The Impact of Early Adversity and Trauma on Adolescent's Epistemic Trust and Learning

Jessie Greisbach

D.Clin.Psy. Thesis (Volume 1), 2017

University College London

UCL Doctorate in Clinical Psychology
Thesis declaration form

I confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signature: 

Name: Jessie Greisbach

Date: 23rd June 2017

Overview

This volume is comprised of three parts. Part 1 is a systematic literature review, which summarises the impact of trauma in the parent-child relationship on children's learning. It critically appraises 32 studies examining the domains of cognitive development, academic performance and functional ability, and social information processing. Despite mixed findings, it concludes that there is a vulnerability of impairments across a range of domains, with the exception of executive functioning. Nine studies identified moderators that may account for some of the variability in findings. Further research is indicated for all domains, and underlines the need for larger sample sizes and the identification of further factors that may be associated with trauma and learning.

Part 2 is an empirical paper that examines in an adolescent sample the role of ostensive cues on Epistemic Trust (ET), learning and generalisation. It also explores whether trauma moderates these relationships, and whether trauma negatively impacts ET. The results show that ostensive cues impact ET but not learning and generalisation. Trauma did not moderate the use of ostensive cues, but was associated with ET. Possible reasons for the findings are suggested, as well as their implications for further research. The study was conducted as part of a joint project with Reches (2017) and Draper (2017).

Part 3 is a critical appraisal providing reflections on the process of completing the empirical research. It considers the original aims of the study, the recruitment challenges, measurement considerations and my role as a trainee clinical psychologist while undertaking the research.

Table of Contents

Acknowledgements **9**

Part 1: Literature review: The Impact of Trauma in the Parent-Child Relationship on Children's Learning **10**

Abstract **11**

Introduction **12**

- Trauma **12**
- The theoretical background associating trauma and learning **12**
- Recent systematic reviews and methodological challenges **14**
- Current review **16**

Method **17**

- Search strategy **17**
- Inclusion and exclusion criteria **18**
- Identification of studies **19**
- Quality appraisal tool **20**

Results **22**

- Cognitive development **22**
  - General cognitive functioning **22**
  - Intelligence **24**
  - Executive functioning and attention **25**
  - Memory **26**
  - Language **27**
- Academic performance and functional ability **38**
- Social information processing **39**
  - Processing the behaviour of others **39**
  - Processing the emotions of others **44**
  - Theory of mind **46**
  - Decision making abilities **47**

Discussion **58**

- Summary of findings **58**
  - Is there a deficit in learning and social learning in children who have experienced trauma in the child-parent relationship? **58**
  - What accounts for the cognitive deficits associated with trauma in the child-parent relationship? **62**
- Interpretation of findings and clinical implications **64**
- Limitations **68**
  - Sample **68**
  - Causality **69**
  - Domains captured **69**
  - Review process **70**

Future research **70**
Conclusion **72**
References **73**

Part 2: Empirical paper: The Impact of Early Adversity and Trauma on Adolescent's Epistemic Trust **85**
Abstract **86**
Introduction **87**
The role of trauma for social learning **87**
Trauma as a mechanism of social learning **87**
Epistemic trust to epistemic freezing **88**
The role of ostensive cues on epistemic trust **89**
Measuring ostensive cues, epistemic trust and social learning **91**
Measuring epistemic trust and ostensive cues **91**
Measuring ostensive cues and learning **92**
Research aims **93**
Method **95**
Design **95**
Participants **95**
Recruitment **95**
Inclusion and exclusion criteria **97**
Sample size **97**
Sample **98**
Ethics **99**
Service User Involvement **99**
Procedure **100**
Measures **101**
Experimental paradigm for epistemic trust, social learning and generalisation **101**
Trauma **104**
Estimated intelligence **105**
Age, gender, ethnicity and socioeconomic status **106**
Data analysis **106**
Results **107**
Preliminary analyses **107**
Missing and removed data **107**
Normal distribution **107**
Reliability scales **109**
Descriptive statistics **109**
Factor analysis **111**
Factor analysis of behavioural indices extracted from Trust Game **111**
Factor analysis of the Epistemic Trust Instrument **112**

Factor analysis of trauma questionnaires **114**
Exploration of correlations **115**
Hypothesis 1: Ostensive cues manipulate trust, learning and the ability to generalise in an adolescent sample. **117**
Do ostensive cues manipulate trust when the covariates of age and SES are controlled for? **117**
Do ostensive cues manipulate learning when the covariate of age is controlled for? **118**
Do ostensive cues manipulate the ability to generalise when the covariate of IQ is controlled for? **118**
Hypothesis 2: Does trauma moderate the effect of ostensive cues? **118**
Hypothesis 3: Is trauma related to epistemic trust? **119**
Discussion **119**
Do ostensive cues manipulate epistemic trust, learning and the ability to generalise in an adolescent sample? **119**
Do ostensive cues manipulate epistemic trust? **120**
Do ostensive cues manipulate learning? **120**
Do ostensive cues manipulate the ability to generalise newly learnt information? **120**
Does trauma moderate the effect of ostensive cues? **122**
Is trauma related to epistemic trust? **123**
Limitations and future directions **124**
Design **124**
Sample **124**
Measurement tools **124**
Implications and conclusions **126**
References **128**

Part 3: Critical Appraisal **142**
Introduction **142**
Recruitment challenges **142**
Original recruitment aims of the empirical paper **142**
NHS ethics committee **143**
Clinical sample **146**
Community sample **147**
Service User Involvement **148**
Measurement considerations **149**
Measuring trauma **149**
Measuring epistemic trust **151**
Conducting research as a trainee clinical psychologist **153**
Summary **155**
References **156**

Appendices

Appendix 1: Checklist for the QualSyst quality appraisal tool **161**
Appendix 2: Quality assessment of studies using the QualSyst **163**
Appendix 3: Outline of joint working **166**
Appendix 4: Letters of approval from University College London and National Research Ethics Service Committee **168**
University College London **169**
National Research Ethics Service Committee **170**
Appendix 5: Introductory letter **176**
Community Letter **177**
Clinical Letter **178**
Appendix 6: Participant Information Sheets **179**
Community sample **180**
Participant Information Sheet for 12-15 year olds **180**
Participant Information Sheet for 16-18 year olds **184**
Participant Information Sheet for parent and carers **188**
Clinical sample **192**
Sample Participant Information Sheet for 12-15 year olds **192**
Sample Participant Information Sheet for 16-18 year olds **196**
Sample Participant Information Sheet for parents and carers **200**
Appendix 7: Assent and consent forms **205**
Community sample **206**
Assent form for 12-15 year olds **206**
Consent form for 16-18 year olds **208**
Consent form for parent and carers **210**
Clinical sample **212**
Sample assent form for 12-15 year olds **212**
Sample consent form for 16-18 year olds **214**
Sample consent form for parent and carers **216**
Appendix 8: Measurement tools **218**
Trust Game **219**
Learning Task **221**
Generalisation Task **227**
Epistemic Trust Instrument **228**
Appendix 9: Correlation matrix of subscales **250**

List of Tables

Part 1: Literature Review

Table 1	Summary of articles reviewed – General cognitive functioning	**29**
Table 2	Summary of articles reviewed – Intelligence	**31**
Table 3	Summary of articles reviewed – Executive functioning and attention	**33**
Table 4	Summary of articles reviewed – Memory	**34**
Table 5	Summary of articles reviewed – Language	**35**
Table 6	Summary of articles reviewed – Academic performance and functional ability	**40**
Table 7	Summary of articles reviewed – Processing the behaviour of others	**48**
Table 8	Summary of articles reviewed – Processing the emotions of others	**51**
Table 9	Summary of articles reviewed – Theory of mind	**55**
Table 10	Summary of articles reviewed – Decision making abilities	**57**

Part 2: Empirical Paper

Table 1	Participant demographic characteristics	**98**
Table 2	Internal consistency of CTQ subscales - Cronbach's alphas	**109**
Table 3	Descriptive statistics of main measures in control group and OC condition	**110**
Table 4	Descriptive statistics of main measures not allocated to condition	**110**
Table 5	Correlation matrix – Trust Game subscales	**111**
Table 6	Factor loadings and communalities of Trust Game subscales	**112**
Table 7	Correlation matrix – ETI subscales	**113**
Table 8	Factor loads and communalities of ETI subscales	**113**
Table 9	Correlation matrix – CTQ and CTES subscales	**114**
Table 10	Factor loadings and communalities of trauma subscales	**115**
Table 11	Correlation matrix of main variables	**116**
Table 12	Correlation of potential covariates with main variables	**117**

List of Figures

Part 1: Literature Review

Figure 1	Outcome of database searches	**20**
Figure 2	Summary of interpretation of findings	**65**

Part 2: Empirical Paper

Figure 1	Recruitment consort flow diagram	**96**

Acknowledgments

I would first like to give my sincerest thanks to my internal supervisor, Professor Peter Fonagy for his continued support, kindness, patience, wise words and guidance. It has been a privilege. I would also like to thank my external supervisor Dr Tobias Nolte for his advice, support and calming approach.

I am very grateful for the support provided throughout my training from my personal tutor, Katrina Scior. Your encouragement and support has been invaluable.

I would like to express my gratitude to the young people who gave up their time to take part in the project and to their parents for trusting the research team to meet with their children. It has been a pleasure to meet you, and thank you for making the project possible. I would also like to thank the dedicated staff in the clinical services for their valuable time and support.

A big thank you goes to my joint thesis partners Tal Reches and Elise Draper for being there for me through the highs and lows of the project. I couldn't have done it without you. I would also like to thank Clarissa Bauer, Julia Griem and Pia Brinkhaus from the Wellcome Trust Centre for Neuroimaging for their support in data entry.

A special thank you to my friends and family for their exceptional level of support. A particular thank you to my parents and sister for their continued belief throughout my endeavours and never-ending faith in me. Lastly but definitely not least, thank you to my partner for his patience, care and endless amounts of encouragement.

Part 1: Literature Review

The impact of trauma in the parent-child relationship on children's learning

Abstract

Aims. Studies have investigated the impact of trauma and early adversity on learning. However fewer have specifically examined trauma in the parental relationship. This literature review examines the impact of trauma in the parent-child relationship on children's learning and social learning.

Method. A systematic review was conducted across three databases. 2876 papers were identified, out of which 32 met the inclusion criteria. The studies identified were of high quality, scoring above 0.7 in an assessment of quality (QualSyst; Kmet, Lee & Cook, 2004). Outcomes were collated in the domains of cognitive development (general cognitive functioning, intelligence, executive functioning and attention, memory, and language), academic performance and functional ability, and social information processing (processing the behaviour and emotions of others, Theory of Mind, and decision making abilities).

Results. The majority of papers found deficits in learning when children had been subjected to trauma inflicted by a parent. The cognitive impairments encompass a broad range of domains, although often with mixed findings. The one domain that did not show a deficit was executive functioning. Nine studies identified moderators that may account for the variability in findings, which included the characteristics of the trauma, the child's gender, language ability, inhibitory control and school engagement, as well as the parent's level of education.

Conclusions. Exposure to trauma in the parent-child relationship may be associated with impaired learning and social learning. The findings have implications for understanding and treating young people who have experienced parental maltreatment.

Introduction

Trauma

Trauma and early adversity are relatively common during childhood (Finklehor, Turner, Shattuck, & Hamby, 2013) and are experienced in a variety of forms including natural disasters, war, life threatening illnesses, and being victims or witnesses of violence. The sequelae of trauma are far reaching and may have equifinality or multifinality end states, whereby an outcome can be a result of different developmental paths, or where similar paths lead to dissimilar outcomes (Cicchetti, 2006).

Childhood trauma is a multifaceted construct and has been implicated with mental health difficulties ranging from Axis I and Axis II disorders (Cohen, Brown & Smailes, 2001), behavioural adjustment (Proctor, Skriner, Roesch & Litrownik, 2010), emotional adjustment (Allen, 2008) and cognitive functioning (Vasilevski & Tucker, 2016). A child's ability to learn from their social environment following adversity is less researched and often overlooked.

The theoretical background associating trauma and learning

Social learning theory (Akers, 1985) suggests that children may model the violence and upset that they have observed which then can lead to disruptive behaviours that may interfere with further learning. Developmental psychopathology attachment theory informed perspectives (Erickson, Egeland & Pianta, 1989) suggest that aversive environments that neglect a child's needs and disrupt the social context of growth can result in reduced capacity to integrate new information. A behavioural approach (Skinner, 1971) may suggest that aversive reinforcement may lead to a generalised reduction of behaviours that would impede learning. A traumagenic approach (Finklehore & Browne, 1985) suggests that

intentional trauma inflicted on a child can result in betrayal, stigmatization and feelings of powerlessness, resulting in reduced engagement with their environment and subsequent deficit to learning. Neuropsychological perspectives on trauma have shown that adversity can weaken the architecture of developing brains (De Bellis, 2005) and set the body's stress response system on high alert (De Bellis et al, 1999; Meaney, Szyf, & Seckl, 2007), which in turn can leave a lasting signature on learning (Shonkoff & Garner, 2012).

Social learning theories, attachment theory informed developmental perspectives, behavioural and traumagenic approaches, and neuropsychology can all be used as frameworks for starting to understand the potential consequences of childhood adversity on later capacity for learning. Notwithstanding the robustness of theoretically driven expectations, empirical studies and associated evidence-based knowledge frameworks are far less well established. Studies among children investigating learning and trauma have focused on populations subjected to natural disasters (Cadamuro, Versari, Vezzali, Giovannini & Trifiletti, 2015), war (Stermac, Elgie, Dunlap & Kelly, 2010), mental health difficulties (Yasik, Saigh, Oberfield & Halamandaris, 2007) and interfamilial child maltreatment (Irigara et al, 2013). The general evidence points to a deficit in learning following traumatic experiences; however this is by no means invariably the case. Some research identified no cognitive learning deficits following trauma (e.g., Clarke, Sack, Ben, Lanham & Him, 1993; McFadyen & Kitson, 1996; Reyome, 1993; Wolff & Fesseha, 1999), and in others cognitive decline was temporary and followed by recovery (Strom, Schultz, Wentzel-Larsen & Dyb, 2016) whilst in other studies long lasting learning difficulties that have persisted into adulthood were shown (Geoffroy, Pinto Pereira, Li & Power, 2016). Thus the impact of trauma on learning undoubtedly reflects a complex set of

interactions and the most researched area has been in children who suffered maltreatment.

Recent systematic reviews and methodological challenges

Kavanaugh and colleagues (2016) and Irigara and colleagues (2013) undertook systematic reviews exploring child maltreatment and learning. They found mixed findings, although in general child maltreatment was identified to negatively impact a child's ability to acquire, store, transform and use knowledge. Domains negatively impacted include intelligence, attention, executive functioning, memory and visuospatial functioning, with language showing the most variability in outcomes. In addition to cognitive domains Irigara et al., (2013) investigated concept learning and found deficits in the capacity to learn. Although both reviews identified the majority of neurocognitive domains as being vulnerable to impairment, Kavanaugh et al., (2016) identified executive functions as the most affected domain. Whereas Irigara et al., (2013) identified memory and language as the central deficits. This is not surprising, as child maltreatment does not result in deterministic outcomes (Cicchetti, 2013). Despite over three decades of research in the effects of maltreatment on cognitive functioning there is relatively little consensus on the cognitive domains that are most impaired. This may be as a result of too broad terminology being used. To help overcome this methodological challenge it would be helpful for reviews to narrow their inclusion criteria to enhance specificity and investigate specific aspects of maltreatment. This is illustrated in Maguire et al., (2015) review on neglect and cognitive functioning that found more consistent findings in the cognitive domains, where all but one study demonstrated deficits.

A further methodological challenge is the lack of specificity in the literature

regarding types of trauma where maltreatment profiles are often grouped as 'maltreatment', 'abuse' and 'neglect' without consistent definitions. For example neglect may refer to witnessing domestic violence (e.g., Crozier, Wang, Huettel & De Bellis, 2014), a lack of supervision, or a failure to provide (e.g., Morey, Haswell, Hooper & De Bellis, 2016). This may be a reflection of children often being exposed to multiple types of abuse (Finklehor, Turner, Hamby & Ormrod, 2011) and to overcome this challenge it may be beneficial to investigate features of abuse rather than abuse types.

An important feature of abuse may be the child's relationship to the perpetrator as research suggests that abuse by a parental figure may be related to poorer outcomes and social adjustment (Harter, Alexander & Neimeyer, 1988) and learning first takes place in the context of the parent-child relationship. Attachment theory highlights that security to explore and learn from the environment first depends on a partnership between the child and caregiver (Marvin, 1977). However if there is maltreatment in this relationship the partnership breaks and this diminishes the child's engagement with the social world (Pearce & Pezzot-Pearce, 1997) and therefore subsequent learning. Despite theoretical frameworks and anecdotal evidence, there is a lack of systematic research that explores children's impaired ability to learn from their social environment following trauma in the parent-child relationship (Dann, 2011) and no systematic review has focused on this area.

While the extent of cognitive impairments is becoming well documented, the most pertinent findings emerging from the literature is the growing understanding of mechanisms that help to explain the variations. Systematic reviews have highlighted that maltreatment type, frequency, severity, the developmental period

in which maltreatment occurred and symptomatology, can moderate the relationship between maltreatment and impaired cognitive functioning (Irigara et al., 2013; Kavanaugh et al., 2016). Maguire et al., (2015) identified that children who were neglected (compared to other maltreatment types) displayed the greatest deficit in cognitive functioning, and neglect and physical abuse is more harmful than neglect alone. Neglect is more likely to be perpetrated by a parent than other forms of maltreatment (Bartlett, Kotake, Fauth & Easterbrooks, 2017) and further supports the need for reviews to explore the impact of abuse in the parent-child relationship.

Klika and Herrenkohl's (2013) review of developmental research on resilience in maltreated children highlights that the field has limited understanding of mediators and moderators in maltreatment, let alone in the specific field of maltreatment and learning. The causal mechanisms between child maltreatment and subsequent cognitive delays have not been sufficiently studied, and it is the identification of these components that are integral to understanding the mechanisms of change, which can advance psychotherapy and evidence based psychological interventions (Emmelkamp et al., 2014).

Current review

The current systematic review aims to address methodological weaknesses of prior reviews by specifically narrowing the inclusion criteria of studies and investigating features of abuse rather than abuse types. An in-depth exploration of trauma in the parent child relationship has not taken place.

This systematic review aims to bridge this gap in the literature. Furthermore, the review aims to identify the moderators that may account for any identified cognitive deficit associated with trauma in the parental relationship. The review aims to

answer the following questions:

(1) Is there a deficit in learning and social learning in children who have experienced trauma in the child-parent relationship?

(2) If so, what accounts for the cognitive deficits associated with trauma in the child-parent relationship?

Method

Search strategy

A systematic electronic search was conducted on three databases, PsycINFO, PILOTS (Published International Literature on Traumatic Stress) and ERIC (Educational Resources Information Centre). Three search term clusters were used to identify relevant studies and are shown below.

- abuse* or maltreat* or trauma* not "traumatic brain injury" not TBI not "traumatic head injury" not "brain disorder" not "brain damage" not disease not cancer not war
- learn* or "social knowledge" or "social cognition" or "cognitive abilit*" or "cognitive deficit*" or "cognitive impair*" or "cognitive process*"
- infan* or child* or youth or adolescen* or juvenile* or teen* or young person or young people

A slightly different search strategy was used for PsycINFO because the search method on the database allows the age range of the participants to be used as an additional filter. This resulted in the age range of 0-17 years old being used rather than using descriptive terms for this age range. Studies were identified from searches up to September 2016 and the search terms were limited to words within the title, abstract, key concepts and subject headings.

Inclusion and exclusion criteria

Studies were included for review if they examined the relationship between trauma that has taken place in the parent-child relationship and the child's cognitive functioning or ability to process social information. The sample included children who were victims of maltreatment living in the family home or were living in out of home placements, indicating parental abuse as well as trauma in the parent-child relationship due to separation and displacement. Studies were only included if they used a quantitative methodology, participants were human subjects aged 0-17 years old, the paper was written in English and the paper has been published in a peer-reviewed journal.

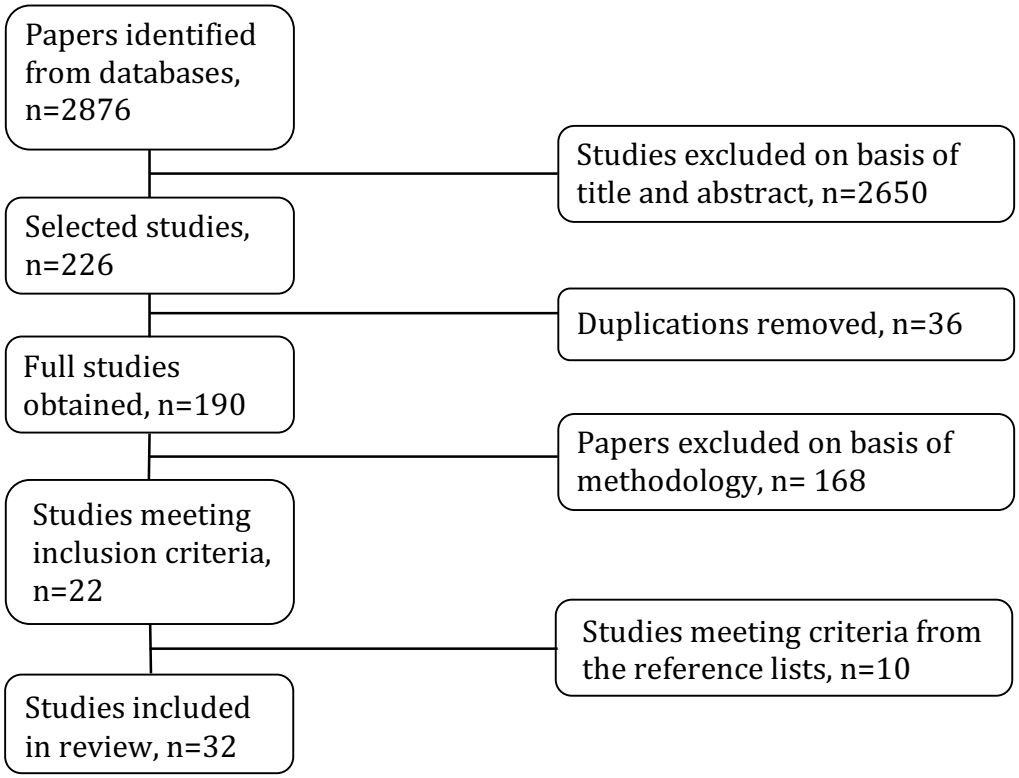
Studies were excluded if they did not state whether the trauma or abuse took place in the parent-child relationship; for example stating that the child was maltreated in the family context may allude to a perpetrator being a sibling, someone in a relationship with the parent, grandparent and so forth. Studies measuring neglect as their primary maltreatment subgroup were excluded as these have been captured in Maguire and colleagues (2015) systematic review. Furthermore, findings investigating cognitive ability with a sample that have experience neglect may be confounded by a lack of environmental stimulation rather than the child being a victim of active abuse directed at the child. For this reason, studies investigating the cognitive functioning of children in orphanages were also excluded. Studies that did not include a control group were excluded in order to gain more homogeneous groups by having greater control of confounding variables. Additionally, retrospective designs were excluded as they are likely to capture a different stage in which the trauma has been processed and may have different report patterns.

Identification of studies

PsycINFO yielded a total of 1686 papers, PILOTS a total of 418 papers and ERIC 772 papers, which totalled 2876 papers (see figure 1). The papers were initially screened by their title and abstracts, and then duplications were removed. This resulted in 190 papers being obtained, which allowed for further investigation of their methodology to determine whether they met inclusion and exclusion criteria. Studies were excluded on the basis of the papers not specifically stating that the perpetrator of the abuse was the primary care giver, or parental abuse only being a proportion of the total sample (n= 145). Further papers were excluded for exceeding the age limit or being retrospective studies (n=10), not being an empirical paper or not using a control group (n=19), neglect being the primary abuse category (n=4), focus being on parenting styles rather than trauma (n=4), or the early years of the child being spent in an orphanage (n=1). This resulted in 22 studies meeting the inclusion criteria. The reference lists from these 22 papers were reviewed and yielded a further 10 studies that met the inclusion criteria for the review, totalling 32 studies.

Figure 1

Outcome of database searches



Quality appraisal tool

The Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields (QualSyst; Kmet et al., 2004) was used to assess the quality of the selected studies. The tool provides a measure to evaluate the strength of the conclusions that can be drawn from the studies used in the current review. The QualSyst was modified to exclude quality ratings that were not relevant for the research question, resulting in eleven of the 14 criteria being utilised. Criteria five, six and seven were omitted, as the studies were not intervention studies. Each study was scored ('yes' = 2, 'partial = 1, 'no' = 0) against eleven criteria and a total ranking was then calculated for each paper which ranges from 0-1. The criteria from the

checklist are shown in Appendix 1 and the individual outcomes of the QualSyst are presented in Appendix 2.

The papers included in this review were largely of high quality, with even the weakest study scoring 0.77 (Pollak, Cicchetti, Hornung & Reed, 2000). All papers sufficiently described appropriate research aims, design, methodology and sample. Two typical designs were used in the papers, which were cross-sectional and longitudinal designs. The data extracted for the purposes of this review were primarily collected at one time point and no longitudinal studies measured learning ability prior to the onset of trauma to help establish causality. The measures used within the papers were either standardised or appropriate variations of standardised measures, with the exception of Hennessy, Rabideau, Cicchetti and Cummings (1994) whose measures held high face validity but failed to use independent coders to assess the accuracy of enactments of emotional expression (unlike other papers using similar approaches, such as Shackman & Pollak (2005) and Shackman, Fatani, Camras, Berkowski & Pollak (2010)). The sample sizes were most likely hampered by the stigma placed on child abuse research with twelve studies not meeting the minimum sample size criteria, fourteen studies meeting partial criteria and six studies achieving samples sizes between 153 (Pears & Fisher, 2005a) and 518 participants (Cicchetti, Rogosch, Maughan, Toth & Bruce, 2003). The allocation of high scores for the controlling of confounding variables was partially a function of papers without a control group being an exclusion criterion. Additionally, all papers matched the comparisons groups or controlled for covariates that were specific to the domains being assessed, with the exception of Weller and Fisher (2013) who did not control for confounding variables. Twenty-six of the thirty-two

papers matched groups on three or more covariates, including age, gender, SES, ethnicity, IQ, number of parents in the home, parental marital status and parental education. All analytic methods were described and appropriately justified as well as the results. The reporting of variance in the results was fully or partially omitted in eleven studies, which may have hindered potential interpretations but not prominently. All studies made appropriate conclusions supported by their data. After careful review, these papers were deemed to be of good quality, which gives credibility to the conclusions drawn.

Results

The studies are grouped by cognitive development, academic performance and functional ability, and social cognitions. There are seven studies measuring cognitive development in children who have experienced trauma in the parental relationship (see Table 1-5) which capture the domains of general cognitive functioning, intelligence, executive functioning and attention, memory and language. There are five studies measuring academic performance and functional ability (see Table 6). There are twenty studies measuring social cognition (see Table 7-10) which capture the domains of children's ability to process the behaviour and emotions of others, Theory of Mind and decision making abilities. Some of the studies reported more than one cognitive domain and have subsequently been reported under all relevant subheadings.

Cognitive development

General cognitive functioning

Four studies measured cognitive functioning (Bucker et al., 2012; Pears et al., 2005a; Robinson et al., 2012; Valentino, Cicchetti, Toth & Rogosch, 2011; see Table 1). Three of the four studies showed clear findings that general cognitive

functioning is impaired in children who have experienced trauma in the parent-child relationship (Bucker et al., 2012; Pears et al., 2005a; Robinson et al., 2012). However Valentino and colleagues (2011) found no significant group difference in general cognitive ability, although when group differences were assessed through the analysis of play, maltreated children demonstrated significantly less cognitive complexity in their play than children who have not been abused by a parent.

Home environment and language moderated the relationship between parental maltreatment and cognitive development. Home environment included parental responsivity, acceptance, companionship & parents engagement in learning (Robinson et al., 2012).

Out of home placement history, age of maltreatment, number of maltreatment types (Pears et al., 2005a), affective functioning (Bucker et al., 2012) and maternal social behaviour (Valentino et al., 2011) did not moderate the relationship between parental maltreatment and cognitive development.

The studies were methodologically strong, scoring between 0.86-0.95 on the critical appraisal tool. All studies controlled for age, gender and SES; additionally two studies controlled for ethnicity (Pears et al., 2005a; Robinson et al., 2012). The main limitation of the studies was small sample sizes, with the Bucker et al (2012) study recruiting only 60 participants resulting in reduced power and an increased risk of type I and type II error. Valentino et al., (2011) was the only study that found mixed findings and recruited children who remained in the care of the biological mother. Therefore the findings of impaired cognitive functioning (which had not been assessed through play) may not be generalizable to children who remain in the family home and may be a result of other factors indicative of the care system. Furthermore, the studies included participants aged between 1-12 years old and

therefore cannot be used to draw conclusion on adolescents cognitive functioning.

Intelligence

Five studies measured intelligence (Bucker et al., 2012; Pears et al, 2005a; Pears, Fisher, Bruce, Kim & Yoerger, 2010; Vasilevski et al., 2016; Viezel, Freer, Lowell & Castillo, 2015; see Table 2). Four of the five studies showed impaired intelligence in children who have experienced trauma in the parent-child relationship (Pears et al., 2005a; Pears et al., 2010; Vasilevski et al., 2016; Viezel et al., 2015). Two studies used the vocabulary and block design subtests of the Wechsler Preschool and Primary Scale of Intelligence–Revised (WPPSI–R; Wechsler, 1989) and both found significant group differences (Pears et al., 2005a; Pears et al., 2010). In contrast, Bucker et al., (2012) used the same two subtests of vocabulary and block design of the Wechsler Intelligence Scale for Children (WISC; Wechsler, 2003) and Vasilevski et al., (2016) used the full version of the WISC and found no significant group difference.

There was no significant relationship found between intelligence and number of maltreatment types, maltreatment experience or age when first placed in foster care (Pears et al., 2005a).

The studies were methodologically strong, scoring between 0.91-1 on the critical appraisal tool. All studies controlled for age, gender and SES; additionally three studies controlled for ethnicity (Pears et al., 2005a; Pears et al., 2010; Viezel el al., 2015). The weakness of three of the studies was small sample sizes (Bucker et al., 2012; Pears et al., 2005a; Vasilevski et al., 2016). Both studies that had adequate sample sizes, of 177 participants (Pears et al., 2010) and 240 participants (Viezel et al., 2015), found significant group differences in intelligence at $p < .01$. All studies recruited children in out of home placements and captured age ranges between 3-16

years old. Therefore the findings of impaired intelligence may not be generalizable to children who remain in the family home or infants.

Executive functioning and attention

Three studies measured executive functioning and attention (Bucker et al., 2012; Pears et al., 2005a; Vasilevski et al., 2016; see Table 3). Two of the three studies found no impairments in executive functioning in children who have experienced trauma in the parent-child relationship (Bucker et al., 2012; Pears et al., 2005a). Vasilevski et al., (2016) was the only study to find a significant difference and to look at the separate domains of executive functioning individually. They found a medium to large effect size on cognitive shifting, flexibility and inhibitory control that accounted for the significant difference, rather than the domains of verbal executive fluency. This is consistent with Bucker et al., (2012) who also found significant group differences in attention but not executive functioning.

Conflicting results were found regarding the effect of affective functioning on attention (Bucker et al., 2012; Vasilevski et al., 2016). However further analysis of Bucker et al (2012) revealed that affective functioning was only associated to some subsets of attention, suggesting that affective functioning may only in part explain some aspects of attention. Years in education and duration of involvement from child protection services did not moderate the relationship between parental maltreatment and cognitive development.

The studies were methodologically strong, scoring between 0.91-0.95 on the critical appraisal tool. All studies controlled for age, gender and SES, and captured age ranges between 4-16 years old. The main limitations of the studies were small sample sizes, and executive functioning and attention only being assessed in

children who were in out of home placements. Additionally, the studies did not capture infant populations.

Memory

Three studies measured memory (Bucker et al., 2012; Vasilevski et al., 2016; Viezel et al., 2015; see Table 6). Two of the three studies showed impaired memory in children who have experienced trauma in the parent-child relationship (Bucker et al., 2012; Vasilevski et al., 2016). Viezel et al., (2015) found no significant difference in working memory and is the most methodologically robust of the three studies. The only other study to solely look at working memory is Bucker et al., (2012) with a small sample size of 60 participants, which may inflate false positives being detected. Vasilevski et al., (2016) was the only study to use a combined measure for memory and learning and it is not possible to disentangle these two domains in the study. On balance, the studies are inconclusive as to whether there are memory deficits in children who have experienced trauma in the parent-child relationship.

There was no significant relationship found between memory and affective functioning or years in education. A low strength positive association between memory and duration of involvement from child protection services suggested that involvement with safeguarding services improved memory.

The studies were methodologically strong, scoring between 0.91-1 on the critical appraisal tool. All studies controlled for age, gender and SES, and captured age ranges between 4-16 years old. The main limitations of the studies were small sample sizes that can inflate type I and type II error, and measures that captured two domains (i.e., memory and learning). Furthermore the type of parent-child trauma was only from children who had been removed from parental care.

Therefore findings might represent being in the care of the local authority rather than as a result of trauma in the parent-child relationship.

Language

Ten studies measured language ability (Allen & Wasserman, 1985; Camras et al, 1990; Jepson & Bucci, 1999; Pears et al., 2005; Robinson et al., 2012; Vasilevski et al., 2016; Viezel et al., 2015; Weller et al., 2013; Weller, Leve, Kim, Bhimji & Fisher, 2015; Wodarski, Kurtz, Gaudin & Howing, 1990; see Table 5). Half of the studies found no differences in language ability between children who have experienced trauma in the parental relationship and those who have not (Jepson et al., 1999; Vasilevski et al., 2016; Weller et al., 2013; Weller et al., 2015; Wodarski et al., 1990). However, Jepson et al., (1999) found that although there were no significant differences found between the groups, the maltreated adolescents showed a trend of gaining higher scores on the concreteness and imagery subscales when compared to the nonmaltreated group. The five studies that showed a significant difference (Allen et al., 1985; Camras et al, 1990; Pears et al., 2005; Robinson et al., 2012; Viezel et al., 2015) found that children who have been maltreated by a parent have impaired language skills in the domains of expressive and receptive language, vocabulary, comprehension and language skills. The studies did not investigate the moderating or mediating factors between language ability and trauma in the parent-child relationship that may account for the mixed findings.

The studies were methodologically strong, scoring between 0.82-1 on the critical appraisal tool and in total the studies ages ranged from 8 months to 16 years old. All studies with the exception of two (Camras et al., 1990; Weller et al., 2013) controlled for age, gender and SES. Studies also controlled for ethnicity (Camras et al., 1990; Jepson et al., 1999; Viezel et al., 2015) and number of parents in the home

(Camras et al., 1990; Jepson et al., 1999). When you take the literature as a whole, most confounding variables were controlled for. However abuse histories were not collected for the control group used by Allen and Wasserman (1985) and therefore reduces the content validity of the study. The main limitations of the studies were small sample sizes, with three studies having inadequate sample sizes of 24 (Allen et al., 1985), 30 (Jepson et al, 1999) and 40 participants (Camras et al., 1990). The only research that achieved an adequate sample size was Viezel and colleagues (2015) study (n=240) and they found significant group differences at $p <. 01$.

