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Kincaid, D., Shannon, C., Boyd, A., Hanna, D., McNeill, O., Anderson, R., Francis-Naylor, M., & Mulholland, C. (2018). An investigation of associations between experience of childhood trauma and political violence and theory of mind impairments in schizophrenia. *Psychiatry Research*, 270, 293-297. <https://doi.org/10.1016/j.psychres.2018.09.052>

Published in:
Psychiatry Research

Document Version:
Peer reviewed version

Queen's University Belfast - Research Portal:
[Link to publication record in Queen's University Belfast Research Portal](#)

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An investigation of associations between experience of childhood trauma and political violence and theory of mind impairments in schizophrenia

Debbie Kincaid^a, Ciaran Shannon^{b*}, Adrian Boyd^b, Donncha Hanna^a, Owen McNeill^b, Rick Anderson^b, Michelle Francis-Naylor^b & Ciaran Mulholland^{b,c}

^aSchool of Psychology, The Queen's University of Belfast, Northern Ireland

^bNorthern Health and Social Care Trust, Antrim, Northern Ireland

^cDepartment of Psychiatry, The Queen's University of Belfast, Northern Ireland

Corresponding author: Dr Ciaran Shannon, STEP Team, Northern Health and Social Care Trust, Gurteen, 60 Steeple Road, Antrim, BT8 6NW, Northern Ireland. Email: ciaran.shannon@northerntrust.hscni.net

Abstract

There has been little examination of the association between trauma and cognitive deficits seen in individuals diagnosed with schizophrenia. Theory of Mind (ToM) impairments are a significant feature of schizophrenia but it remains unclear as to why these deficits are so prevalent in this population. This study aimed to explore associations between ToM deficits and specific forms of childhood adversities in a schizophrenia population. The study sample comprised of 66 adults with a confirmed diagnosis of schizophrenia, attending mental health services in Northern Ireland. Assessments were completed to ascertain if individuals had prior experience of sexual or physical abuse, emotional neglect or experience of the political violence of Northern Ireland's "Troubles", and the Gardner Hinting Test was applied to assess ToM ability. Backwards stepwise regression analyses demonstrated that emotional neglect, specifically during early childhood (0-6 years) predicted ToM impairments in this group. Conflict-related trauma was also associated with ToM but was not an independent significant predictor of ToM deficits. This is the first study to examine links between specific forms of childhood adversity and ToM impairments in individuals diagnosed with schizophrenia. Potential underpinning psychological mechanisms are considered and implications for clinical practice are discussed.

1. *Introduction*

Traumatic childhood experiences including sexual, emotional and physical abuse and neglect have been causally implicated in the development of a range of adult mental health difficulties (Mullen et al., 1996). There is a strong association between psychotic illnesses, including schizophrenia, and a history of childhood adversity (Shevlin et al., 2008; Varese et al., 2012).

Specific exposure to conflict-related trauma has been examined in a number of studies. High rates of exposure to trauma related to political violence in Northern Ireland (colloquially known as ‘The Troubles’) have been observed in individuals diagnosed with chronic schizophrenia (Mulholland et al., 2008) and have been shown to impact on clinical outcomes after a first episode of psychosis (Turkington et al., 2016). “The Troubles” spanned a thirty year period (1968-1998) of civil conflict and sectarian violence, and whilst there has been a reduction in the intensity of violence over the past two decades, intermittent violence continues.

Recently there has been a focus on attempts to understand the psychological mechanisms which underpin specific psychotic experiences (Bentall et al., 2012; Sitko et al., 2014). Theory of Mind (ToM) deficits in schizophrenia have received significant attention (Cassetta and Goghari, 2014). ToM is the cognitive ability to understand and attribute mental states such as thoughts and intentions to self and others in order to explain and predict behaviour (Sprong et al., 2007). Frith (1992) initially proposed an association between impaired ToM and schizophrenia. He hypothesised that symptoms of schizophrenia could be explained by problems with meta-representation: the capacity to think about thoughts and infer mental states in others. Significant and stable ToM deficits in schizophrenia have been evidenced by large effect sizes (Bora et al., 2009; Sprong et al., 2007).

