsafe things. □	0	1	2	3
17.	Being overly careful (checking to see who is around you). □	0	1	2	3
18.	Being jumpy.	0	1	2	3
19.	Problems paying attention.	0	1	2	3
20.	Trouble falling or staying asleep. □	0	1	2	3

Continues on next page

Mark 0, 1, 2 or 3 for how often the following things have bothered you in the last two weeks: 0 Never / 1 Once in a while / 2 Half the time / 3 Almost always

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

1. Getting along with others □ Yes □ No
2. Hobbies/Fun □ Yes □ No
3. School or work □ Yes □ No
4. Family Relationship □ Yes □ No
5. General happiness □ Yes □ No

For the next two questionnaires we would like you to answer the following questions keeping in mind the frightening event that bothers you most now.

CBSQ

We would now like to find out about the different things you have been doing since the frightening event in the past two weeks.

Please read this list and then tell us how much you AGREE or DISAGREE with each sentence, by ticking the box that best matches you.
Remember, there are no right or wrong answers to these questions

	Never	*Some-times*	*Often*	*Always*
1. I do not like being away from adults that I trust (e.g., teachers, parents)	[ ]	[ ]	[ ]	[ ]
2. I always check that my friends and family are safe	[ ]	[ ]	[ ]	[ ]
3. I am always thinking about ways to make myself safer	[ ]	[ ]	[ ]	[ ]
4. I am really careful to stay away from unsafe situations	[ ]	[ ]	[ ]	[ ]
5. I am careful not to do dangerous things	[ ]	[ ]	[ ]	[ ]
6. I often do things to try and make myself feel safer	[ ]	[ ]	[ ]	[ ]
7. I always check that doors and windows are locked or I ask my parents to	[ ]	[ ]	[ ]	[ ]
8. When I go somewhere now I always check for the quickest way to leave in case something goes wrong	[ ]	[ ]	[ ]	[ ]
9. I do not like to try new things	[ ]	[ ]	[ ]	[ ]
10. I try to stop my feelings about it	[ ]	[ ]	[ ]	[ ]
11. I always check my body is okay	[ ]	[ ]	[ ]	[ ]
12. I do not like changing the way I do things	[ ]	[ ]	[ ]	[ ]
13. I try really hard to stop my thoughts about it	[ ]	[ ]	[ ]	[ ]
14. I try not to let other people see how I am feeling	[ ]	[ ]	[ ]	[ ]

15. I like to know exactly what is happening around me	[ ]	[ ]	[ ]	[ ]
16. I do extra things to make sure the places I am are safe	[ ]	[ ]	[ ]	[ ]
17. I do not like making choices	[ ]	[ ]	[ ]	[ ]
18. I always like to make sure that the people around me are not dangerous (e.g., by asking mum, staring at people)	[ ]	[ ]	[ ]	[ ]
19. I sleep with the lights on so that I feel safer	[ ]	[ ]	[ ]	[ ]
20. I like to be near a telephone, or, I like my parents to be near a telephone so they or I can quickly call for help	[ ]	[ ]	[ ]	[ ]
21. I have a plan of what I should do if things go wrong	[ ]	[ ]	[ ]	[ ]

CPTCI-S

We would like to know what kinds of thoughts and feelings you've been having after the frightening event.

People react to frightening events in many different ways. Below is a list of statements. Please read each statement carefully and tell us how much you AGREE or DISAGREE with each statement by ticking one box.

There are no right or wrong answers.

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

For the rest of the questionnaires we are interested in how you think, feel and act more generally.

RCADS-25

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

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

CAQ

People react differently to certain types of thoughts. Here is a list of things people might think or do about certain thoughts. Please read each statement and circle the number (1, 2, 3, 4 or 5) that best describes how much it is like you. Remember there are no right or wrong answers.

1 Not at all like me / 2 A little like me / 3 Sometimes like me / 4 A lot like me / 5 Always like me

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

20.	I think about things that are worrying other people rather than thinking about my own worries.	1	2	3	4	5

CRSQ

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

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

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

CTI-C

Circle the answer which best describes your opinion. Choose only one answer for each idea.
Answer the items with what you are thinking **right now.** Remember to feel this out for how you feel today. There are no right or wrong answers.

		Yes	*Maybe*	*No*
1.	I do well at many different things.	[ ]	[ ]	[ ]
2.	Schoolwork is no fun.	[ ]	[ ]	[ ]
3.	Most people are friendly and helpful.	[ ]	[ ]	[ ]
4.	Nothing is likely to work out for me.	[ ]	[ ]	[ ]
5.	I am a failure.	[ ]	[ ]	[ ]
6.	I like to think about the good things that will happen for me in the future.	[ ]	[ ]	[ ]
7.	I do my schoolwork okay.	[ ]	[ ]	[ ]
8.	The people I know help me when I need it.	[ ]	[ ]	[ ]
9.	I think that things will be going very well for me a few years from now.	[ ]	[ ]	[ ]
10.	I have messed up almost all the best friendships I have ever had.	[ ]	[ ]	[ ]
11.	Lots of fun things I do every day are fun.	[ ]	[ ]	[ ]
12.	The things I do everyday are fun.	[ ]	[ ]	[ ]
13.	I can’t do anything right.	[ ]	[ ]	[ ]
14.	People like me.	[ ]	[ ]	[ ]
15.	There is nothing left in my life to look forward to.	[ ]	[ ]	[ ]
16.	My problems and worries will never go away.	[ ]	[ ]	[ ]
17.	I am as good as other people I know.	[ ]	[ ]	[ ]
18.	The world is a very mean place.	[ ]	[ ]	[ ]
19.	There is no reason for me to think that things will get better for me.	[ ]	[ ]	[ ]

Continues on next page, please turn over.

