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Does childhood trauma predict poorer metacognitive abilities in people with first-episode psychosis?

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Abstract

Research suggests that people with first-episode psychosis (FEP) report more childhood traumas and have lower metacognitive abilities than non-clinical controls. Metacognition refers to the identification of thoughts and feelings and the formation of complex ideas about oneself and others. Childhood trauma negatively affects metacognitive development in population studies, while the association remains largely unexplored in FEP populations. This study hypothesized that childhood trauma would be associated with lower metacognitive abilities in people with FEP. In a representative sample of 92 persons with non-affective FEP, we assessed childhood trauma, metacognitive abilities and symptoms of non-affective psychosis. We used the Childhood Trauma Questionnaire (CTQ) and the Metacognitive Assessment Scale – Abbreviated which includes Self-reflectivity, Awareness of the Mind of the Other, Decentration and Mastery. Hierarchical regression analyses were performed with metacognitive domains as outcome variables and childhood traumas as independent variables, while controlling for age, gender, first-degree psychiatric illness and negative symptoms. We found few significant associations between the different types of childhood trauma and metacognitive domains, and they suggested childhood trauma are associated with better metacognitive abilities. Study limitations included the cross-sectional design and use of self-report measures. Future studies could preferably be prospective and include different measures of psychopathology and neuropsychology.

1. Introduction

People with psychosis are highly likely to have experienced childhood trauma (Trauelsen et al., 2015; Varese et al., 2012) and they exhibit lower metacognitive abilities than non-clinical controls (Healey et al., 2016; Trauelsen et al., 2016b). As childhood trauma has been found to affect metacognition in population studies (Cicchetti et al., 2003; Edwards et al., 2005; Ensink et al., 2015; Pears and Fisher, 2005; Shipman and Zeman, 1999), it seems important to address the possible association in people with psychosis.

Metacognition refers to both simple and more complex mental activities. The simple activities include the ability to identify thoughts and feelings, both in oneself and others; the complex activities include the ability to use this knowledge to form complex ideas about oneself and others (Paul Henry Lysaker et al., 2018). Metacognition is associated with mentalization, social cognition and theory of mind (Fonagy et al., 2011; Paul Henry Lysaker et al., 2018). Their associations are sparsely examined, but it seems that social cognition is related to more distinct kinds of abilities whereas metacognition is related to more integrative kinds of metacognitive awareness (Lysaker et al., 2013). At the same time it has been shown that good social cognitive abilities are associated with better metacognitive abilities (James et al., 2017). One way of measuring metacognitive skills, is with the Metacognition Assessment Scale – Abbreviated (MAS-A) which includes the four domains Self-reflectivity, Awareness of the mind of the other (AoM), Decentration and Mastery. Self-reflectivity and AoM refers to the ability to recognize feelings and cognitions and use this information to form complex ideas about oneself and others, respectively. Decentration refers to the acknowledgement that other people are individual beings living their own lives relatively independently of oneself; and Mastery is the ability to review all this information to better master one's mental health and interpersonal problems.

Metacognitive abilities are thought to develop throughout childhood and adolescence with some continuance into adult life (Kuhn, 2000). For example, mothers' appropriate mind-related comments at 12 months predicted superior metacognitive abilities at ages two and four (Laranjo et al., 2014; Meins et al., 2003). Metacognition is both trait and state dependent and as so may decrease in interpersonally threatening situations and increase in safe environments (Dimaggio and Lysaker, 2015; Liotti and Gilbert, 2011). It has been found that both childhood abuse (Cicchetti et al., 2003; Ensink et al., 2015; Pears and Fisher, 2005) and neglect (Edwards et al., 2005; Shipman and Zeman, 1999) is associated with lowered metacognitive abilities. One possible explanation for these associations is that trauma might decrease one's awareness of both one's own and others'

mental states to protect oneself from the painful feelings associated with the awareness (Lysaker et al., 2011, p. 1189). With such associations found in children and with findings of lower metacognitive abilities in people with psychosis, it seems reasonable to hypothesize an association between the two domains in psychosis populations.

