

**ENVIRONMENTAL-RISK (E-RISK) LONGITUDINAL TWIN STUDY  
CONCEPT PAPER FORM**

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Provisional Paper Title: Psychopathology in young people exposed to complex trauma

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**OBJECTIVE OF THE STUDY AND ITS SIGNIFICANCE:**

Traumas are stressful events that involve danger of death, injury, or sexual violation, which can be directly experienced, witnessed, or learned about. One in three British young people have been exposed to trauma, and traumatised young people are nearly twice as likely to experience a mental health disorder.<sup>1</sup> Current psychiatric assessment of trauma-exposed young people is largely based on descriptive models originally developed to explain symptoms that arise following war exposure in adult veterans. In addition, current psychiatric treatment of trauma-exposed young people is largely based on theoretical models developed to treat psychopathology that arises following single traumatic events in adults, such as road traffic accidents. These models focus on symptoms of post-traumatic stress disorder.<sup>2,3</sup> However, clinicians have observed that these models are insufficient to describe and treat the broader and challenging presentations that are often seen in young people who have been exposed to more complex types of trauma. Complex traumas are defined as types of trauma that involve multiple, interpersonal stressors in childhood or adolescence, such as maltreatment by adults, witnessing domestic violence, or bullying by peers.<sup>4</sup> Of note, complex trauma is defined through the appraisal and report of an exposure as traumatic by the respondent and therefore is a different construct to objective / observed experiences of events such as victimisation. This difference is demonstrated in E-Risk data: although 90% of participants who reported exposure to complex trauma had experienced victimisation during childhood or adolescence (ex\_sve12 or polyvctzce18), only 16% of those who had experienced victimisation during childhood or adolescence reported exposure to complex trauma. The inadequate screening/assessment and treatment of young people exposed to complex trauma results in prolonged distress and impairment for affected individuals. Therefore, psychiatric assessment and treatment of these young people poses significant challenges in clinical practice.<sup>5-11</sup>

To inform and improve assessment and treatment of young people exposed to complex trauma, there is a need for an evidence-based description of the psychopathology they experience. As current assessment and treatment of trauma-exposed young people is based on models of psychopathology seen following non-complex traumas, identifying previously unrecognised differences in those exposed to complex trauma will indicate new targets for assessment and treatment of this population. Additionally, as current assessment and treatment is based on models which assume that symptoms arise post-trauma, clarifying the origin of symptoms will inform whether trauma-focussed approaches are appropriate or whether different approaches are needed. Addressing newly identified targets using relevant approaches could improve the effectiveness of assessment and treatment, leading to better outcomes for affected individuals, and reducing the mental health service burden of complex trauma.

In the proposed project, we aim to develop a comprehensive description of psychopathology related to complex trauma vs no trauma, the differences between psychopathology related to complex trauma vs non-complex trauma, and their origins. We will do this by studying two objectives:

**Objective 1: To characterise psychopathology in 18-year-olds who have been exposed to complex trauma compared to (i) those exposed to non-complex trauma, and (ii) non-traumatised individuals.**

Hypothesis: 18-year-olds who have been exposed to complex trauma are more likely to experience more broad and co-occurring psychopathology than those who have been exposed to non-complex trauma and no trauma.

Previous papers from the E-Risk Study have shown that victimised adolescents have a general vulnerability for psychopathology compared to non-victimised adolescents,<sup>12</sup> but it is unclear how these findings relate to reported measures of complex trauma or non-complex trauma. In addition, most studies that have focussed on complex trauma have only considered categorical outcomes and single disorders,<sup>13</sup> and therefore do not provide a comprehensive description of the dimensional and co-occurring psychopathology typically observed in clinical practice. Furthermore, because very few studies have directly compared complex and non-complex traumas, it is unclear which presentations are specific to complex trauma. Preliminary research suggests that young people exposed to complex trauma are more likely to experience a range of psychiatric symptoms compared to those exposed to non-complex traumas.<sup>14,15</sup> However, these few studies assessed selected samples obtained from specialist clinics or child protection services, which limits generalisability.<sup>16</sup> To provide a better understanding of psychopathology in young people exposed to complex trauma, studies are needed that test broad, co-occurring psychopathology, and compare findings with those observed in young people exposed to non-complex and no trauma, in large, population-based samples. We will address this knowledge gap in objective 1.

**Objective 2: To test whether vulnerabilities measured before trauma exposure (including psychopathology and family socioeconomic status at age 5) account for complex trauma-related psychopathology at age 18.**

Hypothesis: The associations between complex trauma and psychopathology are, in part, accounted for by pre-existing psychopathology and disadvantaged family socioeconomic conditions.