Table 1
Summary of articles reviewed – General cognitive functioning

Study	Age	Participants (*n*)		Country	Type of trauma in parent-child relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Bucker et al., (2012)	4-12 years	60	30	Brazil	OoH placement - Child welfare referred abuse.	Cross-sectional	General Cognitive Functioning	Global Assessment of Functioning scale	Maltreated children scored significantly lower on general cognitive functioning (p <.001). Affective functioning non-significant moderator.	0.91
Pears et al., (2005a)	3-6 years	153	99	USA	OoH placement - Child welfare referred abuse	Cross-sectional	General Cognitive Functioning	NEPSY: A Developmental NEuroPSYchological Assessment	Maltreated children scored significantly lower on general cognitive functioning (p <.05). Out of home placement history, number of maltreatment types & age of maltreatment non-significant moderators.	0.95
Robinson et al., (2012)	6-10 years	141	71	USA	OoH placement - Child welfare referred abuse	Cross-sectional	General Cognitive Functioning	Kaufman Brief Intelligence Test & Peabody Picture Vocabulary Test	Maltreated children scored significantly lower on general cognitive functioning (p <.01). The effect size ranged from small (0.27) to large (0.85) on the KBIT. Home environment & language significant moderators.	0.86

Study	Age	Participants (*n*)		Country	Type of trauma in parent-child relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Valentino et al., (2011)	1-2 years	130	31	USA	Maternal physical abuse	Cross-sectional & Longitudinal	General Cognitive Ability & Cognitive Complexity	The Bayley Mental Development Scale, Symbolic maturity play scale & Play development scale	The measure for general cognitive ability revealed no significant difference (p = .25). However, when cognitive ability was assessed through the analysis of play (social behaviour & child-initiated behaviour), maltreated children scored significantly lower (p < .01), with a large effect size (d= 0.97) Maternal social behaviour non-significant moderators.	0.95

Table 2

Summary of articles reviewed – Intelligence

Study	Age	Participants (*n*)		Country	Type of trauma in parent - child relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Bucker et al., (2012)	4-12 years	60	30	Brazil	OoH placement - Child welfare referred abuse.	Cross sectional	IQ	Wechsler Intelligence Scale for Children– III Edition	No significant difference (p =.58).	0.91
Pears et al., (2010)	3-6 years	117	117	USA	OoH placement - Child welfare referred abuse	Cross sectional	IQ	Wechsler Preschool and Primary Scales of Intelligence-Revised	Maltreated children scored significantly lower on intelligence (p <.01).	1
Pears et al., (2005a)	3-6 years	153	99	USA	OoH placement - Child welfare referred abuse	Cross sectional	IQ	Wechsler Preschool and Primary Scales of Intelligence-Revised	Maltreated children scored significantly lower on intelligence (p <.001). Out of home placement history, number of maltreatment types & age of maltreatment non-significant moderators.	0.95

Study	Age	Participants (*n*)		Country	Type of trauma in parent - child relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Vasilevski et al., (2016)	12-16 years	82	39	Australia	OoH placement - Child welfare referred abuse	Cross-sectional	IQ	Wechsler Intelligence Scale for Children–IV Edition	Maltreated children scored significantly lower on intelligence (p=0.56).	0.95
Viezel et al., (2015).	6-16 years	240	120	USA	OoH placement - Child welfare referred abuse	Cross-sectional	IQ	Wechsler Intelligence Scale for Children–IV Edition	Maltreated children scored significantly lower on intelligence (p <.01).	1

Table 3
Summary of articles reviewed – Executive functioning and attention

Study	Age	Participants (*n*)		Country	Type of trauma in parent-child relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Bucker et al., (2012)	4-12 years	60	30	Brazil	OoH placement - Child welfare referred abuse.	Cross sectional	Executive Functioning & Attention	The Wisconsin Card Sorting Test measures & Continuous Performance Test	No significant difference in EF (p = .37-.82). Maltreated children scored significantly lower on attention ($p < .05$). Affective functioning associated with lower performance on attention.	0.91
Pears et al., (2005a)	3-6 years	153	99	USA	OoH placement - Child welfare referred abuse	Cross sectional	Executive Functioning	NEPSY: A Developmental NEuroPSYchological Assessment & Card Sort Task	No significant difference (p = .07).	0.95
Vasilevski et al., (2016)	12-16 years	82	39	Australia	OoH placement - Child welfare referred abuse	Cross-sectional	Executive Functioning & Attention	The Controlled Animal Fluency Test, The Controlled Oral Word Association Test, Trail Making Test Part B & Stroop Test	Maltreated children scored significantly lower on attention ($p < .01$) & not EF (p = .27 - .42). Affective functioning, years in education & duration of child protection involvement, non-significant moderators.	0.95

Table 4
Summary of articles reviewed – Memory

Study	Age	Participants (*n*)		Country	Type of traumatic in parent-child relationship	Cross sectional	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Bucker et al., (2012)	4-12 years	60	30	Brazil	OoH Placement - Child welfare referred abuse.	Cross-sectional	Working Memory	Wechsler Intelligence Scale for Children– III Edition	Maltreated children scored significantly lower on working memory ($p < .01$). Affective functioning was a non-significant moderator.	0.91
Vasilevski et al., (2016)	12-16 years	82	39	Australia	OoH Placement - Child welfare referred abuse	Cross-sectional	Memory & Learning	The Rey Auditory-Verbal Learning Test	Maltreated children scored significantly lower on memory and learning ($p < .05$). The effect size ranged from a medium (0.54) to large (0.81) effect size. Affective functioning & years in education, non-significant mediators. Positive association with child protection contact.	0.95
Viezel et al., (2015).	6-16 years	240	120	USA	OoH Placement - Child welfare referred abuse	Cross-sectional	Working Memory	Wechsler Intelligence Scale for Children– IV Edition	No significant difference ($p > .05$).	1

Table 5
Summary of articles reviewed – Language

Study	Age	Participants (*n*)		Country	Type of traumatic event in parent-child relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Allen et al., (1985)	8-25 months	24	12	USA	Maternal physical abuse	Cross - sectional	Expressive & Receptive Language	The Bayley Mental Development Scale	Maltreated infants scored significantly lower on language indicating mild language delay ($p < .05$).	0.91
Camras et al., (1990)	3-7 years	40	20	USA	Maternal abuse	Cross - sectional	Vocabulary	Peabody Picture Vocabulary Test	Maltreated children scored significantly lower on language ($p < .02$).	0.82
Jepson et al., (1999)	14 years old (mean)	30	15	USA	Parental physical abuse	Cross - sectional	Linguistic Qualities	Referential Activity & Social Cognition & Object Relations Scale	No significant difference in linguistic qualities ($p > .05$). Maltreated children showed a trend of higher scores on the concreteness and imagery subscales ($p > .10$).	0.86
Pears et al., (2005a)	3-6 years	153	99	USA	OoH Placement - Child welfare referred abuse	Cross sectional	Language Skills	Preschool Language Scale- Third Edition	Maltreated children scored significantly lower on language ($p < .001$).	0.95

Study	Age	Participants (*n*)		Country	Type of traumatic event in parent-child relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Robinson et al., (2012)	6-10 years	141	71	USA	OoH Placement - Child welfare referred abuse	Cross - sectional	Receptive Language	Peabody Picture Vocabulary Test	Maltreated children scored significantly lower on language when compared to the comparison children (p < .001).	0.86
Vasilevski et al., (2016)	12-16 years	82	39	Australia	OoH Placement - Child welfare referred abuse	Cross - sectional	Verbal Compre-hension & Vocabulary	Peabody Picture Vocabulary Test & Wechsler Intelligence Scale for Children– IV Edition	No significant group differences (p = .188 - .949).	0.95
Viezel et al., (2015).	6-16 years	240	120	USA	OoH Placement - Child welfare referred abuse	Cross - sectional	Verbal Compre-hension	Wechsler Intelligence Scale for Children– IV Edition	Maltreated children scored significantly lower on language (p < .05).	1

Study	Age	Participants (*n*)		Country	Type of traumatic event in parent-child relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Weller et al., (2013)	9-12 years	137	25	USA	OoH Placement - Child welfare referred abuse	Cross - sectional	Vocabulary	Wechsler Intelligence Scale for Children– IV Edition	No significant group differences (p = .28).	0.86
Weller et al., (2015)	16 years (mean)	172	92	USA	OoH Placement - Child welfare referred abuse	Cross - sectional & Longitudinal	Vocabulary	Shipley Institute of Living Scale	No significant group differences (p = .13).	0.95
Wodarski et al., (1990)	6-16 years	139	22	USA	Physical Abuse	Cross - sectional	Language skills	Iowa Test of Basic Skills	No significant group differences (p > .05).	0.95

Academic performance and functional ability

All five studies found impaired academic abilities of children who have experienced trauma in the parent-child relationship (Herrenkohl, Herrenkohl, Rupert, & Egolf, 1995; Pears et al., 2010; Pears, Kim, Buchanan & Fisher, 2015; Pears, Kim, Buchanan, Fisher & Yoerger, 2013; Wodarski et al., 1990; see Table 6) and one study additionally highlighted significantly less cognitive engagement in learning (Pears et al., 2013). The aspect of academic performance that showed no deficit was the overall grade achieved for mathematics (Wodarski et al., 1990). One study looked at functional ability at school, which was constructed by grouping educational, cognitive, social and physical ability (Herrenkohl et al., 1995). In alignment with the other four studies, it found that there was a deficit in functional ability in the children who have experienced trauma in the parental relationship.

It is important to note that the papers by Pears et al., (2015) and Pears et al., (2013) used participants from the same study, however both papers have been included as they highlight different moderators in the relationship between trauma in the parent-child relationship and academic functioning.

Gender, cognitive school engagement, affective school engagement (Pears et al., 2013), caregiver school involvement, inhibitory control (Pears et al., 2010) and the number of school moves (Wodarski et al., 1990) moderated the relationship between trauma in the parental relationship and deficits in academic performance.

The studies were methodologically strong scoring between 0.86-1 on the critical appraisal tool. As a whole the studies captured all school ages. All studies with the exception of one (Herrenkohl et al., 1995) controlled for age, gender

and SES, and three studies also controlled for ethnicity (Pears et al., 2010; Pears et al., 2013; Pears et al., 2015). On balance the main confounding variables were controlled. Each study used at least two sources of information, which included school attainments and teacher reports, with one study collecting data from five different sources (Wodarski et al., 1990). The main limitations of the studies were small sample sizes, with only two studies achieving adequate sample size of 177 (Pears et al., 2010) and 206 participants (Herrenkohl et al., 1995). However these studies only recruited children aged 2-6 years old, which limits the generalizability of the results to older age groups.

Social information processing

Processing the behaviour of others

Children who have experienced trauma in the parent-child relationship generally attributed significantly greater hostility and negative bias when interpreting the intention of others (Kay & Green, 2016; Toth, Cicchetti, Macfie, & Emde, 1997), as well as perceiving less controllability of bad events (Cerezo & Frias, 1994). Although Jepson et al., (1999) found no significant group differences when assessing the complexity of representations of people, affective tone of relationship paradigms, capacity for emotional investment in relationships and moral standards, and understanding of social causality. A trend suggested that maltreated children expect greater negativity and harm from relationships. Furthermore, Jepson et al., (1999) measured referential activity (concreteness, clarity and imagery in spoken prose) and assessed the correlations between the complexity of representations of people, affective tone of relationships, capacity for emotional investment, moral standards, and understanding of social causality. The nonmaltreated group generally achieved

Table 6

Summary of articles reviewed – Academic performance and functional ability

Study	Age	Participants (*n*)		Country	Type of traumatic event in the parental relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Herrenkohl et al., (1995)	2-6 years	206	49	USA	Maternal physical and/or emotional abuse	Cross-sectional	School functioning	Modified Achenbach	Physical ($p < .0001$) and emotional discipline ($p < .05$) negatively impacted on academic performance. Correlations strongest to weakest: SES, mother's negative interactive behaviour, child's physical health, mother's positive interaction behaviour, neglect, presence of a male head, severity of discipline & birth difficulties.	0.95
Pears et al., (2010)	3-6 years	177	117	USA	OoH Placement - Child welfare referred abuse	Cross-sectional	Academic performance	Teacher report & school records	Maltreated children scored significantly lower on academic competence ($p < .01$). Inhibitory control & caregiver involvement significant moderators.	1

Study	Age	Participants (*n*)		Country	Type of traumatic event in the parental relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Pears et al., (2015)	3-8 years	141	76	USA	OoH Placement - Child welfare referred abuse	Cross - sectional & Longitudinal	Academic performance & learning skills	Child Behaviour Checklist, Academic Performance Scale & school records	Maltreated children were negatively associated with academic competence and early learning skills in Grades 3 to Grade 5 ($p < .01$). School moves was a significant moderator.	0.86
Pears et al., (2013)	3-8 years	147	93	USA	OoH Placement - Child welfare referred abuse	Cross - sectional & Longitudinal	Academic performance & school engagement	Child Behaviour Checklist, Academic Performance Scale, Scales of Social Competence, School Adjustment & Seattle Personality Questionnaire	Maltreated children scored significantly lower on academic competence, cognitive school engagement & affective school engagement ($p < .05$). Gender, cognitive school engagement, & affective school engagement were significant moderators.	0.95

Study	Age	Participants (*n*)		Country	Type of traumatic event in the parental relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Wodarski et al., (1990)	6-16 years	139	22	USA	Physical abuse	Cross-sectional	Academic performance mathematics & reading	Teacher report, Georgia Criterion Reference Test, & school records	Maltreated children scored significantly lower on the overall academic performance ($p < .03$) & reading ($p < .001$). No significant difference on overall mathematic grades or school absences ($p > .05$). Maltreated children scored significantly lower on teacher reports of academic performance and maltreated children were more likely to repeat a grade.	0.95

positive correlations between the subscales, suggesting that they develop a more complex and flexible understanding of themselves and others. In contrast, there was no significant positive correlation between these domains with the maltreated children, suggesting less fluid developmental trajectory in processing the behaviour of others. Furthermore, negative correlation was found between affect tone and concreteness, suggesting that when the abused children held the expectation that an interpersonal relationship is abusive, they used more concrete language (see Table 7).

Multiple studies found no significant difference in children who have experienced trauma in the parent-child relationship when processing the behaviour of others (see Table 7). Specifically, studies showed no impairment in moral judgment in respect to violence (Fontaine, Salvano-Pardieu, Crouzet, & Pulford, 2002) or judgments regarding harm to a person or unfair resource distribution (Smetana, Daddis, Toth, Cicchettis, Bruce & Kane, 1999), and no significant group differences in the general processing of ambiguous events (Kay et al., 2016; Teisl et al., 2008).

Language and maltreatment type significantly moderated the relationship between trauma in the parent-child relationship and attributional style; however psychopathology and the core features of disinhibited attachment disorder did not (Kay et al, 2016; Toth et al., 1997).

The studies were methodologically strong scoring between 0.86-1 on the critical appraisal tool. As a whole the studies captured children aged 3-14 years old with group differences emerging in all ages, and controlled for the main confounding variables. However the main limitation is that only one study achieved an adequate sample size and this study did not analyse demographic

confounding variables (Teisl et al., 2008). Furthermore this study only investigated two of the six stages involved in cognitive processing of other people's behaviour (as proposed by Crick & Dodge, 1994) and therefore may be simplifying the conclusion that the deficit is due to attributional style and not a result of other variables such as encoding, recall or enactment.

Processing the emotions of others

Nine studies measured children's ability in processing the emotions of others (Camras et al., 1990; During & McMahon, 1991; Hennessy et al., 1994; Pear & Fisher, 2005b; Pollak et al., 2002; Pollak, Cicchetti, Hornung, & Reed, 2000; Pollak, Messner, Kistler & Cohn, 2009; Shackman et al., 2010; Shackman et al., 2005; see Table 9). All except one study showed anomalies with processing the emotions of others in children who have experienced trauma in the parent-child relationship (Hennessy et al., 1994).

Findings were mixed as to whether maltreated children only had processing impairments when emotions were masked (Pollak et al, 2002), or whether impairments were present when identifying both masked and unmasked emotions (Camras et al., 1990). However it was more consistently found that parentally maltreated children identified anger more quickly in facial expressions than non-maltreated children, and paid more attention to early facial formations that indicate anger that includes the brow movement (Pollak et al., 2002; Pollak, et al., 2009; Shackman et al., 2010; Shackman et al., 2005).

Shackman and colleagues (2010) found a significant difference between the abusive and non-abusive mothers facial and verbal expressions of anger, where the abusive mothers showed less variability of facial expression and tone. Shackman and Pollak (2005) also found that abusive mothers pose less

recognisable expressions of emotions, suggesting that maltreated children need to use more cognitive reserve to learn the emotions from their primary caregivers and ultimately need to be more skilled in decoding early signs of anger. This is supported by Pollak and colleagues (2009) finding that the recognition speed of anger was associated with maltreatment severity. Mixed findings were found as to whether maternal facial behaviour mediates the association between maternal abuse and children's recognition scores (Camras et al., 1990; Shackman et al., 2005).

The variables that did not moderate the relationship between trauma in the parent-child relationship and the processing of others emotions included the child's gender, ethnicity, psychopathology, length of time in foster care or number of transitions in foster care. Furthermore, the parent's ability to identify emotions, parent's education, the child's psychopathology and the child's ethnicity did not moderate the findings (During et al., 1991; Pears et al., 2005b; Pollak et al., 2002; Pollak et al., 2000).

The studies were methodologically strong scoring between 0.77-0.95 on the critical appraisal tool and when the studies are looked at collectively they controlled for the main confounding variables. Yet this domain yielded the weakest subset of studies in the review. No study achieved an adequate sample size and the majority of studies had fewer than 58 participants. This may account for the variability in findings because of the low power to detect significant interactions or an increase of type II errors that may result in false positives. Conclusions from this set of studies need to be interpreted with caution. Furthermore the studies capture children aged 2-12 years old and therefore limit the generalizability of the study, as they do not report the

processing of emotions in adolescents.

Theory of mind

All four studies measuring Theory of Mind (ToM) found that children who have experienced trauma in the parent-child relationship underperformed in ToM tasks (Cicchetti et al., 2003; Kay et al., 2016; O'Reilly & Peterson, 2015; Pears et al., 2005b; see Table 10). Two of the four studies reached significant difference in each domain measured (Cicchetti et al., 2003; Pears et al., 2005b), and the other two studies either reached significance or showed trends of deficits in ToM (Kay et al., 2016; O'Reilly et al., 2015). See Table 11.

Developmental timing, language ability, parent's education, onset of maltreatment and maltreatment subtype moderated the relationship between trauma in the parent-child relationship and ToM (Cicchetti et al., 2003; Kay et al., 2016) Regarding maltreatment subtype, only physical abuse was a significant unique predictor of children's false belief performance (Cicchetti et al., 2003). Inconsistency was found regarding maltreatment severity being a predictor of ToM (Cicchetti et al., 2003; O'Reilly et al., 2015). Psychopathology, the core features of disinhibited attachment disorder, length of time in foster care and the number of transitions did not moderate the findings (Kay et al., 2016; Pears at al., 2005b).

The studies were methodologically strong, scoring between 0.91-0.95 on the critical appraisal tool. Collectively the studies controlled for age, gender, SES, ethnicity, marital status of the parent and verbal mental age. Three of the four studies met partial criteria for the sample size and only Cicchetti and colleagues (2003) achieved an adequate sample size. Despite Cicchetti et al., (2003) being the most robust study it solely focused on False Belief, which does

not capture the complexity of ToM. The mixed findings in the subsequent domains of ToM need to be interpreted with caution because of the lack of power. All papers used standardised tests although no study used neurobiological measures such as structural and functional neuroimaging that may strengthen the studies conclusions; however Kay et al., (2016) used multiple measures to capture ToM which increased the validity of the findings.

Decision making abilities

Children who have experienced trauma in their relationship with their parent showed anomalies in their decision making approach in risky situations (Weller et al., 2013; Weller et al., 2015). Specifically when there is uncertainty of loss, parentally maltreated children show increased risk that is not apparent in situations where there is an uncertainty of a gain. Furthermore, children who have experienced trauma in the parent-child relationship are less likely to use environmental cues to help them navigate decision making (Weller et al., 2013). Interestingly, implementation of an intervention that targets the young person's development of social skills and the caregivers skills to deliver consistent reinforcement of prosocial behaviour, reduced the group differences between parentally maltreated and nonmaltreated decision making abilities (Weller et al., 2015). See Table 12.

The two studies were methodologically strong, scoring between 0.86-0.95. However only one study (Weller et al., 2015) controlled for confounding variables and reached an adequate sample size. The main limitation for this domain is that both studies recruited participants who have been removed from the family home and characteristics such as high rates of maltreatment may have limited the variance and reduce associations being identified.

Table 7

Summary of articles reviewed – Processing the behaviour of others

Study	Age	Participants (*n*)		Country	Type of traumatic event in parent-child relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Cerezo et al., (1994)	8-13 years	45	19	Spain	Physical & Emotional Abuse	Cross-sectional	Attribution Style	Child Attributional Style Questionnaire	Maltreated children process bad events as less controllable (p < .005). No group differences for controllability of good events (p > .05).	0.91
Fontaine et al., (2002)	8-13 years	40	20	-	Physical Abuse	Cross-sectional	Moral Judgment	32 scenarios of physical or verbal violence.	No significant difference (p > .05).	0.82
Hennessy et al., (1994)	6-11 years	88	44	USA	Physical Abuse	Cross-sectional	Attending	8 video vignettes of nonverbal, verbal or physical violence.	Maltreated children showed greater fear of aggression (p < .02) & attention to whether conflict is resolved (p < .005). Interparent physical aggression non-significant moderator.	0.91

Study	Age	Participants (*n*)		Country	Type of traumatic event in the parental relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Jepson et al., (1999)	14 years old (mean)	30	15	USA	Physical abuse	Cross-sectional	Attribution Style	Social Cognition & Object Relations Scale	No significant differences ($p > .05$). Trend of maltreated children expecting greater negativity & abuse from relationships ($p > .10$). Positive correlations between domains for nonmaltreated children ($p < .05$). No positive correlations for maltreated children. Negative correlation between affect tone and concreteness for maltreated children ($p < .05$).	0.86
Kay et al., (2016)	14 years (mean)	132	63	UK	OoH Placement - Child welfare referred abuse	Cross-sectional	Attribution Style	9 scenarios of unfair treatment or provocation	Maltreated children made more hostile attributions ($p < .02$), hostile responding ($p < .000$) and passive responding ($p < .000$), and less non-hostile attributions ($p < .05$) and competent responding ($p < .000$). No significant difference in ambiguous attribution ($p = .08$). Language was a significant moderator, & psychopathology & core features of disinhibited attachment disorder were not.	0.95

Study	Age	Participants (*n*)		Country	Type of traumatic event in the parental relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Smetana et al., (1999)	3-5 years old	55	36	USA	Physical Abuse	Cross-sectional	Moral Judgment	6 images of physical harm, psychological harm & unfair resource distribution	No significant difference (p > .05).	0.82
Teisl et al., (2008)	6-12 years	265	76	USA	Physical Abuse	Cross-sectional	Attribution Style	12 video vignettes of hostile, prosocial, accidental & ambiguous intent	Maltreated children significantly more likely to interpret prosocial accidental vignettes with hostile intent (p > .05). No significant difference in ambiguous vignettes (p = .19).	1
Toth et al., (1997)	3-5 years	107	80	USA	Maternal Abuse	Cross-sectional	Attribution Style	MacArthur Story Stem Battery	Maltreated children expressed more negative representations of themselves (p > .0001) and their mother (p > .01). Maltreated children were less responsive & more controlling in interactions (p > .0001). Maltreatment type moderated the above findings.	0.95

Table 8

Summary of articles reviewed – Processing the emotions of others

Study	Age	Participants (*n*)		Country	Type of traumatic event in parent-child relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Camras et al., (1990)	3-7 years	40	20	USA	Maternal abuse	Cross-sectional	Expression Recognition	20 vignettes of happiness, surprise, anger, disgust, fear or sadness	Maltreated children scored significantly lower on identifying emotions ($p > .001$). Maternal facial behaviour significant moderator.	0.82
During et al., (1991)	2-9 years	46	23	USA	Maternal physical abuse	Cross-sectional	Expression Recognition	12 images of happiness, surprise, anger, disgust, fear or sadness	Maltreated children scored significantly lower on identifying emotional expression ($p > .0002$). Maltreated children displaying less systematic processing ($p > .05$). Age significant mediator. Age of person in the photo or the mother's ability to identify emotions non-significant moderators.	0.91

Study	Age	Participants (*n*)		Country	Type of traumatic event in the parental relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Hennessy et al., (1994)	6-11 years	88	44	USA	Physical Abuse	Cross-sectional	Expression Recognition	8 video vignettes of mad, sad, scared, ok & happy	No significant differences in identifying emotions or perceived intensity of emotions ($p > .05$).	0.91
Pears et al., (2005b)	3-5 years	91	60	USA	OoH Placement - Child welfare referred abuse	Cross-sectional	Emotional understanding	Adaptation of the Denham Manual	Maltreated children scored significantly lower on emotional understanding tasks ($p < .01$). Length of time in foster care & number of transitions non-significant moderators.	0.95
Pollak et al., (2002)	8-10 years	47	24	USA	Physical Abuse	Cross-sectional	Expression Recognition	Image sequences of 16 faces revealing happiness, surprise, anger, disgust, fear or sadness	No significant difference in expression recognition with non-distorted images ($p > .05$). Maltreated children significantly quicker to identify anger & slower to identify sadness with distorted images ($p < .05$). No significant difference in the recognition of fear & happiness ($p > .05$). Child's gender, ethnicity & psychopathology, or parent's education, ethnicity & psychopathology non-significant moderators.	0.77

Study	Age	Participants (*n*)		Country	Type of traumatic event in the parental relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Pollak et al., (2000)	3-5 years	48	17	USA	Physical Abuse	Cross-sectional	Emotion Recognition	25 vignettes of happiness, anger, disgust, fear or sadness	Maltreated children had difficulty in identifying sadness & disgust ($p > .05$) (not happiness, fear and anger), & more likely to identify anger in other negative emotions ($p > .01$). Receptive vocabulary significant mediator. Gender & age non-significant moderator.	0.91
Pollak et al., (2009)	9 years old	95	49	USA	High Anger Expression & Physical Threat	Cross-sectional	Emotion Recognition	Cohn-Kadade Facial Expression Database	No significant group differences in correctly identifying emotions ($p = .16$ - .96), however trend of maltreated children identifying anger earlier in the facial formation of the emotion ($p = .06$).	0.95

Study	Age	Participants (*n*)		Country	Type of traumatic event in the parental relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Shackman et al., (2010)	7-12 years	57	29	USA	Maternal Physical Abuse	Cross-sectional	Emotion Recognition	Recording of child's mother producing an expression of anger, happiness, & sadness.	Maltreated children gave significantly increased attention to the movement of their mother's brow lowering/a sign of anger ($p < .05$) - a facial movement that was reduced in the abusing mothers. No significant difference between P3b responses in recordings of their mother's display of happiness or sadness ($p > .05$).	0.82
Shackman et al., (2005)	7-12 years	63	33	USA	Maternal Physical Abuse	Cross-sectional	Emotion Recognition	Recording of child's mother producing an expression of anger, happiness, & sadness.	Maltreated children showed preferential processing bias of anger ($p < .01$). No group differences in the identification of happiness or sadness or when identifying emotions in strangers ($p > .05$). Maltreated children more likely to identify anger in their mother on audio vs. visual recording ($p < .001$). No such bias with strangers ($p > .05$). Mothers posing ability non-significant moderator.	0.82

Table 9
Summary of articles reviewed – Theory of mind

Study	Age	Participants (*n*)		Country	Type of traumatic event in parent-child relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Cicchetti et al., (2003)	3-8 years	518	203	USA	Maternal abuse	Cross-sectional	ToM	Unexpected-content "smarties" task & unexpected-content task	Maltreated children scored significantly lower on false belief understanding (p < .05). Developmental timing, onset of maltreatment & maltreatment subtype significant moderators, but not chronicity of maltreatment.	0.91
Kay et al., (2016)	14 years (mean)	132	63	UK	OoH placement - Child welfare referred abuse	Cross-sectional	ToM	SS task & Child Friendship Interview (CFI)	Maltreated children scored significantly lower in the CFI (p < .03) and not in the SS task (p = .60). Language was a significant moderator. Psychopathology & core features of disinhibited attachment disorder non-significant moderators.	0.95

Study	Age	Participants (*n*)	Country	Type of traumatic	Design	Primary	Measures	Summary of results	QualSyst

		Total	Trauma in parent-child relationship		event in the parental relationship		domains			Score
O'Reilly et al., (2015)	4-13 years old	105	52	Australia	Parental abuse	Cross-sectional	ToM	Sally-Anne task, Band-Aid box task & an adapted ToM Scale	Maltreated children scored significantly lower on false belief ($p < .04$), first-order changed-locations ($p < .04$), and on an advanced belief-emotion test ($p < .001$). Knowledge access, hidden emotion, diverse desires, diverse beliefs and second-order false belief showed a trend that maltreated children had impaired functioning ($p > .05$). Maltreatment severity & parent's education significant moderators.	0.95
Pears et al., (2005b)	3-5 years	91	60	USA	OoH placement - Child welfare referred abuse		ToM	Two Level 1 Perspective-Taking tasks, 6 vignettes, 3 discrepant belief tasks & an appearance–reality task.	Maltreated children scored significantly lower on perception tasks, desire tasks, belief tasks & appearance-reality task ($p < .01$). Length of time in foster care & number of transitions did non-significant moderators.	0.95

Table 10
Summary of articles reviewed – Decision making abilities

Study	Age	Participants (*n*)		Country	Type of traumatic event in the parental relationship	Design	Primary domains	Measures	Summary of results	QualSyst Score
		Total	Trauma in parent-child relationship							
Weller et al., (2013)	9-12 years	137	25	USA	OoH Placement: Child welfare referred abuse	Cross-sectional	Risk Taking	Cup Task AQI paradigm	Maltreated children displayed significantly riskier behaviour, particularly when there is a risk of loss ($p < .02$) with a medium effect size ($d = .45$). Maltreated children significantly less likely to use contextual cues to aid decision making ($p < .05$). Age, gender, severity of abuse or frequency of abuse non-significant mediators.	0.95
Weller et al., (2015)	15-17 years	172	92	USA	OoH Placement: Child welfare referred abuse	Cross-sectional & Longitudinal	Risk Taking	Cup Task AQI paradigm	Maltreated children (in treatment as usual condition, rather than specialist intervention) displayed significantly more risky choices and took more risks to avoid losses, than the community children ($p < .05$).	0.95

Discussion

Summary of findings

The aim of this review was to examine the published literature on studies investigating the impact of trauma in the parent-child relationship on learning and social learning in children. The review yielded thirty-two studies measuring the domains of cognitive development (general cognitive functioning, intelligence, executive functioning and attention, memory, and language), academic performance and functional ability, and social information processing (processing the behaviour and emotions of others, Theory of Mind, and decision making abilities). The studies identified were of high quality, scoring above 0.7 when assessed with a quality tool (QualSyst; Kmet et al., 2011). Despite this, the studies consistently lacked power from small sample sizes, which increases the potential of associations not being identified and false positives being detected. Furthermore the studies based on children who have been removed from the family home may have captured additional trauma indicative of being in care rather than from the parent-child relationship. The studies often covered a broad range of ages but adolescent samples were more often under represented and reduces the generalizability of the results. The potential weaknesses of the studies are further explored in the limitations section, however it is noteworthy that the following conclusions need to be read with caution based on the methodological limitations.

Is there a deficit in learning and social learning in children who have experienced trauma in the child-parent relationship?

In general the studies were in support of there being a deficit in learning and social learning of children who have experienced trauma in the parent-child

relationship. The review found that the cognitive impairments encompass a broad range of domains that in general showed deficits, although the findings showed variability. The one domain that did not show a deficit was executive functioning (Bucker et al., 2012; Pears et al., 2005a) despite deficits in both ToM (Cicchetti et al., 2003; Kay et al., 2016; O'Reilly et al., 2015; Pears et al., 2005b) and impairments in half of the language studies (Allen et al., 1985; Camras et al., 1990; Pears et al., 2005a; Robinson et al., 2012; Viezel et al., 2015). This is surprising as these three domains traditionally correlate (Astington & Baird, 2005; Milligan, Astington & Dack, 2007). The finding of a lack of deficit in executive functioning deficit is also contrary to studies that have examined executive functioning in maltreated children (where the perpetrator was not specifically the parent) where impairments are consistently demonstrated and Kavanaugh et al., (2016) identified executive functions as the most dominantly affected domain following maltreatment. This suggests that children who have experienced trauma in the parent-child relationship may have more developed executive functioning skills (than those maltreated outside of the parent-child relationship) because of the necessity to plan, hold multiple demands and navigate their home environment to aid survival when their primary carer is also the active abuser. A recent study supports this finding, suggesting that inconsistent and abusive early environments may advance executive functioning. Roos, Kim, Schnabler and Fisher (2016) found that children subjected to physical abuse and parental substance misuse had relatively elevated executive functioning compared to children who had experienced other childhood adversities. Evolutionary psychology can be used as a framework to interpret these findings that suggest that maltreated children can veer towards

fast life strategies (Belsky, Schlomer & Ellis, 2012; Del Giudice, Gangestad & Kaplan, 2015), also illustrated by greater risk taking decisions (Weller et al., 2013; Weller et al., 2015). Furthermore, early adversity has been theorised to prompt physical maturation (such as puberty) and may also have similar effects on aspects of brain development (Del Giudice et al., 2015).

In relation to cognitive development, the majority of studies found that children who had been exposed to parental maltreatment showed impairments in general cognitive functioning (Bucker et al, 2012; Pears & Fisher, 2005, Robinson et al, 2012; Valentino et al., 2011), intelligence (Bucer et al, 2012; Pears et al., 2005a; Pears at al., 2010) and attention (Bucker et al, 2012; Vasilevski et al., 2016). However the studies measuring memory were inconclusive and yielded mixed findings (Bucker et al, 2012; Vasilevski, et al., 2016). Similarly half of the studies found that children who had been parentally maltreated showed impaired language ability (Allen et al., 1985; Camras et al., 1990; Pears et al., 2005a; Robinson et al., 2012; Viezel et al., 2015). The extent of these mixed findings in memory and language ability is consistent with studies on children who have been maltreated by a perpetrator who is not necessarily their parent (for review see; Kavanaugh et al., 2016). In contrast, there were no deficits in executive functioning in children who experienced trauma in the parent-child relationship (Bucker et al, 2012; Pears et al., 2005a). In conclusion, trauma in the parent-child relationship impedes cognitive development. Consistent with this conclusion, all studies found that children exposed to parental maltreatment showed deficits in academic performance and functional ability, highlighting the far reaching deficits in learning (Herrenkohl et al., 1995; Pears et al., 2010; Pears et al., 2015; Pears et al., 2013; & Wodarski et al., 1990).

Valentino and colleagues (2011) findings suggest that social cognitions may be more impaired in children who have experienced trauma in the parent-child relationship than non-social processing. In relation to social information processing, the children's processing of other people's behaviour showed the most variability in results and is the set of studies that held the greatest methodological weaknesses, predominantly in relation to inadequate sample sizes. The studies suggest that children who had been exposed to parental maltreatment displayed no impairments in processing moral or ambiguous situations (Fontaine et al., 2002; Kay et al., 2016; Smetana et al., 1999; Teisl et al., 2008). However when specifically looking at expectations in relationships, parentally maltreated children perceive greater hostile intent and less controllability of bad events (Cerezo et al., 1994; Kay et al., 2016; Jepson et al., 1999; Teisl et al., 2008; Toth et al., 1997). Furthermore, parentally maltreated children showed less complex or flexible thinking patterns when processing the behaviour of others, and interestingly used more concrete language when expecting hostile intent (Jepson et al., 1999).

The majority of studies found anomalies in parentally maltreated children's processing of emotions (Camras et al., 1990; During et al., 1991; Pears et al., 2005b; Pollak et al., 2002; Pollak et al., 2000; Pollak at al., 2009; Shackman et al., 2010; Shackman et al., 2005). Specifically, maltreated children used greater cognitive resource to identify anger at a quicker speed (Pollak et al.,, 2002; Pollak et al., 2009; Shackman et al., 2010; Shackman et al., 2005). This implies a hypervigilance to threat and the cognitive strategy of attending to this facial cue may be most adaptive and protective for the child. Particularly as studies found deficits in ToM in parentally maltreated children (Cicchetti et al.,

2003; Kay et al., 2016; O'Reilly et al., 2015; Pears et al., 2005b), suggesting that they have difficulty in attributing mental states, therefore assessing facial features of aggression would serve as a protective strategy. Despite the increased attention to this facial cue, children who have experienced trauma in the parent-child relationship are less likely to use other environmental cues to direct decision making (Weller et al., 2013). Anomalies in decision making also emerged in relation to whether parentally maltreated child are making a decision regarding a potential loss or a potential gain, where they are more likely to take risky decisions to avoid a loss, rather than to achieve a gain (Weller et al., 2013; Weller et al., 2015). This is in line with the finding that parentally maltreated children perceive less controllability of bad events (Cerezo et al., 1994) and perhaps why they are more willing to take risks as they do not see themselves as active agents in the scenario.

What accounts for the cognitive deficits associated with trauma in the child-parent relationship?

Multiple studies reported associations between cognitive deficits and trauma in the parent-child relationship, with Herrenkohl and colleagues (1995) providing the most comprehensive overview. They reported the associations with school functioning (academic and social processing) from strongest to weakest. SES was most strongly correlated, then mother's negative interaction behaviour, physical health of the child, mother's positive interaction behaviour, degree of observed neglect, presence of a male head in the family in preschool years, severity of emotional discipline, severity of physical discipline, and finally the number of difficulties at birth was the weakest correlation. Studies found more non-significant associations, contrary to the author's hypotheses, than

significant findings and those that did show a meaningful relationship in one domain often showed no relationship in another domain. For example, Bucker et al, (2012) found affective functioning associated with impaired general cognitive functioning but not associated with memory and learning, and Vasilevski et al., (2016) also found affective functioning having no relationship with IQ or executive functioning and attention. Kay & Green (2016) also found that psychopathology and the core features of disorganized attachment disorder unrelated to the cognitive processing involved in social processing. These findings are contrary to the view that symptomatology may mediate the relationship between trauma and learning, and perhaps suggest that what may account for the cognitive deficits may be a factor that may be more social and dyadic in nature. Interestingly, Valentino and colleagues (2011) studied both general cognitive functioning in relation to traditional standardised tests, and cognitive functioning based on the complexity of play (which incorporates social behaviour). There were no anomalies in general cognitive functioning however the parentally maltreated children showed impaired cognitive ability in the complexity of their play. This suggests that trauma in the parent-child relationship may impact social behaviour to a greater extent than general cognitive ability.

Nine of the thirty-two studies found factors that moderate the relationship between cognitive deficits and trauma in the child-parent relationship. The child's gender, language ability, inhibitory control and their engagement with the school, as well as their caregivers involvement with the child's learning, moderated the relationship between trauma in the parent-child relationship and academic and cognitive ability (Pears et., 2010; Pears et al.,

2015a; Pears et al., 2013; Robinson et al., 2012). In relation to what accounts for cognitive deficits in social information processing, identified moderators included the characteristics of the maltreatment, such as the age of the child when they experienced parental maltreatment and the developmental period in which it took place, the maltreatment subtype (Cicchetti et al., 2003) and severity (O'Reilly et al., 2015). The parent's education and whether the mother shows less prototypical displays of emotion (Camras et al., 1990), as well as the child's current age (During et al., 1991) and language ability (Kay et al., 2016) were also significant moderators.

One study looked at experimental evidence and investigated the cognitive processes involved in decision making abilities (Weller et al., 2015). Interestingly, it found that when the environment became more consistently reinforcing, the differences in decision making abilities between parentally maltreated and nonmaltreated children decreased. This suggests that it is the relationship and expectation of the environment that may mediate the relationship between parental maltreatment and the impaired ability to cognitively process our environment and learn from it. This is of particular significance as the review yielded moderator variables that influence the strength of the relationship between trauma in the parent child relationship and impaired learning, and this may help to explain the relationship between the two variables.

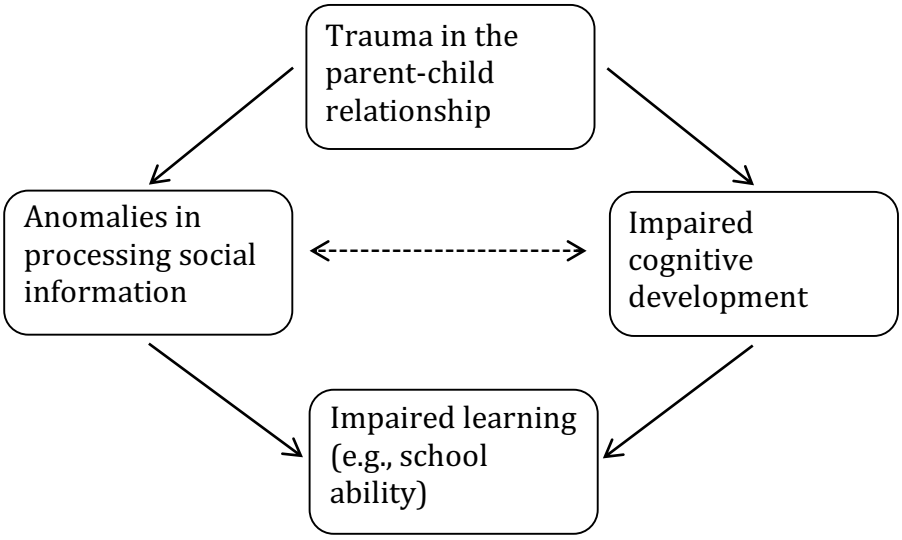
Interpretation of findings and clinical implications

Children who have experienced trauma in the parent-child relationship have impaired cognitive structures that create further obstacles in navigating their internal and external world. Deficits in general cognitive functioning,

intelligence and attention will undoubtedly impede learning and confidence in engaging with their environment, as shown in deficits in school achievement. Furthermore, parental abuse has shown to be associated with abnormalities in social processing whereby the child's cognitive resources are focused on interpreting potential threat (illustrated in Figure 2).

Figure 2

Summary of interpretation of findings



——→ Research supported by current review

----------→ Theoretical connection (ostensive cues)

There are a number of theories that can be drawn on to interpret these findings. For example social context theories and the stress response at the psychological, behavioural and biological levels, which can be adaptive in the short term but may impair learning as a long-term consequence. However this

review is going to focus on one innovative idea that is consistent with the findings, yet acknowledges that other theories may fit the data equally as well. Ostensive cues may be a factor that links abnormalities in social processing and impaired learning. Ostensive cues are social attention prompts that indicate which pieces of information should be given attention and learnt (Russell, 1940). The allocation of additional cognitive reserve to assess potential threat and focus on the brow (indicator of anger) may reduce the child's capacity to process ostensive cues shown in other parts of the face, such as eye gaze, and head turning. Responding to such cues has been shown to aid learning (e.g., Yoon, Johnson & Csibra, 2008; Wu & Kirkham, 2010; Wu, Gopnik, Richardson & Kirkham, 2011).

Social learning theories (Akers, 1985), developmental perspectives (Erickson et al., 1989), behavioural (Skinner, 1971) and traumagenic approaches (Finklehore et al., 1985), and neuropsychology can be used as frameworks to understand the far reaching processing deficits that blunt learning in children who have experienced trauma in the parent-child relationship. In some ways it appears that the deficits are as far-reaching as the theories. However a thread that may combine these theories is trust. It is experience that moulds the psychology of trust, and trust has to be learnt like any other type of generalisation (Luhmann, 1979). Self report from adolescents who have experienced trauma in the parent-child relationship report social mistrust and suspicion as their most dominant social perception and strategy (Moreno-Manso et al., 2016). However it is these children's trust that has been violated in their primary relationship (which is intended to foster trust), which may result in a reduced capacity to trust their social environment and therefore

learn from it. For example, the child who feels unsafe and models violence (social learning theory) does not trust their environment to support them. The child does not trust their social environment to care for them and scaffold their learning (developmental perspective). The child does not trust what they have learnt from their social environment to generalise it to a new setting (behavioural approach). The child does not trust their social environment and therefore disengages from it (traumagenic approach). This stance has been described as epistemic freezing and has been linked to ostensive cues (Fonagy & Allison, 2014). Epistemic freezing is where the child does not show instinctive trust but instead an untrusting stance to new information and learning (Kruglanski, 1989; Kruglanski & Webster, 1996; Pierro & Kruglanski, 2008).