		Yes	*Maybe*	*No*
20.	The important people in my life are helpful and nice to me.	[ ]	[ ]	[ ]
21.	I hate myself.	[ ]	[ ]	[ ]
22.	I will solve my problems.	[ ]	[ ]	[ ]
23.	Bas things happen to me a lot.	[ ]	[ ]	[ ]
24.	I have a friend who is nice and helpful.	[ ]	[ ]	[ ]
25.	I can so a lot of things well.	[ ]	[ ]	[ ]
26.	My future is too bad to think about.	[ ]	[ ]	[ ]
27.	My family doesn't care what happens to me.	[ ]	[ ]	[ ]
28.	Things will work out okay for me in the future.	[ ]	[ ]	[ ]
29.	I feel guilt for a lot of things.	[ ]	[ ]	[ ]
30.	No matter what I do, other people make it hard for me to get what I need.	[ ]	[ ]	[ ]
31.	I am a good person.	[ ]	[ ]	[ ]
32.	There is nothing to look forward to as I get older.	[ ]	[ ]	[ ]
33.	I like myself	[ ]	[ ]	[ ]
34.	I am faced with many difficulties.	[ ]	[ ]	[ ]
35.	I have problems with my personality.	[ ]	[ ]	[ ]
36.	I am as good as other people I know.	[ ]	[ ]	[ ]

END OF SURVEY
Well Done!

Thank you very much for participating in our study. If you have any questions regarding this survey please contact the research team on 07538399761 or email jade.claxton@uea.ac.uk

Appendix C

Parent/guardian information sheet and opt-out consent form

Version 2.0
January 25th 2016

Dear parent/guardian,

R.e. Research project entitled: How do young people respond to frightening events?
INFORMATION SHEET

Researchers: Jade Claxton, Alice Alberici, and Dr. Richard Meiser-Stedman

We are researchers at the University of East Anglia and we would like to invite your child/children to take part in our study looking at what children do to make themselves feel safe and how they react after a frightening event. This study is taking place at your child's school on [*insert date*]. Responses from children who may or may not have experienced a frightening event are equally important. This research is being undertaken as part of an educational qualification (Doctorate in Clinical Psychology).

Why are we doing this study?

Exposure to frightening events e.g. seeing someone get slapped or punched or being in a car accident is very common in children and young people. This is important as it has been associated with a range of negative outcomes including emotional problems, disruption of important relationships, physical health problems and difficulties at school. However we don't know about what strategies young people utilise to cope with difficult life events and what factors predict resilience to such potentially negative outcomes. This information would enable us to consider appropriate targets for prevention and interventions and to develop a screening measure to detect what strategies young people are employing.

What will the study involve?

The study involves your child/children completing some short questionnaires online at school. This should take about 20-30 minutes. Firstly, they will be asked to recall the most frightening thing that has happened to them in the past two months. Then they will be asked to fill out some questionnaires about how they have been since the frightening event, how they are feeling and what things they may have tried to alleviate any distress. A small number of randomly selected pupils who take part may be asked in three months' time to fill out the questionnaires again to check that our measures are accurate. Young people will be provided with an aftercare sheet with lists of options for support services and further places they can obtain information. The major findings will be written up and sent to parents by the end of the course in 2017.

Is the study mandatory?

No. This study is voluntary; it is up to you and your child whether he or she takes part. Your child will be given an information sheet about the study at school, telling them this. In order to make it easier

for children to participate in the study, we are writing to each child's parent to inform them about this study.

If you would <u>not</u> like your child to participate in the study, then please would you return the slip below to your child's school indicating your wishes by [*insert date****].*** You can also email the researchers Jade.claxton@uea.ac.uk or call them on 07538399761 or call your child's school on 01362 697981 to let them know you do not wish for your child to take part. If you are happy for your child to participate in this study, then you do not have to return the slip; ***if we do not hear from you we will assume that you are happy for your child to participate***.

If you do not wish your child to take part, or if you later change your mind and decide to withdraw your child from the study, then you are free to do so and we will not ask why, this will *not* affect how you or your child are treated.

Who has reviewed this study?

This research has been checked by the East Midlands NHS Research Ethics Committee and the University of East Anglia

What are the possible risks in taking part?