Research has begun to address this gap; so far counting six studies with quite diverse findings. (Aydin et al., 2016) found that a total score composed of four types of reported childhood abuse was associated with mentalizing impairments in a sample of 87 patients with a non-affective psychotic disorder. Mentalization was represented by the Hinting Task where the patient must recognize the beliefs or feelings of a character in order to apprehend an implicit message (Corcoran et al., 1995). Weijers et al. also found that mentalization mediated around 40 % of the association between reported childhood abuse and negative symptoms. A case control study of people with early psychosis found that childhood abuse (sexual, physical and emotional) and neglect (physical and emotional), as measured by total Childhood Trauma Questionnaire (CTQ), was related to poorer social cognition measured by the MATRICS Consensus Cognitive Battery (MCCB) comprising the ability to understand others based on the selection and interpretation of social information (Garcia et al., 2016). Also, using the CTQ and the MCCB, a case-control study of people with non-affective FEP and mentally healthy traumatized participants found that childhood neglect - but not abuse - was a significant predictor for poorer social cognition in both groups (Kilian et al., 2017). Aydin et al. found that those with childhood emotional abuse had worse Decentration skills (Aydin et al., 2016). All other trauma types and metacognitive subdomains were not found to be associated. In another study of people either at ultra high risk or with a non-affective psychosis found that childhood trauma was not associated with theory of mind (Palmier-Claus et al., 2016). Trauma were measured by the CTQ total and theory of mind by the Hinting Task and the Mind in the Eyes task where participants are presented with pictures of others' eyes and choose between four words to best describe them. The last study only examined child sexual abuse before age 13 and found it to be associated with good Self-reflectivity but low AoM (Lysaker et al., 2011) Thus, three studies found associations between childhood abuse and metacognition, while three studies found no or only scarce associations. One of the latter studies included ultra high risk participants which may have diminished possible associations in the FEP group (Palmier-Claus et al., 2016). Assessment instruments couldn't explain the mixed results as studies using the same metacognitive instruments, the MCCB and the Hinting Task, and even the same trauma instruments, the CTQ, also found differing results. Most studies had sufficient sample sizes and

appeared robust, and it remains unclear whether there is an association between childhood trauma and metacognitive abilities in people with psychosis.

Therefore, we aimed to test associations between childhood trauma and metacognition in a clinical epidemiological sample of people with non-affective FEP, while controlling for other important factors - age, gender and 1st degree psychiatric illness. We furthermore had models with and without negative symptoms as these repeatedly have been found to be associated with metacognitive abilities (Hamm et al., 2012; McLeod et al., 2014; Trauelsen et al., 2016b) and therefore might affect the association.

We hypothesized that

1) All 7 trauma types would predict lower Self-reflectivity, lower Awareness of the Mind of the Other, lower Decentration and Mastery abilities.

2) An increasing number of childhood adversities would be associated with lower metacognitive abilities in adulthood.

2. Method

2.1. Participants

The sample has previously been described in other papers (Trauelsen et al., 2016b, 2015). Denmark has a nationwide early intervention programme (OPUS) (Petersen et al., 2005) whose inclusion criteria at the time of the study were a first-episode ICD-10 diagnosis F20-29, except F21, and an age of 18-35 years. The only exclusion criterion was insufficient Danish skills to carry out the interviews. Everyone who participated in OPUS between April 1st 2011 and April 1st 2013 in Region Zealand (population = 816,359) was approached for participation.

2.2. Measures

2.2.1 Indiana psychiatric illness interview (IPII)

The IPII is a semi-structured interview where the interviewees are invited to talk about the following areas: Their life story; the psychiatric problems that they may or may not think they have, and how they have been affected by them; how they control and are controlled by these problems; how they are affected by and affect other people; and how their future will be (Lysaker et al., 2002). The interview is conversational with a minimal amount of direction, though participants are encouraged to answer all questions, which allows for a spontaneous narrative. The interview lasts

about 30 minutes, and the responses are audio taped and transcribed.