Not possessing the scholastic ability that helps facilitate social understanding and interaction, as well as not holding trust in the environment to protect us, understandably results in the child being less able to engage with their environment and perceive it as a less helpful resource. This supports the finding that parentally abused children are less likely to use environmental cues to aid decision-making, are more likely to make risky decisions when they perceive potential losses (Weller et al., 2013; Weller et al., 2015), and hold expectations that relationships will hold hostile intent with less controllability of bad events (Cerezo et al., 1994; Kay et al., 2016; Jepson et al., 1999; Teisl et al., 2008; Toth et al., 1997). Furthermore, they are more likely to use concrete language, suggesting less cognitive flexibility when expecting hostility (Jepson et al., 1999). This describes the presentation of many young people who have experienced parental maltreatment when first accessing services, whereby they may present with epistemic vigilance, concrete language and a belief that what

the therapist will say will be irrelevant or attacking. This knowledge emphasises the importance of the therapeutic relationship in providing the security to develop the capacity for being open to new experiences that may slowly shift the expectations of their environment.

The review highlights the range of cognitive deficits that can be affected by trauma in the parent-child relationship and the need for routine cognitive assessments to help direct clinical intervention, the requirements to teach strategies to compensate for specific developmental deficits, and identify support required to achieve academic success. The one study that showed experimental evidence (Weller, et al., 2015) found that processing patterns could be altered through the combination of individual and parenting interventions. Deficits appear across the age ranges and therefore suggestive that early intervention is paramount.

Limitations

The limitations of the studies presented in the review suggest that the conclusions drawn need to be interpreted with caution and as a tentative model.

Sample

The most prominent limitation of the studies is small sample sizes. Despite the studies being assessed by the QualSyst and six studies yielding adequate sample sizes for this area of research, to detect a small effect size of 2% with 80% power, studies would require a sample of at least 700 participants (Cohen, 1988). No studies reached this sample size, with the studies ranging from 24 (Allen et al., 1985) to 518 participants (Cicchetti et al., 2003) resulting in only large effects being detected and an increase in type II errors which may inflate false positives.

The studies recruited participants who were currently experiencing abuse, had abuse histories and were removed to out of home placements, which lead to a number of variables that require further disentangling in future research. Children in the care system undoubtedly present with added complexity and despite the review aiming to reduce the variance in the types of trauma experienced, it still holds multiple levels of abuse experiences and potential consequences.

The aim of the review is to examine the impact of trauma in the parent-child relationship, on learning and social learning in children. All studies used in the review documented parental maltreatment as the primary abuse category. However these findings are likely to be confounded by other abuse histories, as children who have experienced abuse are likely to be subject to multiple abuse types (Finklehor et al., 2011).

Causality

The studies were unable to infer causality and conclude that cognitive deficits emerged following trauma in the parent-child relationship. Therefore associations found may be a consequence of other factors (such as other stressful events and family functioning) or that children with cognitive impairments are more likely to experience abuse (Jones et al, 2012; Olson & Jacobson, 2014). Longitudinal studies may begin to infer causality however the longitudinal papers contributing to the review did not measure learning abilities before the onset of abuse.

Domains captured

The review terms initially yielded 2876 papers and the methodology of 190 papers were assessed. Subsequently the scope of the review was restricted

to cognitive development, academic performance and functional ability, and social information processing. Furthermore, the search terms focused on cognitive ability and did not include the specific search terms of emotions, behaviour, ToM and decision making abilities. It is therefore likely that additional studies within these domains were not identified and were the probable reason as to why hand searching references yielded a further 10 studies. Search terms were not included to capture socioemotional development that may include low self-esteem, insecure attachments or behavioural difficulties, which may have helped to build a richer understanding of factors that may impede learning.

Review Process

The method applied to the current review was systematic to help differentiate the review from standard literature reviews; however only one coder was responsible for the analysis. This is more likely to result in human errors and interpretation bias. A minimum of two coders is advised for selection and data extraction, to help ensure an objective and impartial synthesis of the research (Aveyard, 2014).

Future Research

Impaired learning has been associated with trauma in the parent-child relationship however small sample sizes and a lack of longitudinal designs (to capture children's ability to learn pre and post abuse) result in tentative conclusions and models being drawn. Executive functioning was the one domain not to yield impairment, which is contrary to the wider body of research in maltreated populations. This highlights resilience and a potential protective factor for this cohort, which requires further exploration of how this good

outcome can be sustained and potentially used to aid recovery from trauma.

The current review identified nine studies that found moderators which influence for the cognitive deficit associated with trauma in the parent-child relationship. Despite factors being shown to be associated in some domains, in other domains these factors were not, for example the child's age and gender. This suggests that there may be stronger moderating or mediating factors intervening in the relationship between trauma in the parent-child relationship and the capacity to learn. An emerging and tentative pattern in this review is that social learning may be more impaired than other types of learning. Furthermore, it is tentatively proposed that a lack of trust and a reduced use of environmental cues may also contribute to impaired learning. This requires further research as well as other causal mechanisms between child maltreatment and subsequent cognitive delays. This is an area that has not been sufficiently studied, and it is the identification of mediating components that are integral to understanding the mechanisms of change, which can advance psychotherapy and evidence based psychological interventions (Emmelkamp et al, 2014).

Further esearch would be of benefit to address the limitations of the current review by widening the search terms to include emotions, behaviour, ToM and decision making abilities. As well as broadening the search to capture neglect in order not to be reliant on the studies yielded by Maguire et al., (2015) review and develop more inclusive conclusions with greater validity, as abuse types are often comorbid. Furthermore it would be of benefit to have two coders to lessen interpretation bias and human error.

Conclusion

Children who experience trauma in the parent-child relationship show trends of far reaching deficits in the domains of cognitive development, academic performance and functional ability, and social information processing, resulting in impaired learning and social learning. Factors that may account for the cognitive deficits associated with trauma in the parent-child relationship are under-researched. However an emerging theme that may link the theoretical frameworks and emerging research could be trust to learn from an environment that has failed to provide protection. The one study that yielded experimental evidence showed that once the environment provided consistency and positive regard, and the children were taught social skills to interact with this new environment, decision making anomalies reduce that may improve learning and social learning.

The review aimed to investigate a subsection of childhood trauma and early adversity, namely trauma that took place in the parent-child relationship. This intended to narrow the data with the aim of drawing more consistent findings than found in the wider body of literature on childhood trauma. Tightening the scope continued to yield mixed findings, suggesting that further research is required to identify the moderating or mediating factors that could be targeted in interventions and promote resilience. However a finding emerged that children who have experienced trauma in the parent-child relationship showed no impairment in executive functioning, contrary to the wider literature on childhood trauma which has generally concluded deleterious effects and recommendations for interventions to promote executive functioning. Further research is required to explore this anomaly and the subsequent

recommendations that should follow. The main weakness of the research base is small sample sizes resulting in tentative conclusions and further research is required to help overcome this limitation in the literature.

References

Akers, R. (1985). *Deviant Behavior: A Social Learning Approach*. Belmont, CA: Wadsworth.

Allen, B. (2008). An analysis of the impact of diverse forms of childhood psychological maltreatment on emotional adjustment in early adulthood. *Child maltreatment, 13,* 307-312.

Allen, R., E. & Wasserman, G. A. (1985). Origins of language delay in abused children. *Child Abuse & Neglect, 9,* 335-347.

Astington, J. W., & Baird, J. A. (2005). *Why language matters for theory of mind*. England: Oxford University Press.

Aveyard, H. (2014). *Doing a literature review in health and social care* (3rd ed.). Berkshire, England: Open University Press.

Bartlett, J. D., Kotake, C., Fauth, R., & Easterbrook, M. A. (2017). Intergenerational transmission of child abuse and neglect: Do maltreatment type, perpetrator, and substantiation status matter? *Child Abuse & Neglect, 63*, 84-94.

Belsky, J., Schlomer, G. L., & Ellis, B. J. (2012). Beyond cumulative risk: Distinguishing harshness and unpredictability as determinants of parenting and early life history strategy. *Developmental Psychology, 48*, 662–673.

Bucker, J., Kapczinski, F., Post, R., Cereser, K., Szobot, C., Yatham, L., Kapczinski, N., & Kauer-Sant'Anna, M. (2012). Cognitive impairment in school-aged children with early trauma. *Comprehensive Psychiatry, 53*, 758-764.

Cadamuro, A., Versari, A., Vezzali, L., Giovannini, D., & Trifiletti, E. (2015). Cognitive Performance in the Aftermath of a Natural Disaster: The Role of Coping Strategies, Theory of Mind and Peer Social Support. *Child & Youth Care Forum, 44*, 93-113.

Camras, L. A., Ribordy, S., Hill, J., Martino, S., Sachs, V., Spaccarelli, S., & Stefani, R. (1990). Maternal facial behavior and the recognition and production of emotional expression by maltreated and nonmaltreated children. *Developmental Psychology, 26*, 304–312.

Cerezo, M. A., & Frais, M. (1994). Emotional and cognitive adjustment in abused children. Emotional and cognitive adjustment in abused children. *Child Abuse & Neglect, 18*, 923-932.

Cicchetti, D. (2006). Development and Psychopathology. In D. Cicchetti, & D. Cohen. (Eds.), *Developmental Psychopathology, Theory and Method: Volume, 1. (2nd Ed.,pp.1-23).* New Jersey: Wiley & Sons.

Cicchetti, D. (2013). Annual Research Review: Resilient functioning in maltreated children: Past, present, and future perspectives. *Journal of Child Psychology and Psychiatry, 54,* 402–422.

Cicchetti, D., Rogosch, F. A., Maughan, A., Toth, S. L., & Bruce. J. (2003). False belief understanding in maltreated children. *Developmental & Psychopathology, 15,* 1067–1091.

Clarke, G., Sack, W., Ben, R., Lanham, K., & Him, C. (1993). English language skills in a group of previously traumatized Khmer adolescent refugees. *Journal of*

Nervous and Mental Disease, 181, 454-456.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.

Cohen, P., Brown, J., & Smailes, E. (2001). Child abuse and neglect and the development of mental disorders in the general population. *Development and Psychopathology, 13,* 981-999.

Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social information- processing mechanisms in children's social adjustment. *Psychological Bulletin*, *115*, 74–101.

Crozier, J., Wang, L., Huettel, S., & De Bellis, M. (2014). Neural correlates of cognitive and affective processing in maltreated youth with posttraumatic stress symptoms: Does gender matter? *Development and Psychopathology. 26*, 491-513.

Dann, R. (2011). Look out! 'Looked after'! Look here! Supporting 'looked after' and adopted children in the primary classroom. *International Journal of Primary, Elementary and Early Years Education 3-13, 39,* 455-465.

De Bellis, M. D. (2005). The psychobiology of neglect. *Child Maltreatment, 10*, 150–172.

De Bellis, M. D., Baum, A., Birmaher, B., Kershaven, M., Eccard, C. H., Boring, A. M., Jenkins, F. J., & Ryan, N. D. (1999). A. E. Bennett Research Award. Developmental traumatology: Part 1. Biological stress systems. *Biological Psychiatry, 45,* 1259–1270.

Del Giudice, M., Gangestad, S. W., & Kaplan, H. S. (2015). *Life history theory and evolutionary psychology*. In D. M. Buss (Ed.), The handbook of evolutionary psychology, vol 1: Foundations (pp. 88–114) (2nd ed.). New York, NY:

Wiley.

During, S., & McMahon, R. (1991). Recognition of emotional facial expressions by abusive mothers and their children. *Journal of Clinical Child Psychology, 20*, 132-139.

Emmelkamp, P.M.G., David, D., Beckers, T., Muris, P., Cuijpers, P., Lutz, W., & Vervliet, B. (2014). Advancing psychotherapy and evidence-based psychological interventions. *International Journal of Methods in Psychiatry Research, 23*, 58–91.

Erickson, M. F., Egeland, B., & Pianta, R. (1989). The effects of maltreatment on the development of young children. In D. Cicchetti & V. Carlson (Eds.), *Child maltreatment: Theory and research on the causes and consequences of child abuse and neglect* (pp. 647-684). New York: Cambridge University Press.

Finkelhor, D., & Browne, A. (1985). The traumatic impact of child sexual abuse. *American Journal of Orthopsychiatry, 55,* 530-541.

Finkelhor D, Turner H, Hamby S, & Ormrod R. (2011). Polyvictimization: children's exposure to multiple types of violence, crime and abuse (Juvenile Justice Bulletin). Washington, DC: Office of Juvenile Justice and Delinquency Prevention, US Department of Justice.

Finkelhor D., Turner H. A., Shattuck A., & Hamby S. L. (2013). Violence, crime, and abuse exposure in a national sample of children and youth: An update. *Journal of the American Medical Association Pediatrics, 167,* 614-621.

Fonagy, P., & Allison, E. (2014). The Role of Mentalizing and Epistemic Trust in the Therapeutic Relationship. *Psychotherapy, 51*, 372-380.

Fontaine, R., Salvano-Pardieu, V., Crouzet, S., & Pulford, B. D. (2002). Physically abused and nonmaltreated boys' moral judgments of violence. *Child Study*

Journal, 32, 215-230.

Geoffroy, M-C., Pinto Pereira, S., Li, L., & Power, C. (2016). Child neglect and maltreatment and childhood-to-adulthood cognition and mental health in a prospective birth cohort. *Journal of the American Academy of Child & Adolescent Psychiatry, 55*, 33-40.

Harter, S., Alexander, P, C., & Neimeyer, R, A. (1988). Long-term effects of incestuous child abuse in college women: social adjustment, social cognition, and family characteristics. *Journal of Consulting and Clinical Psychology, 56*, 5-8.

Hennessy, K. D., Rabideau, G. J., Cicchetti, D., & Cummings. E. M. (1994). Responses of physically abused and nonabused children to different forms of interadult anger. *Child Development, 65,* 815–828.

Herrenkohl, E. C., Herrenkohl, R. C., Rupert, L. J., & Egolf, B. P. (1995). Risk factors for behavioral dysfunction: The relative impact of maltreatment, SES, physical health problems, cognitive ability, and quality of parent-child interaction. *Child Abuse & Neglect, 19*, 191–203.

Irigara, T. Q., Pacheco, J. B., Grassi-Oliveira, R., Fonseca, R. P., Leite, J. C. C., & Kristensen, C. H. (2013). Child Maltreatment and Later Cognitive Functioning: A Systematic Review. Psicologia: Reflexao e Critica, *26*, 376-387.

Jepson, L., & Bucci, W. (1999). Object relations and referential activity in physically abused adolescents. *Adolescence, 34,* 781–792.

Jones, L., Bellis, M.A., Wood, S., Hughes, K., McCoy, E., Eckley, L., Bates, G., Mikton, C., Shakespeare, T., & Officer, A. (2012) Prevalence and risk of violence against children with disabilities: a systematic review and meta-analysis of

observational studies. *The Lancet,* 380(9845). Retrieved from http://press.thelancet.com/childrendisabilities.pdf

Kavanaugh, B. C., Dupont-Frechette, J. A., Jerskey, B. A., & Holler, J. A. (2016). Neurocognitive Deficits in Children and Adolescents Following Maltreatment: Neurodevelopmental Consequences and Neuropsychological Implications of Traumatic Stress. *Applied Neuropsychology: Child*, *6,* 64-78.

Kay, C, L., & Green, J, M. (2016) Social cognitive deficits and biases in maltreated adolescents in UK out-of-home care: Relation to disinhibited attachment disorder and psychopathology. *Development and Psychopathology*. *28,* 73-83.

Kmet, L. M., Lee, R. C., & Cook, L. S. (2011). Standard Quality Assessment Criteria for Evaluating Primary Research Papers From a Variety of Fields. 2004. Edmonton, Canada: Alberta Heritage Foundation for Medical Research.

Klika, B., & Herrenkohl, T. (2013). A review of developmental research on resilience in maltreated children. *Trauma, Violence, & Abuse, 14*, 222-234.

Kruglanski, A. W. (1989). *Lay epistemics and human knowledge: Cognitive and motivational bases*. New York, NY: Plenum Press.

Kruglanski, A. W., & Webster, D. M. (1996). Motivated closing of the mind: "Seizing" and "freezing." *Psychological Review*, *103*, 263–283.

Luhmann, N. (1979). *Trust and Power.* Chichester: Wiley.

Maguire, S., Williams, B., Naughton, A. M., Cowley, L. E., Tempest, V., Mann, M. K., Teague, M., & Kemp, A. M. (2015). A systematic review of the emotional, behavioural and cognitive features exhibited by school-aged children experiencing neglect or emotional abuse. *Child: Care, Health and*

Development, 41, 641-653.

Marvin, R. (1977). An ethological-cognitive model for the attenuation of mother-child attachment behavior. In T. Alloway, P. Pliner, & L. Krames (Eds.),*Advances in the study of communication and affect: Vol. 3. Attachment behavior* (pp. 25-60). New York, Plenum Press.

McFadyen, R. G., & Kitson, W. J. H. (1996). Language comprehension and expression among adolescents who have experienced childhood physical abuse. *Journal of Child Psychology and Psychiatry, 37,* 551–562.

Meaney, M. J., Szyf, M., & Seckl, J. R. (2007). Epigenetic mechanisms of perinatal programming of hypothalamic–pituitary–adrenal function and health. *Trends in Molecular Medicine, 13*, 269–277.

Milligan, K., Astington, J.W. & Dack, L.A. (2007) Language and Theory of Mind: Meta-Analysis of the Relation Between Language Ability and False-belief Understanding. *Child Development 78*, 622–646.

Moreno-Manso, J, M., Garcia-Baamonde, M, E., Guerrero-Barona, E., Godoy-Merino, M, J., Blazquez-Alonso, M., & Gonzalez-Rico, P. (2016). Perceived emotional intelligence and social competence in neglected adolescents. *Journal of Youth Studies, 19*, 821-835.

Morey, R., Haswell, C., Hooper, S., & De Bellis, M. (2016). Amygdala, hippocampus, and ventral medial prefrontal cortex volumes differ in maltreated youth with and without chronic posttraumatic stress disorder. *Neuropsychopharmacology, 41*, 791-801.

Olson, K., & Jacobson, K. K. (2014). The importance of assessing for abuse and neglect in children with chronic health conditions referred for neuropsychological evaluation. *Applied Neuropsychology: Child*, *3*, 66–72.

O'Reilly, J., & Peterson, C. (2015). Maltreatment and advanced theory of mind development in school-aged children. *Journal of Family Violence, 30*, 93–102.

Pearce, J.W. & Pezzot-Pearce, T.D. (1997). *Psychotherapy of abused and neglected children.* New York: Guilford Press.

Pears, K., & Fisher, P. A. (2005a). Developmental, Cognitive, and Neuropsychological Functioning in Preschool-aged Foster Children: Associations with Prior Maltreatment and Placement History. *Journal of Developmental and Behavioral Pediatrics*, *26,* 112-122.

Pears, K. C., & Fisher, P. A. (2005b). Emotion understanding and theory of mind amongst maltreated children in foster care: Evidence of deficits. *Development and Psychopathology, 17,* 47–65.

Pears, K, C., Kim, H, K., Buchanan, R., & Fisher, P, A. (2015) Adverse consequences of school mobility for children in foster care: A prospective longitudinal study. *Child Development*, *86*, 1210-1226.

Pears, K. C., Fisher, P. A., Bruce, J., Kim, H. K., & Yoerger, K. (2010). Early elementary school adjustment of maltreated children in foster care: The roles of inhibitory control and caregiver involvement. *Child Development, 81,* 1550–1564.

Pears, K. C., Kim, H. K., Fisher, P. A., & Yoerger, K. (2013). Early school engagement and late elementary outcomes for maltreated children in foster care. *Developmental Psychology, 49*, 2201–2211.

Pierro, A., & Kruglanski, A. W. (2008). "Seizing and freezing" on a significant-person schema: Need for closure and the transference effect in social judgment. *Personality and Social Psychology Bulletin*, *34*, 1492–1503.

Pollak, S. D., Cicchetti, D., Hornung, K., & Reed, A. (2000). Recognizing emotion in faces: Developmental effects of child abuse and neglect. *Developmental Psychology, 36,* 679–688.

Pollak, S. D., Messner, M., Kistler, D. J., & Cohn, J. F. (2009). Development of perceptual expertise in emotion recognition. *Cognition, 110*, 242–247.

Pollak, S. D., & Sinha, P. (2002). Effects of early experience on children's recognition of facial displays of emotion. *Developmental Psychology, 38,* 784–791.

Proctor, L.J., Skriner, L.C., Roesch, S., & Litrownik, A.J. (2010). Trajectories of behavioral adjustment following early placement in foster care: Predicting stability and change over 8 years. *Journal of the American Academy of Child & Adolescent Psychiatry*, *49*, 464-473.

Reyome, N. D. (1993) A comparison of the school performance of sexually abused, neglected and non-maltreated children. *Child Study Journal*, *23,* 17–38.

Robinson, L., Boris, N., Heller, S., Rice, J., Zeanah, C., Clark, C., & Hawkins, S. (2012). The good enough home? Home environment and outcomes of young maltreated children. *Child & Youth Care Forum, 41*, 73–88.

Roos, L. E., Kim, H. K., Schnabler, S., & Fisher, P, A. (2016). Children's executive function in a CPS-involved sample: Effects of cumulative adversity and specific types of adversity. *Children and Youth Services Review, 71*, 184-190.

Russell, B. (1940). *An inquiry into meaning and truth*. London, UK: Allen & Unwin.

Shackman, J., Fatani, S., Camras, L., Berkowitz, M., Bachorowski, J. A., & Pollak, S.

D. (2010). Emotion expression among abusive mothers is associated with their children's emotion processing and problem behaviours. *Cognition & Emotion, 24,* 1421–1430.

Shackman, J. E., & Pollak, S. D. (2005). Experiential influences on multimodal perception of emotion*. Child Development, 76,* 1116–1126.

Shonkoff, J. P., & Garner, A. S. (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics, 129*, 232-46.

Skinner, B. F. (1971). *Beyond freedom and dignity.* New York: Knopf.

Smetana, J. G., Daddis, C., Toth, S. L., Cicchetti, D., Bruce, J., & Kane, P. (1999). Effects of provocation on maltreated and nonmaltreated preschoolers' understanding of moral transgressions. *Social Development, 3,* 335–348.

Stermac, L., Elgie, S., Dunlap, H., & Kelly, T. (2010). Educational experiences and achievement of war-zone immigrant students in Canada. *Vulnerable Children and Youth Studies, 5*, 97-107.

Strom, I., Schultz, J., Wentzel-Larsen, T., & Dyb, G. (2016). School performance after experiencing trauma: A longitudinal study of school functioning in survivors of the Utoya shootings in 2011. *European Journal of Psychotraumatology, 7*, 31359.

Teisl, M., & Cicchetti, D. (2008). Physical abuse, cognitive and emotional processes, and aggressive/disruptive behavior problems. *Social Development*, *17,* 1–23.

Toth, S. L., & Cicchetti, D. (1996) Patterns of relatedness, depressive symptomatology, and perceived competence in maltreated children. *Journal of Consulting and Clinical Psychology*, *64*, 32–41.

Toth, S. L., Cicchetti, D., Macfie, J., & Emde, R. N. (1997). Representations of self and other in the narratives of neglected, physically abused, and sexually abused preschoolers. *Development and Psychopathology, 9,* 781-796.

Valentino, K., Cicchetti, D., Toth, S. L., & Rogosch, F. A. (2011). Mother-child play and maltreatment: a longitudinal analysis of emerging social behavior from infancy to toddlerhood. *Developmental Psychology, 47*, 1280–1294.

Vasilevski, V., & Tucker, A. (2016). Wide-ranging cognitive deficits in adolescents following early life maltreatment. *Neuropsychology, 30*, 239-246.

Viezel, K. D., Freer, B. D., Lowell, A., & Castillo, J. A. (2015). Cognitive abilities of maltreated children. *Psychology in the Schools, 52,* 92–106.

Wechsler, D. (2003). *WISC IV technical and interpretive manual*. San Antonio, TX: Psychological Corporation.

Weller, J. A., & Fisher, P. A. (2013). Decision-making deficits among maltreated children. *Child Maltreatment, 18,* 184–194.

Weller, J, A., Leve, L, D., Kim, H, K., Bhimji, J., & Fisher, P, A. (2015). Plasticity of risky decision making among maltreated adolescents: Evidence from a randomized controlled trial. *Development and Psychopathology, 27,* 535-551.

Wechsler D. (1989). *Manual for the Wechsler Preschool and Primary Scales of Intelligence-Revised*. San Antonio, TX: Psychological Corporation.

Wodarski, J., Kurtz, P., Gaudin, J., & Howing, P. (1990). Maltreatment and the school-age child: Major academic, socioemotional, and adaptive outcomes. *Social Work, 35,* 506–513.

Wolff, P., & Fesseha, G. (1999). The orphans of Eritrea: A five-year follow up

study. *Journal of Child Psychology and Psychiatry, 40*, 1231-1237.

Yasik, A., Saigh, P., Oberfield, R., & Halamandaris, P. (2007). Posttraumatic Stress Disorder: Memory and Learning Performance in Children and Adolescents. *Biological Psychiatry, 61*, 382-388.

Yoon, J. M. D., Johnson, M. H., & Csibra, G. (2008). Communication-induced memory biases in preverbal infants. *Proceedings of National Academy of Sciences. U.S.A*. *105,* 13690–13695.

Wu, R., Gopnik, A., Richardson, D. C., & Kirkham, N. Z. (2011). Infants learn about objects from statistics and people. *Developmental Psychology*, *47,* 1220–1229.

Wu, R., & Kirkham, N. Z. (2010). No two cues are alike: depth of learning during infancy is dependent on what orients attention. *Journal of Experimental Child Psychology*, *107,* 118–136.

Part 2: Empirical Paper

The impact of early adversity and trauma on adolescent's epistemic trust

Abstract

Aims. There is a cascade of possible learning deficits in adolescents following trauma. Concepts that may help explain some of these learning impairments are Epistemic Trust (ET) and ostensive cues (social gestures). It is theorised that ostensive cues trigger ET, which facilitates learning and generalisation, by promoting a trusting stance towards new information and signalling that it is personally relevant. Trauma may reduce adolescents' trust in what people say (ET) and sensitivity to ostensive cues. This study aims to investigate in an adolescent sample the role of ostensive cues on ET, learning and the ability to generalise newly learnt information. Furthermore, it aims to explore whether trauma and early adversity moderates these relationships, and whether trauma and early adversity negatively impacts ET.

Method. Seventy-nine adolescents (12-18 years old) were recruited from community and clinical settings, and completed computerised ET and learning paradigms that manipulated the presence of ostensive cues. Additional quantitative measures were employed to capture trauma and early adversity, ET, estimated intelligence and demographic variables.

Results. The study found that ostensive cues significantly impact ET but not learning and generalisation, although a strong trend was found between ostensive cues and learning. Trauma and early adversity did not moderate the use of ostensive cues; however trauma and early adversity were significantly associated with ET.

Conclusions. Trauma was shown not to impact an adolescent's ability to use ostensive cues, although it was found to impair ET indicating that ostensive cues may be used to help restore the erosion of ET following trauma.

Introduction

The role of trauma for social learning

Trauma is either interpersonal or event related and 80% of the population are estimated to experience at least one significant trauma in their life (Breslau, 2009). In inner city London communities a 40% prevalence rate is reported for childhood trauma (Frissa, Hatch & Gazard, 2013). Adolescence is seen as a heightened period of exposure to trauma due to engaging in more risky behaviours as well as more intensive school bullying, and violence in the community and home (Shaw, 2000).

Trauma has been shown to impair intelligence, memory, language, visual-spatial ability, motor skills and executive functioning of children, which are essential dimensions for learning and social cognition (Irigara et al., 2013; Kavanaugh, Dupont-Frechette, Jerskey, & Holler, 2016). Although there is often a deficit in learning following traumatic experiences, this is by no means invariably the case. Research has differentially found no cognitive deficits following trauma (e.g., Wolff & Fesseha, 1999), and cognitive decline and then recovery (Strom, Schultz, Wentzel-Larsen & Dyb, 2016) versus long lasting learning difficulties that have persisted into adulthood (Geoffroy, Pinto, Li & Power, 2016). There is a limited understanding of the moderating variables influencing the outcomes for traumatised youth (Klika & Herrenkohl, 2013) let alone in the specific field of early adversity and social learning.

Trust as a mechanism of social learning

Trust has been described as a decision that "permeates the interface between people and their social environments" (Jones, Couch, & Scott, 1997, p. 465). It is an essential part of human interactions from infancy to adulthood,

with trust versus mistrust being the first task of the ego (Erikson, 1950) and trustworthiness being the first thing that is processed when meeting a new person (Willis & Todorov, 2006).

Trustful stances positively correlate with the acquisition of learning (Juvina, Saleem, Martin, Gonzalez & Lebiere, 2013) and evidence for altered social learning mechanisms are beginning to emerge for adult samples who have experienced trauma, whereby participants display slower rates of learning during trust games (Lenow, Steele, Smitherman, Kilts & Cisler, 2014; Cisler et al, 2015). These findings have not been replicated in adolescent samples although children who have been exposed to trauma have been shown to have difficulties in generalising what they have learnt from one situation to another (Fagan, 2011).

Trauma reduces people's capacity to trust (Gobin, 2011) and can lead to high levels of suspicion when thinking about the social world (Bentovim, Bentovim, Vizard & Wiseman, 1995). Trauma can lead to mental representations of the social world being characterised by simple, categorical, negative and punitive attributes (Ornduff, Freedenfeld, Kelsey & Critelli, 1994), subsequently affecting what children anticipate and focus on, and how they organise the way they evaluate and process information (van der Kolk, 2003). Self-report from children who have experienced trauma states social mistrust and suspicion as their most dominant social perception and strategy (Moreno-Manso et al., 2016).

Epistemic trust to epistemic freezing

Epistemic Trust (ET) has been described as the "trust required for social learning" (Fonagy & Allison, 2016, p.288) and is the mechanism through which

we gauge whether information from another is genuine and personally relevant to us and therefore worth integrating into our lives (Fonagy & Allison, 2014). It involves cognitive openness, flexible thinking and tolerance to ambiguity (Kruglanski, 1989).

It is hypothesised that the knowledge we acquire about the world forms an epistemic "superhighway" that triggers a readiness to learn cultural knowledge. However in the social environment the risk of deception is too high for the superhighway to always remain open, therefore this evolutionary mechanism has the capacity to close (Fonagy et al., 2014). Epistemic vigilance may not be merely beneficial but critical if communication itself is to remain advantageous (Sperber et al., 2010).

Kruglanski (Kruglanski, 1989; Kruglanski & Webster, 1996; Pierro & Kruglanski, 2008) introduced the concept of epistemic freezing, which is described as a cognitive closure with dogmatic thinking styles, decreased ability to become aware of alternative hypotheses and a difficulty to trust new information. It is postulated that epistemic vigilance and epistemic freezing follows trauma, and is associated with an unbearable sense of isolation and a stress response when the social world is thought about (Fonagy, 2013). Epistemic freezing is seen as a more rigid closure of the epistemic superhighway (compared to the frequent temporary closures that takes place in day-to-day living) and may be less sensitive to cues signalling the need for it to be reopened (Fonagy et al., 2014).

The role of ostensive cues on epistemic trust

One of the tasks for humans is to be able to receive and transfer information to the next generation to aid survival. Csibra and Gergely (2009)

describe communication as an evolutionary product that involves a certain method of teaching that alerts individuals that the information about to be presented is something that they should acquire because it belongs to human culture and can be generalised. This practice of teaching is characterised by ostensive cues (Russell, 1940), which centres on eye contact, personal recognition, contingent responding, vocal prosody, use of the individual's name and bodily gestures. Developmental evidence has shown that these cues aid learning in infants (Yoon, Johnson & Csibra, 2008; Wu & Kirkham, 2010; Wu, Gopnik, Richardson & Kirkham, 2011). Egyed, Kiraly and Gergely (2013) found that 18-month babies provided with ostensive cues were able to learn and generalise information with a 69% correct response rate. This compares to a 31% correct responses when no ostensive cues were present.

Ostensive cues have been linked with attachment styles, whereby insecure attachment reduces infants' ability (Corriveau et al, 2009) and adults' ability (Green & Campbell, 2000; Green-Hennessy & Reis, 1998; Mikulincer, 1997; Mikulincer & Arad, 1999) to trust and learn from their social environment. This compliments the well-established research that secure attachment correlates with cognitive openness and learning (Thompson, 2008; Pierro et al., 2008). Ostensive cues have been linked with attachment security and also mentalising, as each of these constructs appear to prime a trustful stance when learning from the social environment (Corriveau et al, 2009; Fonagy et al., 2014). The communication style in secure attachment relationships and mentalising is marked by recognition of the listener as someone who matters and can be understood, and is often expressed through facial and verbal gestures (i.e., ostensive cues). This process develops trust and

safeness, therefore allowing information to be cognitively processed and updated, which allows the loosening of cognitive control and exploration of novel concepts (Fonagy et al., 2014).

Trauma has been shown to relate to a cascade of factors that may affect children's ability to use ostensive cues and therefore affect subsequent learning. For example, traumatised children have shown restricted social competence (Levendosky, Okun & Parker, 1995; Keil & Price, 2009), are more likely to perceive hostile intent (Kay & Green, 2016) and are less able to attribute mental states and intentions to others (O'Reilly & Peterson, 2015). Greater cognitive reserve is used to detect early signs of anger (Shackman et al, 2010; Shackman & Pollak, 2005) and traumatised youth are less likely to use environmental cues to help them navigate decision making (Weller & Fisher, 2013), which may restrict their capacity to detect and use ostensive cues.

Measuring ostensive cues, epistemic trust and social learning

Despite ET and ostensive cues being well-established theories, there is limited empirical research particularly with adolescents. This is in part because of the difficulty to measure ET (Luca & Lewis, 2010) and research methods being most complementary to infant studies; however the development of computational methods to capture trust opens new avenues for research.

Measuring epistemic trust and ostensive cues

The Trust Game (King-Casas et al., 2005) involves exchanging symbolic monetary units with another player. If the participant co-operates both parties gain higher pay-offs than by not co-operating. To share the money, the participant has to trust that the other player has good intentions (Berg, Dickhault, & McCabe, 1995). Participants generally share fifty percent or more

in the first round, which signals trust (Gintis, 2000; Camerer, 2003; Krueger, 2008) and adolescents tend to show a preference for fairness in coin exchange whereas adults show greater polarisation (Belli, Rogers & Lau, 2012). If the other player deviates from this social communication pattern it strongly impacts trust (King-Casas et al., 2005). Trust is operationalized as the amount of money that is exchanged between the players. Once a trust level has been set it tends to guide subsequent monetary exchanges (King-Casas et al., 2005), showing that a trustful or non-trustful stance has been primed in this interactive and social relationship.

The Trust Game has been successfully adapted to investigate a range of social behaviour, including communication (Barclay, 2006; Schotter & Sopher, 2006; Slonick, 2007). In this way the measure compliments the inclusion of ostensive cues, such as personal recognition and contingent responding, although published research has not investigated computerised simulation of ostensive cues.

Measuring ostensive cues and learning

The go/no-go paradigm is a well-known social psychology experimental measure that compliments computational methods. The paradigm requires you to "go" and approach to win, or "no go" and withhold to avoid losing (Donders, 1963). As well as a learning tool, the go/no-go paradigm is used to measure automatic social cognitions that reflect a belief or an evaluation that the participant is not fully consciously aware of or has control over (Nosek & Banaji, 2001); for example measuring trust between different groups (Zhang et al, 2013). In this way the paradigm lends itself to incorporating ostensive cues (which can prime social cognitions) into its learning trials. A computerised

approach may increase the internal validity of such a paradigm and allow for greater control of external variables; however this has not yet been investigated in published literature.

Research aims

Research has started to build a theoretical and empirical framework that identifies ostensive cues as a method to trigger ET, and that ET promotes learning and generalisation. However the research has focused on infant samples and there is currently no strong formulation with adolescents. It is theorised that trauma and early adversity will result in the less frequent use of ostensive cues, which may be an adaptive behaviour to an environment that has been inconsistent and untrustworthy. In turn this may lead to a reduction in ET and a less trusting stance to new information. Therefore interpersonal learning situations don't modify cognitive structures in line with the information that the person has available. This results in cognitive structures not being updated and new pieces of information not being generalised to future situations (Fonagy et al., 2014). Furthermore, the study aims to investigate whether trauma and early adversity has a direct impact on ET, independent of ostensive cues.

The study will randomly allocate adolescent participants to an ostensive cue (OC) condition and a control group to examine the effect of ostensive cues on ET, learning and generalisation in computer-based tasks. The role of trauma and early adversity will be explored by investigating whether it has a moderating effect on ostensive cues. To investigate whether trauma and early adversity is related to ET, a separate social dilemma task will be employed because ET has been manipulated in the Trust Game by ostensive cues and therefore a non-manipulated ET measure is required.

Through this exploration it will be important to measure additional variables that may be associated with ET, learning, generalisation and trauma to aid internal validity, such as IQ and demographic factors. Intelligence is strongly associated with learning, and trauma can negatively impact IQ (Irigara et al., 2013; Kavanaugh et al., 2016). Furthermore IQ has been shown to be a protective factor against the negative sequelae of trauma (Breslau, Lucia & Alvarado, 2006). Age, gender and socioeconomic status (SES) have been associated with learning outcomes for children who have experienced trauma, as well as their recovery patterns (Irigara et al., 2013; Kavanaugh et al., 2016; Kronenberg et al, 2010). The level of trust that people hold for others has also been associated with age, gender, ethnicity and SES (Chaudhuri, Paichayontvijit & Shen, 2013; Fett, Gromann, Giampietro, Shergill, & Krabbendam, 2014; Smith, 2010; Stephens, Cameron & Townsend, 2014).

This study aims to build with an adolescent sample a model for ostensive cues, ET, learning, trauma and early adversity. It hopes to develop our understanding into whether ostensive cues are a method for triggering ET and whether ET is an underlying mechanism that explains why some adolescents are more able than others to learn from their social environment. It aims to provide insight into the associations between inflexible thinking styles and distrustful stances, which is a common difficulty for children who have faced trauma and early adversity, as well as a difficulty across a range of mental health disorders. Furthermore it may support the development of interventions to help engagement, and strengthen agency and trust when working with adolescents whose presentation could be formulated as epistemic vigilance or epistemic freezing.

The current study therefore addresses the following questions:

1. Do ostensive cues manipulate epistemic trust, learning and the ability to generalise in an adolescent sample?
2. Does trauma moderate the effect of ostensive cues?
3. Is trauma related to Epistemic Trust?

Methods

Design

This study used a cross-sectional, between-subjects design to assess ET, learning and generalisation rates in an ostensive cue (OC) condition and control group while controlling for covariates; and also to investigate whether trauma moderates the ability to use ostensive cues. A correlational design was used to investigate the relationship of ET with trauma.

This study was conducted with two fellow trainee clinical psychologists at UCL, Tal Reches (Reches, 2017) and Elise Draper (Draper, 2017). A subsection of the dataset was shared and the details of each trainee's specific contributions are outlined in Appendix 3.