There is no known major risk in filling out the questionnaires however we are asking young people to think about a frightening event which some may find upsetting. Previous research conducted with young people has found none to a very small amount of participants became upset and chose to stop. Therefore it is anticipated there will be no significant adverse effects from partaking. We will ensure that participants understand they can stop at any point for any reason. We will ensure that a trained researcher is available at all times in the unlikely event that a child does become upset. Information will also be provided with other ways in which participants can seek emotional support.

Is the study confidential?

Questionnaires will be anonymised once collected using numbers so no child will be identifiable after we have done a wellbeing screen. Any information that your child tells us will be kept confidential, *unless* your child or someone else is thought to be at risk of harm or if they approach thresholds for symptoms of depression or anxiety. If we do identify that your child might benefit from some support we would get in touch with you and signpost you to appropriate support services. Only the researchers listed on this information sheet will have authorised access to the data which will be secured in accordance with the Data Protection Act 1998.

What if there is a problem?

If you have any concern about any aspect of this study please contact Dr. Richard Meiser-Stedman <u>R.Meiser-Stedman@uea.ac.uk</u>). Or if you would like to make a complaint please contact UEA Clinical Psychology Doctorate Programme Professor Ken Laidlaw on 01603 593600

If you have any questions or would like some more information, please contact Jade Claxton or Alice Aberici on 07538399761 or email Jade.claxton@uea.ac.uk Thank you for your time.

Yours Sincerely,
Alice Alberici, Jade Claxton, Dr. Richard Meiser-Stedman
University of East Anglia

……

I *DO NOT* give permission for my child to take part in the "How do young people respond to frightening events" study.

Child's name: ..... Class: .....

Parent or guardian's name: .....

Parent's signature: ..... Date: .....

Appendix D:

Participant Information Sheet (Child)

Version 2.0
January 25th 2016

INFORMATION SHEET FOR UNDER 16 YEARS

Study title: How do young people respond to frightening events?

Researchers: Alice Alberici, Jade Claxton and Dr. Richard Meiser-Stedman

We are researchers at the University of East Anglia and we are inviting you to take part in our research study. Before you decide to take part it is important that you understand why we are doing this study and what we will ask you do to if you take part. Please read the information carefully so that you can decide if you want to take part or not. Feel free to ask us if there is anything you do not understand.

What is this study about?
Our study is looking at how young people think, feel and act after a frightening event and what they do to make themselves feel safe. It is just as important for us to hear from young people who have not experienced a frightening event as those that have. So even if you have not experienced a frightening event we would still like you to take part.

Why are we doing this study?
Experiencing frightening events e.g. seeing someone get slapped or punched or being in a car accident is very common in children and young people. This is important because sometimes young people can be affected by difficulties with their emotions, relationships, schooling and health after they have experienced a frightening event. We would really like to find out about the strategies young people use to cope with frightening events and which strategies seem most helpful. This information could help us to think about what might be most helpful for children who have experienced a frightening event to avoid these difficulties.

What will the study involve if I take part?
We will ask you to complete some short questionnaires [*specify online or on paper in line with school wishes*] at school. This should take about 20-30 minutes. Firstly, you will be asked to remember the most frightening thing that has ever happened to you. Then you will be asked to fill out some questionnaires about how you have been thinking, feeling and acting since the frightening event. A small number of randomly selected young people who take part may be invited in three months' time to fill out the questionnaires again to check that our measures are accurate. We will write up our findings and share them with your school at the end of the study (summer 2017).

Do I have to take part?
No. This study is voluntary; it is up to you whether you take part or not. Once you have finished reading the information sheet you can decide whether you would like to take part and if you do you can sign an assent form saying you would like to take part when we do the research. If you do not want

to take part, or if you later change your mind and decide to withdraw from the study, then you are free to do so up until [*insert date*] we will not ask why and this will *not* affect how are treated by us, the university or your school.

Who has reviewed this study?
This research has been checked by the East Midlands NHS Research Ethics Committee and the University of East Anglia

What are the possible risks in taking part?
There is no known major risk in filling out the questionnaires. We are however asking young people to think about a frightening event which some may find upsetting. We have looked at other studies that have been done with young people also asking about frightening events, and found that usually no participants or only a very small amount became upset and chose to stop. It is important for you to know that you can stop at any point for any reason and do not need to tell us why. If you do find anything upsetting about taking part in the study, the researchers are trained in working with distress in young people and will be on hand for you to talk to on the day. You can also speak to [*insert name of nominated school contact*] on the day or at a later point or your family. We will also give out an aftercare sheet on the day you take part with a list of different services and places you can get more information and support.

Is the study confidential?
Questionnaires will be anonymised once collected using numbers so no participant will be identifiable after we have done a wellbeing screen that will tell us if you are experiencing a lot of anxiety or depression symptoms. If we find that this is the case then we will contact your parent(s)/guardians and let them know about support services which might help you. Any information that you tell us will be kept private and only shared with the research team, *unless* you or someone else is thought to be at risk of harm. If this happens then the researchers will need to share the information with others such as parents or school. Only the researchers listed on this information sheet will have authorised access to the data which will be kept in line with the Data Protection Act 1998.