Previous research highlights three possible mechanisms underlying the origins of psychopathology in young people who have been exposed to complex trauma. First, exposure to complex trauma could affect brain development, causing psychopathology. Second, psychopathology associated with complex trauma could reflect pre-existing vulnerabilities, which may increase the risk of complex trauma exposure. Third, confounding factors, such as disadvantaged socioeconomic conditions, could independently lead to an increased risk of complex trauma exposure and psychopathology. Evidence from experiments in animal models supports the first mechanism.<sup>17,18</sup> However, human research has been predominantly cross-sectional, lacking pre-trauma assessments needed to understand the role of pre-existing vulnerabilities. Furthermore, no previous research has compared young people exposed to complex trauma with those exposed to non-complex trauma in order to investigate the origins of psychopathology unique to complex trauma. To provide a better understanding of the origins of psychopathology in young people exposed to complex trauma, further longitudinal research is needed to test these mechanisms, including research which compares young people exposed to complex and non-complex trauma. We will address this knowledge gap in objective 2.

**STATISTICAL ANALYSES:**

We will compare E-Risk participants at age 18 who have been exposed to complex trauma with (i) those exposed to non-complex trauma, and (ii) non-traumatised individuals. In all analyses we will account for clustering of twins within families.

**Objective 1:** We will assess psychopathology both in terms of disorders and dimensions. We will run logistic regression analyses to test for bivariate associations between complex trauma and disorders. Additionally, we will use structural equation modelling to account for correlations between aspects of psychopathology, to identify dimensional latent factors of psychopathology (structure), and to test differences in the structure of psychopathology (invariance) between groups with complex trauma, non-complex trauma, and no trauma.

**Objective 2:** We will expand these models to include age 5 pre-trauma psychopathology and family socioeconomic status, and compare results with corresponding models, to test whether associations are accounted for by these vulnerabilities measured before trauma exposure.

**VARIABLES NEEDED AT WHICH AGES (labels and names):**

**Age 18:**

**Trauma exposure:**

PTSD - trauma exposure - P18 - Elder PTSD\_A\_E18  
Complex/non-complex trauma exposure

Information on the complex trauma measure is provided in the attached document 'Coding trauma type and complex trauma in the E-Risk Longitudinal Twin Study,' from p8.<sup>4</sup> In summary: We have assessed trauma dossiers for age 18 E-Risk participants to code variables to indicate complex and non-complex trauma exposure. Definitions were based on a comprehensive review of literature, and consensus discussion with experts at the Institute of Psychiatry, Psychology and Neuroscience, and the National and Specialist CAMHS Trauma and Anxiety Clinic, Maudsley Hospital. For each participant, we have determined (i) whether they have been exposed to trauma in their lifetime, (ii) whether the traumas they experienced were interpersonal in nature (actions of a person intentionally causing or threatening death, injury or sexual violation to another; experienced or witnessed by study member), and (iii) whether they had experienced multiple interpersonal traumas. Participants who meet all three of these criteria, meet the definition for complex trauma exposure. Trauma-exposed participants who do not meet all three criteria, meet the definition for non-complex trauma exposure. Another psychiatrist has independently coded these variables in E-Risk, with excellent inter-rater reliability (kappa=0.86). Of the 2,064 participants with available data, 9.1% (188/2,064) experienced complex trauma and 21.7% (448/2,064) experienced non-complex trauma by age 18.

**Psychopathology:**

Diagnosis and symptom scores of major depressive episode, generalised anxiety disorder, PTSD, disordered eating, ADHD, conduct disorder, alcohol dependence, cannabis dependence, other drug dependence, nicotine dependence, psychotic symptoms, and prodromal symptoms:

Major depressive episode, dsm4 - P18 - Elder DXMDEE18  
Major depressive episode symptom score (or symptom items to derive symptom score)  
Gen Anxiety Disorder, dsm4\_based - P18 - Elder DXGADE18  
Gen anxiety disorder symptom score (or symptom items to derive symptom score)  
PTSD Current dx, dsm5 - P18 - Elder DXPTSD5CUE18  
PTSD (DSM-5) symptom score (or symptom items to derive symptom score)  
PTSD (DSM-5) symptoms, past 12 months PTSD26  
Disordered eating symptom score (or symptom items to derive symptom score)  
DSM-5 ADHD Dx (based on >=5 Symp) [incl 4 NEET & meds] - P18 - ET DXADHD5X\_18E  
ADHD (DSM-5) symptom score (or symptom items to derive symptom score)  
Moderate Conduct Disorder (>=5 count) - P18 - Elder CDMODE18  
Conduct disorder symptom score (or symptom items to derive symptom score)  
Alcohol dependent, dsm4\_based - P18 - Elder DXALCDEPE18  
Alcohol dependent symptom score (or symptom items to derive symptom score)  
Marijuana dependency, dsm4 - P18 - Elder DXMARJE18  
Marijuana dependency symptom score (or symptom items to derive symptom score)  
Drug dependent (or on methadone maintenance), dsm4 - P18 - Elder DXDRUGME18