Participants

Recruitment

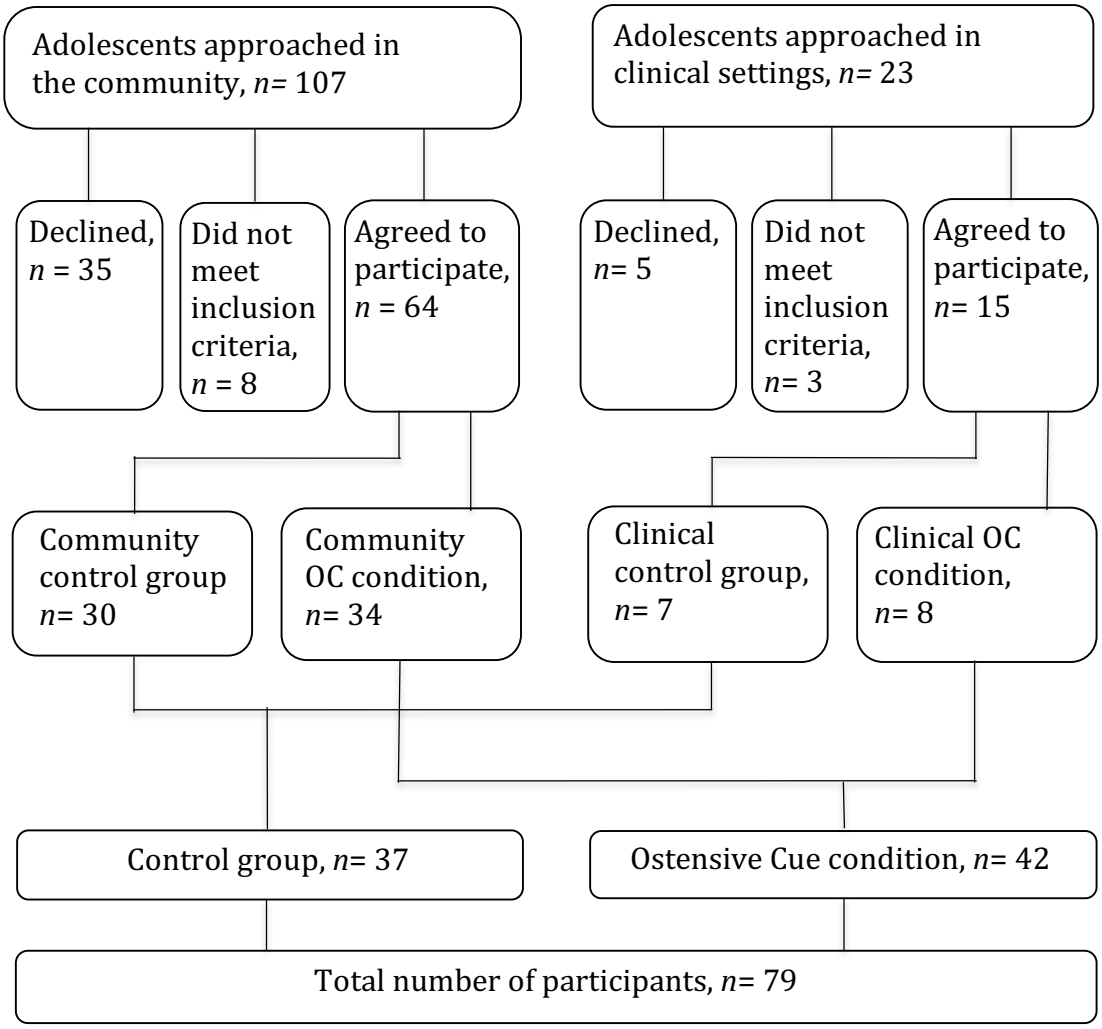
A community and a clinical sample were recruited to gain greater variance of trauma and early adversity exposure. The community sample was recruited through opportunity sampling and chain-referrals. Recruitment took place between October 2016 and April 2017 and a total of 64 adolescents aged 12-18 year olds (M= 15.67, SD= 2.02) joined the study. The clinical sample was recruited at two clinical sites, an outpatient and in-patient service. Recruitment

took place between March 2017 and April 2017 and a total of 15 adolescents aged 15-18 year olds (M= 16.64, SD= 1.24) joined the study.

The flow of participants through the study is presented in the consort diagram (Figure 1).

Figure 1

Recruitment consort flow diagram



In total 107 adolescents were approached to participate in the study from community and clinical settings. In the community setting 29 people declined participation without providing a reason, 5 people said that they were

too busy and 1 person did not want to answer questions about trauma. Eight people did not meet inclusion criteria because of geographical location (n=5), not being fluent in English (n=2) and having received a diagnosis of an Autism Spectrum Disorder (n=1). This resulted in 64 community participants joining the study, 30 were randomly allocated to the control group and 34 to the OC condition. In the clinical setting, of the 23 adolescents approached 5 people declined participation because of mental health difficulties (n=2), being too busy (n=2) and one person provided no reason for not wanting to join (n=1). Three people did not meet the inclusion criteria because of having received a diagnosis of an Autism Spectrum Disorder (n=2) and learning disability (n=1). This resulted in 18 clinical participants joining the study, 7 were randomly allocated to the control group and 8 to the OC condition. A total of 79 adolescents aged 12-18 years (M= 15.85, SD= 1.93) participated in the study.

Inclusion and exclusion criteria

Participants were 12-18 years old and fluent in English. Exclusion criteria included a diagnosis of a neurodevelopmental disability or psychosis, or a physical health problem that may compromise cognitive ability (e.g., brain injury).

Sample Size

A power calculation was carried out in order to determine a sample size for an ANCOVA of two levels and two covariates (using G*Power 3.1, Faul, Erdfelder, Lang & Buchner, 2007). The power analysis was conducted using an alpha of 0.5, a power of 0.8 and a medium effect size (f^2= 0.25) and concluded that a sample size of 179 would be required. To detect large effect sizes, it is

indicated that a sample size of 79 is required for power at 0.8 and alpha of 0.5. The researchers were able to recruit a sample of 79 participants.

Sample

The demographic information for the 79 participants is shown in Table 1. The intention of the study was to match groups in terms of age, gender, ethnicity and IQ.

Table 1

Participant demographic characteristics

	Control	OC
N	37	42
	Mean (SD)	Mean (SD)
Age	15.53 (1.92)	16.14 (1.91)
Gender		
Male	56.76% (n=21)	38.10% (n=16)
Female	43.24% (n=16)	61.90% (n=26)
Ethnicity		
Majority	83.78% (n=31)	85.71% (n=36)
Minority	16.21% (n=6)	14.29% (n=6)
SES		
Low	70.27% (n=26)	76.19% (n=32)
High	29.73% (n=11)	23.81% (n=10)
	Mean (SD)	Mean (SD)
IQ	108.24 (15.54)	104.88 (12.95)

Comparisons revealed no significant difference between the groups in age (t (77)= 1.421 , p= .159), gender (χ^2 = 2.751, df (1), p=.097), ethnicity (χ^2 =.057, df (1), p=.811), SES (χ^2 = .353, df (1), p=.552) and IQ (t (77)=-1.049, p=.298).

Eighty-seven percent of participants reported to have experienced one or more traumatic events in their lifetime. The severity of the traumatic event(s) were scored on a Likert scale ranging from 1-7 and the majority of trauma's

were scored in the mid-severity range (M=4.53, SD=1.32). In the sample as a whole, indicators for each main category of abuse had occurred to differing extents at some time point in their life; physical abuse (24.05%), sexual abuse (3.80%), emotional abuse (73.42%), physical neglect (58.23%) and emotional neglect (78.48%). A Denial and Minimisation scale suggested that 91.10% of participants responded with positive impression management reporting biases (i.e., potential underreporting of maltreatment).

Ethics

UCL research ethics committee granted ethical approval for the community sample. Bloomsbury NRES Committee and the relevant local Research and Development departments granted ethical approval for the clinical sample (see Appendix 4). All data was collected and stored according to the Data Protection Act 1998.

Service User Involvement

Six adolescents from the community and two adolescents from a clinical service provided consultation on how to help the design, measures and literature to be age-appropriate and supportive. The community adolescents were identified through opportunity sampling and selected on the basis of age in order to gain consultation from varying age groups. To recruit service users as consultants, the clinical team explored the opportunity with their clients and two adolescents agreed to participate. The consultation involved role-playing each section of the study and providing detailed feedback that was incorporated. Young people were given £10 an hour for their consultation and fully debriefed following their participation. Additionally, clinicians from the clinical services also provided consultation.

Procedure

Participants were identified through opportunity sampling and chain referrals for the community sample, and by the young person's responsible clinician for the clinical sample. An introductory letter and participant information sheets were sent (see Appendix 5 and 6) and each participant was given a minimum of 24 hours to consider their participation and had an opportunity to ask questions. Once verbal consent was given for participation a time was set up to join the project and complete the measures.

Half of the participants were allocated to the OC condition and half to the control group, based on the stratification variables of age, gender, ethnicity and SES. If allocated to the OC condition, an electronic photo of the mother was requested prior to the testing session. In the community sample testing took place in the family home with a parent on the premises. In the clinical sample testing took place in the clinical service with their responsible clinician available.

All participants provided informed assent or consent, and all adolescents under 16 years old had written parental consent for participation (see Appendix 7). All participants were told that that their participation was voluntary and that they could withdraw from the study at any point. Participants were informed that all of their answers would remain confidential unless it breached safeguarding criteria. The descriptions and order in which the measures were administered were standardised. A researcher was present throughout the completion of all measures and participants were encouraged to ask questions and inform the researcher if they found any of the questions distressing.

The testing session took 2-3 hours with regular breaks. At the end of data collections participants were debriefed, thanked for their participation and given £30 to compensate them for their time.

Measures

The measures for the Trust Game, Learning Task, Generalisation Task and ET measures can be seen in Appendix 8.

Experimental paradigms for epistemic trust, social learning and generalisation

The computer task has been designed on MATLAB software by Dr Michael Moutoussis (Wellcome Trust Centre for Neuroimaging) and has been developed to measure trust, learning and generalisation while allowing for the manipulation of ostensive cues. The computerised paradigm has been trialled with children (Smithers, 2015; O'Callaghan, 2017).

Stage 1: The Trust Game is a simulated social economic exchange paradigm (King-Casas et al., 2005) that has undertaken multiple versions (Camerer, 2003). This study employs ten rounds and in each round the participant is given 20 play-pounds and the option to give 0-20 of these play-pounds to a simulated player. The amount the participant gives is trebled when it reaches the simulated player. Then the simulated player decides how much they will give back to the participant and how much they will keep for themselves. The goal for the participant is to find a rule that results in them gaining as many coins as possible (i.e., to trust).

The Trust Game has been shown to correlate with other trust measures (Glaeser, Laibson, Scheinkman & Soutter, 2000) and observation data (McClure et al., 2007; Qualter, Brown, Munn, & Rotenberg, 2010). The paradigm has demonstrated its validity and reliability in clinical and non-clinical populations,

adolescents and people who have experienced trauma (Belli et al., 2012; Cisler et al, 2015; Lenow et al., 2014; Sharp, Ha & Fonagy, 2011).

The OC condition in the Trust Game involves the participant being told to imagine that the simulated player is their mother in order to elicit attachment representations (rather than a stranger in the control group). The algorithm identifies the nearest interaction pattern (based on the participants' behaviour) from Read Montague's normative database of real people's behaviour and applies this to the simulated mother. The simulated mother contingently responds to the participant's choices and calls the participant by their name. These are all features of ostensive cues that are believed to elicit the priming of ET. Furthermore, this section requires mentalising in order to infer the intentions of the mother (e.g., the intention to share or not to share the coins) as well as incorporating an attachment figure. This further aids the priming of ET, as ET develops in the context of attachment relationships and mentalising. In contrast the participants in the control group are told that they are playing against a stranger and since no ostensive cues are incorporated it is postulated that the ET superhighway is not primed to open.

Social learning and generalisation tasks

Stage 2: Learning Task uses the go/no-go paradigm where participants are shown four different stimuli and are asked to learn whether they should approach (go) or avoid (no go) by trial and error. Half of the stimuli result in gain and half result in loss. Participants are explained that a star will be awarded or deducted for correct and incorrect responses to reinforce learning; however 25% of the stars are allocated in an inconsistent manner. A response deadline is in place to encourage participants to make instinctive, binary choices

and if the time limit is surpassed, two stars are removed. There are 80 rounds and the occasional misleading communication reflects that social learning is rarely a small number of consistent exchanges.

At the end of the task there is a teaching round where the participant is told which objects are safe to approach and which to avoid. The participant then repeats a subsection consisting of 20 rounds. This results in all participants learning the rule that it is safe to approach two of the items (which are brown coloured) and not safe to approach the remaining two items (which are black and white) irrespective of whether they learnt it independently.

The OC condition in the Learning Task incorporates a headshot photograph of their mother, which is visible on the screen. This is intended to keep the epistemic superhighway open by tapping into the ostensive cues of eye contact and familiarity. In contrast the participants in the control group did not include a photograph of their mother.

Stage 3: Generalisation Task has 80 rounds and is based on the same structure of the learning task described above, with the exception of no ostensive cues being incorporated. In this task the participants' go/no-go responses can either be taught by trial and error (which takes a longer learning time) or by generalising what was learnt in the previous task to a new set of stimuli (i.e., to avoid the black and white stimuli and approach the multicolour stimuli).

The go/no-go paradigm is the paradigm used for both the learning and generalisation stages and has demonstrated its validity and reliability in social cognition studies (Nosek et al., 2001), adolescent samples (Kilford et al, 2015) and substance misuse populations (Smith, Mattick, Jamadar & Iredale, 2014).

The Epistemic Trust Instrument (ETI; O'Connell, 2014) presents twenty social dilemmas with conflicting advice on how to respond from their mother and an unknown professional. The participant selects either their mother or the unknown professional as a trusted figure and scores their level of trust on a scale ranging from 0-100 (mildly trust to strongly trust). The total average trust score is calculated for each figure, along with the proportion of times that the mother was chosen as the trusted figure. Additionally, the level of confidence that the participant feels in their decision to choose a trusted figure (i.e., their mother or the unknown professional) is scored on a scale ranging from 0-100 (very unlikely to very likely), with higher scores indicating less confidence in their decision. Such scenarios can be powerful tools to assess trust because they often tap into instinctive rather than rational beliefs (Haidt, 2012). Psychometric properties for this measure have not been established. The instrument has been used with adult clinical and community samples (O'Connel, 2014) and is currently being used with participants who have experienced trauma and received a diagnosis of a borderline personality disorder at the Wellcome Trust Centre for Neuroimaging.

Trauma

The Childhood Trauma Questionnaire (CTQ; Bernstein & Fink, 1998) is a retrospective self-report measure of interpersonal trauma, which is scored on a 5-point Likert scale ranging from 1 (never true) to 5 (very often true). There are 25 items capturing the subscales of physical abuse, sexual abuse, emotional abuse, physical neglect and emotional neglect. The measure incorporates a 3-item minimisation and denial scale, which is often an expected response to trauma (Grinberg, 1961).

Bernstein and Fink (1998) have demonstrated high test-retest reliability (.79-.86) and good internal consistency of the CTQ. The CTQ has demonstrated its validity and reliability among clinical and non-clinical populations, with adolescents and with substance misuse samples (Bernstein, Ahluvalia, Pogge & Handelsman, 1997; Bernstein et al., 1998; Scher, Stein, Asmundson, McCreary & Ford, 2001;Thombs, Lewis, Bernstein, Medrano, & Hatch, 2007).

The Childhood Traumatic Events Scale (CTES; Pennebaker & Susman, 1988) is a retrospective measure of traumatic events. Six items measure the occurrence of bereavement, parental separation, traumatic sexual experience, violence, extreme illness or injury and significant upheavals. This study incorporated an additional item to measure peer victimisation and bullying. All items include follow up questions when applicable; including trauma severity (7-point scale) and whether they confided in other people (7-point scale).

The CTES has shown sensitivity in measuring trauma among clinical and non-clinical samples, substance misuse populations and studies investigating reactivity to social threat (Carnuta, Crisan, Vulturar, Opre & Miu, 2015; Scheller-Gilkey, Thomas, Woolwine & Miller, 2002). Psychometric properties for this measure have not been established.

Estimated intelligence

The Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999) measures intellectual ability in individuals aged from 6 to 89 years old. Two subsets were used (vocabulary and matrix reasoning) for an estimation of general cognitive ability. If the participant's first language was not English, then the vocabulary task was substituted with the block design task.

Wechsler (1999) found that the WASI reported good discriminant, factorial and construct validities, as well as achieving high correlations with other intelligence measures. The use of two subtests is deemed appropriate for an estimated IQ score (Lange and Iverson, 2007).

Age, gender, ethnicity and socioeconomic status

Demographic data of age, gender and ethnicity was collected during the testing session. Ethnicity was converted into a dichotomous variable representing majority (i.e., White British) or minority (e.g., Black British, Bengali and Egyptian) group membership. Socioeconomic status was derived from the participant's parent(s) profession and converted into a dichotomous variable representing low and high SES (Office of National Statistics, 2013).

Data analysis

All analyses used SPSS Version 24. Descriptive information was analysed using t-tests for continuous data and chi-square for categorical data. Factor analysis was conducted with oblique rotation (direct oblimin) on each multi-subscale measure to reduce data and error, and provide more stable measures. Field (2013) recommends preliminary screening of the correlations between variables before factor analysis in order to remove correlations that are too small (below .3) and too large (above .8); however he highlights that flexibility is often required for the purposes of parsimonious data. The Bartlett's Test of Sphericity (to assess equal variance) and the Kaiser-Meyer-Olkin measure (to verify sampling adequacy) was assessed before analysis proceeded. Bivariate correlational analysis was conducted to measure the association between the variables. The covariates that yielded significant correlations were used in subsequent analysis. To test whether ostensive cues manipulate trust, learning

and the ability to generalise (hypothesis 1) an Analysis of covariance (ANCOVA) was performed on each relationship while controlling for significant covariates. The Levene's test of homogeneity was assessed (to conclude homogeneity of variance) before analysis proceeded. To test whether trauma moderates the effect of ostensive cues (hypothesis 2) the trauma measures were split into low and high trauma responses by their median scores and an Analysis of covariance (ANCOVA) was performed while controlling for significant covariates. Linear regression was used to test whether trauma is related to ET (hypothesis 3).

Results

Preliminary analyses

Missing and removed data

There was no missing data in the CTQ, CTES, ETI, WASI or demographic measures. The computerised Trust Game had 3 corrupted files that led to the data of 76 participants being analysed on this measure. There were 7 participants in the Learning Task and 3 participants in the Generalisation Task who achieved less than 25% correct responses, which resulted in the data being excluded from the analysis because it was deemed as an indication of a lack of understanding or engagement in the task.

Normal distribution

Outliers were only identified in the CTQ and accounted for 0.68% of the CTQ data. Winsorizing was used to substitute the outlier with the highest non-outlier value.

The normality of each of the subscales, age and estimated IQ were examined visually on histograms, scatter plots and by calculating the skewness

and kurtosis of the distributions (range +/-1.96(SE)). The data met the assumptions of normality with the exception of the Trust Game (Total Investment, Total Investor Earnings, Total Trustee Repay subscales), ETI (Confidence subscale), CTQ and CTES (frequency and severity subscales).

The learning score, generalisation score, CTES confide subscale, age and estimated IQ met the assumptions for normality. The ETI subscales were normally distributed with the exception of the Confidence subscale; however once a factor analysis was performed on the scale this was no longer a concern. Subscales in the Trust Game, CTQ and CTES violated the assumptions of normality based on the skew of the data.

Factor analysis identifies the common latent variables in data and in doing so can reduce skewness (Fields, 2013). The ETI subscales were normally distributed with the exception of the Confidence subscale; however once a factor analysis was performed this was no longer a concern. The factor analysis identified factors that remained to be skewed for the Trust Game (4.27) and Trauma Factor (3.35).

The planned analysis involves ANCOVA and regression, which are both robust to deviation from perfectly normal distribution. In order to ensure that the assumptions of the tests are met, the dispersion of the standardised residuals was reviewed following the analysis. This approach was taken because performing a transformation on the data before analysis would distort the meaning of the outcome variables; particularly as the trauma measures do not use natural scales. Additionally, Trust Game subscales were impervious to transformation.

Reliability of scales

Cronbach's alphas were calculated on the CTQ and are shown in Table 2. The scores show good internal consistency, which is in line with the cronbach's alphas reported across a number of settings ranging from a median of .66 for the physical neglect subscale to a median of .92 for the sexual abuse subscale (Bernstein et al., 1998).

Table 2

Internal consistency of CTQ subscales – Cronbach's alphas (α)

Subscale	Cronbach's alphas (α)
Physical Abuse	.86
Sexual Abuse	.95
Emotional Abuse	.89
Physical Neglect	.81
Emotional Neglect	.83
Denial and minimisation	.81
Total Score	.89

The internal consistency of the CTES was not analyzed because of the single item occurrences of the frequency and severity of separate traumatic events.

Descriptive statistics

Descriptive statistics were calculated for each variable and a summary can be seen in Table 3 and Table 4. The full correlation matrix of the subscales can be found in Appendix 9.

Table 3

Descriptive statistics of main measures in control group and OC condition

Measures	Control Group	OC Condition	Minimum possible score	Maximum possible score
	Mean (SD)			
Trust Game				
Initial Investment	8.34 (3.97)	10.20 (4.45)	0	20
Investment 2nd Round	9.17 (5.34)	10.41 (4.32)	0	20
Total Investment	84.60 (20.82)	104.80 (33.88)	0	200
Total Investor Earnings	200.00 (.00)	215.32 (18.53)	___	___
Total Trustee Repay	84.60 (20.82)	120.95 (1.19)	___	___
Total Trustee Earnings	169.20 (41.64)	193.46 (54.18)	___	___
Learning Score	0.46 (0.13)	0.53 (0.18)	0	1
Generalisation Score	.62 (0.70)	.62 (0.20)	0	1

Table 4

Descriptive statistics of main measures not allocated to condition

Measures	Mean (SD)	Minimum possible score	Maximum possible score
ETI			
Proportion Chose Mother	61.46 (18.21)	0	100
Strength Mother Trust	35.53 (15.19)	0	100
Strength Stranger Trust	20.36 (11.97)	0	100
Confidence	43.51 (12.54)	0	100
CTQ			
Physical Abuse	5.72 (1.48)	5	25
Sexual Abuse	5.16 (1.15)	5	25
Emotional Abuse	9.61 (4.84)	5	25
Physical Neglect	6.86 (2.52)	5	25
Emotional Neglect	9.52 (3.87)	5	25

Denial & minimisation	2.66 (0.81)	0	3
Total Score	37.23 (11.71)	25	125
CTES			
Frequency	2.32 (1.74)	0	7
Severity	4.53 (1.32)	1	7
Confide	3.66 (1.64)	1	7

Factor analysis

Factor analysis was undertaken on the Trust Game, Dilemma Task, CTQ and CTES. These factor scores were used in all hypothesis testing.

Factor analysis of behavioural indices extracted from the Trust Game

The preliminary analysis of the Trust Game correlations identified Total Trustee Repay and Total Trustee Earnings subscales containing multiple correlations below the .3 and .8 criteria, which were subsequently excluded. This resulted in only the participant's behaviour being captured in the factor analysis. See Table 5.

Table 5

Correlation matrix – Trust Game subscales

	Initial Invest-ment	Invest-ment 2nd Round	Total Invest-ment	Total Investor Earnings	Total Trustee Repay
Initial Investment	___				
Investment 2nd Round	.38**	___	.		
Total Investment	.56**	.44**	___		
Total Investor Earnings	.38**	.30**	.69**	___	
Total Trustee Repay	.54**	.41**	.96**	.87**	___
Total Trustee Earnings	.54**	.43**	.97**	.50**	.86**

Note. *p <.05. **p <.01.

A Principle Component Analysis (PCA) was conducted on the Initial Investment, Investment 2nd Round, Total Investment, and Total Investor

Earnings subscales. The factor loadings suggest a good relationship between the original variable and underlying factor. The communalities were all above .4 confirming that each variable shared common variance (see Table 6).

Table 6

Factor loadings and communalities of Trust Game subscales

	Factor Loadings	Communalities
Initial Investment	.75	.56
Investment 2nd Round	.65	.42
Total Investment	.75	.80
Total Investor Earnings	.78	.61

One factor emerged which explains 59.89% of the total variance and was used for all subsequent analysis. Normality checks (as described above) concluded that the Trust Game Factor is non-normative because of a positive skew of 4.27.

Factor analysis of the Epistemic Trust Instrument

The preliminary analysis of the correlations between the ETI subscales found that the majority of the scales fell below the .3 cut off (see Table 7) and for data inclusion a PCA was initially conducted on all variables. This yielded two factors that were loaded on constructs that did not complement the theoretical underpinnings of the measure, which is essential for a factor analysis (Fields, 2013). Furthermore the two factors captured lower total variance, than when the confidence subscale was excluded and one factor was created.

Table 7

Correlation matrix – ETI subscales

	Proportion Chose Mother	Strength Mother Trust	Strength Stranger Trust
Proportion Chose Mother	___		
Strength Mother Trust	.69**	___	
Strength Stranger Trust	-.72**	-.26*	___
Confidence	-.02	-.32**	-.24*

Note. *p <.05. **p <.01.

A second PCA was conducted on the Proportion Chose Mother, Strength Mother Trust and Strength Stranger Trust subscales. Traditionally the KMO uses a score of below .5 as cut off for sampling adequacy; however factor analysis is traditionally applied to large data sets where such conventions have originated. The small sample size of this study therefore has allowed a margin and accepts a KMO of .44. The factor loadings and communalities suggest a strong relationship between the variables and supported the use of a Factor Analysis (see Table 8).

Table 8

Factor loadings and communalities of ETI subscales

	Factor Loadings	Communalities
Proportion Chose Mother	.96	.93
Strength Mother Trust	-.79	.59
Strength Stranger Trust	.77	.62

One factor emerged which explains 71.23% of the total variance and was used for all subsequent analysis. The factor is likely to capture ET in both the primary attachment relationship and with unknown individuals. Normality checks (as described above) concluded that the ETI Factor is normally distributed.

Factor analysis of trauma questionnaires

The preliminary analysis of the correlations between the trauma subscales found that measures for Physical Abuse, Sexual Abuse, the amount participants confided in others and the CTES Severity subscales were well below the acceptable .3 criteria for factor analysis as shown in Table 9, and therefore excluded from further analysis.

Table 9

Correlation matrix – CTQ and CTES subscales

	PA	SA	EA	PN	EN	FREQ	SEV
PA	___						
SA	-.07	___					
EA	.42**	.34**	___				
PN	.35**	.12	.67*	___			
EN	.43**	.02	.69**	.61**	___		
FREQ	.42**	.37**	.59**	.37**	.50**	___	
SEV	.07	.06	.28*	.06	.18	.16	___
CONF	-.29*	-.08	-.24	-.14	-.38**	-.14	.29*

Note. PA= CTQ Physical Abuse subscale, SA= CTQ Sexual Abuse subscale, EA= CTQ Emotional Abuse subscale, PN= CTQ Physical Neglect Subscale, EN= CTQ Emotional Neglect subscale, FREQ= CTES Frequency subscale, SEV= CTES Severity subscale, CONF= CTES Amount confided in others about the trauma subscale. *p <.05. **p <.01.

The CTQ and CTES use different scales to capture trauma and to provide a more stable measure of the underlying experiences of trauma, composites were formed with unit-weighted z scores to substitute test scores in the factor analysis. A PCA was conducted on the Emotional Abuse, Physical Neglect, Emotional Neglect and Frequency subscales. The communalities and the high

factor loadings suggest a strong pattern in the data and support the use of a Factor Analysis (see Table 10).

Table 10

Factor loadings and communalities of trauma subscales

	Factor Loadings	Communalities
CTQ Emotional Abuse	.90	.81
CTQ Physical Neglect	.81	.65
CTQ Emotional Neglect	.85	.73
CTES Frequency	.73	.53

One factor emerged which explains 68.10% of the total variance and was used for all subsequent analysis. The factor is likely to capture the frequency of trauma and early adversity that is both interpersonal and event related. Normality checks (as described above) concluded that the Trauma Factor is non-normative because of a positive skew of 3.35.

Exploration of correlations

Pearson's correlations were used to explore the associations between the main variables of ET, learning, generalisation and trauma (see Table 11). The correlation matrix found a significant relationship between the Trust Game and Learning score whereby greater trust was associated with higher learning rates. In contrast no significant association was found with trust and the ability to generalise nearly learnt knowledge.

Interestingly the two trust scores (Trust Game and ETI) did not correlate and suggests the measures capture different aspects of ET, and perhaps the manipulation of ostensive cues. The ETI was significantly associated with the Trauma Factor suggesting greater exposure to trauma is associated with

reduced levels of ET. However no significant association was found between trauma and the trust game (p= .927).

Table 11

Correlation matrix of main variables

	Trust Game Factor	Learning Score	Generalisation Score	ETI Factor
Trust Game Factor	___			
Learning Score	.30*	___		
Generalisation Score	.03	.30*	___	
ETI Factor	.07	.09	.09	___
Trauma Factor	.01	-.03	-.13	-.26*

Note. *p <.05. **p <.01.

The relationship between the main measures with demographic variables and IQ were explored in order to control for potential covariates in subsequent analysis (see Table 12). This highlighted that age is an important covariant to control for in analyses of the Trust Game, Learning Score and CTQ Factor; as the older the adolescent the greater their scores on these measures. SES is an important covariate to control for the Trust Game, ETI Factor and Trauma Factor; higher levels of SES are related to greater trust and lower exposure to trauma. Estimated IQ is an important covariate for the Generalisation Score whereby higher IQ is associated with a greater ability to generalise newly learnt knowledge. No significant associations were found with gender and ethnicity, subsequently leading to these variables not being included in further analysis.

Table 12

Correlation of potential covariates with main variables

	Trust Game Factor	Learning Score	Generalisa-tion Score	ETI Factor	Trauma Factor
Demographics					
Age	.26*	.26*	.22	-.09	.42**
Gender	.02	-.03	.01	-.01	-.05
Ethnicity	-.16	-.01	.15	.04	-.08
SES	-.23*	-.01	-.01	.17	-.16
IQ	.07	.09	.33**	.10	-.19

Hypothesis 1: Ostensive cues manipulate trust, learning and the ability to generalise in an adolescent sample.

Do ostensive cues manipulate trust when the covariates of age and SES are controlled for?

An ANCOVA was conducted to determine whether there is a statistically significant difference between the OC condition and control group on Trust Game scores, when controlling for age and SES. The Levene's test of homogeneity concluded that the groups had heterogeneous variance across the samples. When standardised predicted values were plotted against the predicted values to examine the dispersion of the residuals, it revealed that the normality assumption had been violated. The Bootstrap technique does not assume normally distributed data and can be used to help collaborate the *p*-value from an ANCOVA with non-normally distributed data. Bootstrapping employed an assumed sample of 1000 participants from the existing sample of 76 participants.

An ANCOVA was performed to investigate the statistical difference between the OC condition and control group when controlling for age and SES. A significant

difference was found between the trust rates in the OC condition (M= .32, 95%CI= .03- .60) and the control group (M= -.37, 95%CI= -.68, -.06), F (1,72)= 10.55, p< .01, partial η^2= .13. Bootstrapping generated estimated means that did not overlap for the OC condition (M= .32, 95%CI= -.03, .63) and control group (M= -.37, 95%CI= -.59, -.15), indicating that the alpha level calculated in the ANCOVA can be accepted.

Do ostensive cues manipulate learning when the covariate of age is controlled for?

An ANCOVA was performed to investigate the statistical difference between the OC condition and control group on learning scores when controlling for age. A non-significant difference was found between the learning rates of participants in the OC condition (M=.55, 95%CI=.50, .59) and the control group (M=.48, 95%CI=.44, .53), F (1, 69)=3.78, p= .056, partial η^2= .05.

Do ostensive cues manipulate the ability to generalise when the covariate of IQ is controlled for?

An ANCOVA was employed to explore the statistical difference between the OC condition and control group on the ability to generalise newly learnt knowledge. No significant group differences were found (F (1, 73)= .16, p= .69, partial η^2= .00) between the OC condition (M= .64, 95%CI= .58, .69.) and the control group (M= .62, 95%CI= .56, .68).

Hypothesis 2: Does trauma moderate the effect of ostensive cues?

An ANCOVA was conducted to investigate whether the Trauma Factor moderated the effect of ostensive cues in the Trust Game, while controlling for age. A medium split was conducted on the Trauma Factor to form a low and high trauma group for the ANCOVA. A non-significant relationship was found, F=(1,

71)= .53, p= .47, partial η^2= .01, which concluded that there is no evidence that trauma moderates the ability to use ostensive cues.

Hypothesis 3: Is trauma related to epistemic trust?

Despite the Trauma Factor having a significant positive skew, the standard multiple regression model was checked for normality and the distribution of the residuals and heteroscedasticity concluded that the dispersion of the residuals met the assumptions of normality. Therefore concluding that there is not statically significant bias or systematic error in the model, resulting in parametric analysis being appropriate for the data.

A linear regression was conducted to examine the relationship between the Trauma Factor and the ETI Factor. A significant association was found with a small to medium effect size, and trauma and early adversity accounted for 7% of the variance found in ET, R^2 = .07, (F (1, 77)= 5.75, p <. 05, f^2= .08).

Discussion

The aim of the study was to investigate in an adolescent sample the role of ostensive cues on ET, learning and the ability to generalise newly learnt information. A further aim was to explore whether trauma and early adversity moderates these relationships and whether trauma and early adversity negatively impacts ET.

Do ostensive cues manipulate epistemic trust, learning and the ability to generalise in an adolescent sample?

Do ostensive cues manipulate epistemic trust?

As predicted, the current study found that ostensive cues could manipulate levels of ET in an adolescent sample. Ostensive cues were associated with greater levels of ET, independent of age, gender, ethnicity, SES and IQ. The findings support the hypothesis that ostensive cues are a vehicle for creating an attitude of ET, whereby they create a communicative stance that triggers an open and trusting position, and signals that it is safe to join and collaborate (Fonagy et al., 2014).

Although this finding has not been directly tested in previous studies, the hypothesis tentatively draws on the developmental theory that infants display sensitivity to ostensive cues to promote survival (Csibra & Gergely, 2006, 2009, 2011). The association between ostensive cues and ET in an adolescent sample suggests that ostensive cues are an ingrained biomarker that continues to be activated into adolescence.

The study highlighted that ET increased with age ($p < .05$), which is consistent with previous trust research (van den Bos, van Dijk, Westenberg, Rombouts, & Crone, 2011; van den Bos, Westenberg, van Dijk, & Crone, 2010). This may be a reflection of developmental differences in reflective functioning (Gummerun, Hanoch & Keller, 2008), social perspective taking (Eisenberg et al., 1995) and delayed gratification (Green, Myerson & Ostazewski, 1999). Furthermore it highlighted that ET is positively correlated with SES ($p < .05$), which is in support of research showing that lower SES contexts are associated with a difficulty in trusting others (Stephens et al., 2014).

Do ostensive cues manipulate learning?

Contrary to the study's hypothesis, this study did not find evidence that

ostensive cues manipulate learning when controlling for age. However a trend emerged that ostensive cues were associated with higher learning rates, although this failed to reach statistical significance (p= .056). A small-medium effect size was found suggesting that ostensive cues help facilitate learning (Cohen, Miles & Shevlin., 2001). On balance, the overall trend of the findings tentatively suggests that ostensive cues may play a role in promoting social learning, although additional factors may be more prominent. For example the learning task was reliant on memory, attention, and the ability to quickly perceive visual details and make decisions.

Interestingly learning rates in the study did not correlate with IQ suggesting that it may have captured a factor that is not traditional learning. This may have been the manipulation of ostensive cues and if so, it may tentatively imply that ostensive cues may help to bridge gaps in IQ differences. Alternatively it could suggest that the study was capturing a latent factor (such as a lack of concentration, engagement or motivation) in light of the low learning scores (M= 0.49, SD=0.19), suggesting that the participants were on average performing approximately at chance level.

Do ostensive cues manipulate the ability to generalise newly learnt information?

Contrary to the study's hypothesis, this study did not find evidence that ostensive cues manipulate the ability to generalise newly learnt knowledge. Prior research has provided mixed results regarding the impact of ostensive cues on the ability to generalise new knowledge in infants (Egyed et al., 2013; Varro-Horvath, Dorn and Labadi, 2017); however before conclusions should be drawn with an adolescent sample, the design of the current study should be considered. The above infant studies (Egyed et al., 2013;Varro-Horvath et al.,

2017) both approached the question primarily through natural pedagogy lenses focusing on immediate learning and generalisation. The current study does not provide evidence to support this theory. However when considered with ET lenses, Fonagy and Allison (2016) specifically state that a lack of ostensive cues or ET would not mean that information could not be remembered and recited, but it would not be believed and integrated into cognitive structures. Therefore the immediate recall method used in this study may not capture the potential effects of ET on generalisation. Instead it may have been more appropriate to administer the generalisation task after a delayed period.

Does trauma moderate the effect of ostensive cues?

Ostensive cues were only found to have a significant effect on ET; therefore trauma was only investigated as a moderator in this relationship. Contrary to the study's hypothesis, this study did not find evidence that trauma moderates the effect of ostensive cues on ET. An effect size analysis revealed that trauma had a small effect of 0.1 (Cohen et al., 2001). Despite the model having sufficient observed power (.94) the trauma component lacked power (.11), which highlights the lack of variance of trauma in the sample, therefore subsequent conclusions need to be drawn tentatively and with considerable caution.

This finding is contrary to the trend in research suggesting that traumatised youth are less likely to use environmental cues (Shackman et al., 2010; Shackman et al., 2005; Weller et al., 2013). Instead this study cautiously suggests that adolescents who have experienced trauma can use ostensive cues as effectively as non-traumatised adolescents. This tentative finding may have implications for ostensive cues being used to help traumatised youth to develop

trust in their environment rather than adopting positions of mistrust and suspicion.

Is trauma related to epistemic trust?

As predicted, the current study found that trauma is related to ET in an adolescent sample; as exposure to trauma and early adversity increases, ET decreases. The findings lend support to the theory that trauma erodes the capacity to trust our social environment (Fonagy et al., 2014; Sperber et al., 2010) and empirical research that social mistrust and suspicion is one of the most dominant social perception and strategies following trauma (Moreno-Manso et al., 2016). The small effect size indicates that although there is a significant relationship, other more prominent factors may contribute to this relationship, and that protective factors may also shield against the impact of trauma. For example, experiences of earlier trust may be rewarding enough to stimulate its further growth and lead to a restoration of ET.

Interestingly the study suggests that trauma does not moderate the use of ostensive cues, although negatively impacts ET. This is reasonable as ostensive cues are only one way to elicit trust in what people tell us. For example prior experience of the informant and knowledge of their intentions are undoubtedly significant factors (Shafto, Eaves, Navarro & Perfors, 2012); however this finding may also be associated with the measurement tools employed. It is possible that the ETI captures social dilemmas that may tap into the social world to a greater extent than a more abstract, money centred, and computer simulated interpersonal social exchange. Furthermore the ETI has been shown to correlate with attachment security (O'Connell, 2014) and may be tapping into the attachment relationship to a greater extent than the Trust

Game. It has been suggested that of all developmental adversity, attachment trauma may account for the greatest destruction of trust (Cicchetti, 2016).

Limitations and future directions

This study has several limitations that should be considered when interpreting the findings; these relate to design, sample and measurement tools.

Design

The findings of this study are based on cross-sectional data and therefore causal relationships cannot be inferred. Longitudinal designs would help to overcome this difficulty and help to conclude the direction of observations.