2.2.2. Metacognition assessment scale-abbreviated (MAS-A)

MAS-A (Lysaker et al., 2005) is an elaboration of the metacognition assessment scale (MAS) which was developed for metacognitive assessment in psychotherapy (Semerari et al., 2003). The MAS-A brings a dimensional structure to the original MAS and demands a presence of lower order metacognitive skills before the highest scores can be awarded. The ratings were based on the IPII transcripts measuring the presence of observations and elaborations conveyed by the interviewees.

The MAS-A consists of the four subscales Self-reflectivity, Awareness of the Mind of the Other (AoM), Decentration and Mastery. Self-reflectivity consists of nine levels, which range from identifying to integrating knowledge about oneself with the identification of affective and cognitive processes as a benchmark for achieving higher ratings. AoM consists of seven levels, which range from identifying to integrating knowledge about others, in a progressively more complex way. Decentration consists of three levels. It reflects the ability to understand that other people lead their lives and interact with each other independently of oneself. Mastery consists of nine levels and concerns the ability to use ones understanding of self and others to solve or overcome psychological difficulties. The MAS-A total score is the sum of the four subscales. Each level can be rated as 0, 0.5 or 1 points. The total MAS score ranged from 0 to 28.

The MAS-A has been found to have good inter-rater reliability with intra-class coefficients ranging from 0.71 to 0.91 (Lysaker et al., 2005). The current study calculated reliability for 20 % randomly drawn IPII transcripts rated by the first and third author. Cronbach's alpha was 0.88.

2.2.3. Childhood adversities.

The Danish validated version of the Childhood Trauma Questionnaire (CTQ) (Bernstein and Fink, 2011) was used for trauma assessment (Bernstein et al., 2003). It consists of five subcategories with five questions each. The CTQ subcategories were dichotomized using the cut-off scores from moderate to severe as proposed by Bernstein et al. (Bernstein and Fink, 2011). Separation and institutionalization were assessed with the Childhood Experience of Care and Abuse Questionnaire (CECA.Q) (Bifulco et al., 2005; Smith et al., 2002). The number of adversities ranged from zero to seven, combining CTQ with separation and institutionalization.

The perceived probability for a relation between adversities and the psychosis was measured by an item from the Brief Betrayal Trauma Survey (BBTS) (Goldberg and Freyd, 2006). This instrument is derived from the Betrayal Trauma Inventory (Freyd, 1998) and consists of several items, including the question whether the interviewee believes the psychosis is a result of the childhood adversity, rated on a five point scale from not likely to very likely.

2.2.4. Psychopathology

The ICD-10 diagnoses were obtained by the use of the OPCRIT diagnostic system and based on patient records and a Positive and Negative Symptom Scales (PANSS) interview (Kay et al., 1987). PANSS was extended to include life-long symptoms (McGuffin et al., 1991). For analyses, we used the five factor categorization suggested and validated by van der Gaag (2006).

Seventeen PANSS interview videos and vignettes were randomly drawn and rated by the four raters. For diagnoses, there was an overall agreement of 82 % and a median kappa of 0.52. The ICC (2, k) coefficients for DUP was 0.94. For the PANSS van der Gaag components, the ICC (2, k) coefficients were: Positive component score 0.81, negative component score 0.90, depressive component score 0.86, excitement component score 0.64 and cognitive component score 0.81. These numbers represent excellent >.75 and fair-to-good reliability 0.40-0.75 (Fleiss, 2011).

2.3. Procedure

Participants were informed about the study by the research team as soon as possible after inclusion in OPUS. The FEP participants were interviewed twice for approximately 1.5 hours.
A psychologist or medical doctor administered the PANSS. We had all received training by a senior psychiatrist.
To minimize the interviewer's influence on the interviewee, the IPII was the first interview to be performed.