What if there is a problem?
If you have any concern about any aspect of this study, you can email the research supervisor, Dr. Richard Meiser-Stedman (R.Meiser-Stedman@uea.ac.uk). If you remain unhappy and would like to make a complaint please contact the head of the Clinical Psychology Doctorate programme Professor Ken Laidlaw on 01603 593600.

How do I take part?
If you decide you want to take part when we do the study you can sign the consent form and fill in the questionnaires.

If you have any questions or would like some more information, please call Jade or Alice on 07538399761 or email jade.claxton@uea.ac.uk or contact [*insert name of school contact*].

Thank you for your time.

Yours Sincerely,
Alice Alberici, Jade Claxton, Dr. Richard Meiser-Stedman
University of East Anglia

Appendix E:

Participant Assent Form (Child)

Participant Identification Number for this trial:

CONSENT FORM FOR UNDER 16 YEARS

Study title: How do young people respond to frightening events?
Names of Researchers: Alice Alberici, Jade Claxton and Dr Meiser-Stedman
Thank you for thinking about taking part in our research project. If you have any more questions about the project please ask the researcher before you decide whether you want to take part or not. If you do decide you would like to take part please read the following:

Please initial boxes

1. I confirm that I have read and understand the information sheet dated 25th January 2016 (version 2.0) for the above study. I have had the time to think about the information, understand any risk involved with taking part and been able to ask questions about the study. ☐

2. I understand that taking part is voluntary (I can choose whether I want to take part or not) and that I can stop taking part at any time without giving a reason and I won't be treated any differently by my school or by the University of East Anglia. ☐

3. I understand that any information I give will only be shared with the research team **except if I say something which makes the researchers think that I or someone else is at risk of being harmed. If this happens the researchers will need to share this information with other people.** ☐

4. I understand if my answers suggest I am experiencing lots of anxiety or depression the researchers will talk to my parent(s)/guardian(s) or school to suggest what support might help me. ☐

5. I confirm that I know how to contact the research team about the study if I need to, and how to get information about the results. ☐

6. I agree to take part in the above study. ☐

Name: **Date:**

Date of Birth: ***Class:***

Appendix F:

Participant Aftercare Sheet

Looking after yourself

Thank you for taking part in in this study. If after the study you feel you need to talk to someone about any problems you may have or if you have experienced something you need to share, there are people to support you.

If you feel comfortable to do so we would recommend you talk to your parent or guardian. We also encourage you to get in contact with the school's named contact for the study Katie Ford, if you don't feel you can go to this person please let another school member of staff know. You can also visit your school nurse, head of year or pastoral care with any concerns you might have.

If you feel you are suffering from any serious problems we would urge you to contact your local General Practitioner (G.P) who can discuss this with you and refer you to other services if necessary.

Helplines

If you are struggling with how you are feeling and need to talk please do not suffer in silence. The following organisations are there to listen in confidence and provide advice without judging:

- The Samaritans helpline is available 24 hours 7 days a weeks on: 08457 909090 or visit www.samaritans.org
- Childline is a free helpline also available anytime on: 0800 1111 or visit www.childline.org.uk

Online support and information

www.rethink.org/living-with-mental-illness/young-people

www.thesite.org/healthandwellbeing/mentalhealth

www.mindfull.org

www.youngminds.org.uk/for_children_young_people

www.getconnected.org.uk

Visit www.youthaccess.org.uk to search their directory of services for help in your area.

Visit www.docready.org for a digital tool that helps to prepare young people for meeting with a GP or health professional

Appendix G:

Wellbeing Screen Letter to Parent/Guardian

Norwich Medical School
University of East Anglia
Norwich Research Park
Norwich
Norfolk
NR4 7TJ

Dear Parent/Guardian,

We would like to thank you and your child for their participation in our research study. We are very grateful for your contribution to an important research field; the development of which would not be possible without help from young people like your child.

As part of our commitment to the wellbeing of young people undertaking our research, we take steps to inform parents where any child scores above the cut-off on any of our measures of mental health symptoms.

This means that on the day your child filled in our survey [*insert date*], the responses they gave on questionnaires looking at frightening events and symptoms of anxiety and or depression resulted in a score higher than we might expect the "normal" range to lie in, and may reflect difficulties in this area.

However, as the responses to the questions on these measures only gives us a snapshot picture, with little other information, this may not reflect clinical significance and may just have been due to factors on the day, or it could reflect short-term difficulties such as recent stress caused by exams, schoolwork or a bereavement.

However we feel it may be worthwhile reviewing with your child and their GP, for further consideration and to look at any options available, even as a precautionary measure.

Should you wish to discuss this further with the research team please contact us on 07538399761 or by email (Jade.claxton@uea.ac.uk) alternatively you may wish to contact [*insert nominated school contact*] at the school your child attends.