Sample

The small sample size and limited statistical power of the study only allowed for the detection of large effect sizes, potentially resulting in more discrete associations not being captured. To detect a small effect size of 2% with 80% power, studies would require a sample of at least 700 participants (Cohen, 1988). Research with a larger sample size may have helped reach clearer conclusions and would have allowed participants to be allocated to a trauma and non-trauma group (or multi-level trauma groups) for direct group comparisons.

Measurement tools

Despite the benefits of computational methods it is important to acknowledge that the manipulation of ostensive cues through computer simulating interactions are likely to change what we are measuring by removing the spontaneity, irregularity and relational nature that arises from human communication. For example, the control group contained no ostensive phrases and was used in the study to represent a neutral situation. However this lack of

complexity in the communication pattern may have given powerful information to the participant that they were not in a normal situation and therefore this would not have been a neutral condition. Subsequently findings from this study may not generalise to human interaction and requires replication with human social exchanges. A further consideration of the ostensive cue condition is the incorporation of the mother, which aimed to help elicit ET; however the study did not explore for the quality of the parent-child relationship and whether this may have affected the interpretation of intended trust-promoting cues.

Both the learning and generalisation tasks included the go/no-go paradigm that includes the decision to approach or avoid. Approach and avoid learning rates have been shown to represent different psychological constructs (Guitart-Musip, Duzel, Dolan & Dayan, 2014). Post hoc analysis revealed a significant difference in the Generalisation task between correct responses when approaching stimuli (M= 0.68, SD= 0.19) and avoiding stimuli (M=0.55, SD= 0.25) in the task, t (77)= 5.21, p< 0.001. It would be of benefit to explore whether ostensive cues have a greater carry over effect in conditions that involve approaching novel stimuli, rather than when deciding to avoid social contact. Furthermore it would be advantageous if future research would separate and delay the administration of the Generalisation Task from the Learning Task, as discussed above.

The lack of psychometric measures to capture ET were a further limitation of the study and once the psychometric properties of the ETI are established it would be of benefit to review the conclusions of this study. Additionally, despite the Trust Game, Learning Task and Generalisation Task using standardised computational methods the literature base does not pay

attention to classic psychometric theory. This is most probably due to the measures not naturally lending themselves to psychometric testing; however exploration of criterion validity and equivalent forms reliability is reasonable. Considering the lack of psychometric properties of the ETI, alternative factors that could explain the association between trauma and the ETI need to be considered. The ETI measure may be capturing attachment representations rather than ET as the instrument highly correlates with attachment security (O'Connell, 2014). Equally the instrument may be measuring the quality of the relationship with the mother or the child's perceptions of the parent-child relationship rather than ET. Furthermore the difference in response styles with adolescents who have experienced higher levels of trauma may be representative of children who have experienced trauma showing greater risk taking when making decisions in risky situations, particularly when there is an uncertainty of loss (Weller et al., 2013; Weller et al., 2015) as presented in the social dilemma scenarios in the ETI.

Over ninety percent of participants were identified as individuals who potentially minimised the occurrence of traumatic events. It would be important for future research to expand data collection with a multi-informant approach in order to gain less measurement error. Furthermore, more robust SES measurement tools would be advisable for future research in order to not only capture parents' current occupation but also previous work experience and of economic and social position in relation to others, based on occupation, income and education.

Implications and conclusions

This study is the first to investigate in an adolescent sample the effects of

ostensive cues on ET, learning and generalisation; as well as the impact of trauma on ostensive cues and ET. The study supported the hypothesis that ostensive cues facilitate ET in adolescence. The study did not find evidence that ostensive cues and ET significantly increases an adolescent's capacity to learn and generalise newly learnt information. However there was a trend suggestive of a relationship between ostensive cues and social learning which tentatively suggests that ostensive cues and ET plays a role in an adolescent's capacity for social learning. There has been no previously published research on the inclusion of ostensive cues in a computer based Trust Game or learning paradigm. This study suggests that this is a viable method and has implications for computer-based teaching.

Trauma was shown to not impact adolescent's ability to use ostensive cues, although it was found to impair ET. This is the first study to undertake this investigation and has potential implications for therapeutic interventions with traumatised youth, as it tentatively implies that ostensive cues may be used to help restore the erosion of ET following trauma. This is in line with mentalisation based treatment approaches that utilise this technique, such as Adolescent Mentalization-Based Integrative Treatment (AMBIT; Bevington, Fuggle & Fonagy, 2012) and mentalisation based treatment of Borderline Personality (Bateman & Fonagy, 2006).

A question remains as to how these factors may help explain some of the learning deficits seen in traumatised youth; for example in the areas of intelligence, memory, language, visual-spatial ability, motor skills, executive functioning, academic performance and functional ability (Herrenkohl, Herrenkohl, Rupert, & Egolf, 1995; Irigara et al., 2013; Kavanaugh et al., 2016).

Firstly, it is important to not that the complexity of these domains was not captured in the learning task used in the current study. However the finding that trauma is related to ET lends support to previous research that traumatised adolescents reduce their trust in others which may consequently impair learning. For example, they are more likely to hold expectations that relationships will hold hostile intent, and when doing so show less cognitive flexibility (Kay et al., 2016; Jepson & Bucci, 1999). These are characteristics of ET and are likely to make learning from the social environment harder. ET is not suggested, as the sole factor that impairs learning and an important next step for research will be to make use of structural equation modelling to explore ET alongside other variables that may lead to learning deficits in traumatised youth.

The study draws its conclusions tentatively because of its limitations and hopes the findings will foster a growing interest in the field of ostensive cues, ET, and childhood trauma and adversity, while laying the grounds for further research.

References

Barclay, P. (2006). Reputational benefits of altruistic punishment. *Evolution and Human Behavior, 27*, 325–344.

Bateman, A., & Fonagy, P. (2006). *Mentalization-based treatment for borderline personality disorder: A practical guide*. Oxford: Oxford University Press.

Belli, S. R., Rogers, R. D., & Lau, J. Y. F. (2012). Adult and adolescent social reciprocity: Experimental data from the trust game. *Journal of Adolescence, 35,* 1341-1349.

Berg, J., Dickhaut, J., & McCabe K. (1995). Trust, reciprocity and social history. *Games and Economic behavior*, *10,* 122-142.

Bernstein, D., Ahluvalia, T., Pogge, D., & Handelsman, L. (1997). Validity of the Childhood Trauma Questionnaire in an adolescent psychiatric population. *Journal of the American Academy of Child Adolescent Psychiatry, 36,* 340-348.

Bernstein, D., & Fink, P. (1998). *Childhood Trauma Questionnaire: A Retrospective Self-Report. Manual*. San Antonio: The Psychological Corporation.

Bentovim, A., Bentovim, M., Vizard, E., & Wiseman, M. (1995). Facilitating interviews with children who may have been sexually abused. *Child Abuse Review, 4,* 246-262.

Bevington, D., Fuggle, P., & Fonagy, P. (2012). Applying attachment theory to effective practice with hard-to-reach youth: the AMBIT approach. *Attachment & Human Development, 17,* 157-174.

Breslau, N. (2009). The epidemiology of trauma, PTSD, and other posttrauma disorders. *Trauma, Violence, & Abuse, 10*, 198-210.

Breslau, N., Lucia, V, C., & Alvarado, G, F. (2006). Intelligence and Other Predisposing Factors in Exposure to Trauma and Posttraumatic Stress Disorder. *Archives of General Psychiatry, 63,* 1238-1245.

Camerer, C, F. (2003). Strategizing in the brain. *Science*, *300*, 1673-1675.

Carnuta, M., Crisan, L. G., Vulturar, R., Opre, A., & Miu, A, C. (2015). Emotional non-acceptance links early life stress and blunted cortisol reactivity to social threat. *Psychoneuroendocrinology, 51,* 176-187.

Chaudhuri, A., Paichayontvijit, T., & Shen, L. (2013). Gender differences in trust and trustworthiness: Individuals, single sex and mixed sex groups. *Journal of Economic Psychology, 34,* 181-194.

Cicchetti, D. (2016). *Developmental Psychopathology, Maladaptation and Psychopathology* (3rd ed.). Hoboken: John Wiley & Sons.

Cisler, J. M., Bush, K., Steele, J.S., Lenow, J. K., Smitherman, S., & Kilts, C. D. (2015). Brain and behavioural evidence for altered social learning mechanisms among women with assault-related posttraumatic stress disorder. *Journal of Psychiatric Research, 63,* 75-83.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.

Cohen, J (1992). "A power primer". *Psychological Bulletin, 112,* 155–159.

Cohen, J., Miles, J., & Shevlin, M. (2001). Applying regression and correlation: A guide for students and researchers. London: Sage.

Corriveau, K. H., Harris, P. L., Meins, E., Fernyhough, C., Arnott, B., Elliott, L., Hearn, A., Vittorinim L., & de Rosnay, M. (2009). Young children's trust in their mother's claims: Longitudinal links with attachment security in infancy. *Child Development*, *80*, 750–761.

Csibra, G., & Gergely, G. (2006). Social learning and social cognition: The case for pedagogy. In M. H. Johnson & Y. Munakata (Eds.), *Processes of change in brain and cognitive development. Attention and Performance XXI* (pp. 249-274). Oxford, UK: Oxford University Press.

Csibra, G., & Gergely, G. (2009). Natural pedagogy. *Trends in Cognitive Sciences*, *13*, 148–153.

Csibra, G., & Gergely, G. (2011). Natural pedagogy as evolutionary adaptation.

Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences, 366, 1149-1157.

Donders FC. (1963). On the speed of mental processes. *Acta Psychologica*, *30,* 412–431.

Draper, E. (2017). Exploring the relationship between epistemic trust and borderline personality disorder in adolescents. (unpublished doctoral thesis). University College London, England.

Egyed, K., Kiraly, I., & Gergely, G. (2013). Communicating Shared Knowledge in Infancy. *Psychological Science, 24,* 1348-1353.

Eisenberg, N., Carlo, G., Murphy, B., & van Court, P. (1995). Prosocial development in late adolescence: a longitudinal study. *Child Development, 66*, 911–936.

Erikson, E. H. (1950). *Childhood and society.* New York: Norton.

Fagan, M. (2011) Relational trauma and its impact on late-adopted children, *Journal of Child Psychotherapy, 37,* 129-146.

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39,* 175-191.

Fett, A-K, J., Gromann, P, M., Giampietro, V., Shergill, S, S., & Krabbendam, L. (2014). Default distrust? An fMRI investigation of the neural development of trust and cooperation. *Social Cognitive and Affective Neuroscience, 9,* 395-402.

Field, A. P. (2005). *Discovering statistics using IBM SPSS statistics* (4th ed.). London: Sage.

Fonagy, P. (2013). Mentalization based interventions and mechanism of change in psychological therapy. Fundacion Castilla del Pino. University of Cordoba. Retrieved from http://www.uco.es/informacion/webs/fundacioncastilla/documentos/archivos/simposium/2013-simposio/presentaciones/fonagy-pres.pdf

Fonagy, P., & Allison, E. (2014). The Role of Mentalizing and Epistemic Trust in the Therapeutic Relationship. *Psychotherapy, 51*, 372-380.

Fonagy, P., & Allison, E. (2016). When in Truth Relevant?. The Psychoanalytic Quarterly, *85*, 275-303.

Frissa, S., Hatch, S. L., Gazard, B. (2013). Trauma and current symptoms of PTSD in a South East London community. *Social Psychiatry and Psychiatric Epidemiology, 48,* 1199-1209.

Geoffroy, M., Pinto P, S., Li, L., & Power, C. (2016). Child neglect and maltreatment and childhood-to-adulthood cognition and mental health in a prospective birth cohort. *Journal of the American Academy of Child & Adolescent Psychiatry, 55,* 33-40.

Gintis H. (2000). Beyond homo economicus: evidence from experimental economics. *Journal of Economic Literature*, *38,* 120-122.

Glaeser, E. L., Laibson, D. L., Scheinkman, J. A., & Soutter, C. L. (2000). Measuring trust. *The Quarterly Journal of Economics, 115,* 811–846.

Gobin, R. L., (2011). Trauma, trust, and betrayal awareness. Unpublished doctoral dissertation, University of Oregon, Eugene.

Green, J. D., & Campbell, W. K. (2000). Attachment and exploration in adults: Chronic and contextual accessibility. *Personality and Social Psychology Bulletin*, *26*, 452–461.

Green-Hennessy, S., & Reis, H. T. (1998). Openness in processing social information among attachment types. *Personal Relationships*, *5*, 449–466.

Green, L., Myerson, J., & Ostaszewski, P. (1999). *Discounting of delayed rewards across the life span: age differences in individual discounting functions. Behavioural Processes, 46,* 89-96.

Grinberg, L. (1961). Why We Deny. *The Psychoanalytic Quarterly, 30,* 118-138.

Guitart-Masip, M., Duzel, E., Dolan, R., & Dayan, P. (2014). Action versus valance in decision making. *Trends in Cognitive Sciences, 18,* 194-202.

Gummerun, M., Hanoch, Y. & Keller, M. (2008). When child development meets economic game theory: an interdisciplinary approach to investigating social development. *Human Development*, *51*, 235-261.

Haidt, J. (2012). The righteous mind: why good people are divided by politics and religion. New York, Pantheon Books.

Herrenkohl, E. C., Herrenkohl, R. C., Rupert, L. J., & Egolf, B. P. (1995). Risk factors for behavioral dysfunction: The relative impact of maltreatment, SES, physical health problems, cognitive ability, and quality of parent-child interaction. *Child Abuse & Neglect, 19*, 191–203.

Irigara, T. Q., Pacheco, J. B., Grassi-Oliveira, R., Fonseca, R. P., Leite, J. C. C. & Kristensen, C. H. (2013). Child Maltreatment and Later Cognitive Functioning: A Systematic Review. *Psicologia: Reflexao e Critica, 26*, 376-387.

Jepson, L., & Bucci, W. (1999). Object relations and referential activity in physically abused adolescents. *Adolescence, 34,* 781–792.

Jones, W. H., Couch, L., & Scott, S. (1997). Trust and betrayal: The psychology of getting along and getting ahead. In *Handbook of Personality Psychology* (pp. 465- 482). San Diego: Academic Press.

Juvina, I., Saleem, M., Martin, J. M., Gonzalez, C., & Lebiere, C. (2013). Reciprocal trust mediates deep transfer of learning between games of strategic interaction. *Organizational Behaviour and Human Decision Processes, 120,* 206-215.

Kavanaugh, B. C., Dupont-Frechette, J. A., Jerskey, B. A., & Holler, J. A. (2016). Neurocognitive Deficits in Children and Adolescents Following Maltreatment: Neurodevelopmental Consequences and Neuropsychological Implications of Traumatic Stress. *Applied Neuropsychology: Child*, *6,* 64-78.

Kay, C, L., & Green, J, M. (2016) Social cognitive deficits and biases in maltreated adolescents in UK out-of-home care: Relation to disinhibited attachment disorder and psychopathology. *Development and Psychopathology*. 28, 73-83.

Keil, V., & Price, J, M. (2009). Social information-processing patterns of maltreated children in two social domains. *Journal of Applied Developmental Psychology, 30,* 43-52.

Kilford, E. J., Foulkes, L., Potter, R., Collishaw, S., Thapar, A., & Rice, F. (2015). Affective bias and current, past and future adolescent depression: A familiar high risk study. *Journal of Affective Disorders, 174,* 265-271.

King-Casas, B., Tomlin, D., Anen, C., Camerer, F., Quartz, S, R., & Montague, P, R. (2005). Getting to know you: reputation and trust in a two-person economic exchange. *Science, 308,* 78-83.

Klika, B., & Herrenkohl, T. (2013). A review of developmental research on resilience in maltreated children. *Trauma, Violence, & Abuse, 14*, 222-234.

Kronenberg, M, E., Hansel, T, C., Brennan, A, M., Osofsky, H, J., Osofsky, J, D., & Lawrason, B. (2010). Children of Katrins: Lessons learned about post disaster symptoms and recovery patters. *Child Development, 81,* 1241-1259.

Krueger F. (2008). The neural correlates of economic game playing. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *363,* 3859-3874.

Kruglanski, A. W. (1989). *Lay epistemics and human knowledge: Cognitive and motivational bases*. New York, NY: Plenum Press.

Kruglanski, A. W., & Webster, D. M. (1996). Motivated closing of the mind: "Seizing" and "freezing". *Psychological Review*, *103*, 263–283.

Lange, R. T., & Iverson, G., L. (2008). Concurrent validity of Wechsler Adult Intelligence Scales- third edition index score short forms in the Canadian standardization sample. *Educational and Psychological Measurement, 68*, 139-153.

Lenow, J. K., Steele, J. S., Smitherman, S., Kilts, C. D. & Cisler, J. M. (2014). Attenuated behavioural and brain responses to trust violations among assaulted adolescent girls. *Psychiatry Research: Neuroimaging, 223,* 1-8.

Levendosky, A. A., Okun, A., & Parker, J. G. (1995). Depression and maltreatment as predictors of social competence and social problem-solving skills in school-age children. *Child Abuse & Neglect, 19,* 1183-1195.

Luca, A. J., & Lewis, C. (2010). Should we trust experiments on trust? *Human Development, 53,* 167-172.

McClure, E. B., Parrish, J. M., Nelson, E. E., Easter, J., Thorne, J. F., Rilling, J. K., Ernst, M., & Pine, D. S. (2007). Responses to Conflict and Cooperation in Adolescents with Anxiety and Mood Disorders. *Journal of Abnormal Child Psychology, 35,* 567–577.

Mikulincer, M. (1997). Adult attachment style and information processing: Individual differences in curiosity and cognitive closure. *Journal of Personality and Social Psychology, 72,* 1217-1230.

Mikulincer, M., & Arad, D. (1999). Attachment working models and cognitive openness in close relationships: A test of chronic and temporary accessibility effects. *Journal of Personality and Social Psychology*, *77*, 710–725.

Moreno-Manso, J, M., Garcia-Baamonde, M, E., Guerrero-Barona, E., Godoy-Merino, M, J., Blazquez-Alonso, M., & Gonzalez-Rico, P. (2016). Perceived emotional intelligence and social competence in neglected adolescents. *Journal of Youth Studies, 19*, 821-835.

Nosek, B., & Banaji, M, R. (2001). The Go/No-Go Association Task. *Social Cognition, 19,* 625-664.

O'Callaghan, A. (2017). Exploration of epistemic trust in a non-clinical sample of children. (unpublished doctoral thesis). University College London, England.

O'Connell, J. (2014). Can we develop an adult assessment tool for measuring epistemic trust? (unpublished master's thesis). University College London, England.

Office of National Statistics. (2013). New coding tool enables users to measure socio-economic status. London: Office for National Statistics.

O'Reilly, J., & Peterson, C. (2015). Maltreatment and advanced theory of mind development in school-aged children. *Journal of Family Violence, 30*, 93–102.

Ornduff, S, R., Freedenfeld, R, N., Kelsey, R, M. & Critelli, J, W. (1994). Object relations of sexually abused female subjects: A TAT Analysis. *Journal of Personality Assessment, 63*, 223-238.

Pennebaker, J. W., & Susman, J. R. (1988). Disclosure of traumas and psychosomatic processes. *Social Science and Medicine, 26,* 327-332.

Pierro, A., & Kruglanski, A. W. (2008). "Seizing and freezing" on a significant-person schema: Need for closure and the transference effect in social judgment. *Personality and Social Psychology Bulletin, 34*, 1492–1503.

Qualter, P., Brown, S., Munn, P., & Rotenberg, K. (2010). Childhood loneliness as a predictor of adolescent depressive symptoms: an 8-year longitudinal study. *European Child & Adolescent Psychiatry, 19*, 493–501.

Reches, T. (2017). Exploring the relationship attachment, epistemic trust and expectations of helping relationships in adolescents. (unpublished doctoral thesis). University College London, England.

Russell, B. (1940). *An inquiry into meaning and truth*. London, UK: Allen & Unwin.

Scheller-Gilkey, G., Thomas, S. M., Woolwine, B. J., & Miller, A. H. (2002). Increased Early life stress and depressive symptoms in patients with comorbid substance abuse and schizophrenia. *Schizophrenia Bulletin, 28,* 223-231.

Scher, C. D., Stein, M. B., Asmundson, G. J. G., McCreary, D. R., & Forde, D. R. (2001). The childhood trauma questionnaire in a community sample:

Psychometric properties and normative data. *Journal of Traumatic Stress*. *14*, 843–857.

Schotter, A., & Sopher, B. (2006). Trust and trustworthiness in games: An experimental study of intergenerational advice. *Experimental Economics, 9,* 123–145.

Shackman, J., Fatani, S., Camras, L., Berkowitz, M., Bachorowski, J. A., & Pollak, S. D. (2010). Emotion expression among abusive mothers is associated with their children's emotion processing and problem behaviours. *Cognition & Emotion, 24,* 1421–1430.

Shackman, J. E., & Pollak, S. D. (2005). Experiential influences on multimodal perception of emotion*. Child Development, 76,* 1116–1126.

Shafto, P., Eaves, B., Navarro, D, J., & Perfors, A. (2012). Epistemic trust: modeling children's reasoning about others' knowledge and intent. *Developmental Science, 15,* 436-447.

Sharp, C., Ha, C., & Fonagy, P. (2011). Get them before they get you: Trust, trustworthiness, and social cognition in boys with and without externalizing behaviour problems. *Developmental and Psychopathology, 23,* 647-658.

Shaw, J. (2000). Children, adolescents and trauma. *Psychiatric Quarterly*, *71*, 227-243.

Slonick, S. J. (2007). Cash and alternate methods of accounting in an experimental game. *Journal of Economic Behavior and Organization, 62*, 316–321.

Smith, S, S. (2010). Race and Trust. *The Annual Review of Sociology, 36,* 453-75.

Smith, J. L., Mattick, R. P., Jamadar, S. D., & Iredale, J. M. (2014). Deficits in behavioural inhibition in substance abuse and addiction: a meta-analysis. *Drug & Alcohol Dependence, 1,* 1-33.

Smithers, M. (2015). Epistemic trust and mental health difficulties in pre-adolescents. (unpublished master's thesis). University College London, England.

Sperber, D., Clement, F., Heintz, C., Mascaro, O., Mercier, H., Origgi, G., & Wilson, D. (2010). Epistemic vigilance. *Mind & Language*, *25*, 359–393.

Stephens, N. M., Cameron, J. S., & Townsend, S. S. M. (2014). Lower Social Class Does Not (Always) Mean Greater Interdependence: Women in Poverty Have Fewer Social Resources Than Working-Class Women. *Journal of Cross-Cultural Psychology, 45,* 1061-1073.

Strom, I., Schultz, J., Wentzel-Larsen, T., & Dyb, G. (2016). School performance after experiencing trauma: A longitudinal study of school functioning in survivors of the Utoya shootings in 2011. *European Journal of Psychotraumatology, 7*, 31359.

Thombs, B. D., Lewis, C., Bernstein, D. P., Medrano, M. A., & Hatch, J. P. (2007). An evaluation of the measurement equivalence of the Childhood Trauma Questionnaire-Short Form across gender and race in a sample of drug-abusing adults. *Journal of Psychosomatic Research, 63*, 391-398.

Thompson, R. A. (2008). Early attachment and later development: Familiar questions, new answers. In J. Cassidy & P. R. Shaver (Eds.), Handbook of attachment theory and research (2nd ed., pp. 348–365). New York, NY: Guilford Press.

van den Bos, W., van Dijk, E., Westenberg, M., Rombouts, S. A. R. B., & Crone, E. A.

(2011). Changing Brains, Changing Perspectives. *Psychological Science, 22*, 60–70.

van den Bos, W., Westenberg, M., van Dijk, E., & Crone, E. A. (2010). Development of trust and reciprocity in adolescence. *Cognitive Development, 25*, 90–102.

van der Kolk, B. A. (2003). The neurobiology of childhood trauma and abuse. *Child and Adolescent Psychiatric Clinics of North America, 12,* 293-317.

Varro-Horvath, D, A., Dorn, K., & Labadi, B. (2017). Understanding deceptive intentions behind pointing gestures in 12-15-month-old infants. *Infant Behaviour & Development, 47,* 121-124.

Wechsler, D. (1999). Wechsler Abbreviated Scale of Intelligence. The Psychological Corporation: Harcourt Brace & Company. New York, NY.

Weller, J. A., & Fisher, P. A. (2013). Decision-making deficits among maltreated children. *Child Maltreatment, 18,* 184–194.

Willis, J. & Todorov, A. (2006). First impressions: making up your mind after a 100-ms exposure to a face. *Psychological Science, 17,* 592-98.

Wolff, P., & Fesseha, G. (1999). The orphans of Eritrea: A five-year follow up study. *Journal of Child Psychology and Psychiatry, 40*, 1231-1237.

Wu, R., Gopnik, A., Richardson, D. C., & Kirkham, N. Z. (2011). Infants learn about objects from statistics and people. *Developmental Psychology*, *47,* 1220–1229.

Wu, R., & Kirkham, N. Z. (2010). No two cues are alike: depth of learning during infancy is dependent on what orients attention. *Journal of Experimental Child Psychology*, *107,* 118–136.

Yoon, J. M. D., Johnson, M. H., & Csibra, G. (2008). Communication-induced

memory biases in preverbal infants. *Proceedings of National Academy of Sciences. U.S.A*. *105,* 13690–13695.

Zhang, S., Xu, M., Li, X., Fang, H., Yang, S., & Liu, J.(2013). Implicit trust between the Uyghur and the Han in Xinjiang, China. *PLoS One, 8,* e71829.

Part 3: Critical Appraisal

Introduction

This critical appraisal will provide a reflection on the process of completing the empirical research. Firstly, the original aims of the study are discussed followed by the recruitment challenges in accessing child participants for a study about trauma, which subsequently led to the study being amended. Secondly, I reflect on measurement considerations when researching trauma and Epistemic Trust (ET), and lastly I consider the experience of conducting research as a trainee clinical psychologist.

Recruitment challenges

Original recruitment aims of the empirical paper

The empirical research set out to recruit 34 young people from the community and 34 young people from clinical settings based upon power calculations. Three clinical sites were identified and agreed to participate in the research. The spectrum of sites was identified in order to access a range of severity of trauma. The generic CAMHS services were predicted to identify young people who have experienced mild trauma, the inpatient service to identify medium levels of trauma and the outpatient substance misuse service to identify the highest levels of trauma via adolescents identified as being hard-to-reach (Delhaye et al., 2012). Time restraints for recruitment as a result of an unfavourable opinion being granted by the first ethics committee and service infrastructure resulted in 15 young people being recruited from clinical sites and the remaining participants recruited from the community. This resulted in no clinical versus community comparisons being analysed, which was the original planned design. This would have also allowed for structural equation modelling to be conducted, to explore possible connections and patterns

between observed and latent constructs, with the aim of starting to develop a model for adolescent trauma, ostensive cues, Epistemic Trust (ET) and learning. To some extent this was achieved in the current study with the use of factor analysis, but not to the planned extent.

NHS ethics committee

The ethics committee's role as gatekeepers is essential to minimise potential harm and anticipate potential risk for individuals. Gaining NHS ethical approval is an essential component to gain access to clinical samples; however it is fraught with challenges, and these challenges are often enhanced when conducting research on sensitive topics, such as with children and vulnerable populations. Lee (1993) suggests that concern about sensitivity of research is created when (i) the topic is private or stressful (ii) the issues cause fear and (iii) areas contain possible public disagreement. The topic of early adversity and trauma with an adolescent sample matches each of these domains and subsequently created methodological concerns for the first ethics committee, which resulted in an unfavorable opinion of the research. Concerns included the conceptualisation of the topic, accessing the sample and safety for the young people to complete measures on traumatic experiences, which appear to be an inherent concern of research in "sensitive" topics (Lee, 1993). This is highlighted by the observation of Finkelhor, Vanderminden, Turner, Hamby & Shattuck (2014) that the United Nations Children's Fund (UNICEF) announced strong concerns regarding the safety of children in trauma research (Child Protection Monitoring & Evaluation Reference Group, 2012) despite the main body of research showing findings to the contrary.

There is an established research base investigating adult participation of

trauma research that has generally reported either neutral or favorable responses to participating in studies involving traumatic events (Edwards, Kearns, Calhoun & Gidycz, 2009; Newman & Kaloupek, 2004; Savell, Kinder, & Young, 2006) including child maltreatment (Martin, Perrott, Morris & Romans, 2001). Participants have reported that they appreciate being given a space to share their experiences in a confidential and non-judgmental space (Griffin, Resick, Waldrop & Mechanic, 2003). Although there is a smaller body of literature examining adolescent participation, adolescent populations generally do not report distress following participating in research on early adversity and trauma. Finkelhor et al., (2014) found that 4.5% of 10-17 year olds interviewed about violence, sexual assault and family maltreatment reported that they found the participation *at all* upsetting and 0.8% reported being *pretty or a lot* upset, and only 3% of those who reported being upset said that they regretted taking part. Similar distress rates of 5.7% have been found in adolescents answering questions about maltreatment (Zajac, Ruggiero, Smith, Sauders, Kilpatrick, 2011) and 7.9% distress rates when answering questions about victimization (Radford, Corral, Bradley, & Fisher, 2013). Adolescents also report that trauma research is less upsetting than every day stressors and for some it is even enjoyable (Rinehart, Nason, Yeater & Miller, 2017). Additionally, research has highlighted measures that reduce participation distress, such as using questionnaires rather than interviews (Becker-Blease & Freyd, 2006; Fleischman & Wood, 2002). Research suggests that adolescents may be less fragile than assumed; yet despite such feedback the concern that trauma-focused questions may further harm young people appear to block the research attempts that aim to understand and support traumatised youth.

The process of amending the design and addressing the raised concerns involved amending the protocol to ensure that for the clinical sample, testing took place in a NHS service with the responsible clinician available. Therefore the clinician could introduce the young person to the researcher and was available to provide additional debriefing or support if required. In theory this was supportive for participants and was viable in the in-patient setting. In practice, this reduced the number of young people who joined the project from the outpatient substance misuse service, which is an outreach service that primarily sees young people in the community. It created barriers for the young people who had to travel to an unfamiliar location and for clinicians who were required to stay on-site for the 2-3 hour testing period.

Clinical sample

The recruitment period for the clinical sample was significantly reduced due to the delay in NHS ethics whereby one clinical site had a recruitment period of 7 weeks and another 5 weeks. This delay caused pronounced difficulties for the research resulting in an uneven sample size in the clinical and non-clinical samples, which meant a community versus clinical comparison not being undertaken, as well as creating challenges for already overstretched clinical services to identify young people within a limited time frame.

This process taught me the importance of timing and how once substantial delays have incurred within research, clinical teams may subsequently be in different positions. It highlighted how the NHS and the priorities for services can rapidly change, and how research needs to work (sometimes rapidly) within these openings. For example, during this period one of the clinical sites temporarily closed following a Care Quality Commission

(CQC) inspection and on reopening the priority of their targets changed. In another team the delay appeared to reduce investment in the project and took time to redevelop a relationship before young people were put forward for the research. This highlights the importance of remaining in contact with teams on a regular basis; however the challenges of keeping a connection with a whole team when time is a limited resource for NHS services. A third site was included in the second NHS application because of the envisaged time constraints, with the aim of widening the recruitment pool. Due to the late joining of this site, it meant that they were not part of the research design. They were not involved in consultation nor did they have young people pilot the protocol prior to its implementation. This site identified no young people, which highlighted the importance of clinical sites being actively involved in research development and how this subsequently aids investment and engagement with recruitment.

Community sample

We envisaged that the majority of our recruitment would take place from schools that have established links with UCL and the Anna Freud Centre (AFC). The AFC Schools in Mind project liaised with schools and promoted the opportunity to participate. Additionally my fellow trainees working on the project and I contacted nine schools that are linked to UCL through the widening access to clinical psychology scheme. Although psychology teachers were generally keen for the young people to join the project, gaining sign off from the head teacher was more problematic. The concerns were generally related to asking questions about trauma and mental health.

Despite the reservations held by schools, families did not seem to hold significant concerns about the protocol or the nature of the questions. Families

frequently asked if other people they knew could join and 81.25% of young people who joined the project were through a recommendation from a friend. This was an efficient recruitment method when organisational structures created barriers to accessing teenagers. It may have also been a factor for the level of disclosed trauma in the community sample, as young people were introduced to the study by a trusted figure (Demi & Warren, 1995). Family recommendations of the study suggest that young people did not find the research process distressing, but instead perhaps beneficial or enjoyable. Additionally, the monetary incentive supported this being a realistic recruitment method (Demi & Warren, 1995). However the potential difficulty with chain-referral sampling is that participants may have directed us to other like-minded people who have similar social interactional and learning styles that would create biases in the recruited sample.

Service User Involvement

Service User Involvement (SUI) involved adolescents providing consultation to shape and improve the study. During the process I was struck by the common sense element of SUI, and found that the involvement of potential participants improved the study. However initially I had reservations whether we would be able to successfully incorporate their ideas, and whether it would have tokenistic elements. The experience highlighted the importance of working collaboratively and honestly with service users by making clear distinctions of areas where their suggestions would have limited influence, compared to where their ideas could be incorporated and developed. The consultations felt lively and empowering. They involved role-playing each section of the study and young people providing detailed feedback, with many ideas being incorporated.

These included amending wording in the participant information sheets, the delivery of questionnaires, amending the learning and generalisation task, and developing a one page summary sheet to support clinicians initially introducing the study to young people. One young person was illiterate and provided detailed feedback on approaches he has found helpful, which may help overcome barriers to participating. SUI was used in the design stage of the project and young people have agreed to be re-approached to help formulate and advise how the research findings will be communicated and shared with participants. On reflection it would have been beneficial to gain their expertise on the interpretation of the data to incorporate their unique insights, and to have increased service user empowerment in the research.

Measurement considerations

Selecting appropriate measurement instruments is an integral part of research design. Within this study, the greatest attention was given to the measurement of the two main constructs: trauma and epistemic trust.

Measuring trauma

A concern was that children may underreport trauma or not disclose the event at all, as trauma disclosure is often associated with shame, safety fears, depression and self-blame (Ruch, Gartell, Amedeo, & Coyne, 1991). Children have a high probability of the perpetrator of a traumatic event being someone known to them, and for children to get their primary needs met it can be adaptive for them to dissociate or forget the trauma (Freyd, 1996), which can result in the trauma not being disclosed for a number or years, if at all (Foynes, Freyd & DePrince, 2009).

A multi-informant approach was considered in the design stages of the project as the accuracy of self-reported trauma can be improved by triangulating responses with additional sources, such as a primary carer or clinician. However using a multi-informant approach can also cause confusion when child, primary carer and clinician give conflicting accounts, as agreement between them is often poor (Hebert, Langevin & Daigneault, 2016). Discussions with the clinical teams highlighted that in previous research run in the services, young people have been less willing to participate if parents were actively involved in providing data about them. Furthermore, cost and time limitations created additional barriers. On balance it was decided that the multi-informant approach would not be used. However on reflection this may have significantly impacted the data, as the response style on the Denial and Minimisation subscale of a trauma questionnaire suggested that 91.10% of participants responded with positive impression management reporting biases.

We tried to reduce the chance that young people would underreport trauma and adversity by spending additional time explaining confidentiality and safeguarding protocol, as well as providing reassurance that all other information shared would remain anonymous and methods would be employed to ensure confidentiality (Nederhof, 1985). However participants knowing that the researcher would look at their answers may still influence them to provide socially desirable responses.

Two self-report measures were employed to measure trauma, the Child Trauma Questionnaire (CTQ; Bernstein & Fink, 1998) and the Childhood Traumatic Events Scale (CTES; Pennebaker & Susman, 1988). The CTQ was primarily selected because it is one of the few trauma measures that incorporate

a minimisation and denial scale that would capture the above concerns. This was complemented by its applicability to the sample, its positive implementation in many CAMHS settings, and its standardised scoring system. In contrast, the CTES is less well used with no standardised scoring system, which created reservations. However it captures non-interfamilial and event related trauma, as well as a greater range of early adversity. It was used to complement the standardised CTQ and develop a more holistic indicator of trauma and early adversity.

An additional question was incorporated into the CTES to measure peer victimisation and bullying, as peer influences have been shown to have more influential effects on learning than family processes and belief systems (Caputo, 2004). It was felt that incorporating this question was important due to the prevalence of bullying, as adolescence is a period of increased peer interactions either through friendships or romantic relationships and over half of teenagers have been victims of bullying (Festl & Quandt, 2013). Niolon and colleagues (2015) found that 32% of teenagers who have dated reported that they have been perpetrators of dating violence, and 77% have perpetrated emotional dating violence. As technology has become more advanced, and with the increasing use and access to the Internet among adolescents, teenagers can be harassed 24hours a day, seven days a week. Approximately 22% of teenagers have been victims of cyber bullying (Festl et al., 2013) and 15% have experienced cyber-dating abuse (Peskin et al., 2016).

Measuring epistemic trust

Social trust is complex to measure as it is a multidimensional construct, which often has biased reporting patterns and social desirability effects. Its

multidimensional construct has resulted in the validity of measures being critiqued for inferring too broad conclusions (Lucas & Lewis, 2010). However when multiple questions are put to participants in an attempt to capture complexity, a pattern emerges where participants respond with a greater proportion of 'don't know' responses (Lundåsen, 2010). This results in the conundrum of too few or too many questions resulting in impaired validity of the scale. Social desirability bias is a further measurement difficulty for self-reports of social trust, which is subject to over-reporting of trustful stances (Lundåsen, 2010). It is therefore helpful for measures to clearly specify which aspect of trust is being measured and attempt to collect the data without directly stating the question (i.e., not specifically asking "do you trust this person?").

Learning paradigms can help overcome the difficulties associated with survey self-report questionnaires, as learning paradigms measure behaviour rather than asking a participant to describe a process that may not be fully conscious. Furthermore, children are less able to verbalise abstract symptoms or give account to their behaviour, and ET is a construct that would be difficult for other informants to report, unlike other parent-child measures.

A computerised learning paradigm and a questionnaire were two available measures that had been used with children 8-16 years old (O'Callaghan, 2016; Smithers, 2015) and adult populations (O'Connell, (2014). However neither of these measures had their psychometric properties fully evaluated to date, which caused initial concern. Alternatively other studies used actors to communicate ostensive cues, which are theorised to trigger ET, although this was not viable for this study (Egyed, Kiraly & Gergely, 2013). It has

been argued that in some fields of trauma research non-standardised assessment approaches are appropriate if they include (i) domains where there are no standardised measures (ii) describing behaviour in activities (iii) measuring cognitive and communication behaviour in certain contexts and (iv) investigating changes in communication exchanges (Coelho, Ylvisaker & Turkstra, 2005). The topic of ET and social learning matches each of these criteria, and I and my fellow trainees systematically administered the measures within a standardised protocol to help protect internal validity.

ET is an emerging research field, yet the development of measures has not paralleled the theory. Despite the theory grounding the measures, at times I did not feel confident that they had the sensitivity or fully captured the complexity of ET. Perhaps a difficulty for many researchers studying trust is its multidimensional character as illustrated by there being a minimum of seventeen different meanings given to trust (McNight & Chervany, 1996). It was important for me to remind myself that all tools are likely to only partially reflect the underlying construct because of error and properties of the tool (Barker, Pistrang & Elliot, 2012).

Conducting research as a trainee clinical psychologist

I was surprised that both NHS research committees expressed reservations that trainee clinical psychologists were undertaking this research. I was in agreement that the scale of the project would be challenging when balancing placement, study and course demands. However I felt that the experience gained by the clinical training equipped us to implement and manage safeguarding concerns, whereas the panels felt we were not best placed to meet vulnerable populations. Each of the trainee clinical psychologists in this study

produced curriculums vitae containing both pre-training experience of interviewing vulnerable populations on research trials and also training placements with vulnerable children. Despite this the "student" label acted as a barrier and it was seen that we did not yet have the appropriate clinical skills.