2.4. Ethics

All participants received oral and written study information. For persons with FEP, it was clearly stated that they could withdraw their consent at any time and that participation had no impact on their treatment. Controls received DKK 400 equal to EURO 54 as compensation for their time and contribution. The protocol was submitted to the Regional Ethics Committee and pre-approval was

found unnecessary. The Data Protection Council, Region Zealand, approved data management (journal no. 12-000660).

2.5. Statistical analysis

We used the IBM SPSS Statistics 24 for all analyses. Frequency graphs were inspected visually to determine the approximation of the normal distribution. Spearman Rank Correlation analyses were performed for all variables included in the regression models to provide an overview of their associations.

To address the first hypothesis we performed hierarchical regression analyses with the four MAS-A domains as the outcome variables. In the and second step we included variables known to affect metacognition: The first step included age, gender and first degree psychiatric illness in the family and the second step negative symptoms. In the third step we included sexual, physical and emotional abuse, physical and emotional neglect, separation and institutionalization if they were significantly correlated with the outcome variable.

The α-level was 0.05. We did not correct for multiple comparisons because, as Rothman states, a possible cost of this is that we conclude there is no associations though this may be the case (Rothman, 1990).

To address the second hypothesis we performed multiple regression analyses with the four MAS-A domains as the outcome variables and number of adversities as the explanatory variable added in the third step. These models were also adjusted for age, gender and first degree relative psych. ill. In the first step and negative symptoms in the second.

Positive symptoms were not included in the models as we have found it unrelated to metacognition in a previous article (Trauelsen et al., 2016b).

Our data passed all assumptions for multiple regression analyses. The residuals were independent, with Durbin-Watson values above 1, and there was no homoscedasticity. Multicollinearity was low; the Variance Inflation Factors were well below cut-off points of four (Myers, 1990) and the Tolerances were greater than 0.2 (O'brien, 2007). We identified one outlier, but it was not possible to remove this case as there were no indications that the case was not rated properly - MAS ratings by the first and second author that were conducted for interrater reliability were similar and PANSS co-rating sufficient. There were also two outliers that were still rather close to the other points in the distribution and that did not affect the outcomes if they were removed.

3. Results

3.1. Descriptive data

We included 92 (47 %) out of 194 eligible patients with FEP. Exclusions were due to a wish not to participate (51); inability to obtain contact (18); withdrawal of consent (14); inclusion before the CTQ was included in the study protocol (11), missing data of first degree psychiatric disorder in the family (9) and insufficient Danish skills (3). The sociodemographic and clinical characteristics show an almost all Caucasian group mainly diagnosed with schizophrenia. The data are presented along with clinical characteristics in Table 1. Further details of childhood adversity data are presented in (Trauelsen et al., 2015).

Insert table 1 here.

3.2. Correlation analyses

All significant childhood trauma – metacognition correlations were positive. Emotional neglect was only correlated to Self-reflectivity; sexual abuse was positively correlated to Self-reflectivity, Decentration and MAS-A total, while emotional abuse was positively correlated to all the MAS-A subdomains and MAS-A total. There were no significant correlations between institutionalization, separation, physical abuse, physical neglect, number of adversities and any of the metacognitive domains or MAS-A total.

Of the seven adversities, sexual abuse alone was correlated with negative symptoms. Negative symptoms were negatively correlated to all the metacognitive domains and MAS-A total.

Insert table 2 here.