ToM deficits are implicated as a psychological mechanism underpinning paranoid delusions via inaccurate attributions about the intentions of others and a propensity to ascribe malign intent (Harrington et al., 2005) however its specificity to paranoid delusions has been contested. ToM impairments have been evidenced in individuals with other psychotic symptoms including negative symptoms (Bora et al., 2009; Cassetta and Goghari, 2014) and meta-analysis has highlighted that individuals with disorganised symptoms have significantly greater ToM impairment than individuals with paranoid symptoms (Sprong et al., 2007).

Whilst it is evident that ToM abnormalities are present in schizophrenia, there is a lack of understanding as to mechanisms involved. ToM may be acquired during childhood and over the course of multiple caregiver interactions. Attachment style is related to the quality of communication between caregiver and child, and insecure attachment is thought to underpin ToM deficits (Pos et al., 2015). Parental communication is associated with the development of ToM, and features of the early social environment such as family discussions about feelings inform children's ToM and are likely to be linked with attachment security (Meins et al., 2002).

It has been proposed that threat and deprivation experiences in childhood may differentially influence neural development (Sheridan and McLaughlin, 2014). Child neglect, whereby insufficient cognitive and social nurturing is provided, gives rise to difficulties with complex cognitive tasks, whereas threat-based experiences such as childhood physical abuse (CPA) or childhood sexual abuse (CSA) result in altered neural circuits associated with emotional learning (Sheridan and McLaughlin, 2014). This latter finding is consistent with the traumagenic neurodevelopmental model of psychosis (Read et al., 2001). Considering the biological impact of exposure to adversity alongside the psychological development of self-other

relationships, it is conceivable that ToM development may be impeded in individuals exposed to childhood adversity however research is limited.

Studies exploring the development of ToM in maltreated children have consistently shown that maltreatment is associated with delayed ToM development even when confounding variables are controlled for (Cicchetti et al., 2003; Colvert et al., 2008) and severity of maltreatment has been found to be an independent predictor of delayed ToM development (O'Reilly and Peterson, 2015). One recent meta-analysis reported that childhood physical abuse and neglect impacted negatively on ToM (Luke and Banerjee, 2013) whereas another by Benarous et al. (2015) suggested that childhood trauma is associated with poorer performance on a specific ToM task (false-belief), with inconclusive evidence about the association with other ToM tasks.

A recently published study is the first to explore associations between childhood adversity and ToM impairments in individuals across the psychosis continuum. It found that exposure to adversity was not a significant predictor of ToM however specific links between subtypes of adversity and ToM ability were not explored (Palmier et al., 2016). Thus, the current study aims to explore the association between specific forms of childhood adversity and ToM deficits in adults diagnosed with schizophrenia. To our knowledge, this is the first such study. Based on the literature pertaining to childhood maltreatment outlined above it was hypothesized that childhood emotional neglect and CPA will be associated with ToM deficits. Given the previously published research suggesting an impact on psychosis outcomes and symptoms in individuals with a diagnosis of schizophrenia and a history of exposure to “Troubles” related violence (Mulholland et al., 2008), it was further hypothesized that such exposure would be associated with ToM deficits. Insight into the relationships between specific adversities and

outcomes has important implications in terms of understanding pathways to psychosis via interactions between risk factors and important biological and psychological mechanisms and may have implications for both interventions (Longden et al., 2016).

2. Methods

2.1 Participants

All adults (aged 18 and over) with a DSM-V diagnosis of schizophrenia as confirmed by a consultant psychiatrist and who were attending mental health services within a service in Northern Ireland were considered for inclusion in the study. The following exclusion criteria applied: 1) moderate-severe brain injury and 2) currently in a relapse of disorder as acute psychosis may impede ToM performance (Bora et al., 2009). Ethical approval was granted by the regional research ethics committee. Written informed consent was obtained from each participant.