I found that my clinical skills helped me to understand the young people's likely difficulties in sharing their experiences and allowed me to try and compensate for this by building rapport and being transparent and open in our engagement. Given that some of the young people shared difficult experiences, the training helped me to respond more confidently when considering safeguarding protocol than I had done when interviewing young people on research trials prior to becoming a trainee clinical psychologist. The challenge I found was to avoid slipping into the role of being a clinician and trying to help. Therefore it was important for me to remain aware of my role as a researcher and the boundaries surrounding research.

In the initial stages of this research I feel that my trainee role and enthusiasm may have led me to be overly optimistic about what could be accomplished. The empirical study led me to recognise the challenges faced in achieving the ideal aims I proposed in my literature review for improving research in the area of trauma and learning. My literature review highlighted the need for large sample sizes, which I did not succeed in with the empirical research. The process of the empirical research also highlighted the challenges of only measuring specific traumas and achieving longitudinal designs in an ever-changing NHS setting.

Summary

Recruiting adolescents for a project that involved questions about trauma led to multiple barriers. The most significant challenge was gaining NHS ethical approval, which resulted in a significantly limited recruitment window. Despite frequent contact with clinical services during this period, it inevitably led to lessened engagement with the project, as time was not available to develop strong relationships with clinicians, nor for them to develop trust in the project and the researchers' abilities to support young people through data collection. Similarly, organisational structures obstructed recruitment in schools. However when young people joined the project, the young people, their families and clinicians subsequently recommended other young people to join. In many ways it appeared the concerns outweighed the positive feedback from participants.

The data collection process was time and energy intensive yet the most rewarding aspect of my thesis. It was a privilege to be welcomed into family homes and for young people to share their experiences. Despite the quantitative methodology, a number of young people commented on it being a helpful process to have a space to think about their lives and how there aren't many opportunities to do this. Similarly, participants in the clinical sample agreed to share experiences with the clinical team in order to help enrich treatment plans. It saddens me that despite research and anecdotal evidence highlighting the benefits of trauma research, it is a topic that causes such fear for organisational bodies that are in place to protect young people and who may speak in place of the child. It appears that adults are more scared to ask the questions than teenagers are to answer them, and this sadly leads to their voices being silenced.

There are a number of limitations to this thesis relating to recruitment bias, measures and methodological issues. However the findings will hopefully contribute to the growing body of research in ostensive cues, ET, trauma and early adversity, and will help us understand how to promote social trust in adolescence.

References

Barker, C., Pistrang, N., & Elliott, R. (2012). *Research methods in clinical psychology: An introduction for students and practitioners* (2nd ed.). Chichester, UK: Wiley.

Becker-Blease, K. A., & Freyd, J. J. (2006). Research participants telling the truth about their lives: The ethics of asking and not asking about abuse. *American Psychologist, 61,* 218–226.

Bernstein, D., & Fink, P. (1998). *Childhood Trauma Questionnaire: A Retrospective Self-Report. Manual*. San Antonio: The Psychological Corporation.

Caputo, R. K. (2004). Parent Religiosity, Family Processes, and Adolescent Outcomes. *Families in Society, 85,* 495-510.

Child Protection Monitoring and Evaluation Reference Group. (2012). Ethical principles, dilemmas and risks in collecting data on violence against children: A review of available literature. New York, NY: U.N. Children's Fund, Statistics and Monitoring Section/Division of Policy and Strategy.

Coelho, C., Ylvisaker, M., & Turkstra, L. S. (2005). Nonstandardized assessment approaches for individuals with traumatic brain injuries. *Seminars in Speech and Language, 26,* 223-241.

Delhaye, M., Kempenaers, C., Burton, J., Linkowski, P., Stroobants, R., & Goossens, L. (2012). Attachment, parenting, and separation-individuation in adolescence: a comparison of hospitalized adolescents, institutionalized delinquents, and controls. *The Journal of Genetic Psychology, 173,* 119-41.

Demi, A. S., & Warren, N. A. (1995). Issues in conducting research with vulnerable families. *Western Journal of Nursing Research, 17,* 188-202.

Edwards, K. M., Kearns, M. C., Calhoun, K. S., & Gidycz, C. A. (2009). College women's reactions to sexual assault research participation: Is it distressing? *Psychology of Women Quarterly, 33, 225–234.*

Egyed, K., Kiraly, I., & Gergely, G. (2013). Communicating Shared Knowledge in Infancy. *Psychological Science, 24,* 1348-1353.

Festl, R., & Quandt, T. (2013). Social relations and cyberbullying: The influence of individual and structural attributes on victimization and perpetration via the Internet. *Human Communication Research, 39,* 101-126.

Finkelhor, D., Vanderminden, J., Turner, H., Hamby, S., & Shattuck, A. (2014). Upset among youth in response to questions about exposure to violence, sexual assault and family maltreatment. *Child Abuse & Neglect, 38,* 217–223.

Fleischman, A. R., & Wood, E. B. (2002). Ethical issues in research involving victims of terror. *Journal of Urban Health, 79,* 315–321.

Freyd, J. J., (1996). *Betrayal trauma: The logic of forgetting childhood abuse*. Cambridge, MA, USA: Harvard University Press.

Foynes, M. M., Freyd, J. J., & DePrince, A. P. (2009). Child abuse: Betrayal and disclosure. *Child Abuse and Neglect, 33*, 209-217.

Griffin, M. G., Resick, P. A, Waldrop, A. E., & Mechanic, M. B. (2003). Participation in trauma research: is there evidence of harm? *Journal of Traumatic Stress, 16,* 221-227.

Hebert, M., Langevin, R., & Daigneault, I. (2016). The association between peer victimization, PTSD, and dissociation in child victims of sexual abuse. *Journal of Affective Disorders, 193,* 227-232.

Lee, R, M. (1993). *Doing research on sensitive topics*. London: Sage.

Lucas, A., & Lewis, C. (2010). Should we trust experiments on trust? *Human Development, 53,* 167-172.

Lundåsen, S. (2010). Methodological problems with surveying trust. In *AAPOR* (pp. 5806-5815). American Statistical Association.

Martin, J. L., Perrott, K., Morris, E. M., & Romans, S. E. (2001). Participation in retrospective child sexual abuse research: Beneficial or harmful? What women think six years later. In L. M. Williams & V. L. Banyard (Eds.), *Trauma and memory* (pp. 149-159). Thousand oaks, CA: Sage.

McKnight, D. H., & Chervany, N, L. (1996). D. The Meanings of Trust. In: University of Minnesota. Retrieved from, http://www.misrc.umn.edu/workingpapers/fullpapers/1996/9604_040100.pdf

Nederhof, A. J. (1985). Methods of coping with social desirability bias: A review. *European Journal of Social Psychology, 15*, 263-280.

Newman, E., & Kaloupek, D. G. (2004). The risks and benefits of participating in trauma-focused research studies. *Journal of Traumatic Stress, 17,* 383-394.

Niolon, P. H., Vivolo-Kantor, A. M., Latzman, N. E., Valle, L. A., Kuoh, H., Burton, T., Taylor, B. G., & Tharp, A. T. (2015). Prevalence of teen dating violence and

co-occurring risk factors among middle school youth in high-risk urban communities. *Journal of Adolescent Health*, *56*, 5–13

O'Callaghan, A. (2017). Exploration of epistemic trust in a non-clinical sample of children. (unpublished doctoral thesis). University College London, England.

O'Connell, J. (2014). Can we develop an adult assessment tool for measuring epistemic trust? (unpublished master's thesis). University College London, England.

Pennebaker, J. W., & Susman, J. R. (1988). Disclosure of traumas and psychosomatic processes. *Social Science and Medicine, 26,* 327-332.

Peskin, M. F., Markham, C. M., Shegog, R., Temple, J. R., Baumler, E. R., Addy, R. C., Hernandez, B., Cuccaro, P., Gaby, E. K., Thiel. M., & Emery, S. T. (2016). Prevalence and correlates of perpetration of cyber dating abuse among early adolescents. *Journal of Youth and Adolescence, 46,* 358-375.

Radford, L., Corral, S., Bradley, C., & Fisher, H. L. (2013). The prevalence and impact of child maltreatment and other types of victimization in the UK: Findings from a population survey of caregivers, children and young people and young adults. *Child Abuse & Neglect, 37,* 801-813.

Rinehart, J, K., Nason, E, E., Yeater, E, A., & Miller, G, F. (2017). Do some students need special protection from research on sex and trauma? New evidence for young adult resilience in "sensitive topics" research. *Journal of Sex Research, 54,* 273-283.

Ruch, L, O., Gartell, J, W., Amedo, S, R., & Coyne, B, J. (1991). The sexual assault symptom scale: measuring self-reported sexual assault trauma in the

emergency room. *Psychological Assessment: A Journal of Consulting and Clinical Psychology, 3,* 3-8.

Savell, J. K., Kinder, B. N., & Young, M. S. (2006). Effects of administering sexually explicit questionnaires on anger, anxiety, and depression in sexually abused and nonabused females: Implications for risk assessment. *Journal of Sex & Marital Therapy, 32*, 161–172.

Smithers, M. (2015). Epistemic trust and mental health difficulties in pre-adolescents. (unpublished master's thesis). University College London, England.

Zajac, K., Ruggiero, K. J., Smith, D. W., Saunders, B. E., & Kilpatrick, D. G. (2011). Adolescent distress in traumatic stress research: Data from the National Survey of Adolescent-Replication. *Journal of Traumatic Stress, 24,* 226-229.

Appendix 1

Checklist for the QualSyst quality appraisal tool

Checklist for the QualSyst quality appraisal tool

(Kmet et al., 2004)

Item Number	Criteria
1	Question / objective sufficiently described?
2	Study design evident and appropriate?
3	Method of subject/comparison group selection or source of information/input variables described and appropriate?
4	Subject (and comparison group, if applicable) characteristics sufficiently described?
8	Outcome and (if applicable) exposure measure(s) well defined and robust to measurement / misclassification bias? means of assessment reported?
9	Sample size appropriate?
10	Analytic methods described/justified and appropriate?
11	Some estimate of variance is reported for the main results?
12	Controlled for confounding?
13	Results reported in sufficient detail?
14	Conclusions supported by the results?

Appendix 2

Quality assessment of studies using the QualSyst

Quality assessment of the studies using the QualSyst (Kmet et al., 2004)

	Item number and corresponding score*											
Reference	1	2	3	4	8	9	10	11	12	13	14	Score
Allen et al., (1985)	2	2	2	2	2	0	2	2	2	2	2	0.91
Bucker et al., (2012)	2	2	2	2	2	0	2	2	2	2	2	0.91
Camras et al., (1990)	2	2	2	2	2	0	2	0	2	2	2	0.82
Cerezo et al., (1994)	2	2	2	2	2	0	2	2	2	2	2	0.91
Cicchetti et al., (2003)	2	2	2	2	2	2	2	0	2	2	2	0.91
During et al., (1991)	2	2	2	2	2	0	2	2	2	2	2	0.91
Fontaine et al., (2002)	2	2	2	2	2	0	2	0	2	2	2	0.82
Hennessy et al., (1994)	2	2	2	2	1	1	2	2	2	2	2	0.91
Herrenkohl et al., (1995)	2	2	2	2	2	2	2	2	1	2	2	0.95
Jepson et al., (1999)	2	2	2	2	1	0	1	1	2	2	2	0.86
Kay et al., (2016)	2	2	2	2	2	1	2	2	2	2	2	0.95
O'Reilly et al., (2015)	2	2	2	2	2	1	2	2	2	2	2	0.95
Pears et al., (2005a)	2	2	2	2	2	1	2	2	2	2	2	0.95
Pears et al., (2005b)	2	2	2	2	2	2	2	1	2	2	2	0.95
Pears et al., (2010)	2	2	2	2	2	2	2	2	2	2	2	1
Pears et al., (2013)	2	2	2	2	2	1	2	2	2	2	2	0.95
Pears et al., (2015)	2	2	2	2	2	1	2	0	2	2	2	0.86
Pollak et al., (2000)	2	2	2	2	2	0	2	2	2	2	2	0.91
Pollak et al., (2002)	2	2	2	2	2	0	2	0	2	1	2	0.77
Pollak et al., (2009)	2	2	2	2	2	1	2	2	2	2	2	0.95
Robinson et al., (2012)	2	2	2	2	2	1	2	0	2	2	2	0.86
Shackman et al., (2005)	2	2	2	2	2	0	2	0	2	2	2	0.82
Shackman et al., (2010)	2	2	2	2	2	0	2	0	2	2	2	0.82
Smetana et al., (1999)	2	2	2	2	2	0	2	0	2	1	2	0.82
Teisl et al., (2008)	2	2	2	2	2	2	2	2	2	2	2	1
Toth et al., (1997)	2	2	2	2	2	1	2	2	2	2	2	0.95

Valentino et al., (2011)	2	2	2	2	2	1	2	2	2	2	2	0.95
Vasilevski et al., (2016)	2	2	2	2	2	1	2	2	2	2	2	0.95
Viezel et al., (2015)	2	2	2	2	2	2	2	2	2	2	2	1
Weller et al., (2013)	2	2	2	2	2	1	2	2	0	2	2	0.86
Weller et al., (2015)	2	2	2	2	2	1	2	2	2	2	2	0.95
Wodarski et al., (1990)	2	2	2	2	2	1	2	2	2	2	2	0.95

**Note: Item numbers 5, 6 and 7 have been omitted due to not being applicable to the research question*

Appendix 3

Outline of joint working

Outline of joint working

The empirical paper was part of a joint research project conducted by myself, Tal Reches and Elise Draper.

Although the research hypotheses were formulated independently, we all required a sample of adolescents to complete the Epistemic Trust paradigms. The workload in terms of ethics, data protection and risk assessment procedures was shared equally. Organising access to participants at the clinical services was shared, as well as data entry and data cleaning on joint measures. The clinical site that I coordinated was the outpatient substance misuse service in Cambridge and Peterborough NHS Foundation Trust. Three research assistants at the Wellcome Trust Centre for Neuroimaging supported data entry.

Although each trainee collected data on all measures, I was the sole trainee to analyse data on learning, generalisation, trauma and early adversity. Similarly Tal Reches was the only trainee to analyse data on expectations of helping relationships and attachment relationships, and Elise Draper was the sole trainee to analyse data on emerging borderline personality disorder and symptomatology. Due to missing data on different measures there are likely to be some differences between our overall samples. The analysis and write-up were conducted independently.

Appendix 4

Letters of approval from University College London and National Research Ethics Service Committee

Letter of approval from University College London

UCL RESEARCH ETHICS COMMITTEE ACADEMIC SERVICES

16 May 2016

Professor Peter Fonagy
Division of Psychology and Language Sciences
UCL

Dear Professor Fonagy

Notification of Ethical Approval
Re: Ethics Application 8843/001: Epistemic trust in adolescents

Further to your satisfactory responses to the committee's comments, I am pleased to confirm in my capacity as Chair of the UCL Research Ethics Committee (REC) that your study has been ethically approved by the UCL REC until 16th May 2018.

Approval is subject to the following conditions.

1. You must seek Chair's approval for proposed amendments to the research for which this approval has been given. Ethical approval is specific to this project and must not be treated as applicable to research of a similar nature. Each research project is reviewed separately and if there are significant changes to the research protocol you should seek confirmation of continued ethical approval by completing the 'Amendment Approval Request Form': http://ethics.grad.ucl.ac.uk/responsibilities.php

2. It is your responsibility to report to the Committee any unanticipated problems or adverse events involving risks to participants or others. The Ethics Committee should be notified of all serious adverse events via the Ethics Committee Administrator (ethics@ucl.ac.uk) immediately the incident occurs. Where the adverse incident is unexpected and serious, the Chair or Vice-Chair will decide whether the study should be terminated pending the opinion of an independent expert. The adverse event will be considered at the next Committee meeting and a decision will be made on the need to change the information leaflet and/or study protocol.

3. For non-serious adverse events the Chair or Vice-Chair of the Ethics Committee should again be notified via the Ethics Committee Administrator (ethics@ucl.ac.uk) within ten days of an adverse incident occurring and provide a full written report that should include any amendments to the participant information sheet and study protocol. The Chair or Vice-Chair will confirm that the incident is non-serious and report to the Committee at the next meeting. The final view of the Committee will be communicated to you.

On completion of the research you must submit a brief report of your findings/concluding comments to the
Committee, which includes in particular issues relating to the ethical implications of the research.

Yours sincerely

xxxxxxxxxxxx

Professor John Foreman
Chair of the UCL Research Ethics Committee

Cc: Tobias Nolte, Elise Draper, Jessie Greisbach & Tal Reches, Applicants

Academic Services, 1-19
Torrington Place (9th
Floor), University College
London
Tel: +44 (0)20 3108 8216

Letter of approval from National Research Ethics Service

Committee

NHS
Health Research Authority
London - Bloomsbury Research Ethics Committee
HRA RES Centre Manchester
Barlow House 3rd Floor
4 Minshull Street
Manchester
M1 3DZ
Telephone: 0207 104 8002

27 January 2017

Professor Peter Fonagy
Freud Memorial Professor of Psychoanalysis
University College London
Psychoanalysis Unit

Research Department of Clinical, Educational and Health Psychology
London
WC1E6BT

Dear Professor Fonagy

Study title:	**Exploring how trauma, symptomatology and expectations of helping relationships are related to epistemic trust in adolescents.**
REC reference:	**16/LO/2108**
IRAS project ID:	**217408**

Thank you for your letter of 05 January 2017, 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 and
Ms Gila Falkus.

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 hra.studyregistration@nhs.net outlining the reasons for your request.

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

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

Please ensure that the PIS for the Parent/Carer states that it is information for Parent/Carer and not Young People.

You should notify the REC once all conditions have been met (except for site approvals from host organisations) and provide copies of any revised documentation with updated version numbers. Revised documents should be submitted to the REC electronically from IRAS. The REC will acknowledge

receipt and provide a final list of the approved documentation for the study, which you can make available to host organisations to facilitate their permission for the study. Failure to provide the final versions to the REC may cause delay in obtaining permissions.

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

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

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

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

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

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

Registration of Clinical Trials

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

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

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

If a sponsor wishes to request a deferral for study registration within the required timeframe, they should contact hra.studyregistration@nhs.net. The expectation is that all clinical trials will be registered, however, in exceptional circumstances non registration may be permissible with prior agreement from the HRA. Guidance on where to register is provided on the HRA website.

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

Ethical review of research sites

NHS sites

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

Approved documents

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

Document	*Versi*	*Date*
Contract/Study Agreement [Draft Agreement]		
Contract/Study Agreement [Insurance Certificate]		
Copies of advertisement materials for research participants [Guide for clinicians to share with young people (changes accepted)]	2	05 January 2017
Covering letter on headed paper [Covering letter to REC]	1	05 January 2017
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Insurance confirmation]		05 April 2016
Interview schedules or topic guides for participants [Interview schedule]	1	05 February 2016
IRAS Application Form [IRAS_Form_11112016]		11 November 2016
IRAS Application Form XML file [IRAS_Form_11112016]		11 November 2016
IRAS Checklist XML [Checklist_21112016]		21 November 2016
IRAS Checklist XML [Checklist_13012017]		13 January 2017
Letter from funder [Funding Confirmation]		08 June 2016
Letters of invitation to participant [Cover letter]	2	16 September 2016
Non-validated questionnaire [Dilemma Task]	1	05 February 2016
Non-validated questionnaire [Computer task]	1	05 February 2016
Other [Email confirmation re: Academic Supervisors]		20 November 2016
Other [Schedule of events]		22 November 2016
Other [Statement of activities]		22 November 2016
Participant consent form [Consent Parent/Carer]	2	16 September 2016
Participant consent form [Consent 16-18]	2	16 September

		2016
Participant consent form [Assent 12-15]	2	16 September 2016
Participant information sheet (PIS) [PIS 12-15 (changes accepted)]	3	05 January 2017
Participant information sheet (PIS) [PIS 16-18 (changes accepted)]	3	05 January 2017
Participant information sheet (PIS) [PIS Parent/Carer (changes accepted)]	3	05 January 2017
Referee's report or other scientific critique report		28 October 2016
Referee's report or other scientific critique report		
Referee's report or other scientific critique report		
Referee's report or other scientific critique report [REC feedback for associated application 1]		21 September 2016
Referee's report or other scientific critique report [REC feedback for associated project 2]		05 October 2016
Referee's report or other scientific critique report [Response to REC]		15 October 2016
Research protocol or project proposal [Protocol]	2	16 September 2016
Summary CV for Chief Investigator (CI) [Summary CV Chief		28 October 2016
Summary CV for student [Jessie Greisbach CV]		28 October 2016
Summary CV for student [Elise Draper CV]		28 October 2016
Summary CV for student [Tal Reches CV]		28 October 2016
Summary CV for supervisor (student research) [Tobias Nolte		28 October 2016
Validated questionnaire [BPFSC]		28 October 2016
Validated questionnaire [CTES]		28 October 2016
Validated questionnaire [CTQ]		28 October 2016
Validated questionnaire [APPA-R]		28 October 2016
Validated questionnaire [NRI-SPV]		
Validated questionnaire [NRI-SPV (short version)]		28 October 2016
Validated questionnaire [PEPI]		28 October 2016
Validated questionnaire [RFQY]		28 October 2016
Validated questionnaire [SDQ]		28 October 2016

Statement of compliance

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

After ethical review

Reporting requirements

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

Notifying substantial amendments
Adding new sites and investigators
Notification of serious breaches of the protocol
Progress and safety reports
Notifying the end of the study

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

User Feedback

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

HRA Training

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

16/LO/2108 **Please quote this number on all correspondence**

With the Committee's best wishes for the success of

this project. Yours sincerely

xxxxxxxxxxxxxxxxxxxxxx

Reverend Jim Linthicum
Chair

Email: nrescommittee.london-bloomsbury@nhs.net

Enclosures: "After ethical review – guidance for researchers"

Copy to: Ms Tania West

Ms. Fiona Horton,
North East London NHS Foundation Trust

Appendix 5

Introductory Letter

Community Introductory Letter

RESEARCH DEPARTMENT OF CLINICAL, EDUCATIONAL AND HEALTH PSYCHOLOGY

Date
Name
Address

Research Department of Clinical,
Educational and Health Psychology
1-19 Torrington Place,
London WC1E 7HB

A study about trust and learning in adolescence

Dear *parent/carer's name* and *young person's name*,

You have received this information pack because *young persons name* said that *he/she* would like to hear more about a research study that we are inviting *young persons name* and yourself to join.

The study is investigating whether the way we learn is affected by our relationships and the things we experience. We are researching this because we want to learn what makes learning easier and harder, and we hope this research will help people in the future. We would like to offer the opportunity for *young persons name* and yourself, or just *young persons name* to join the study.

I have enclosed an information sheet for you and *young person's name* so that you can learn more about the project. I will call you in a few days to speak to you about the study and answer any questions. **If you do not wish your child to participate, this will be respected and we will not contact you or your child about this project in the future.** If you would like to contact me, please send me an email on *researcher's email address*.
Yours sincerely,

Researchers name
Researcher
Epistemic Trust Research Project,
University College London
Researcher's email address

Clinical Introductory Letter

UCL & NHS Trust Logo

Date
Name
Address

Research Department of Clinical,
Educational and Health Psychology
1-19 Torrington Place,
London WC1E 7HB

A study about trust and learning in adolescence

Dear *parent/carer's name* and *young person's name*,

You have received this information pack because *young persons name* said that *he/she* would like to hear more about a research study that we are inviting *young persons name* and yourself to join. Their key worker at *name of service* introduced this project to *young persons name*.

The study is investigating whether the way we learn is affected by our relationships, mental health and the things we experience. We are researching this because we want to learn what makes learning easier and harder, and we hope this research will help people in the future. We would like to offer the opportunity for *young persons name* to join the study.

I have enclosed an information sheet for you and *young person's name* so that you can learn more about the project. I will call you in a few days to speak to you about the study and answer any questions. **If you do not wish your child to participate, this will be respected and we will not contact you or your child about this project in the future.** If you would like to contact me, please send me an email on *researcher's email address* or leave a message with *name of service* on *telephone number*, and I will call you back.

Yours sincerely,

Researchers name
Researcher
Epistemic Trust Research Project
Researcher's email address

Appendix 6

Participant Information Sheets

Community sample

Participant Information Sheets for 12-15 year olds (community sample)

A study about trust and learning
INFORMATION FOR YOUNG PEOPLE

Invitation and brief summary

We would like to invite you to join a research project. We want to learn more about how teenagers learn and what makes learning easier or harder. We are specifically looking at epistemic trust, which means an openness to learn from others. We think that when people are babies they learn through their relationship with their parent(s) or the person who takes care of them. We also think that being in difficult situations may lead to people being less trusting and this might mean they find it more difficult to learn new things. This is important to us because the information that we get from this project might help us get a better understanding about how teenagers learn and help people in the future.

What would taking part involve?

Before meeting we will ask half of the young people joining the project to email the researcher a photograph of their mother, so we can include it in a section of the computer task.

We will meet you at your home or at the Anna Freud Centre, whichever you and your parent or carer prefer. We will ask you to sign a form, complete some computer tasks, fill in some questionnaires and then do a short activity. Each of these things are described below.

- **The form**

The assent form shows that you agree to take part in the study. We will also ask you to give us your doctors (GP) contact details as part of our routine safeguarding protocol.

- **The computer tasks**

You will be asked to play some games on a computer, these involve:

- Trading coins with the computer

- Making decisions whether to move towards or away from different objects
- Problem solving tasks where you are asked to make decisions about conflicting advice

Before you begin playing each game, the researcher will go through it with you to make sure you understand what you're doing.

- **The questionnaires**

There are questions about:

- Your behaviour and any worries you may have
- How you get on with friends and family
- Difficult situations you may or may not have experienced

The questionnaires we will ask you to complete are the Strength and Difficulties Questionnaire, Reflective Functioning Questionnaire for Youth, The Borderline Personality Disorder Features Scale for Children, The Inventory of Parent and Peer Attachment Revised questionnaire, The Measure of Parental Style, Childhood Trauma Questionnaire, the Childhood Traumatic Events Scale, the Network of Relationship Questionnaire Manual, Psychotherapy Expectation & Perception Inventory, and the Child Rejection Sensitivity Questionnaire.

- **The short activity**

We would like to give you some words and ask you what they mean. For example, words that describe animals and words that describe feelings, such as anger. There is also another short activity, like a puzzle. The short activities have been taken from the Wechsler Abbreviated Scale of Intelligence.
It is important to note that this is **NOT** a test.

All this should take around 2-3 hours (with breaks). If you decide that you want to stop before all the different tasks are finished then you can.
We would like to say thank you for helping us by giving you £10 for every hour that you help us.

What are the possible benefits of taking part?

If you do decide to participate you will be helping us to understand the part trust plays in learning. This may help other people in the future.

What are the possible disadvantages and risks of taking part?

The research is not intended to be upsetting. But, if you do find it stressful or upsetting we will give you information about who you can contact for support.

Rules that we must follow

There are a few things for you to know before you decide whether or not to take part in this study. We have to follow some important rules to make sure that people who help us are treated well and not harmed in any way:

Consent or agreeing to take part in the study

- You do not have to agree to take part if you do not want to. You are completely free to decide whether or not you want to take part in the study.
- If you decide you would like to take part in the study both you and your parent or carer have to agree
- **If you do agree to take part, you can change your mind and stop at any time, without giving a reason. This will result in no negative consequences and it will not affect any support you are receiving. Your decision not to take part or to withdraw from the study will override the wishes of your parent or carer.**

Confidentiality: keeping what you tell us private

The information you give is private. Nothing you say will be told to anyone outside the research team, except in three circumstances:

- You tell us that you or another person are planning to seriously harm a specific person.
- You tell us that you or another young person is at risk of harm.
- We may contact your GP if we are concerned about your mental health or emotional difficulties.

Further supporting information

How will my information be kept confidential?

We will keep all the information that you give us private (confidential). You will be given an ID number (e.g. 001) so your name will not be on any of your answers. The information will not be shared with anyone (e.g. school) and it will be used only for this project.

What will happen to the results of the study?

The report will be written about the results of the study. In that report, no one could identify you, or your parent or carer. In other words, we can guarantee that information about you will be secret and private because we talk about groups not the individual. Once the project is finished we will happily give you a report of what we learn.

How have young people been involved in this study?

Young people have provided consultation to the research project by reviewing materials, planning how to present the questionnaires and computer tasks to young people and making adaptations to the questionnaire pack and computer tasks.

Who is organising and funding the study?

Doctoral trainees at the Department of Clinical, Educational and Health Psychology at University College London have set up the project. Professor

Peter Fonagy and Dr Tobias Nolte are supervising the research. The research is being funded by University College London.

What if something goes wrong?
Professor Peter Fonagy, Principle Investigator, will be available if you have any questions or concerns. You can contact him at:
Research Department of Clinical, Educational and Health Psychology
1-19 Torrington Place, WC1E 7HB
Tel: 020 7679 1943
Email: p.fonagy@ucl.ac.uk

If you have any concerns and would like to contact someone outside the team you can email the Chair of the UCL Research Ethics Committee, Professor John Foreman c/o Helen Dougal at:
Email: ethics@ucl.ac.uk

Thank you for reading ☺

We will contact you shortly to answer any questions and discuss whether this is a project that you would like to join.

Our contact details are

Jessie Greisbach, Tal Reches and Elise Draper are researchers on the project. Dr Tobias Nolte is a supervisor on the project. If you have any questions or concerns, you can contact them on:

j.greisbach@ucl.ac.uk
tal.reches.13@ucl.ac.uk
elise.draper@ucl.ac.uk
t.nolte@ucl.ac.uk

This study has been approved by UCL Research Ethics Committee (Project ID Number): 6129/003

Participant Information Sheets for 16-18 year olds (community sample)

A study about trust and learning
INFORMATION FOR YOUNG PEOPLE

Invitation and brief summary

We would like to invite you to join a research project. We want to learn more about how teenagers learn and what makes learning easier or harder. We are specifically looking at epistemic trust, which means an openness to learn from others. We think that when people are babies they learn through their relationship with their parent(s) or the person who takes care of them. We also think that being in difficult situations may lead to people being less trusting and this might mean they find it more difficult to learn new things. This is important to us because the information that we get from this project might help us get a better understanding about how teenagers learn and help people in the future.

What would taking part involve?

Before meeting we will ask half of the young people joining the project to email the researcher a photograph of their mother, so we can include it in a section of the computer task.

We will meet you at home or at the Anna Freud Centre, whichever you would prefer. We will ask you to sign a form that shows you have agreed to take part, complete some computer tasks, fill in some questionnaires and then do a short activity. Each of these things are described below.

- **The form**

The consent form shows that you agree to take part in the study. We will also ask you to give us your doctors (GP) contact details as part of our routine safeguarding protocol.

- **The computer tasks**

You will be asked to play a game on a computer where you will be trading coins with the computer. Then you will play a different game that involves you moving decisions about whether to move towards or away from different objects. Then there will be a dilemma task where you will be given situations and asked to make decisions about conflicting advice. Before you begin each

task, the researcher will go through it with you to make sure you understand what you need to do.

- **The questionnaires**

There are questions about:

- Your behaviour and any worries you may have
- How you get on with friends and family
- Difficult situations you may or may not have experienced

The questionnaires we will ask you to complete are the Strength and Difficulties Questionnaire, Reflective Functioning Questionnaire for Youth, The Borderline Personality Disorder Features Scale for Children, The Inventory of Parent and Peer Attachment Revised questionnaire, The Measure of Parental Style, Childhood Trauma Questionnaire, the Childhood Traumatic Events Scale, the Network of Relationship Questionnaire Manual, Psychotherapy Expectation & Perception Inventory, and the Child Rejection Sensitivity Questionnaire.
Some people prefer to fill these out themselves and other people prefer them read to them, either way we will be pleased to help you with any difficulties in answering or understanding the questions.

- **The short activity**

We would like to give you some words and ask you what they mean. For example, words that describe animals and words that describe feelings, such as anger. There is also another short activity, like a puzzle. The short activities have been taken from the Wechsler Abbreviated Scale of Intelligence.
It is important to note that this is **NOT** a test.

All this should take around 2-3 hours (with breaks). If you decide that you want to stop before all the different tasks are finished then you can.
We would like to show you our appreciation for agreeing to complete the computer task, questionnaires and activities by offering you £10 for every hour that you help us.

What are the possible benefits of taking part?
If you do decide to participate you will be helping us to understand the part trust plays in learning. This may help other people in the future.

Are there any risks to you if you take part in the research?
The research is not intended to be upsetting. However, if you do find it stressful or are upset by it we will provide you with information on who you can contact for support. You can also stop participating at any point during the research.

Rules that we must follow
There are a few things for you to know before you decide whether or not to take part in this study. We have to follow some important rules to make sure that

people who help us are treated well and not harmed in any way. Here are those rules:

Consent or agreeing to take part in the study

- You do not have to agree to take part if you do not want to. You are completely free to decide whether or not you want to take part in the study.
- If you do agree to take part, you can change your mind and stop at any time, without giving a reason. This will result in no negative consequences and it will not affect any support you are receiving.

Confidentiality: keeping what you tell us private

Secondly, you should know that all the information you give is private. Nothing you say will be told to anyone outside the research team, except in three circumstances:

- You tell us that you or another person are planning to seriously harm a specific person.
- You tell us that you or another young person is at risk of harm.
- We may contact your GP if we are concerned about your mental health or emotional difficulties.

<u>Further supporting information</u>

How will my information be kept confidential?

All the information that you provide (from the questionnaires and computer games) will be treated confidentially. You will be assigned an ID number (e.g. 001) and we won't identify you by name to anyone. The information will not be shared with anyone (e.g. school) and it will be used solely for this project. Once the project is finished we will happily give you a report of our findings if you are interested.

What will happen to the results of the study?

The report will be written about the results of the study. In that report, the results will be presented in a way that no one can find out that it is you and your parent or carer or know that you took part. In other words, we can guarantee that information about you will be secret and private because we talk about groups not the individual.

How have young people been involved in this study?

Young people have provided consultation to the research project by reviewing materials, planning how to present the questionnaires and computer tasks to young people and making adaptations to the questionnaire pack and computer tasks.

Who is organising and funding the study?

Doctoral trainees at the Department of Clinical, Educational and Health Psychology at University College London have set up the project. Professor

Peter Fonagy and Dr Tobias Nolte are supervising the research. The research is being funded by University College London.

What if something goes wrong?
Professor Peter Fonagy, Principle Investigator, will be available if you have any questions or concerns. You can contact him at:
Research Department of Clinical, Educational and Health Psychology
1-19 Torrington Place, WC1E 7HB
Tel: 020 7679 1943
Email: p.fonagy@ucl.ac.uk

If you have any concerns and would like to contact someone outside the team you can email the Chair of the UCL Research Ethics Committee, Professor John Foreman c/o Helen Dougal at:
Email: ethics@ucl.ac.uk

Thank you for reading ☺

We will contact you shortly to answer any questions and discuss whether this is a project that you would like to join.

Our contact details are
Jessie Greisbach, Tal Reches and Elise Draper are researchers on the project. Dr Tobias Nolte is a supervisor on the project. If you have any questions or concerns, you can contact them on:

j.greisbach@ucl.ac.uk
tal.reches.13@ucl.ac.uk
elise.draper@ucl.ac.uk
t.nolte@ucl.ac.uk

This study has been approved by UCL Research Ethics Committee (Project ID Number): 6129/003

Participant Information Sheets for Parent and Carers (community sample)

A study about trust and learning
INFORMATION FOR PARENT/CARER

Invitation and brief summary

We are asking your child to help us with a study that we are doing to learn about how teenagers learn and generalise new pieces of information.

We want to learn more about how adolescents learn and what makes learning easier or harder. We are specifically looking at epistemic trust, which refers to an openness to learn from others. We think that when people are babies they learn through their relationship with their parent(s) or the person who takes care of them. We also think that difficult situations may lead to people being less trusting of things that they are told and therefore find it more difficult to learn new information. This is important to us because the information that we get from this project might help us understand the process of learning and help people in the future.

Do I have to take part?

As a legal guardian of your child you are the person who must legally consent on their behalf. If you do not wish your child to participate then that will be respected and we will not contact you or your child about this project in the future. However even if you consent, if your child does not want to participate then that will be respected and they will not be approached to participate in this project in the future. There are no consequences for not participating.

What would taking part involve?

Before meeting we will ask half of the young people joining the project to email the researcher a photograph of their mother, so we can include it in a section of the computer task.

We will meet your child at home or at the Anna Freud Centre, which ever you and your child would prefer. Your child will be asked to sign a form to show that they have agreed to take part, complete some computer tasks, fill in some questionnaires and then do a short activity. Each task is described below in more detail. We will also ask for the contact details of your child's doctor (GP) as part of our routine safeguarding protocol.

- **The computer task**

Your child will be asked to play a game on a computer where they will be trading coins with the computer. Then they will play a different game that involves making decisions about whether to move towards or away from different objects. The last section is a dilemma task where they will be given situations and asked to make decisions about conflicting advice. Before they begin playing each game, the researcher will go through it with them to make sure they understand and answer any questions.

- **The questionnaires**

Your child will be asked to complete a questionnaire pack that the researcher will offer to read to them and complete together. The pack includes questions about their behaviour, worries they may have, how they get on with friends and family, and difficult situations they may or may not have experienced.
The questionnaires we will ask you to complete are the Strength and Difficulties Questionnaire, Reflective Functioning Questionnaire for Youth, The Borderline Personality Disorder Features Scale for Children, The Inventory of Parent and Peer Attachment Revised questionnaire, The Measure of Parental Style, Childhood Trauma Questionnaire, the Childhood Traumatic Events Scale, the Network of Relationship Questionnaire Manual, Psychotherapy Expectation & Perception Inventory, and the Child Rejection Sensitivity Questionnaire.

- **The short activity**

The activities include asking the meaning of words. For example, words that describe animals and words that describe feelings, such as anger. There is also another short activity, like a puzzle. The short activities have been taken from the Wechsler Abbreviated Scale of Intelligence.
The above tasks will take approximately 2-3 hours (with breaks).

It is important to note that this is **NOT** a test.

If they decide that they want to stop before all the different tasks are finished then they can.

We would like to show you our appreciation for agreeing to participate by offering your child £10 for every hour that you help us with the above tasks.

What are the possible benefits of taking part?

If your child does decide to participate they will be helping us to understand the part trust plays in learning. This may help other people in the future.

Are there any risks to you if you take part in the research?

The research is not intended to be upsetting. However, if your child finds it stressful or are upset by it we will provide them with information of whom they can contact for support. They will also be reminded that they can stop participating at any point during the research.

Rules that we must follow

There are a few things for you to know before you decide whether or not to take part in this study. When organisations like ours do studies, there are some important rules we have to follow to make sure that people who help us are treated well and not harmed in any way. Here are those rules:

Consent

First, you should know that you do not have to agree to take part if you do not want to. In other words, this is voluntary. If you DO NOT take part, it will not disadvantage you in any way. If you DO agree to take part, **you can change your mind and withdraw your consent at any time and without giving a reason. This will result in no negative consequences.** If your child decides not to consent or chooses to withdraw consent at anytime their wishes will be respected and override any consent given by yourself.

Confidentiality

Secondly, you should know that all the information you give is confidential. All data will be collected and stored in accordance with the Data Protection Act 1998. Nothing you say will be told to anyone outside the research team, except in three circumstances:

- We would have to tell the police or another relevant agency if we were told that someone was planning to seriously harm a specific person.
- We would also have to tell the police or another relevant agency if we were to learn that a person under the age of 18 was currently at risk.
- We may contact your child's doctor (GP) if we are concerned about your child's mental health.

Further supporting information

How will our information be kept confidential?

All the information that you provide will be treated confidentially. You will be assigned an ID number (e.g. 001) and we won't identify you by name to anyone. The information will not be shared with anyone (e.g. school) and it will be used solely for this project. Once the project is finished we will happily give you a report of our findings if you are interested.