3.3. Hierarchical regression analyses

Results of the hierarchical regression analysis did not provide confirmation for the first research hypothesis. All the models explained a statistically significant part of the variation in the

metacognitive subdomains, but childhood trauma predicted higher and not lower metacognitive scores. The addition of sexual and emotional abuse and emotional neglect significantly improved the prediction of higher Self-reflectivity scores in a model that predicted 29.7 % of the variability (R^2 change = .072. F = 2.85, p = .042). The addition of emotional abuse did not improve the prediction of AoM in a model that predicted 17.4 % of the variability (R^2 change = .014. F = 1.41, p = .239). The addition of sexual and emotional abuse significantly improved the prediction of higher Decentration scores in a model that predicted 25.2 % of the variability (R^2 change = .088. F = 4.98, p = .009). The addition of emotional abuse trended to significantly improve the prediction of Mastery in a model that predicted 19.9 % of the variability (R^2 change = .035. F = 3.74, p = .056).

The statistical models are presented in tables 3 to 6.

Insert tables 3 – 6 here.

Results of the hierarchical regression analysis did not provide confirmation for the second research hypothesis. Number of adversities did not improve the prediction of variability in any of the MAS-A subdomains: For Self-reflectivity the numbers were (R^2 change = .006. F = .625, p = .431); for AoM (R^2 change = .002. F = .223, p = .638); for Decentration (R^2 change = .009. F = .939, p = .335) and for Mastery (R^2 change = .000. F = .005, p = .944).

Post hoc. analyses were performed to test whether childhood trauma predicted MAS-A total: Sexual and emotional abuse alone were correlated with MAS-A total. They were included in the hierarchical regression analysis in step 3 after gender, age and first degree psychiatric disorder was included in step 1 and negative symptoms in step 2, similar to the other models. Sexual and emotional abuse trended to significantly increase the predictive capacity of the model (R^2 change = 0.051, F = 3.03, p = 0.054). Likewise, a post hoc analysis was performed to examine number of adversities and they did not improve the prediction of variability in MAS-A total (R^2 change = .003. F = .327, p = .569).

4. Discussion

This study examined whether reported childhood trauma predicted lower metacognitive abilities for people with a first-episode non-affective psychosis. Contrary to our expectations, we only found a few associations between childhood trauma and metacognition and against our expectations, they were all positive. Sexual and emotional abuse and emotional neglect predicted higher Self-

reflectivity scores; sexual and emotional abuse predicted higher Decentration scores while number of adversities had no significant impact on any MAS-A subdomains. Furthermore, none of the seven childhood traumas or number of adversities added to the prediction of variability in MAS-A total.

One way to interpret these findings is that childhood trauma is related to better metacognitive abilities. However, no other study have found any such positive associations (Aydin et al., 2016; Garcia et al., 2016; Kilian et al., 2017; Palmier-Claus et al., 2016; Weijers et al., 2018), except for one that must be regarded with caution as it only assessed one type of childhood trauma - sexual abuse - and found it associated with higher Self-reflectivity scores (Lysaker et al., 2011). We will however consider the possibility of a positive association by testing the idea that insight into a trauma-psychosis association could have increased metacognitive abilities. Through the BBTS we found that 26 participants strongly believed that childhood trauma was a major causal factor for their psychosis. The positive correlation between CTQ and MAS-A variables turned out to be explained by this group – however, when controlling for age and negative component score, the correlation only trended significance (p = 0.077). However, this may be due to a small sample size. The idea that those who believed childhood trauma to be a causal factor for psychosis may have achieved this position through psychotherapy or other metacognitive-stimulating activity. We are aware of the speculation in this explanation and that our project was not designed to address such complicated questions. However, these findings illuminate the complexity of the trauma-metacognition-insight question and could be useful for future work. Our finding does not necessarily clash with the idea that childhood trauma causes avoidance of others' mental states to avoid painful feelings (Lysaker et al., 2011, p. 1189). This may still be the case before the issues are addressed in a safer environment, such as therapy. It is also possible that the post hoc finding simply illustrates the association between more insight and better metacognition (Paul H. Lysaker et al., 2018). It would be interesting to pursue the associations between trauma, insight and metacognition in longitudinal studies.