Sixty seven individuals initially agreed to participate in the study. One person did not wish to complete the research interview and the final number included in the study was 66. The mean age of participants was 45 years (range: 21-73, SD 11.4) and 52 (79%) were male and 14 (21%) were female. Forty-eight (73%) were single, 4 (6%) were married, 11 (17%) were separated or divorced, and 3 (4%) were widowed.

2.2 Measures

Four measures were administered in the following order during each research interview:

- 1) The *Traumatic Experiences Checklist* (TEC) is a retrospective, self-report measure of potentially traumatic life experiences (Nijenhuis et al., 1999). It employs a yes/no format

in response to 29 items pertaining to emotional neglect and abuse; sexual abuse and harassment; and physical abuse and threat to life, in addition to other potentially overwhelming experiences, for example “Did this happen to you: Physical abuse (e.g. being hit, tortured, or wounded) by your parents, brothers, or sisters?” The psychometric properties of the TEC have been validated using a sample of psychiatric outpatients: it was found to have good internal consistency and test-retest reliability, in addition to satisfactory criterion-related validity Nijenhuis et al., 2002).

- 2) The “*Troubles*” *Related Experiences Questionnaire* (TREQ) is a 27 item self-report questionnaire which measures exposure to events related to the civil conflict known as ‘The Troubles’ in Northern Ireland (Dorahy et al., 2007). Example questions include “as a result of the Troubles, have you been a victim of a bombing (explosion), including blast or petrol bombs?” Internal reliability scores exceed 0.90, and its construct validity is also supported.
- 3) The *Gardner Hinting Test* (Marjoram et al., 2005) is designed to assess ToM ability. It is comprised of 10 scenarios involving social interactions between two characters, all of which entail an indirect message or hint being conveyed. Each scenario is presented verbally, and participants are then asked to identify the intended message. This measure has been shown to be able to distinguish between clinical (schizophrenia) and non-clinical groups (Scherzer et al., 2012).
- 4) The *Revised Manchester Scale KGVM Symptom Scale Version 6.2* (Krawiecka et al., 1977) is a standardised assessment scale designed for rating the severity of psychiatric symptoms experienced by chronically psychotic individuals. The delusional subscale of

this instrument was used. The measure is widely used in psychosis research and possesses high levels of test-retest reliability (Jackson et al., 2004).

2.3 Procedure

Participants attended a research interview lasting approximately 0.5 to 1 hour. Measures were administered in the order listed above, by one of two researchers (DK & AB).

2.4 Design and Statistical Methods

The study utilized a retrospective, cross-sectional design, and participants were recruited via opportunity sampling. Statistical analyses were performed using SPSS version 23 (IBM Corp., 2014). Descriptive statistics were used to ascertain demographic characteristics of the sample and to explore the prevalence of various forms of childhood adversity. Correlational analyses were conducted in order to explore associations between all variables and in order to identify any potential confounding variables. Backwards stepwise regression analyses were undertaken in order to explore associations between all predictor variables and ToM and in order to explore which specific types of adversity predicted ToM deficits. Males were coded as “1” and females were coded as “2” in regression models. The various assumptions of regression models were checked including normal distribution, linearity, multicollinearity and homoscedasticity.

3. Results

3.1 Trauma prevalence

Fifty-six (85%) participants reported experiencing at least one potentially traumatic childhood experience as assessed by the TEC. Childhood experiences of “Troubles”-related

trauma were reported by 29 (44%) participants. There were no significant differences between males and females on levels of reported adversity on either measure. Table 1 details pertinent descriptive statistics for each of the measures employed. Table 2 provides a breakdown of adversity types per age category as reported on the TEC.

3.2 Associations between variables

In order to identify any associations between the variables (including any potential confounding variables), Pearson correlation co-efficients were explored (Table 3). Emotional neglect was the only variable found to be significantly associated with low scores on the Gardner Hinting Test ($r = -0.301$, $N = 65$, $p = 0.015$).