What will happen to the results of the study?

The report will be written about the results of the study. In that report, the results will be presented in such a way that no one can identify the young person or you or know that you took part. In other words, we can guarantee that information about you will be anonymous because we talk about groups not the individual.

How have young people been involved in this study?

Young people have provided consultation to the research project by reviewing materials, planning how to present the questionnaires and computer tasks to young people and making adaptations to the questionnaire pack and computer tasks.

Who is organising and funding the study?
Doctoral trainees at the Department of Clinical, Educational and Health Psychology at University College London have set up the project. Professor Peter Fonagy and Dr Tobias Nolte are supervising the research. The research is being funded by University College London.

What if something goes wrong?
Professor Peter Fonagy, Principle Investigator, will be available if you have any questions or concerns. You can contact him at:
Research Department of Clinical, Educational and Health Psychology
1-19 Torrington Place, WC1E 7HB
Tel: 020 7679 1943
Email: p.fonagy@ucl.ac.uk

If you have any concerns and would like to contact someone outside the team you can email the Chair of the UCL Research Ethics Committee, Professor John Foreman c/o Helen Dougal at:
Email: ethics@ucl.ac.uk

Thank you for reading ☺

We will contact you shortly to answer any questions and discuss whether this is a project that you would like to join study.

Our contact details are
Jessie Greisbach, Tal Reches and Elise Draper are researchers on the project. Dr Tobias Nolte is a supervisor on the project. If you have any questions or concerns, you can contact them on:

j.greisbach@ucl.ac.uk
tal.reches.13@ucl.ac.uk
elise.draper@ucl.ac.uk
t.nolte@ucl.ac.uk

This study has been approved by UCL Research Ethics Committee (Project ID Number): 6129/003

Clinical sample

Sample Participant Information Sheets for 12-15 year olds (clinical sample)

Cambridgeshire and Peterborough NHS
NHS Foundation Trust

UCL

Epistemic Trust and Learning in Adolescence
INFORMATION FOR YOUNG PEOPLE

Invitation and brief summary

We would like to invite you to join a research project. We want to learn more about how teenagers learn and what makes learning easier or harder. We are specifically looking at epistemic trust, which means an openness to learn from others. We are looking at how difficult situations and mental health in childhood may lead to people being less trusting of things that they are told and therefore find it more difficult to learn new information. We are also looking at how trust affects young people's expectations of helping relationships. This is important to us because the information that we get from this project might help us understand the process of learning and help people in the future.

What would taking part involve?

Before meeting we will ask half of the young people joining the project to email the researcher a photograph of their mother, so we can include it in a section of the computer task.

We will meet you at (*name of service*) and your key worker will introduce us. We will ask you to sign a form, complete some computer tasks, fill in some questionnaires and then do a short activity. Each of these things are described below.

- **The form**

The assent form shows that you agree to take part in the study.

- **The computer tasks**

You will be asked to play some games on a computer, these involve:

- Trading coins with the computer
- Making decisions whether to move towards or away from different objects
- A dilemma task - the purpose of this task is to look at how people make decisions in a dilemma situation, where different people may act in different ways. Before you begin playing each game, the researcher will go through it with you to make sure you understand what you're doing.

- **The questionnaires**

There are questions about:

- Your behaviour and how you are feeling
- How you get on with friends and family
- Difficult situations you may or may not have experienced
- Your expectations of helping relationships

The questionnaires we will ask you to complete are the Strength and Difficulties Questionnaire, Reflective Functioning Questionnaire for Youth, The Inventory of Parent and Peer Attachment Revised questionnaire, The Borderline Personality Disorder Features Scale for Children, Childhood Trauma Questionnaire, the Childhood Traumatic Events Scale, the Network of Relationship Questionnaire Manual, Psychotherapy Expectation & Perception Inventory, and the Child Rejection Sensitivity Questionnaire.

- **The short activity**

We would like to give you some words and ask you what they mean. For example, words that describe animals and words that describe feelings, such as anger. There is also another short activity, like a puzzle. The short activities have been taken from the Wechsler Abbreviated Scale of Intelligence.
It is important to note that this is **NOT** a test.
All this should take around 2-3 hours (with breaks). If you decide that you want to stop before all the different tasks are finished then you can.
We would like to say thank you for helping us by giving you a £30 voucher for completing the tasks.

What are the possible benefits of taking part?

If you do decide to participate you will be helping us to understand the part trust plays in learning. This may help other people in the future. You may find some of the tasks enjoyable to complete.

What are the possible disadvantages and risks of taking part?

The research is not intended to be upsetting. But, if you do find it stressful or upsetting we will give you information about who you can contact for support.

Rules that we must follow

There are a few things for you to know before you decide whether or not to take part in this study. We have to follow some important rules to make sure that people who help us are treated well and are safe:

Consent or agreeing to take part in the study

- You do not have to agree to take part if you do not want to. You are completely free to decide whether or not you want to take part in the study.
- If you decide you would like to take part in the study both you and your parent or carer have to agree
- **If you do agree to take part, you can change your mind and stop at any time, without giving a reason. This will not affect any support you are receiving. Your decision not to take part or to withdraw from the study will override the wishes of your parent or carer.**

Confidentiality: keeping what you tell us private

The information you give is private. Nothing you say will be told to anyone outside the research team, except in three circumstances:

- You tell us that you or another person are planning to seriously harm a specific person.
- You tell us that you or another young person is at risk of harm.
- We may inform your mental health worker if we are concerned about your mental health.

If it was necessary to take any of the above steps, this will be discussed with you first.

Further supporting information

How will my information be kept confidential?

We will keep all the information that you give us private (confidential). You will be given an ID number (e.g. 001) so your name will not be on any of your answers. The information will not be shared with anyone (e.g. school) and it will be used only for this project. Once the project is finished we will happily tell you what we have learnt.

What will happen to the results of the study?

The report will be written about the results of the study. In that report, no one could identify you, or your parent or carer. In other words, we can guarantee that information about you will be secret and private because we talk about groups not the individual.

Who has reviewed the study?

All research in the NHS is looked at by an independent group of people, called a Research Ethics Committee, to protect you. This study has been reviewed and given favourable opinion by London - Bloomsbury Research Ethics Committee (Project ID Number): 16/LO/2108

How have young people been involved in this study?

Young people have provided consultation to the research project by reviewing materials, planning how to present the questionnaires and computer tasks to

young people and making adaptations to the questionnaire pack and computer tasks.

Who is organising and funding the study?
Doctoral trainees at the Department of Clinical, Educational and Health Psychology at University College London have set up the project. Professor Peter Fonagy and Dr Tobias Nolte are supervising the research. The research is being funded by University College London and is an educational project.

What if something goes wrong?
If you have any worries about how this study is being run, you should ask to speak to the researcher who will do their best to answer your questions. If you would like to contact someone outside the team you can do this through the Research Governance Sponsor, University College London (UCL). You can write to Joint UCLH/UCL Biomedical Research Unit, R&D Directorate (Maple House), Rosenheim Wing, Ground Floor, 25 Grafton Way, London, WC1E 5DB quoting reference 16/0021. All communication will be in confidence.
If something does go wrong and you are harmed then you may have grounds for a legal action for compensation against University College London (UCL).
If you would like to contact Cambridgeshire and Peterborough Patient Advice and Liaison Services (PALS), they can be contacted either by calling 0800 376 0775, via email PALS@cpft.nhs.uk, or in writing to:
Patient Advice and Liaison Service,
Elizabeth House,
Fulbourn,
Cambridge
CB21 5EF

Thank you for reading ☺

We will contact you shortly to answer any questions and discuss whether this is a project that you would like to join.

Our contact details are
Jessie Greisbach, Tal Reches and Elise Draper are researchers on the project. If you have any questions about the project you can contact them on:

j.greisbach@ucl.ac.uk
tal.reches.13@ucl.ac.uk
elise.draper@ucl.ac.uk

Dr Tobias Nolte is a supervisor on the project. If you have any concerns you wish to discuss, you can contact him on:

t.nolte@ucl.ac.uk

Cambridgeshire and Peterborough NHS
NHS Foundation Trust

UCL

Epistemic Trust and Learning in Adolescence
INFORMATION FOR YOUNG PEOPLE

Invitation and brief summary

We would like to invite you to join a research project. We want to learn more about how teenagers learn and what makes learning easier or harder. We are specifically looking at epistemic trust, which means an openness to learn from others. We are looking at how difficult situations and how people feel in childhood may lead to people being less trusting of things that they are told and therefore find it more difficult to learn new information. We are also looking at how trust influences young people's expectations of helping relationships. This is important to us because the information that we get from this project might help us understand the process of learning and help people in the future.

What would taking part involve?

Before meeting we will ask half of the young people joining the project to email the researcher a photograph of their mother, so we can include it in a section of the computer task.

We will meet you at (*name of service*) and your key worker will introduce us. We will ask you to sign a form that shows you have agreed to take part, complete some computer tasks, fill in some questionnaires and then do a short activity. Each of these things are described below.

- **The form**

The consent form shows that you agree to take part in the study.

- **The computer tasks**

You will be asked to play a game on a computer where you will be trading coins with the computer. Then you will play a different game that involves you making decisions about whether to move towards or away from different

objects. Then there will be a dilemma task looking at how people make decisions in a dilemma situation. The dilemmas will contain a mixture of moral and amoral situations. Before you begin each task, the researcher will go through it with you to make sure you understand what you need to do.

- **The questionnaires**

There are questions about:

- Your behaviour and how you are feeling
- How you get on with friends and family
- Difficult situations you may or may not have experienced
- Your expectations of helping relationships

The questionnaires we will ask you to complete are: the Strength and Difficulties Questionnaire, Reflective Functioning Questionnaire for Youth, The Inventory of Parent and Peer Attachment Revised questionnaire, The Borderline Personality Disorder Features Scale for Children, Childhood Trauma Questionnaire, the Childhood Traumatic Events Scale, the Network of Relationship Questionnaire Manual, Psychotherapy Expectation & Perception Inventory, and the Child Rejection Sensitivity Questionnaire.
Some people prefer to fill these out themselves and other people prefer them read to them, either way we will be pleased to help you with any difficulties in answering or understanding the questions.

- **The short activity**

We would like to give you some words and ask you what they mean. For example, words that describe animals and words that describe feelings, such as anger. There is also another short activity, like a puzzle. The short activities have been taken from the Wechsler Abbreviated Scale of Intelligence.
It is important to note that this is **NOT** a test.

All this should take around 2-3 hours (with breaks). If you decide that you want to stop before all the different tasks are finished then you can.
We would like to show you our appreciation for agreeing to complete the computer task, questionnaires and activities by offering you a £30 voucher for completing the tasks.

What are the possible benefits of taking part?

If you do decide to participate you will be helping us to understand the part trust plays in learning. This may help other people in the future. You may also find some of the tasks enjoyable to complete.

Are there any risks to you if you take part in the research?

The research is not intended to be upsetting. However, if you do find it stressful or are upset by it we will provide you with information on who you can contact for support. You can also stop participating at any point during the research.

Rules that we must follow

There are a few things for you to know before you decide whether or not to take part in this study. We have to follow some important rules to make sure that people who help us are treated well and are safe. Here are those rules:

Consent or agreeing to take part in the study

- You do not have to agree to take part if you do not want to. You are completely free to decide whether or not you want to take part in the study.
- **If you do agree to take part, you can change your mind and stop at any time, without giving a reason. This will result in no negative consequences and it will not affect any support you are receiving.**

Confidentiality: keeping what you tell us private

Secondly, you should know that all the information you give is private. Nothing you say will be told to anyone outside the research team, except in three circumstances:

- You tell us that you or another person are planning to seriously harm a specific person.
- You tell us that you or another young person is at risk of harm.
- We may inform your mental health worker if we are concerned about your mental health.

<u>If it was necessary to take any of the above steps, this will be discussed with you first.</u>

<u>Further supporting information</u>

How will my information be kept confidential?

All the information that you provide (from the questionnaires and computer games) will be treated confidentially. You will be assigned an ID number (e.g. 001) and we won't identify you by name to anyone. The information will not be shared with anyone (e.g. school) and it will be used solely for this project. Once the project is finished we will happily give you a report of our findings if you are interested.

What will happen to the results of the study?

The report will be written about the results of the study. In that report, the results will be presented in a way that no one can find out that it is you or know that you took part. In other words, we can guarantee that information about you will be secret and private because we talk about groups not the individual.

Who has reviewed the study?

All research in the NHS is looked at by an independent group of people, called a Research Ethics Committee, to protect your interests. This study has been reviewed and given favourable opinion by London - Bloomsbury Ethics Research Ethics Committee (Project ID Number): 16/LO/2108

How have young people been involved in this study?

Young people have provided consultation to the research project by reviewing materials, planning how to present the questionnaires and computer tasks to young people and making adaptations to the questionnaire pack and computer tasks.

Who is organising and funding the study?
Doctoral trainees at the Department of Clinical, Educational and Health Psychology at University College London have set up the project. Professor Peter Fonagy and Dr Tobias Nolte are supervising the research. The research is being funded by University College London and is an educational project.

What if something goes wrong?
If you have a concern about any aspect of this study, you should ask to speak to the researcher who will do their best to answer your questions. If you have any concerns and would like to contact someone outside the team you can do this through the Research Governance Sponsor, University College London (UCL). You can write to Joint UCLH/UCL Biomedical Research Unit, R&D Directorate (Maple House), Rosenheim Wing, Ground Floor, 25 Grafton Way, London, WC1E 5DB quoting reference 16/0021. All communication will be dealt with in strict confidence.
If in the event that something does go wrong and you are harmed during the research and this is due to someone's negligence then you may have grounds for a legal action for compensation against University College London (UCL).
If you would like to contact Cambridgeshire and Peterborough Patient Advice and Liaison Services (PALS), they can be contacted either by calling 0800 376 0775, via email PALS@cpft.nhs.uk, or in writing to:
Patient Advice and Liaison Service,
Elizabeth House,
Fulbourn,
Cambridge
CB21 5EF

Thank you for reading ☺

We will contact you shortly to answer any questions and discuss whether this is a project that you would like to join.

Our contact details are
Jessie Greisbach, Tal Reches and Elise Draper are researchers on the project. If you have any questions about the project you can contact them on:

j.greisbach@ucl.ac.uk
tal.reches.13@ucl.ac.uk
elise.draper@ucl.ac.uk

Dr Tobias Nolte is a supervisor on the project. If you have any concerns you wish to discuss, you can contact him on:

t.nolte@ucl.ac.uk

Sample Participant Information Sheets for Parent and Carers (clinical sample)

Cambridgeshire and Peterborough NHS
NHS Foundation Trust

UCL

Epistemic Trust and Learning in Adolescence
INFORMATION FOR PARENTS/CARERS

Invitation and brief summary

We are asking you to help us with a study that we are doing to learn about how teenagers learn and generalise new pieces of information. We are telling all teenagers who attend (*name of service*) about this project.

We want to learn more about how adolescents learn and what makes learning easier or harder. We are specifically looking at epistemic trust, which refers to an openness to learn from others. We are looking at how difficult situations and mental health in childhood may lead to people being less trusting of things that they are told and therefore find it more difficult to learn new information. We are also looking at how trust influences young people's expectations of helping relationships. This is important to us because the information that we get from this project might help us understand the process of learning and help people in the future.

Do I have to take part?

As a legal guardian of your child you are the person who must legally consent on their behalf. If you do not wish your child to participate then that will be respected and we will not contact you or your child about this project in the future. However even if you consent, if your child does not want to participate then that will be respected and they will not be approached to participate in this project in the future. There are no consequences for not participating.

What would taking part involve?

Before meeting we will ask half of the young people joining the project to email the researcher a photograph of their mother, so we can include it in a section of the computer task. We may ask for a photo as we are interested to see whether the presence of the image affects how young people learn a new task.

We will meet your child at (*name of service*) and their key worker will introduce us. Your child will be asked to sign a form to show that they have agreed to take part, complete some computer tasks, fill in some questionnaires and then do a short activity. Each task is described below in more detail.

- **The computer task**

Your child will be asked to play a game on a computer where they will be trading coins with the computer. Then they will play a different game that involves making decisions about whether to move towards or away from different objects. The last section is a dilemma task – the purpose of this task is to look at how people make decisions in a dilemma situation. The dilemmas will contain a mixture of moral and amoral situations. Before they begin playing each game, the researcher will go through it with them to make sure they understand and answer any questions.

- **The questionnaires**

Your child will be asked to complete a questionnaire pack that the researcher will offer to read to them and complete together. The pack includes questions about their behaviour, mental health, how they get on with friends and family, difficult situations they may or may not have experienced and their expectations of helping relationships.

The names of these questionnaires are the Strength and Difficulties Questionnaire, Reflective Functioning Questionnaire for Youth, The Inventory of Parent and Peer Attachment Revised questionnaire, The Borderline Personality Disorder Features Scale for Children, Childhood Trauma Questionnaire, the Childhood Traumatic Events Scale, the Network of Relationship Questionnaire Manual, Psychotherapy Expectation & Perception Inventory, and the Child Rejection Sensitivity Questionnaire.

- **The short activity**

The activities include asking the meaning of words. For example, words that describe animals and words that describe feelings, such as anger. There is also another short activity, like a puzzle. The short activities have been taken from the Wechsler Abbreviated Scale of Intelligence.

The above tasks will take approximately 2-3 hours (with breaks).

It is important to note that this is **NOT** a test.

If they decide that they want to stop before all the different tasks are finished then they can.

We would like to show your child our appreciation for agreeing to participate by offering them a £30 voucher for completing the tasks.

<u>What are the possible benefits of taking part?</u>

If your child does decide to participate they will be helping us to understand the part trust plays in learning. This may help other people in the future. Your child may also find completing some of the activities enjoyable.

Are there any risks to you if you take part in the research?

The research is not intended to be upsetting. However, if you or your child do find it stressful or are upset by it we will provide you with information on who you can contact for support. They can also stop participating at any point during the research.

Rules that we must follow

There are a few things for you to know before you decide whether or not you would like your child to take part in this study. When running studies, there are some important rules we have to follow to make sure that people who help us are treated well and not harmed in any way. Here are those rules:

Consent

First, you should know that your child does not have to agree to take part, if they or you do not want them to. In other words, this is voluntary. If your child does not take part, it will not disadvantage them in any way. If they do agree to take part, you or your child can change your mind and withdraw consent at any time and without giving a reason. This will result in no negative consequences and it will not affect any support you or your family are receiving. If your child decides not to consent or chooses to withdraw consent at anytime their wishes will be respected and override any consent given by yourself.

Confidentiality

Secondly, you should know that all the information your child gives is confidential. All data will be collected and stored in accordance with the Data Protection Act 1998. Nothing you or you child says will be told to anyone outside the research team, except in three circumstances:

- We would have to tell the police or another relevant agency if we were told that someone was planning to seriously harm a specific person.
- We would also have to tell the police or another relevant agency if we were to learn that a person under the age of 18 was currently at risk.
- We may inform your child's mental health worker if we are concerned about their mental health.

If it was necessary to take any of the above steps, this will be discussed with the young person.

Further supporting information

How will our information be kept confidential?

All the information that your child provides will be treated confidentially. Your child will be assigned an ID number (e.g. 001) and they won't be identified by name to anyone. The information will not be shared with anyone (e.g. school) and it will be used solely for this project. Once the project is finished we will happily give you a report of our findings if you are interested.

What will happen to the results of the study?

The report will be written about the results of the study. In that report, the results will be presented in such a way that no one can identify the young

person or you. In other words, we can guarantee that information will be anonymous because we talk about groups not the individual.

Who has reviewed the study?
All research in the NHS is looked at by an independent group of people, called a Research Ethics Committee, to protect your interests. This study has been reviewed and given favourable opinion by London - Bloomsbury Research Ethics Committee (Project ID Number): 16/LO/2108

How have young people been involved in this study?
Young people have provided consultation to the research project by reviewing materials, planning how to present the questionnaires and computer tasks to young people and making adaptations to the questionnaire pack and computer tasks.

Who is organising and funding the study?
Doctoral trainees at the Department of Clinical, Educational and Health Psychology at University College London have set up the project. Professor Peter Fonagy and Dr Tobias Nolte are supervising the research. The research is being funded by University College London and is an educational project.

What if something goes wrong?
If you have a concern about any aspect of this study, you should ask to speak to the researcher who will do their best to answer your questions. If you have any concerns and would like to contact someone outside the team you can do this through the Research Governance Sponsor, University College London (UCL). You can write to Joint UCLH/UCL Biomedical Research Unit, R&D Directorate (Maple House), Rosenheim Wing, Ground Floor, 25 Grafton Way, London, WC1E 5DB quoting reference 16/0021. All communication will be dealt with in strict confidence.

If in the event that something does go wrong and you are harmed during the research and this is due to someone's negligence then you may have grounds for a legal action for compensation against University College London (UCL).
If you would like to contact Cambridgeshire and Peterborough Patient Advice and Liaison Services (PALS), they can be contacted either by calling 0800 376 0775, via email PALS@cpft.nhs.uk, or in writing to:
Patient Advice and Liaison Service,
Elizabeth House,
Fulbourn,
Cambridge
CB21 5EF

Thank you for reading ☺

We will contact you shortly to answer any questions and discuss whether this is a project that you would like to join study.

Our contact details are

Jessie Greisbach, Tal Reches and Elise Draper are researchers on the project. If you have any questions about the project you can contact them on:

j.greisbach@ucl.ac.uk
tal.reches.13@ucl.ac.uk
elise.draper@ucl.ac.uk

Dr Tobias Nolte is a supervisor on the project. If you have any concerns you wish to discuss, you can contact him on:
t.nolte@ucl.ac.uk

Appendix 7

Assent and consent forms

Community sample

Assent form for 12-15 year olds (community sample)

A study about trust and learning

Thank you for your interest in taking part in this research. Before you agree to take part, the person organising the research must explain the project to you.

If you have any questions arising from the Information Sheet or explanation given to you, please ask the researcher before you decide whether to join.

Before you can take part in the research study we need your assent (that means you agree) to take part. Therefore, please can you complete, sign and date this form in the space provided. You will be given a copy of this assent form to keep and refer to at any time.

This study has been approved by UCL Research Ethics Committee (Project ID Number): 6129/003

ASSENT FORM

I ……

- Have read the notes written above and the Information Sheet, and understand why I'm being asked to participate in this study
- Understand that I will be requested to complete some questionnaires and take part in a computer task
- **Understand that if decide at any time that I no longer wish to take part in this project, I can notify the researchers involved and withdraw immediately. I understand that withdrawing will result in no negative consequences and it will not affect any support I am currently receiving.**
- Consent to the processing of my personal information for the purposes of this research study.
- Understand that such information will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 1998.
- Agree to the research team obtaining my doctor's (GP) details as part of the routine safeguarding protocol.

- Agree that the research project named above has been explained to me by the researcher and I agree to take part in this study.

Optional

- Agree that the research project named above can request information from my clinical record held at the support service that referred me to this research project
  Yes / No / Not applicable

Signed ……..

Name in block letters ……

Date ……

To be completed by the Research Assistant

I am satisfied that the person named above had given their informed assent to take part in

this study: Signed: ……

Name in block letters: ……

Date: ……..

Our contact details are

Jessie Greisbach, Tal Reches and Elise Draper are researchers on the project. Dr Tobias Nolte is a supervisor on the project. If you have any questions or concerns, you can contact them on:

j.greisbach@ucl.ac.uk
tal.reches.13@ucl.ac.uk
elise.draper@ucl.ac.uk
t.nolte@ucl.ac.uk

Consent form for 16-18 year olds (community sample)

A study about trust and learning

Thank you for your interest in taking part in this research. Before you agree to take part, the person organising the research must explain the project to you.

If you have any questions arising from the Information Sheet or explanation given to you, please ask the researcher before you decide whether to join.

Before you can take part in the research study we need your consent (that means you agree) to take part. Therefore, please can you complete, sign and date this form in the space provided. You will be given a copy of this consent form to keep and refer to at any time.

This study has been approved by UCL Research Ethics Committee (Project ID Number): 6129/003

CONSENT FORM

I ……

- Have read the notes written above and the Information Sheet, and understand why I'm being asked to participate in this study
- Understand that I will be requested to complete some questionnaires and take part in a computer task
- **Understand that if decide at any time that I no longer wish to take part in this project, I can notify the researchers involved and withdraw immediately. I understand that withdrawing will result in no negative consequences and it will not affect any support I am currently receiving.**
- Consent to the processing of my personal information for the purposes of this research study.
- Understand that such information will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 1998.
- Agree to the research team obtaining my doctor's (GP) details as part of the routine safeguarding protocol.
- Agree that the research project named above has been explained to me by the researcher and I agree to take part in this study.

Optional

- Agree that the research project named above can request information from my clinical record held at the support service that referred me to this research project
  Yes / No / Not applicable

Signed ……..

Name in block letters ……

Date ……

Taking part in the research involves you answering questions about your mental health. As part of our routine safeguarding protocol we are required to obtain the contact details of your GP. Please provide these details below:

Name of doctor (GP) ……

Name of surgery ……..

Telephone number ……..

To be completed by the Research Assistant

I am satisfied that the person named above had given their informed assent to take part in this study: Signed: ……

Name in block letters: ……

Date: ……..

Our contact details are

Jessie Greisbach, Tal Reches and Elise Draper are researchers on the project. Dr Tobias Nolte is a supervisor on the project. If you have any questions or concerns, you can contact them on:

j.greisbach@ucl.ac.uk
tal.reches.13@ucl.ac.uk
elise.draper@ucl.ac.uk
t.nolte@ucl.ac.uk

Consent form for parent and carer (community sample)

A study about trust and learning

Thank you for your interest in taking part in this research. Before you agree to take part, the person organising the research must explain the project to you.

If you have any questions arising from the Information Sheet or explanation given to you, please ask the researcher before you decide whether to join. You will be given a copy of this consent form to keep and refer to at any time.

Before you can take part in the research study we need your consent (that means you agree) to take part. Therefore, please can you complete, sign and date this form in the space provided. You will be given a copy of this consent form to keep and refer to at any time.

This study has been approved by UCL Research Ethics Committee (Project ID Number): 6129/003

CONSENT FORM

If applicable, please complete either participant statement 1 <u>or</u> participant statement 2

I ……

- Have read the notes written above and the Information Sheet, and understand why my child is being asked to participate in the study.
- Understand that my child will be requested to complete some questionnaires and take part in a computer task
- **Understand that if my child decides at any time that I no longer wish to take part in this project, I can notify the researchers involved and withdraw immediately. I understand that withdrawing will result in no negative consequences and it will not affect any support we are currently receiving.**
- Consent to the processing of my personal information for the purposes of this research study.
- Understand that such information will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 1998.

- Agree to the research team obtaining the contact details of my child's doctor (GP) as part of the routine safeguarding protocol.
- Agree that the research project named above has been explained to me to my satisfaction and I agree for my child to take part in this study.

Signed ……..

Name in block letters ……

Date ……

Taking part in the research involves your child answering questions about their mental health. As part of our routine safeguarding protocol we are required to obtain the contact details of your child's GP. Please provide these details below:

Name of doctor (GP) ……

Name of surgery ……..

Telephone number ……..

To be completed by the Research Assistant

I am satisfied that the person named above had given their informed assent to take part in

this study: Signed: ……

Name in block letters: ……

Date: ……..

Our contact details are

Jessie Greisbach, Tal Reches and Elise Draper are researchers on the project. Dr Tobias Nolte is a supervisor on the project. If you have any questions or concerns, you can contact them on:

j.greisbach@ucl.ac.uk
tal.reches.13@ucl.ac.uk
elise.draper@ucl.ac.uk
t.nolte@ucl.ac.uk

Clinical sample

Sample consent form for 12-15 years olds (clinical sample)

Cambridgeshire and Peterborough NHS
NHS Foundation Trust

UCL

Centre Number:

Study Number:

Participant Identification Number for this trial:

ASSENT FORM

Title of Project: **Epistemic Trust and Learning in Adolescence**

Name of Researcher:

Please initial box

1. I confirm that I have read the information sheet dated 05.01.2017 (version V3.0) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected. ☐
3. I understand that some documents from the study may be looked at by responsible people appointed by UCL, who must make sure (as Research Governance sponsor) that the study is being run properly. I give permission for this group to have access to the necessary information. ☐

4.	I understand that information will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 1988.	☐
5.	I understand that the information collected about me may be used to support other research in the future, and may be shared anonymously with other researchers.	☐
6.	I agree that the research project named above can request information from my clinical records held at the support service that referred me to this research project.	☐
7.	I agree that someone from the research study can contact me in the future.	☐
8.	I agree to take part in the above study.	☐

_____	_____	_____
Name of Participant	Date	Signature
_____	_____	_____
Name of Person taking consent	Date	Signature

Our contact details are

Jessie Greisbach, Tal Reches and Elise Draper are researchers on the project. If you have any questions about the project you can contact them on:

j.greisbach@ucl.ac.uk
tal.reches.13@ucl.ac.uk
elise.draper@ucl.ac.uk

Dr Tobias Nolte is a supervisor on the project. If you have any concerns you wish to discuss, you can contact him on:

t.nolte@ucl.ac.uk

Sample consent form for 16-18 year olds (clinical sample)

Cambridgeshire and Peterborough NHS
NHS Foundation Trust

UCL

Centre Number:

Study Number:

Participant Identification Number for this trial:

CONSENT FORM

Title of Project: **Epistemic Trust and Learning in Adolescence**

Name of Researcher:

		Please initial box
1.	I confirm that I have read the information sheet dated 05.01.2017 (version V3.0) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	☐
2.	I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected.	☐
3.	I understand that some documents from the study may be looked at by responsible people appointed by UCL, who must make sure (as Research Governance sponsor) that the study is being run properly. I give permission for this group to have access to the necessary information.	☐
4.	I understand that information will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 1988.	☐

5.	I understand that the information collected about me may be used to support other research in the future, and may be shared anonymously with other researchers.	☐
6.	I agree that the research project named above can request information from my clinical records held at the support service that referred me to this research project.	☐
7.	I agree that someone from the research study can contact me in the future.	☐
8.	I agree to take part in the above study.	☐

Name of Participant	Date	Signature

Name of Person taking consent	Date	Signature

Our contact details are

Jessie Greisbach, Tal Reches and Elise Draper are researchers on the project. If you have any questions about the project you can contact them on:

j.greisbach@ucl.ac.uk
tal.reches.13@ucl.ac.uk
elise.draper@ucl.ac.uk

Dr Tobias Nolte is a supervisor on the project. If you have any concerns you wish to discuss, you can contact him on:

t.nolte@ucl.ac.uk

Sample consent form for parent and carer (clinical sample)

Cambridgeshire and Peterborough NHS
NHS Foundation Trust

UCL

Centre Number:

Study Number:

Participant Identification Number for this trial:

CONSENT FORM

Title of Project: **Epistemic Trust and Learning in Adolescence**

Name of Researcher:

Please initial box

1. I confirm that I have read the information sheet dated 05.01.2017 (V3.0) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my child's participation is voluntary and is free to withdraw at any time without giving any reason, without their medical care or legal rights being affected. ☐
3. I understand that some documents from the study may be looked at by responsible people appointed by UCL, who must make sure (as Research Governance sponsor) that the study is being run properly. I give permission for this group to have access to the necessary information. ☐

4. I understand that information will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 1988. ☐

5. I understand that the information collected about me may be used to support other research in the future, and may be shared anonymously with other researchers. ☐

6. I agree that the research project named above can request information from my child's clinical records held at the support service that referred me to this research project. ☐

7. I agree that someone from the research study can contact me in the future. ☐

8. I agree to my child taking part in the above study. ☐

Name of Participant	Date	Signature
Name of Person taking consent	Date	Signature

Our contact details are

Jessie Greisbach, Tal Reches and Elise Draper are researchers on the project. If you have any questions about the project you can contact them on:

j.greisbach@ucl.ac.uk
tal.reches.13@ucl.ac.uk
elise.draper@ucl.ac.uk

Dr Tobias Nolte is a supervisor on the project. If you have any concerns you wish to discuss, you can contact him on:

t.nolte@ucl.ac.uk

Appendix 8

Measurement tools

The Trust Game

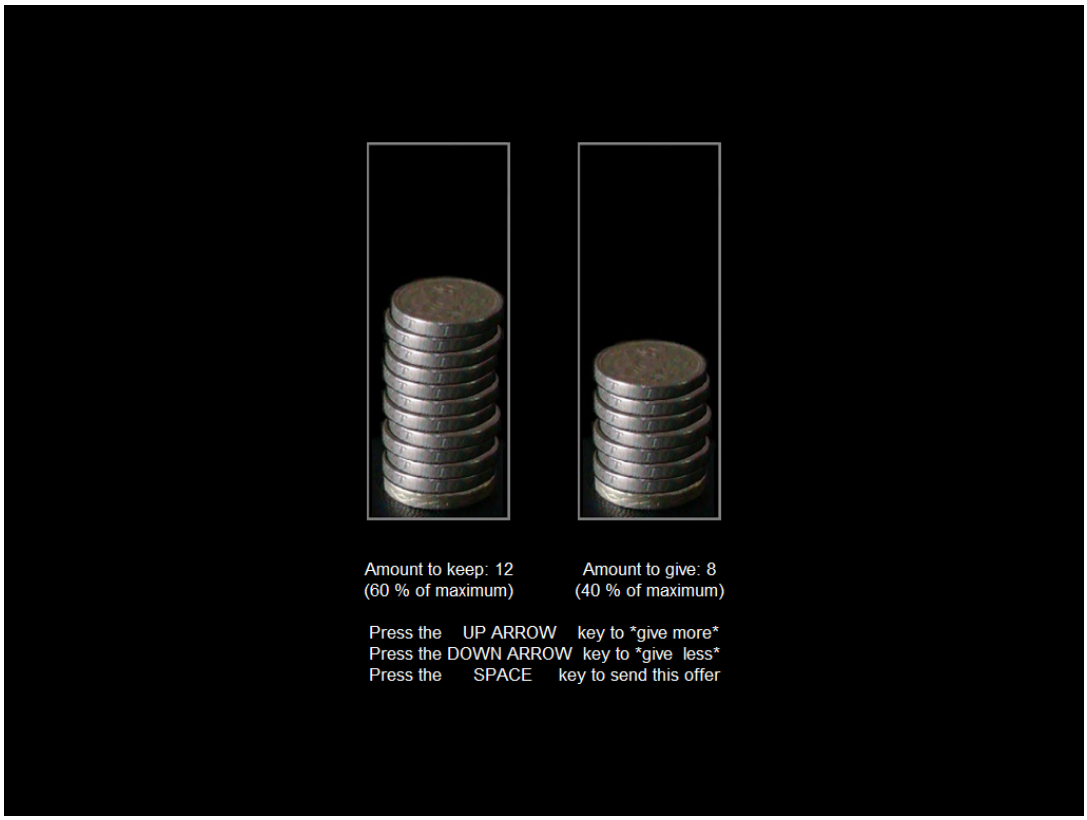
Instructions: “Welcome to the Give-and-Get Game, which is made up of 10 rounds. At each round you will get a fresh amount of 20 play-pounds. At each round you will be asked to give between 0 and 20 play-pounds to the grown-up we told you about who is playing from another computer.

It is entirely up to you how many coins you give. The amount you give will be TRIPLED as it reaches the grown-up. If for example, you give 5 coins, the grown up will get 15. She will then decide how much of the amount that she got at this round (in our example, of the 15 coins) to give back to you. She gets to keep the rest.

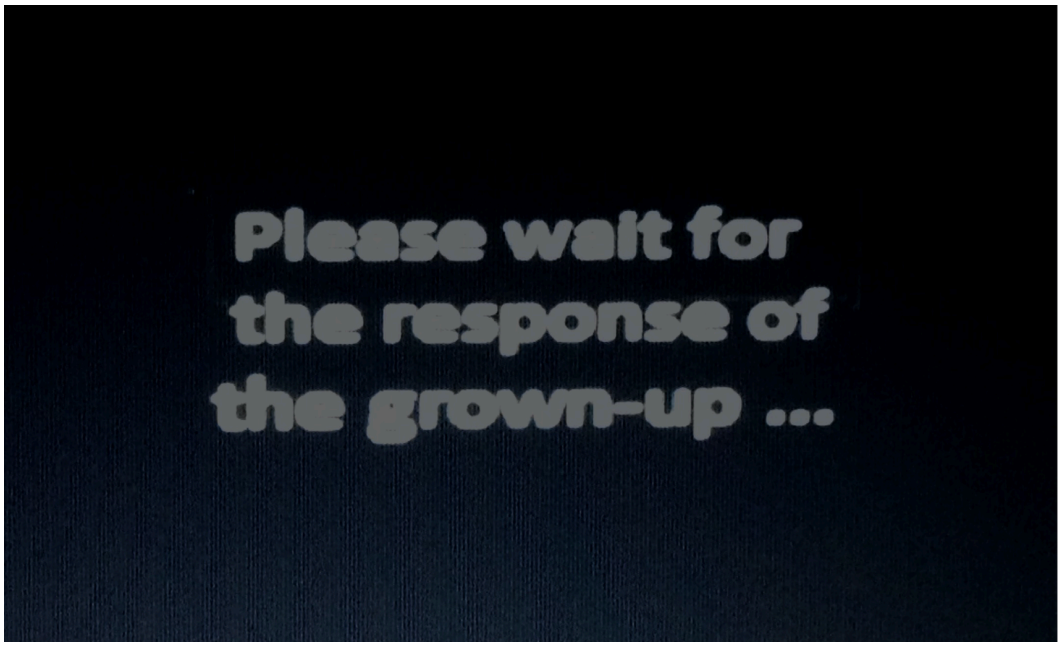
Similarly, you keep what you got together with your coins from the previous rounds. You will be able to see how much you gave, how much you got back and how much the grown-up got in each round.

It is a little complicated, so take your time to read this screen and to ask the researcher anything you want. Have fun! Press any key to start.”

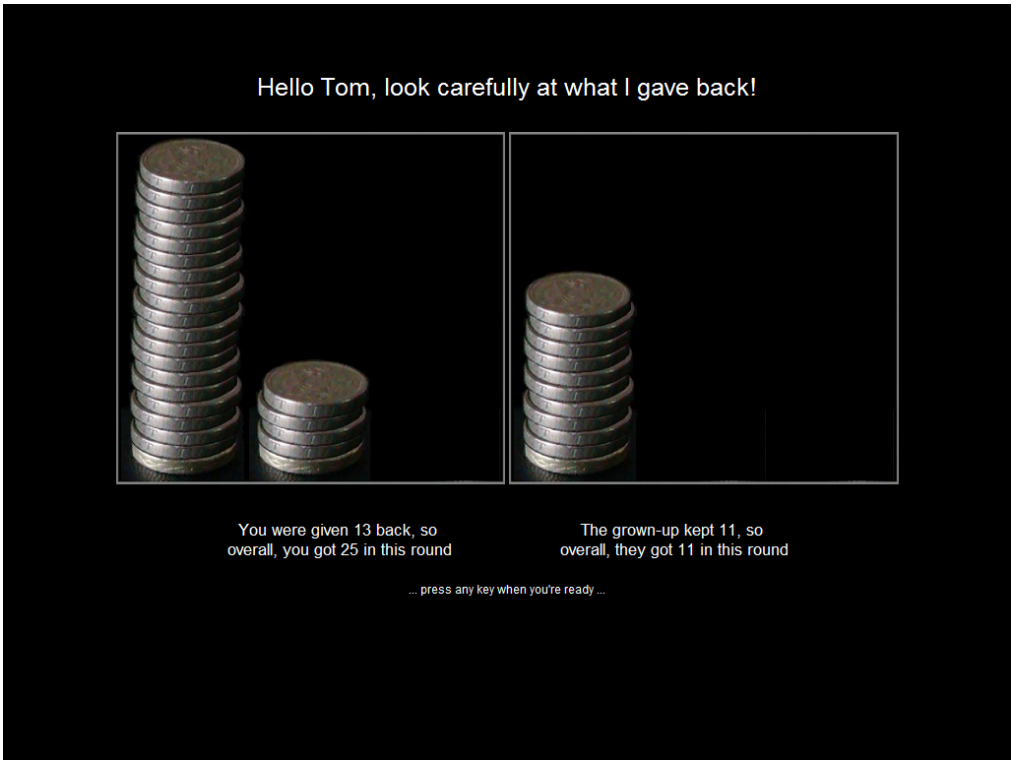
The participant is then asked to practice using the arrow keys so they learn how to manipulate the amount of coins they would like to keep and send. Following this, round 1 begins and the participant is presented with the screen below.