Yours Sincerely,

Jade Claxton
Trainee Clinical Psychologist

Alice Alberici
Trainee Clinical Psychologist

Dr Richard Meiser-Stedman
Clinical Psychologist

Appendix H:

NHS Research Ethics Committee Letter of Approval

NHS
Health Research Authority

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

Telephone: 0115 8839521

08 February 2016

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

Dear Ms Alberici

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

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

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

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

Confirmation of ethical opinion

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

Conditions of the favourable opinion

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

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

Appendix I:

NHS Research Ethics Committee Letter of Approval for Amendment (27/4/16)

Increase Sample Size for Recruitment

NHS
Health Research Authority

East Midlands - Derby Research Ethics Committee

The Old Chapel
Royal Standard Place
Nottingham
NG1 6FS

27 April 2016

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

Dear Ms Alberici

Study title:	**Cognitive processes in posttraumatic stress disorder (PTSD) and depression following trauma: a cross-sectional study of secondary school pupils**
REC reference:	**16/EM/0009**
Protocol number:	**1**
Amendment number:	**Amendment 1**
Amendment date:	**05 April 2016**
IRAS project ID:	**188569**

The above amendment was reviewed on 21 April 2016 by the Sub-Committee in correspondence.

Ethical opinion

The members of the Committee taking part in the review gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

Approved documents

The documents reviewed and approved at the meeting were:

Document	*Version*	*Date*
Notice of Substantial Amendment (non-CTIMP)	Amendment 1	05 April 2016
Research protocol or project proposal	3	01 April 2016

Membership of the Committee

The members of the Committee who took part in the review are listed on the attached sheet.

R&D approval

All investigators and research collaborators in the NHS should notify the R&D office for the relevant NHS care organisation of this amendment and check whether it affects R&D approval of the research.

Statement of compliance

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

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

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

Yours sincerely

J. Parliament

pp
Mr Peter Korczak (Chair)
Chair

E-mail: NRESCommittee.EastMidlands-Derby@nhs.net

Enclosures: *List of names and professions of members who took part in the review*

Copy to: *Sponsor - Mrs Sue Steel*

Appendix J:

NHS Research Ethics Committee Letter of Approval for Amendment (02/11/16):

Reduce Timeframe Between Parents Receiving Information Sheet and Data Collection (from 4 weeks to 2 weeks).

NHS
Health Research Authority

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

02 November 2016

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

Dear Ms Alice Alberici

Study title:	**Cognitive processes in posttraumatic stress disorder (PTSD) and depression following trauma: a cross-sectional study of secondary school pupils**
REC reference:	**16/EM/0009**
Protocol number:	**1**
Amendment number:	**SA2**
Amendment date:	**06 October 2016**
IRAS project ID:	**188569**

The above amendment was reviewed on 20 October 2016 by the Sub-Committee in correspondence.

Ethical opinion

The members of the Committee taking part in the review gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

Approved documents

The documents reviewed and approved at the meeting were:

Document	*Version*	*Date*
Notice of Substantial Amendment (non-CTIMP)	SA2	06 October 2016
Research protocol or project proposal	3.1	28 September 2016

Membership of the Committee

The members of the Committee who took part in the review are listed on the attached sheet.

Working with NHS Care Organisations

Sponsors should ensure that they notify the R&D office for the relevant NHS care organisation of this amendment in line with the terms detailed in the categorisation email issued by the lead nation for the study.

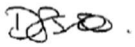
Statement of compliance

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

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

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

Yours sincerely



PP
Mr Peter Korczak (Chair)
Chair

E-mail: NRESCommittee.EastMidlands-Derby@nhs.net

Enclosures: *List of names and professions of members who took part in the review*

Copy to:
Mrs Sue Steel

Appendix K:

Letter of Support from Recruited School on Opt-Out Consent Process

27th November 2015

Dear Research Ethics Committee,

Re: An exploration of young people's emotional and behavioural responses to frightening events

I write in relation to the above proposed study and its application for ethical approval.

I have liaised with one of the study researchers and have been informed about the nature of the proposed research and what it would entail. This study, if approved, would involve pupils aged between 11-17 years filling out an online or paper copy of a battery of questionnaires relating to a frightening event they have experienced and how this may have impacted on their thoughts, feeling and behaviours. We are aware that pupils in our school are often caught in distressing experiences, and appreciate the importance of conducting research in this area.

The study researchers have proposed that the study includes an opt-out consent procedure. This consent procedure would involve parents being informed about the study via our school's typical methods of communication (e.g. email, letter), where their consent for their children to take part would be assumed on a given date unless otherwise specified. We understand that parents may opt-out using any of several methods (i.e. by returning the opt-out slip, by telephone or by email) and that a follow up reminder will be sent to parents prior to the research being undertaken. We are confident that parents read correspondence they receive from us, and believe this will provide parents with sufficient information about their children's participation in the study and the option to opt-out. Using an opt-in method would unduly increase the bureaucratic burden of schools and parents, and is likely to lead to poorer uptake rates, which may affect the value of the research. Therefore, we are supportive of the proposed opt-out consent procedure.

We are satisfied that the researchers have carefully considered the emotional impact for pupils taking part in the study. The researchers will work together with our school to put in place appropriate supportive measures in the unlikely event that any young people become distressed during participation, and where any young people exhibit clinical levels of any identified mental health issues.

I can confirm that the relevant staff in our school have considered these factors and would be delighted to take part in this important study; we certainly support the researcher's application for ethical approval.