3.3 Childhood adversity and ToM

The assumptions of regression were checked, and there were no violations. With regards to multicollinearity, all VIF values were all less than 5. Childhood adversity (including emotional abuse and neglect, physical abuse and life threat, sexual abuse and harassment, and “Troubles”-related trauma) alongside age, gender and presence of delusions were utilized as predictors in a backwards stepwise regression analysis with ToM deficits (i.e. low scores on the Gardner Hinting Test) as criterion variables. The model was statistically significant ($F(4, 60) = 4.173, p=0.005$): 16.5% (adjusted $r^2=0.165$) of the variance in ToM was explained by variance in gender (females had a significantly higher ToM ability), emotional neglect, and impact of “Troubles”-related trauma. Table 4 depicts the relevant coefficients and their corresponding significance levels.

3.4 Emotional neglect and ToM

After emotional neglect was found to be a significant predictor, a follow-up analysis was conducted to investigate if emotional neglect at a particular age was predictive of theory of mind impairments. A backwards stepwise multiple regression procedure was applied to emotional neglect between the ages of 0-6 years, 7-12 years, and 13-18 years. The model was statistically significant ($F(1, 63) = 7.102, p = 0.010$): emotional abuse between the ages of 0-6 years was the only significant predictor of ToM impairments, accounting for 8.7% (adjusted $r^2=0.087$) of the variance in ToM (Table 5).

4. Discussion

This is the first study to explore the specificity of associations between specific forms of childhood adversity and ToM impairments in a population with a diagnosis of schizophrenia.

The study found that emotional neglect, gender and impact of “Troubles”-related trauma accounted for 16.5% of variance in ToM. Congruent with our first hypothesis, emotional neglect, specifically between the ages of 0-6 years, was most predictive of ToM deficits. This finding is consistent with the ToM impairments observed in children exposed to severe early deprivation (Colvert et al., 2008), and is comparable to other research demonstrating the adverse impact of neglect (physical and emotional) on ToM development (Luke and Banerjee, 2013; Weinstein et al., 2016). Maltreatment during toddlerhood has been found to have a particularly negative impact upon ToM development (Cicchetti et al., 2003). The differentiation of emotional neglect from other forms of maltreatment highlighted by this study is consistent with the specific effects of early deprivation on neuro-development. This includes under-development of neural structures due to a lack of stimulation, which may have a deleterious effect on neuro-development by adversely impacting the development of synaptic connections, and subsequently compromising performance on complex cognitive tasks (Sheridan and McLaughlin, 2014).

Exposure to emotional neglect may preclude or reduce opportunities for communication of mental state understanding from caregivers and therefore may result in difficulties forming mental representations, which is required for effective ToM (Harrington et al., 2005a). The Attachment-Developmental-Cognitive hypothesis proposes that key psychological features of schizophrenia- ToM deficits and negative self-and-other attributions- may be explained by disruptions to, or impairments in attachment relationships within the first decade of life (Rajkumar, 2014). It is therefore plausible that the psychological mechanisms which underpin ToM deficits in schizophrenia relate to factors associated with disrupted attachments such as reduced quality of communication and insufficient emotional nurturance in early emotional neglect however further research is required before causality can be inferred.

Our findings do however contrast with the findings of Germine et al. (2015) who failed to demonstrate a significant association between childhood emotional neglect (and institutional care) and ToM ability in adults. Interestingly, their study concluded that CPA was the most significant form of adversity to be associated with ToM deficits, as did Kay and Green (2016) in their sample of maltreated adolescents in out-of-home care. Our hypothesis that CPA would be associated with ToM impairments was not upheld by our results. Our results thus appear somewhat inconsistent with the link between physical abuse and neglect and ToM impairments highlighted by a recent meta-analysis (Luke and Banerjee, 2013) however physical abuse was not considered independent of physical neglect and therefore confounds the argument of specificity.