Once the participant chooses the amount that they want to keep and the amount they want to give away, they confirm their choice by pressing the space bar. A pause is created while a message appears on the screen stating, “Please wait for the response of the grown-up”.



In the ET condition, the grown-up begins to engage the young person and primes a trusting stance and in the non-ET condition neutral feedback is given. Below is an example of the ET condition where the grown up begins to engage with the participant by using their name and beginning to support the participant with the next steps they need to take.

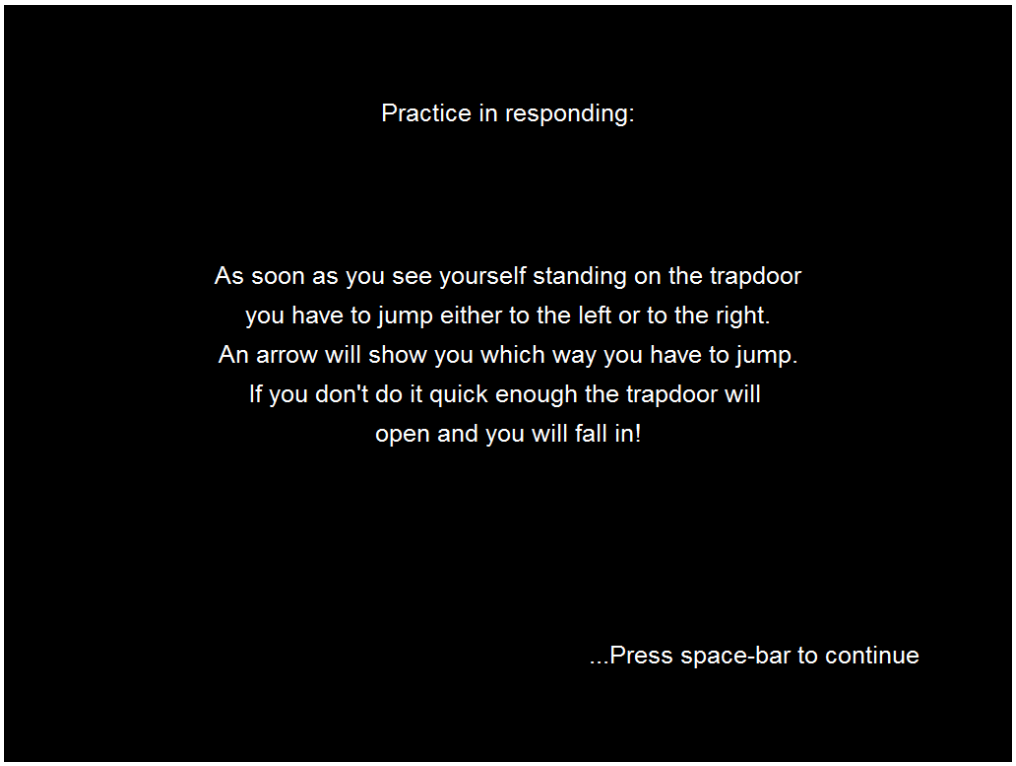


This process is repeated until ten rounds have been completed.

The Learning Task

Instructions: Welcome to the 'Get me or Scat game'. In this game you will have to get to some objects and animals and to jump away from some others. You jump using the right and left arrow keys. Press the space key to continue.

First the participant has a practice in responding to the keys, as described below.

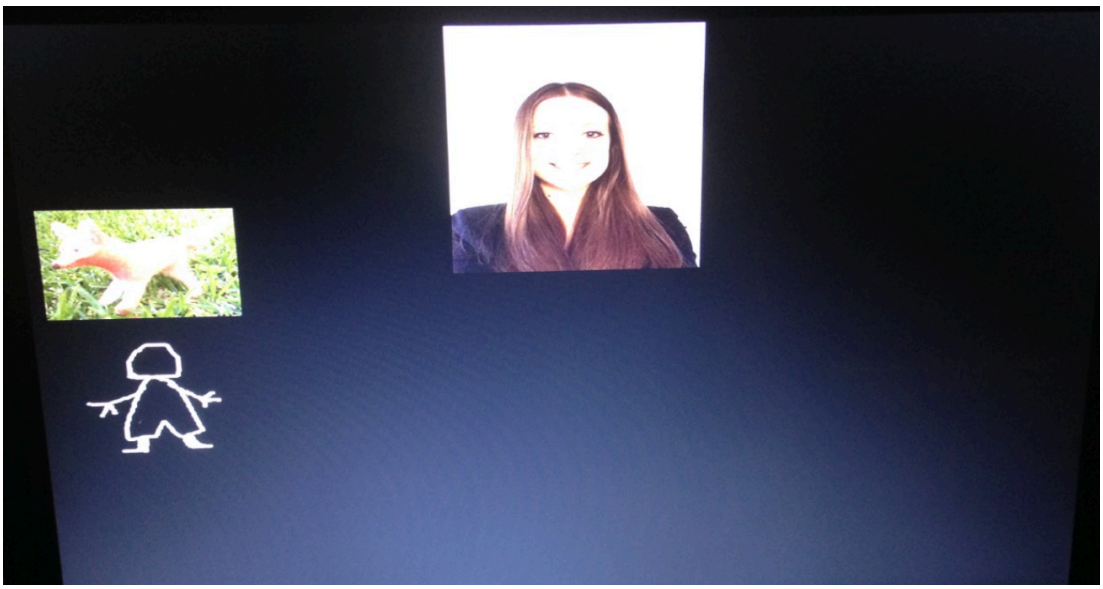


The participant practices using the arrow keys and if they are not used in the allocated time the figure falls through the trap door.

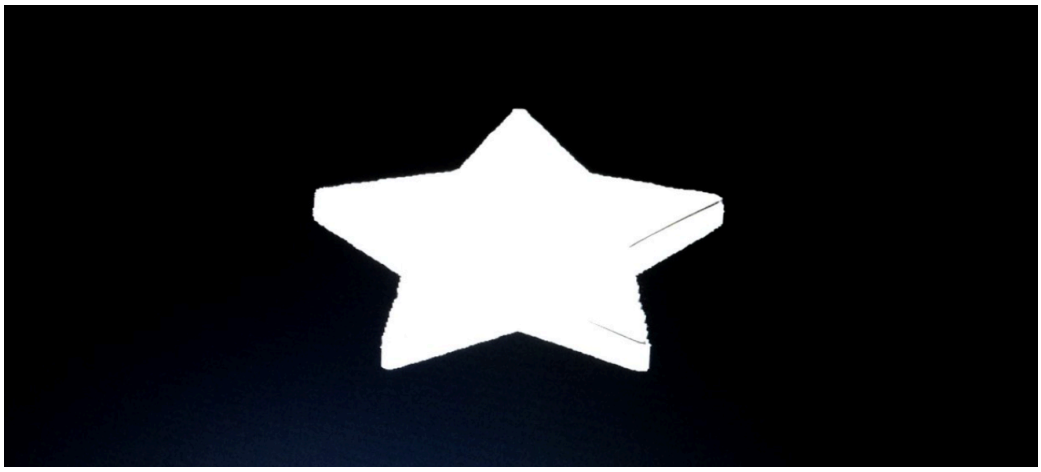
Following the practice round, further instructions are provided:

"In each trial you will now see one of four Magic Objects. For each one of them, you have to discover whether to jump towards it or away from it, by pressing the 'jump right' and 'jump left' keys. There *may* also be a photo of a person, but that does not guide *which* way to jump. If you don't jump quick enough, you'll fall in the trap and lose two stars (usually). If you jump to the correct side you get a star (most of the time, that is). If you jump to the WRONG side, you lose a start (again, most of the time). Find out where to jump for each Magic Object and win lots of stars! Good luck! Press spacy-bar to continue."

The participant is then presented with a series of magic objects, which they must decide whether they should approach or avoid. A picture of the participant's mother is shown on the screen in the ET condition.

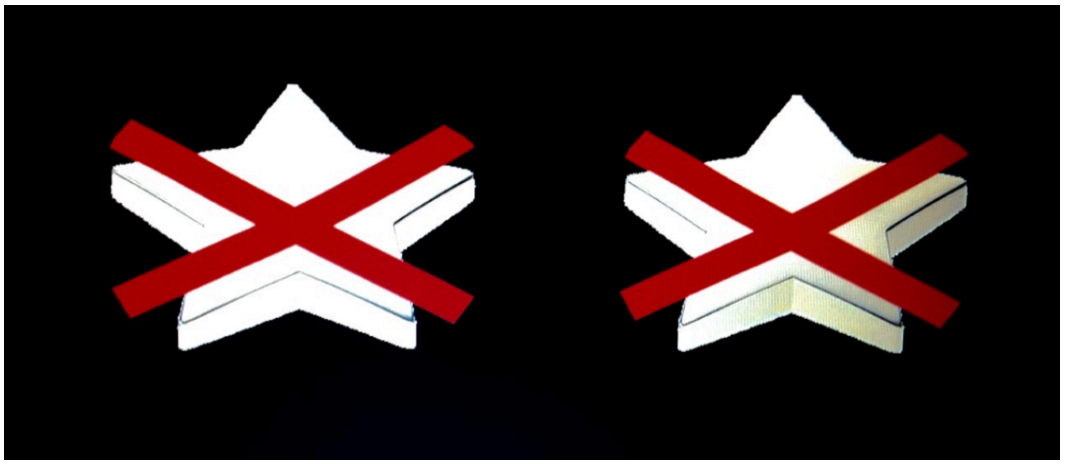


If the participant jumps to the fox and it is an object that is safe to approach they will be awarded one star.

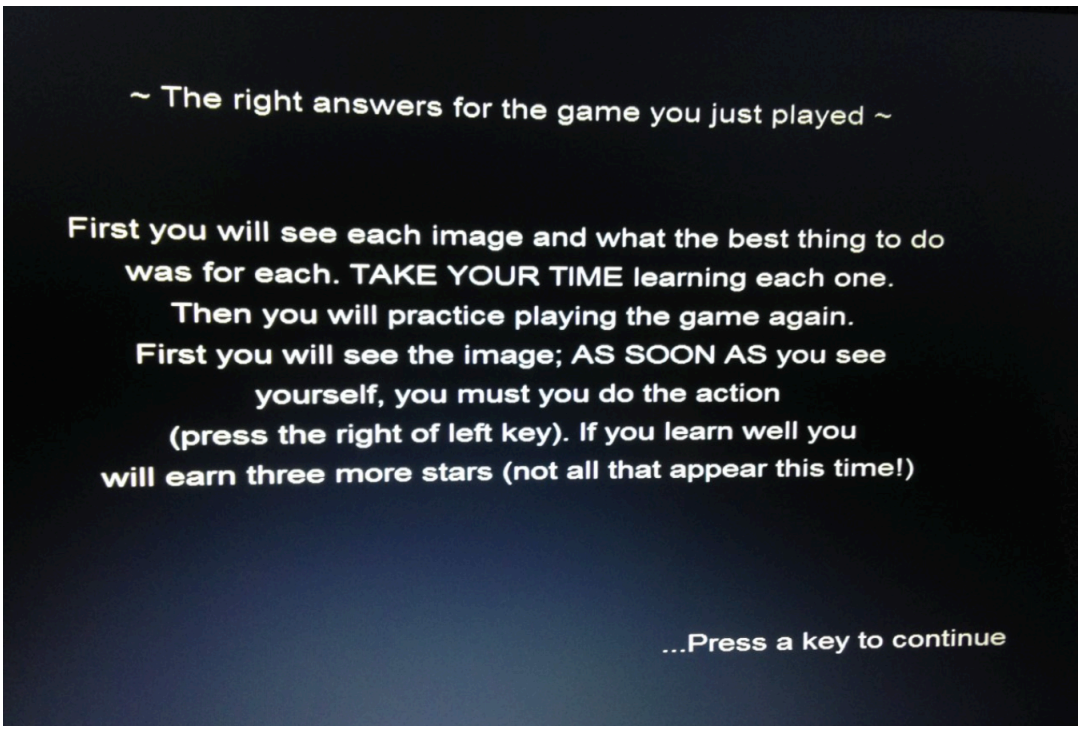


If the participant jumps to the fox and it is an object that is not safe to approach they will loose a star.

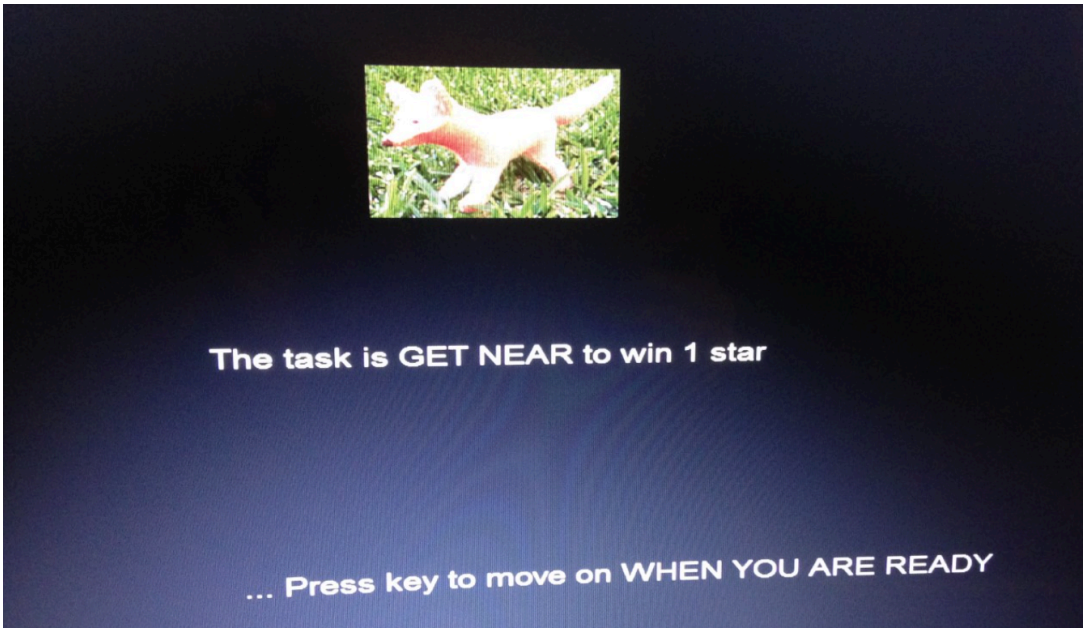
If the participant does not jump towards or away from the object in the designated time, they will loose two stars.



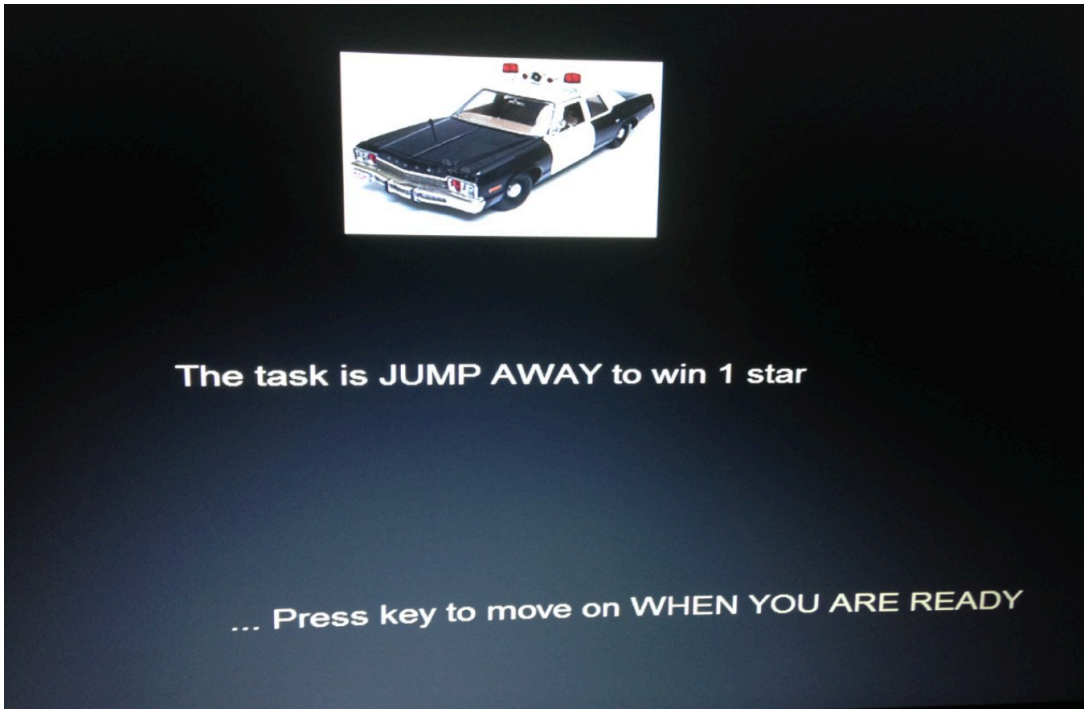
The participant will then be taught which objects are safe to approach and which objects should be avoided.



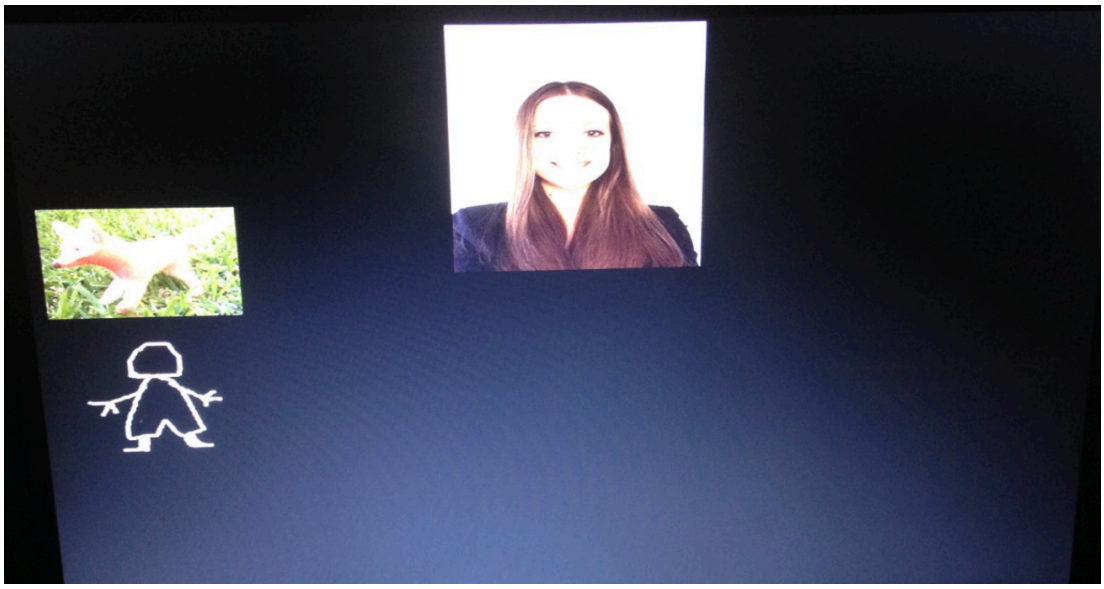
For example, the fox was safe to approach for the majority of the trials so the following screen is shown.



In contrast, it was best to avoid the police car so the following screen was shown. This is repeated for all four objects.



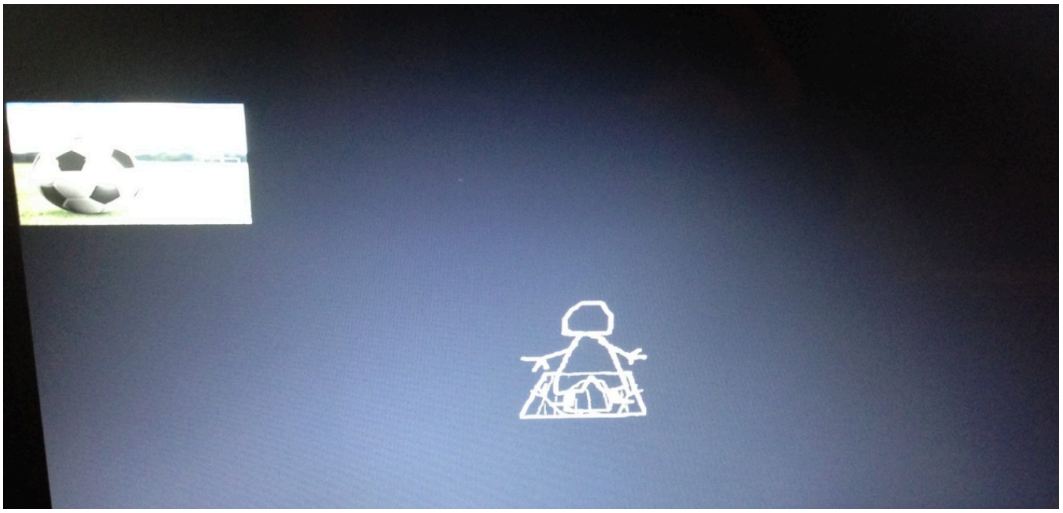
The participant is then asked to play the game again and use what they have now been taught. Below is an example of a screen.



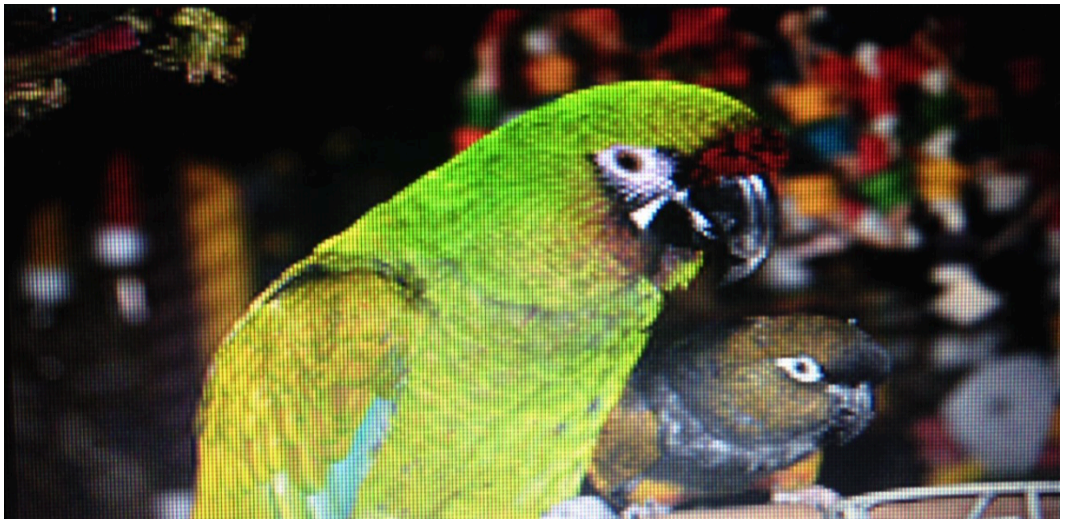
The Generalisation Task

Instructions: “In each trial you will now see one of four Magic Objects. For each one of them, you have to discover whether to jump towards it or away from it, by pressing the ‘jump right’ and ‘jump left’ keys. There *may* also be a photo of a person, but that does not guide *which* way to jump. If you don’t jump quick enough, you’ll fall in the trap and lose two stars (usually). If you jump to the correct side you get a star (most of the time, that is). If you jump to the WRONG side, you lose a start (again, most of the time). Find out where to jump for each Magic Object and win lots of stars! Good luck! Press spacy-bar to continue.”

The participant is then presented with a series of magic objects, which they must decide whether they should approach or avoid.



The generalizable traits are that the objects that are black and white should be avoided, and the objects that are multi-coloured should be approached. Below are the examples of some of the objects shown:



The Epistemic Trust Instrument (ETI; O'Connell, 2014)

Instructions

The purpose of this task is to look at how people make decisions in a dilemma situation. There will be 20 questions containing a mixture of moral and amoral situations.

Although you will have your own opinions about what you think is right and wrong in these moral dilemma questions, you must ignore your own opinions and assume

that you are a blank slate with no clue about what is considered right and wrong by society.

There are four rules for the dilemma task:

1. Put aside your own opinions of what you think the answer should be. Imagine that you are very naïve and have no clue about what is right and wrong.

2. Ask yourself, what would the "professional" (e.g., masseuse, butcher, etc.) know about this situation, given the stereotypical information you know about their job.

3. Ask yourself, what would YOUR own mother know about this situation, given the stereotypical information you know about her job.

4. If neither person (i.e., professional or your mother) would know anything about the situation from their jobs (and jobs alone), ask yourself, which of these two people am I most likely to trust or to take advice from in a general situation, independent of the this dilemma task.

Instrument Items

Item 1

While on vacation, a couple of tourists select out a small speedboat from a variety of options. An hour after they set off, a sales assistant in the rental shop says that there is a chance that the boat they are in is prone to mild leaking. Alternatively, there is a chance that they are in a different boat that does not leak. The owners are unsure whether to spend a lot of money sending out a search team or not.

A butcher advises that they should not send out a search team because in his opinion, the boat may hold together until they get back.

Your mother advises that they should send out a search team because in her opinion, the boat may not hold together until they get back.

Which advice do you trust in this situation?

Butcher Mother

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------| Very Unlikely

Very Likely

Item 2

Mrs Bennett has cancer. She asks the cashier working in the pharmacy to give her more painkillers than her prescription states. No harm will come to Mrs Bennett if she takes this additional medication and it would help to ease her pain. There is a chance that the cashier will get away with giving the additional medication. Alternatively, there is a chance that he will get caught.

A plumber advises that he should not give the additional medication because in his opinion it is probably noticeable when medication goes missing in a pharmacy.

Your mother advises that he should give the additional medication because in her opinion it is probably not noticeable when medication goes missing in a pharmacy.

Which advice do you trust in this situation?

Plumber Mother

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Item 3

Sherry is certain that her ruthless boss Bryan overheard her criticise his unethical management practices. There is a chance that she will keep her job if she apologises. Alternatively, there is a chance that he will not accept her apology and that she could lose her job for criticising his practices. If Sherry decides not to apologise to Bryan she is unsure what will happen.

A painter advises that she should not apologise because it is possible that he may have forgotten about it.

Your mother advises that she should apologise because it is possible that he won't have forgotten about it.

Which advice do you trust in this situation?

Mother Painter

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Item 4

Una is walking down a street when she comes across a wallet on the ground. She opens the wallet and finds that it contains several hundred pounds in cash but no identification. There is a chance that Una will not be seen taking the wallet and will get to keep the money. There is also a chance that someone will witness her taking the wallet and she will be reported to the police.

A postman advises that she should not take it because from his experience the police usually take these types of thefts very seriously.

Your mother advises that she should take it because from her experience the police do not usually take these types of thefts very seriously.

Which advice do you trust in this situation?

Postman Mother

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Item 5

Laura has signed a contract with a sales company stating that she will not work any other jobs while employed with them. She currently has an evening job in a restaurant from which she gets paid cash-in-hand. If Laura gets caught she will lose her job with the company. There is a chance that a co-worker will come into the restaurant, see Laura working, and tell her boss. Alternatively, there is a chance that no one from work will ever come into the restaurant and see her.

An electrician advises that she should not keep working in the restaurant because he knows from experience that not that many people working in sales have two jobs.

Your mother advises that she should keep working in the restaurant because she knows from experience that many people working in sales have two jobs.

Which advice do you trust in this situation?

Electrician Mother

|----------|----------| MildlyTrust

StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Item 6

Jim, an owner of a small business, is struggling to make ends meet. It occurs to him that he could lower his taxes by pretending that some of his personal expenses are business expenses. There is a chance that Jim will get away with this and save money. Alternatively, there is a chance that he will get caught and receive a fine.

Your mother advises that he should not lie about his expenses because she knows from experience that there are not many small businesses that generally get away with this.

A lifeguard advises that he should lie about his expenses because he knows from experience that there are many small businesses that generally get away with this.

Which advice do you trust in this situation?

Mother Lifeguard

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Item 7

Tom goes to the pharmacy with the intention of buying a particular brand name medicine. When he gets there, he discovers that the pharmacy is out of the brand that he is looking for. Tom is unsure whether a cheaper similar medicine will be as effective as the brand name for his complaint.

A bartender advises that he should not get the cheaper one because in his opinion there is a difference between the effectiveness of this medicine and the brand name one.

Your mother advises that he should get the cheaper one because in her opinion there is no difference between the effectiveness of this medicine and the brand name one.

Which advice do you trust in this situation?

Mother Bartender

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Item 8

There is a runaway trolley quickly approaching a fork in the tracks. On the tracks extending to the left is a group of workmen. The tracks extending to the right are clear. It is not known which path the trolley will take on its own. If an eyewitness pulls a lever there is a chance that the trolley will go right and avoid the workmen. Alternatively, there is a chance that the trolley will go left and kill the workmen. The eyewitness can do nothing or pull the lever.

Your mother advises that they should not pull the lever because in her opinion it may not turn the trolley to the right, killing the workmen.

A shop assistant advises that they should pull the lever because in her opinion it may turn the trolley to the right, saving the workmen.

Which advice do you trust in this situation?

Mother Shop Assistant

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Item 9

Helen forgot to submit an essay for her French elective. However, when she checked the results online there was a grade beside her name. Helen is not sure whether the professors in her university will ever notice this error. If Helen remains quiet, she will have a great grade but if she gets caught there are serious consequences for indirectly cheating.

A janitor advises that she should not remain quiet because in his opinion it likely that student's grades will be reassessed once they are posted online.

Your mother advises that she should remain quiet because in her opinion it is unlikely that student's grades will be reassessed once they are posted online.

Which advice do you trust in this situation?

Mother Janitor

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Item 10

A health care agency is deciding whether to promote the use of a newly developed vaccine designed to permanently cure a deadly disease that is quickly spreading around the country.

There is a chance that those who take the vaccine will develop immunity to the deadly disease forever. Alternatively, there is a chance that those who take the vaccine will contract the disease instead.

A computer technician advises that they should not promote the vaccine because in his opinion it may not help to prevent death or cure people.

Your mother advises that they should promote the vaccine because in her opinion it may help to prevent death and cure people.

Which advice do you trust in this situation?

Computer technician Mother

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Item 11

Jane received an email from a close colleague at work. The email asked her to make an anonymous online donation for him to partake in a charity sky dive. Jane does not want to give a lot of money but she does not want her colleague to find out that she gave a very very small donation. Jane is unsure whether it is truly anonymous or not.

Your mother advises that she should not give a very small donation because she knows from experience that there is often ways of detecting who sent an anonymous donation online.

A waitress advises that they should give a very small donation because she knows from experience that there is often no way of detecting who sent an anonymous donation online.

Which advice do you trust in this situation?

Mother Waitress

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Item 12

Mr. Johnson is a young man in hospital with a chronic disease. There is a chance that administering a particular drug could cure him of his illness forever. Alternatively, there is a chance that it could end his life faster.

Your mother advises that the drug should not be administered because in her opinion it does not work out safe when doctors take these types of risks.

A farmer advises that the drug should be administered because in his opinion it works out safe when doctors take these types of risks.

Which advice do you trust in this situation?

Mother Farmer

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Item 13

Paula has decided to make a batch of brownies for herself. The recipe calls for a measure of chopped walnuts. A bag of walnuts on her shelf has exceeded their expiration date. There is a chance that these walnuts will make Paula very ill if she consumes them. Alternatively, there is a chance that she will feel fine.

A construction worker advises that she should not use the walnuts because in his opinion they usually do not last beyond their expiration date so they may not be safe to consume.

Your mother advises that she should use the walnuts because in her opinion they usually last beyond their expiration date so they may be safe to consume.

Which advice do you trust in this situation?

Construction worker Mother

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Item 14

David is a lawyer working on a big case. The judge presiding over the trial happens to be someone he knew from law school. If David were to talk to him over lunch it would be very good for his work on the case. If they meet for lunch, there is a chance that someone will find out and it may slightly impede the case. Alternatively, there is a chance that no one will find out and it could help David to win his case.

Your mother advises that they should not meet for lunch because she knows from experience that there are not many judges and lawyers who socialise when working on the same case.

A hairdresser advises that they should meet for lunch because she knows from experience that there are many there are many judges and lawyers who socialise when working on the same case.

Which advice do you trust in this situation?

Mother Hairdresser

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Item 15

There is a fire in the building next door and deadly fumes are rising up through the ventilation system. There is a dog trapped in an office. An eyewitness can do something. By saving the dog there is a chance that the eyewitness could get injured. Alternatively, there is a chance that the eyewitness will not get injured.

A cleaner advises they should not save the dog because in her opinion the fire looks dangerous.

Your mother advises that they should save the dog because in her opinion, the fire does not look dangerous.

Which advice do you trust in this situation?

Cleaner Mother

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Item 16

There is a famine and Mustaq's family is unsure whether they will have enough food to survive the winter. There is a chance that stealing food from a neighbour in the village will provide him with enough food to save his family's life. There is also a chance that if he is caught stealing the neighbour may take matters into his own hands.

A hotel receptionist advises he should not steal the food because in her opinion the neighbour will probably notice the missing food.

Your mother advises that he should steal the food because in her opinion the neighbour will probably not notice the missing food.

Which advice do you trust in this situation?

Hotel receptionist Mother

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Item 17

A lifeboat is sitting dangerously low in the water. If the weight is not reduced the boat will sink and there is a chance that the people on board will all drown. If someone volunteers to jump into the sea to reduce the weight, there is a chance that this person will be saved by the rescue boat. Alternatively, there is a chance that this person will drown before the rescue boat reaches them.

Your mother advises someone should not jump out of the boat because in her opinion it will not be possible for the volunteer to tread water until the rescue-boat arrives.

A tile-layer advises that someone should jump out of the boat because in his opinion it will be possible for the volunteer to tread water until the rescue-boat arrives.

Which advice do you trust in this situation?

Mother Tile-layer

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Item 18

Harry is driving when he sees an injured man thumbing a lift at the side of the road. He has never picked up a hitchhiker before and he does not know whether it is safe to do so, but this man needs medical attention. Harry could take a chance that it is safe and allow him into the car, or he could drive past him.

Your mother advises he should not give the man a lift because she knows from experience that it is generally not safe to pick up hitchhikers.

A florist advises that he should give the man a lift because she knows from experience that it is generally safe to pick up hitchhikers.

Which advice do you trust in this situation?

Mother Florist

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Item 19

There is a chance that a new environmental policy could save many animal species. There is also a chance that it could backfire and put one specific category of species in danger. Someone must make a decision on whether to sign the policy or not.

A babysitter advises that this policy should not be signed because in her opinion this one specific category of species concerned is very important for the ecology.

Your mother advises that this policy should be signed because in her opinion this one specific category of species concerned is not very important for the ecology.

Which advice do you trust in this situation?

Babysitter Mother

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Item 20

Matthew has been trying to get an interview for his dream job. He figures that if he could leave out a period of unemployment from his CV he could make it more impressive. If Matthew does this, there is a chance that he could get hired, improving his reputation. Alternatively, there is a chance that he could get caught, damaging his reputation.

A carpenter advises that he should not omit the employment gap from his CV because he knows from experience that it is very obvious when someone is giving selective information on a CV.

Your mother advises that he should omit the employment gap from his CV because she knows from experience that it is not very obvious when someone is giving selective information on a CV.

Which advice do you trust in this situation?

Carpenter Mother

|----------|----------|

MildlyTrust StronglyTrust MildlyTrust StronglyTrust

How likely are you to change your mind regarding this decision?

|----------|----------|

Very Unlikely Very Likely

Appendix 9

Correlation matrix of all variables

Correlation matrix of subscales

	Int. Inv.	Inv. 2nd	Tot. Inv.	Tot. Inv. Earn.	Tot. Trus. Rep.	Tot. Trus Earn	Learn Score	Gen. Score	Prop. Moth	Stre. Moth. Trust	Stre. Stran. Trust	Con.	PA	SA	EA	PN	EN	CTQ Tot.	CTES Freq.	CTES Sev.
Trust Game																				
Initial Investment																				
Investment 2nd Round	.38**																			
Total Investment	.56**	.44**																		
Total Investor Earnings	.38**	.30**	.69**																	
Total Trustee Repay	.54**	.41**	.96**	.87**																
Total Trustee Earnings	.54**	.43**	.97**	.50**	.86**															
Learning Score	.14	-.02	.25*	.31**	.30*	.19														
Generalisation Score	.05	-.10	.03	.15	.08	-.02	.26*													
ETI																				
Proportion Chose Mother	.20	.00	-.04	.03	-.02	-.06	.07	.08												
Strength Mother Trust	.17	-.08	.00	.11	.04	-.03	-.06	.07	.69**											
Strength Stranger Trust	-.16	-.02	-.02	.01	-.01	-.02	-.24*	-.09	-.72**	-.26*										
Confidence	.03	-.00	.11	.21	.17	.05	.18	.15	-.02	-.32**	-.24*									
CTQ																				
Physical Abuse	-.03	.20	-.04	-.02	-.04	-.04	.08	.02	-.27*	-.31**	.20	.04								
Sexual Abuse	-.01	.02	-.01	-.08	-.03	.02	-.15	-.14	-.09	-.05	.14	-.01	-.07							
Emotional Abuse	.03	.17	-.08	.07	-.03	-.12	-.03	-.07	-.17	-.23*	.21	.10	.42**	.34**						

Physical Neglect	-.13	.23	-.07	-.04	-.06	-.07	.07	-.07	-.09	-.23*	.06	-.04	.35**	.12	.67**					
Emotional Neglect	-.02	.26*	-.09	-.11	-.11	-.07	.00	-.09	-.18	-.33**	.09	.01	.43**	.03	.69**	.61**				
CTQ Total Score	-.05	.25*	-.09	-.03	-.07	-.10	.01	-.07	-.23*	-.33**	.19	.04	.56**	.26*	.93**	.80**	-.85**			
CTES																				
Frequency	.03	.10	-.04	-.05	-.04	-.03	-.01	-.18	-.19	-.32**	.17	-.01	.42**	.37**	.59**	.37**	.50**	.61**		
Severity	.02	.18	.06	.03	.04	.07	-.07	-.02	.05	-.01	-.03	-.11	.07	.06	.28*	.06	.18	.23	.16	
Confide	.04	.10	.08	-.03	.05	.12	.08	.09	.11	.12	-.03	-.02	-.29*	-.08	-.24	-.14	-.38**	-.32**	-.14	.29*

Note. Int.Inv. = Initial Investment, Inv.2nd = Investment 2nd Round, Tot.Inv. = Total Investment, Tot.Inv.Earn. = Total Investor Earnings, Tot.Trus.Rep. = Total Trustee Repay, Tot.Trus.Earn. = Total Trustee Earnings, Learn.Score = Learning Score, Gen.Score = Generalisation Score, Prop.Moth. = Proportion Chose Mother, Stre.Moth.Trust = Strength Mother Trust, Stre.Stran.Trust = Strength Stranger Trust, Con. = Confide, PA = Physical Abuse, SA = Sexual Abuse, EA = Emotional Abuse, PN = Physical Neglect, EN = Emotional Neglect, CTQ.Tot = CTQ Total Score, CTES Freq. = CTES Frequency, CTES Sev = CTES Severity.