Yours sincerely,

Nick O'Brien
Assistant Head

Appendix L:
Author Guidelines, Clinical Psychology Review

Article structure

Manuscripts should be prepared according to the guidelines set forth in the Publication Manual of the American Psychological Association (6th ed., 2009). Of note, section headings should not be numbered.
Manuscripts should ordinarily not exceed 50 pages, *including* references and tabular material. Exceptions may be made with prior approval of the Editor in Chief. Manuscript length can often be managed through the judicious use of appendices. In general the References section should be limited to citations actually discussed in the text. References to articles solely included in meta-analyses should be included in an appendix, which will appear in the on line version of the paper but not in the print copy. Similarly, extensive Tables describing study characteristics, containing material published elsewhere, or presenting formulas and other technical material should also be included in an appendix. Authors can direct readers to the appendices in appropriate places in the text.
It is authors' responsibility to ensure their reviews are comprehensive and as up to date as possible (at least through the prior calendar year) so the data are still current at the time of publication. Authors are referred to the PRISMA Guidelines (http://www.prisma-statement.org/statement.htm) for guidance in conducting reviews and preparing manuscripts. Adherence to the Guidelines is not required, but is recommended to enhance quality of submissions and impact of published papers on the field.

Appendices

If there is more than one appendix, they should be identified as A, B, etc. Formulae and equations in appendices should be given separate numbering: Eq. (A.1), Eq. (A.2), etc.; in a subsequent appendix, Eq. (B.1) and so on. Similarly for tables and figures: Table A.1; Fig. A.1, etc.

Essential title page information

Title. Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible. **Note: The title page should be the first page of the manuscript document indicating the author's names and affiliations and the corresponding author's complete contact information.**
Author names and affiliations. Where the family name may be ambiguous (e.g., a double name), please indicate this clearly. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lower-case superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name, and, if available, the e-mail address of each author within the cover letter.
Corresponding author. Clearly indicate who is willing to handle correspondence at all stages of refereeing and publication, also post-publication. **Ensure that telephone and fax numbers (with country and area code) are provided in addition to the e-mail address and the complete postal address.**
Present/permanent address. If an author has moved since the work described in the article was done, or was visiting at the time, a "Present address"' (or "Permanent address") may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

Abstract
A concise and factual abstract is required (not exceeding 200 words). This should be typed on a separate page following the title page. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separate from the article, so it must be able to stand alone. References should therefore be avoided, but if essential, they must be cited in full, without reference to the reference list.
Graphical abstract
Although a graphical abstract is optional, its use is encouraged as it draws more attention to the online article. The graphical abstract should summarize the contents of the article in a concise, pictorial form designed to capture the attention of a wide readership. Graphical abstracts should be submitted as a separate file in the online submission system. Image size: Please provide an image with a minimum of 531 × 1328 pixels (h × w) or proportionally more. The image should be readable at a size of 5 × 13 cm using a regular screen resolution of 96 dpi. Preferred file types: TIFF, EPS, PDF or MS Office files. You can view Example Graphical Abstracts on our information site.
Authors can make use of Elsevier's Illustration and Enhancement service to ensure the best presentation of their images and in accordance with all technical requirements: Illustration Service.
Highlights
Highlights are mandatory for this journal. They consist of a short collection of bullet points that convey the core findings of the article and should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point). You can view example Highlights on our information site.
Keywords

Immediately after the abstract, provide a maximum of 6 keywords, using American spelling and avoiding general and plural terms and multiple concepts (avoid, for example, 'and', 'of'). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.
Abbreviations
Define abbreviations that are not standard in this field in a footnote to be placed on the first page of the article. Such abbreviations that are unavoidable in the abstract must be defined at their first mention there, as well as in the footnote. Ensure consistency of abbreviations throughout the article.
Acknowledgements
Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).
Formatting of funding sources
List funding sources in this standard way to facilitate compliance to funder's requirements:
Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].
It is not necessary to include detailed descriptions on the program or type of grants and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.
If no funding has been provided for the research, please include the following sentence:

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

Footnotes

Footnotes should be used sparingly. Number them consecutively throughout the article. Many word processors can build footnotes into the text, and this feature may be used. Otherwise, please indicate the position of footnotes in the text and list the footnotes themselves separately at the end of the article. Do not include footnotes in the Reference list.

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Regardless of the application used other than Microsoft Office, when your electronic artwork is finalized, please 'Save as' or convert the images to one of the following formats (note the resolution requirements for line drawings, halftones, and line/halftone combinations given below):

EPS (or PDF): Vector drawings, embed all used fonts.

TIFF (or JPEG): Color or grayscale photographs (halftones), keep to a minimum of 300 dpi.

TIFF (or JPEG): Bitmapped (pure black & white pixels) line drawings, keep to a minimum of 1000 dpi.

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• Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); these typically have a low number of pixels and limited set of colors;
• Supply files that are too low in resolution;
• Submit graphics that are disproportionately large for the content.

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figure. A caption should comprise a brief title (**not** on the figure itself) and a description of the illustration. Keep text in the illustrations themselves to a minimum but explain all symbols and abbreviations used.