Weinstein et al. (2016) does however offer overall support for our results: childhood neglect was associated with poorer performance on ToM tasks. However childhood adversity (including physical, emotional and sexual abuse) was associated with *enhanced* ToM in individuals with borderline pathology (compared to a control group). Whilst Germine et al (2015) outcomes are the opposite of Weinstein et al. (2016), their findings are comparable in that the same ToM measure (namely the Reading the Mind in the Eyes Test: RMET) was utilized by their studies. The latter study did not differentiate between specific forms of adversity however, and therefore the impact of CPA specifically is not discernible. The paucity of research, in addition to the conflicting results regarding the influence of CPA on ToM makes drawing conclusions difficult.

It has been posited that the unpredictability and harshness of CPA may have a particularly potent effect on ToM development (Cicchetti et al., 2003). Furthermore, difficulty in predicting parental behaviour may account for the high levels of attachment insecurity observed

in individuals exposed to CPA (Unger and De Luca, 2014). A contrasting theory, in line with the findings of this study, relates to the hyper-arousal response which is associated with CPA and other early threat-based experiences (Read et al., 2001; Sheridan and McLaughlin, 2014). Neurodevelopmental changes associated with emotional learning such as amygdala over-activation results in hyper-vigilance to threat cues; potentially parental behaviour or mental state. ToM acquisition would therefore be adaptive in order to protect against exposure to trauma (Weinstein et al., 2016), and may explain why CPA was not associated with ToM impairments in this study.

Our results failed to demonstrate an association between delusions and ToM which was a surprising outcome given the body of research demonstrating their connection (Craig et al., 2004; Harrington et al., 2005b; Langdon et al., 2005). Delusional beliefs are however a predominant focus of treatment interventions and were identified in only a minority of participants in our study and therefore it is possible that a type II error may have occurred due to insufficient power to detect a significant association.

Whilst there was no significant correlation between subjective impact of “Troubles”-related trauma and ToM, a significant association was observed when these variables were combined with emotional neglect and gender. It is therefore possible that childhood exposure to emotional neglect and “Troubles”-related violence plus gender may interact in order to produce a unique detrimental effect on ToM in a Northern Irish population. It is also possible that “Troubles”-related trauma may represent a contributing factor to emotional neglect when considering hierarchy of needs. The ability to attend to emotional needs is severely compromised when there is a high threat to physical safety, as sometimes occurred during “The Troubles”.

ToM is considered a composite function which relies on multiple cognitive functions but ToM impairments are independent of deficits in intellectual ability or other cognitive functions such as executive functioning or memory (Benarous et al., 2015; Harrington et al., 2005b). It is possible that the ToM task utilised in this study may have differentially identified ToM impairments associated with early emotional neglect (understanding indirect messages) but the task may not tap into other dimensions of ToM (for example false-belief understanding) which may be specifically linked with other forms of trauma. The trajectory of ToM deficits in individuals diagnosed with schizophrenia remains unclear as it is not yet established whether ToM deficits are a precursor or consequence of psychosis. ToM impairments are contended to represent a disintegration of previously intact ToM (Frith, 1992) but this is contradicted by evidence that such impairments have been observed in individuals at ultra-high risk (UHR) for psychosis, those experiencing a first-episode of psychosis, and unaffected relatives (Bora and Pantelis, 2013).

4.1 Limitations

The cross sectional study design, large gender imbalance and relatively modest sample size warrants caution in interpreting these findings though the sample size was adequate. Retrospective trauma measures were employed which pose concerns regarding the accuracy of data due to the potential influence of processes such as forgetting or amnesia, particularly in a psychosis population where impaired reality-testing may exert influence. However, retrospective self-reports of adversity have been evidenced as appropriate for use with psychosis patients in terms of reliability (Fisher et al., 2011), and tendencies towards under-reporting rather than over-reporting of adversity have been noted on retrospective measures (Fergusson et al., 2000). While the TEC has been translated in several languages (Espirito-Santo et al., 2013; Schumacher et al.,

2011), there is no published psychometric data on the English version. Translation followed standard translation procedures i.e. translated and back translated (Nijenhuis, personal communication).