Drug dependent symptom score (or symptom items to derive symptom score)	
Fagerstrom Dx for Nicotine Dependence - P18 - Elder	SMKDXFTNDE18
Nicotine dependence symptom score (or symptom items to derive symptom score)	
Psychotic symptom score	
Psychotic symptom items, since age 12 - P18 - Elder	ff1e18fin - ff13e18fin
Psychotic symptom items, past 12 months - P18 - Elder	ff1pe18 - ff13pe18
Prodromal symptom score (or symptom items to derive symptom score)	

Dimension scores:

P	PBF_E
Internalising	INTBF_E
Externalising	EXTBF_E
Thought	THDBF_E

**Pre-trauma measures:**

**Age 5:**

Total Mum & Teacher Internalising Scale - Elder twin (CBCL and TRF)	TOTINTE5
Total Mum & Teacher Externalising Scale - Elder twin (CBCL and TRF)	TOTEXTE5
Social Class Composite	seswq35

**Age 12:**

Proportion of family members with valid data who have any disorder	FHANYPM12
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**Study:**

Standard variables

**REFERENCES CITED:**

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## Data Security Agreement

Provisional Paper Title	Complex Trauma in Young People: Psychopathology and Cognition
Proposing Author	Stephanie Lewis
Today's Date	24 October 2018

### **Please keep one copy for your records**

(Please initial your agreement)

\_SL\_ I am familiar with the King's College London research ethics guidelines (<https://www.kcl.ac.uk/innovation/research/support/ethics/about/index.aspx>) and the MRC good research practice guidelines (<https://www.mrc.ac.uk/research/policies-and-guidance-for-researchers/good-research-practice/>).

\_SL\_ My project has ethical approval from my institution.

\_SL\_ I am familiar with the EU General Data Protection Regulation (<https://mrc.ukri.org/documents/pdf/gdpr-guidance-note-3-consent-in-research-and-confidentiality/>), and will use the data in a manner compliant with its requirements.

\_SL\_ My computer is (a) encrypted at the hard drive level, (b) password-protected, (c) configured to lock after 15 minutes of inactivity, AND (d) has an antivirus client which is updated regularly.

\_SL\_ I will treat all data as "restricted" and store in a secure fashion.

\_SL\_ I will not share the data with anyone, including students or other collaborators not specifically listed on this concept paper.

\_SL\_ I will not merge data from different files or sources, except where approval has been given by the PI.

\_SL\_ I will not post data online or submit the data file to a journal for them to post. Some journals are now requesting the data file as part of the manuscript submission process. The E-Risk Study cannot be shared because the Study Members have not given informed consent for unrestricted open access. Speak to the study PI for strategies for dealing with data sharing requests from Journals.

\_SL\_ Before submitting my paper to a journal, I will submit my draft manuscript and scripts for data checking, and my draft manuscript for co-author mock review, allowing three weeks.

\_SL\_ I will submit analysis scripts and new variable documentation to project data manager after the manuscript gets accepted for publication.

\_SL\_ I will delete the data after the project is complete.

\_\_\_\_\_ **For projects using location data:** I will ensure geographical location information, including postcodes or geographical coordinates for the E-Risk study member's homes or schools, is never combined or stored with any other E-Risk data (family or twin-level data)

\_\_\_\_\_ **For projects using genomic data:** I will only use the SNP and/or 450K data in conjunction with the phenotypes that have been approved for use in this project at the concept paper stage.

**Signature:** .Stephanie Lewis.....

**CONCEPT PAPER RESPONSE FORM**

**A. To be completed by the proposing author**

Proposing Author:

I have read the E-Risk data-sharing policy guidelines and agree to follow them

Provisional Paper Title: Psychopathology in young people exposed to complex trauma

Potential co-authors: Karestan Koenen, Avshalom Caspi, Terrie Moffitt, Louise Arseneault, Helen Fisher

Potential Journals:

Intended Submission Date (month/year): July 2019

***Please keep one copy for your records and return one to Louise (louise.arseneault@kcl.ac.uk)***

**B. To be completed by potential co-authors:**

Approved     Not Approved     Let's discuss, I have concerns

Comments:

Please check your contribution(s) for authorship:

- Conceptualizing and designing the longitudinal study
- Conceptualizing and collecting one or more variables
- Data collection
- Conceptualizing and designing this specific paper project
- Statistical analyses
- Writing
- Reviewing manuscript drafts
- Final approval before submission for publication
- Acknowledgment only, I will not be a co-author

**Signature:** .....