Tables

Please submit tables as editable text and not as images. Tables can be placed either next to the relevant text in the article, or on separate page(s) at the end. Number tables consecutively in accordance with their appearance in the text and place any table notes below the table body. Be sparing in the use of tables and ensure that the data presented in them do not duplicate results described elsewhere in the article. Please avoid using vertical rules and shading in table cells.

References

Citations in the text should follow the referencing style used by the American Psychological Association. You are referred to the Publication Manual of the American Psychological Association, Sixth Edition, ISBN 1-4338-0559-6, copies of which may be ordered from http://books.apa.org/books.cfm?id=4200067 or APA Order Dept., P.O.B. 2710, Hyattsville, MD 20784, USA or APA, 3 Henrietta Street, London, WC3E 8LU, UK. Details concerning this referencing style can also be found at http://humanities.byu.edu/linguistics/Henrichsen/APA/APA01.html

Citation in text

Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Any references cited in the abstract must be given in full. Unpublished results and personal communications are not recommended in the reference list, but may be mentioned in the text. If these references are included in the reference list they should follow the standard reference style of the journal and should include a substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

Web references

As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

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Please ensure that the words 'this issue' are added to any references in the list (and any citations in the text) to other articles in the same Special Issue.

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References should be arranged first alphabetically and then further sorted chronologically if necessary. More than one reference from the same author(s) in the same year must be identified by the letters "a", "b", "c", etc., placed after the year of publication. **References should be formatted with a hanging indent (i.e., the first line of each reference is flush left while the subsequent lines are indented).**
Examples: Reference to a journal publication: Van der Geer, J., Hanraads, J. A. J., & Lupton R. A. (2000). The art of writing a scientific article. *Journal of Scientific Communications,* 163, 51-59.
Reference to a book: Strunk, W., Jr., &White, E. B. (1979). *The elements of style.* (3rd ed.). New York: Macmillan, (Chapter 4).
Reference to a chapter in an edited book: Mettam, G. R., & Adams, L. B. (1994). How to prepare an electronic version of your article. In B.S. Jones, & R. Z. Smith (Eds.), *Introduction to the electronic age* (pp. 281-304). New York: E-Publishing Inc.
[dataset] Oguro, M., Imahiro, S., Saito, S., Nakashizuka, T. (2015). *Mortality data for Japanese oak wilt disease and surrounding forest compositions.* Mendeley Data, v1. http://dx.doi.org/10.17632/xwj98nb39r.1
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Supplementary material such as applications, images and sound clips, can be published with your article to enhance it. Submitted supplementary items are published exactly as they are received (Excel or PowerPoint files will appear as such online). Please submit your material together with the article and supply a concise, descriptive caption for each supplementary file. If you wish to make changes to supplementary material during any stage of the process, please make sure to provide an updated file. Do not annotate any corrections on a previous version.

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Appendix M:
Author Guidelines, Journal of Abnormal Child Psychology

Journal of Abnormal Child Psychology
An official publication of the International Society for Research in Child and Adolescent Psychopathology
Editor-in-Chief: Charlotte **Johnston**
ISSN: 0091-0627 (print version)
ISSN: 1573-2835 (electronic version)
Journal no. 10802

Manuscript Submission
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Please follow the hyperlink "Submit online" on the right and upload all of your manuscript files following the instructions given on the screen.

Title Page
The title page should include:

- The name(s) of the author(s)
- A concise and informative title
- The affiliation(s) and address(es) of the author(s)
- The e-mail address, and telephone number(s) of the corresponding author
- If available, the 16-digit ORCID of the author(s)

Abstract
Please provide an abstract of 150 to 250 words. The abstract should not contain any undefined abbreviations or unspecified references.
Keywords
Please provide 4 to 6 keywords which can be used for indexing purposes.
Text Formatting
Manuscripts should be submitted in Word.

- Use a normal, plain font (e.g., 10-point Times Roman) for text.
- Use italics for emphasis.
- Use the automatic page numbering function to number the pages.

Do not use field functions.
Use tab stops or other commands for indents, not the space bar.
Use the table function, not spreadsheets, to make tables.
Use the equation editor or MathType for equations.
Save your file in docx format (Word 2007 or higher) or doc format (older Word versions).

Manuscripts with mathematical content can also be submitted in LaTeX.
LaTeX macro package (zip, 182 kB)

Headings
Please use no more than three levels of displayed headings.

Abbreviations
Abbreviations should be defined at first mention and used consistently thereafter.

Footnotes
Footnotes can be used to give additional information, which may include the citation of a reference included in the reference list. They should not consist solely of a reference citation, and they should never include the bibliographic details of a reference. They should also not contain any figures or tables.

Footnotes to the text are numbered consecutively; those to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data). Footnotes to the title or the authors of the article are not given reference symbols.

Always use footnotes instead of endnotes.

Acknowledgments
Acknowledgments of people, grants, funds, etc. should be placed in a separate section on the title page. The names of funding organizations should be written in full.

Manuscript Format

All JACP manuscripts should be submitted to Editorial Manager in 12-point Times New Roman with standard 1-inch borders around the margins.