4.2 Implications

Further research is warranted in order to explore associations between specific adversities and ToM impairments in individuals diagnosed with schizophrenia as assessed by a range of ToM tasks, whilst future longitudinal research should focus on exploring the trajectory of ToM abilities in individuals at high-risk for psychosis. Knowledge of pathways between trauma and specific features of psychosis, and insight into their underpinning mechanisms may have clinical implications, especially for intervention (Bentall et al., 2014; Longden et al., 2016). These findings also highlight the need for routine assessment of early adversity such as emotional neglect, which may require specialized training for clinicians in order to provide effective trauma-informed services.

Declarations of Interests: None

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Table 1: Descriptive statistics of measures employed

Measure	Possible range of scores	Achieved range of scores	Mean	Std. Deviation
TEC				
<i>Emotional neglect</i>	0-15	0-12	1.59	3.002
<i>Emotional abuse</i>	0-15	0-12	2.98	3.275
<i>Physical abuse</i>	0-15	0-12	1.7	3.191
<i>Threat to life</i>	0-15	0-16	2.41	3.984
<i>Sexual harassment</i>	0-15	0-12	0.77	2.339
<i>Sexual abuse</i>	0-15	0-10	0.98	2.297
<i>Total trauma</i>	0-90	0-52	8.68	11.097
TREQ				
<i>Childhood trauma</i>	0-168	0-35	2.48	5.695
<i>Subjective impact</i>	0-112	0-51	7.42	9.834
ToM Hinting Test	0-20	4-20	14.78	3.879
Delusions Subscale	0-4	0-4	0.97	1.301

Table 2: Traumatic Experiences Checklist (TEC) childhood adversity domains per age category

	<i>0-6 years</i>		<i>7-12 years</i>		<i>13-18 years</i>	
<i>Adversity subtype</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
Emotional neglect	8	12	16	24	10	15
Emotional abuse*	8	12	29	44	26	40
Physical abuse*	5	8	16	24	13	20
Threat to life	3	5	6	9	10	15
Sexual harassment	5	8	7	11	4	6
Sexual abuse	4	6	10	15	7	11

*denotes significant differences in adversity across age groups

Table 3: Correlations (*r*) between age, gender, childhood adversity subtypes, delusions and ToM ability (as measured by the Gardner Hinting Test)

	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	-											
2. Gender	0.036	-										
3. Emotional neglect	-0.144	0.308*	-									
4. Emotional abuse	-0.050	0.139	0.384**	-								
5. Physical abuse	-0.039	0.096	0.456**	0.558**	-							
6. Threat to life	-0.019	0.190	0.467**	0.612**	0.932**	-						
7. Sexual harassment	-0.082	0.322**	0.182	0.321**	0.388**	0.476**	-					
8. Sexual abuse	-0.063	0.377**	0.247*	0.360**	0.329**	0.448**	0.850**	-				
9. TRT*** Incidence	-0.163	-0.012	0.192	0.045	0.079	0.116	0.025	0.125	-			
10. TRT*** Impact	0.000	0.042	0.281*	0.222	0.280*	0.366**	0.152	0.160	0.529**	-		
11. Delusions	0.043	-0.131	0.016	0.007	0.001	-0.018	0.200	0.072	0.046	0.129	-	
12. ToM	-0.062	0.136	-0.301*	-0.097	-0.149	-0.129	0.070	0.091	-0.199	0.037	0.030	-

*significant at the $p = 0.05$ level **significant at the $p = 0.01$ level ***"Troubles"-Related Trauma

Table 4: Predictors of ToM deficits

<i>Predictor Variable</i>	<i>Standardized Beta</i>	<i>t score</i>	<i>P value</i>
Emotional neglect	-0.402	-3.214	0.002*
Impact of “Troubles”-related trauma	0.280	2.036	0.046*
Gender	0.245	2.034	0.046*

Table 5: Emotional neglect per age category predicting ToM deficits

<i>Predictor Variable</i>	<i>Standardized</i>	<i>t score</i>	<i>P value</i>
<i>Emotional neglect</i>	<i>Beta</i>		
0-6 years	-0.318	-2.665	0.010**
7-12 years	0.028	0.140	0.889
13-18 years	-0.102	-0.817	0.417