APA Style
Page length: 35 pages; Text must be double-spaced; APA Publication Manual standards must be followed.

TERMINOLOGY
Please use the standard mathematical notation for formulae, symbols etc.:Italic for single letters that denote mathematical constants, variables, and unknown quantities
Roman/upright for numerals, operators, and punctuation, and commonly defined functions or abbreviations, e.g., cos, det, e or exp, lim, log, max, min, sin, tan, d (for derivative) Bold for vectors, tensors, and matrices.
Citation
Cite references in the text by name and year in parentheses. Some examples:

Negotiation research spans many disciplines (Thompson 1990).
This result was later contradicted by Becker and Seligman (1996).
This effect has been widely studied (Abbott 1991; Barakat et al. 1995; Kelso and Smith 1998; Medvec et al. 1999).

Reference list
The list of references should only include works that are cited in the text and that have been published or accepted for publication. Personal communications and unpublished works should only be mentioned in the text. Do not use footnotes or endnotes as a substitute for a reference list.

Reference list entries should be alphabetized by the last names of the first author of each work.
Journal article
Harris, M., Karper, E., Stacks, G., Hoffman, D., DeNiro, R., Cruz, P., et al. (2001). Writing labs and the Hollywood connection. Journal of Film Writing, 44(3), 213–245.
Article by DOI
Slifka, M. K., & Whitton, J. L. (2000) Clinical implications of dysregulated cytokine production. Journal of Molecular Medicine, doi:10.1007/s001090000086
Book
Calfee, R. C., & Valencia, R. R. (1991). APA guide to preparing manuscripts for journal publication. Washington, DC: American Psychological Association.
Book chapter
O'Neil, J. M., & Egan, J. (1992). Men's and women's gender role journeys: Metaphor for healing, transition, and transformation. In B. R. Wainrib (Ed.), Gender issues across the life cycle (pp. 107–123). New York: Springer.
Online document
Abou-Allaban, Y., Dell, M. L., Greenberg, W., Lomax, J., Peteet, J., Torres, M., & Cowell, V. (2006). Religious/spiritual commitments and psychiatric practice. Resource document. American Psychiatric Association.
http://www.psych.org/edu/other_res/lib_archives/archives/200604.pdf. Accessed 25 June 2007.

Journal names and book titles should be italicized.

For authors using EndNote, Springer provides an output style that supports the formatting of in-text citations and reference list.
EndNote style (zip, 3 kB)

TABLES
All tables are to be numbered using Arabic numerals.
Tables should always be cited in text in consecutive numerical order.
For each table, please supply a table caption (title) explaining the components of the table.
Identify any previously published material by giving the original source in the form of a reference at the end of the table caption.
Footnotes to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data) and included beneath the table body.
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Supply all figures electronically.
Indicate what graphics program was used to create the artwork.
For vector graphics, the preferred format is EPS; for halftones, please use TIFF format. MSOffice files are also acceptable.
Vector graphics containing fonts must have the fonts embedded in the files.
Name your figure files with "Fig" and the figure number, e.g., Fig1.eps.

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Definition: Black and white graphic with no shading.
Do not use faint lines and/or lettering and check that all lines and lettering within the figures are legible at final size.
All lines should be at least 0.1 mm (0.3 pt) wide.
Scanned line drawings and line drawings in bitmap format should have a minimum resolution of 1200 dpi.
Vector graphics containing fonts must have the fonts embedded in the files.
Halftone Art

Figure Numbering
All figures are to be numbered using Arabic numerals.
Figures should always be cited in text in consecutive numerical order.
Figure parts should be denoted by lowercase letters (a, b, c, etc.).
If an appendix appears in your article and it contains one or more figures, continue the consecutive numbering of the main text. Do not number the appendix figures,"A1, A2, A3, etc." Figures in online appendices (Electronic Supplementary Material) should, however, be numbered separately.

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Each figure should have a concise caption describing accurately what the figure depicts.
Include the captions in the text file of the manuscript, not in the figure file.
Figure captions begin with the term Fig. in bold type, followed by the figure number, also in bold type.
No punctuation is to be included after the number, nor is any punctuation to be placed at the end of the caption.
Identify all elements found in the figure in the figure caption; and use boxes, circles, etc., as coordinate points in graphs.
Identify previously published material by giving the original source in the form of a reference citation at the end of the figure caption.

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Specialized Formats

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It is possible to collect multiple files in a .zip or .gz file.

Numbering

If supplying any supplementary material, the text must make specific mention of the material as a citation, similar to that of figures and tables.
efer to the supplementary files as “Online Resource”, e.g., "... as shown in the animation (Online Resource 3)", “... additional data are given in Online Resource 4”.
Name the files consecutively, e.g. “ESM_3.mpg”, “ESM_4.pdf”.

Captions

For each supplementary material, please supply a concise caption describing the content of the file.

Processing of supplementary files
Electronic supplementary material will be published as received from the author without any conversion, editing, or reformatting.
Accessibility
In order to give people of all abilities and disabilities access to the content of your supplementary files, please make sure that
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