Another interpretation, may be that there is no strong association between childhood trauma and metacognitive abilities. This explanation is in line with two other studies. Aydin et al. found that only childhood emotional abuse was associated with worse Decentration skills while the four other CTQ trauma types and three other MAS-A domains were not associated (Aydin et al., 2016); and Palmier-Claus et al. found that CTQ total was unrelated to theory of mind (Palmier-Claus et al., 2016). In relation to these findings it seems there might not be an association between childhood

trauma and metacognition. On the other hand, (Garcia et al., 2016) found that total CTQ was related to poorer social cognition and (Kilian et al., 2017) and (Weijers et al., 2018) explored different trauma categories and found some associations. Kilian et al. computed trauma categories from the CTQ with abuse comprised of sexual, physical and emotional abuse and neglect comprised of physical and emotional neglect. Weijers et al. computed trauma categories from the Childhood Experience of Care and Abuse interview (Bifulco et al., 2005) with abuse including psychological, physical and sexual abuse and parental conflict. Kilian et al. found that neglect - but not abuse - was a significant predictor for poorer social cognition while Weijers et al. only explored abuse and found it to be associated with mentalizing impairments. Thus, their results are not uniform with respectively neglect and abuse being associated, and they are not as easily compared to our findings as we apply the original trauma categories. Computing such factors may increase the possibility of finding associations and could be considered in future studies. However, the approach has not been as well validated and therefore findings must be considered with caution. That said there are obvious similarities between the different kinds of abuse, as they are inflicted upon the child, and between the different kinds of neglect, as they denote a lack of care. We therefore performed the analyses post hoc with one abuse score (sexual, physical and emotional) and one neglect score (physical and emotional) and found that abuse was positively associated with Self-reflectivity, Decentration and MAS-A total while neglect was not associated with any MAS-A domains. These post hoc analyses thus only support our original findings and does not support the findings of Kilian et al. and Weijers et al. Again, we call for additional research to clarify the association between childhood trauma and metacognition.

A third suggestion for our findings is that other additional factors are important for metacognitive abilities. These could include intelligence or executive functioning, emotion regulation, attachment patterns and factors of resilience. There is both evidence that metacognition is a rather separate entity from intelligence and executive functioning (Brüne et al., 2011; Koelkebeck et al., 2010; Sprong et al., 2007) and that non-social cognition plays a role for MAS-A scores, as Frajo-Apor et al. found that it accounted for three out of four domains of the emotional intelligence difference between a psychosis and non-clinical control group (Frajo-Apor et al., 2016). Emotion regulation, as provided by caregivers, has also been found to be important for metacognition (Diamond and Aspinwall, 2003), and anxious attachment was associated with awareness of one's own and others mental states in Aydin et al.s study (Aydin et al., 2016). Finally, factors of resilience may have levelled out some of the negative effects that we hypothesized childhood trauma to have on

metacognition. We did find that both peer and adult support was related to higher childhood trauma reports in a previous paper, and that peer support decreased the risk of psychosis conferred by childhood trauma (Trauelsen et al., 2016a). Thus, there are several factors that we did not account for and that may have affected our findings.

4.1. Limitations and strengths

The study design was cross-sectional which minimizes claims of causations. Different interpretations of our findings are therefore possible. Negative symptom severity may for example have caused lower metacognitive scores due to lower engagement, poor rapport, poverty of speech etc. Though, longitudinal studies, including one of our own sample (Austin et al., Under review) finds that poorer metacognitive abilities predict higher negative symptom severity ½, 1 and 3 years later (Hamm et al., 2012; McLeod et al., 2014).

The study was largely based on self-report measures such as the assessment of first degree psychiatric illness and childhood trauma. Recall bias of childhood trauma have probably been present in some scale, but more and more findings suggest that the CTQ reports are reliable (Fisher et al., 2011; Simpson et al., 2018).

In addition, the FEP participants were included after inclusion in the OPUS treatment and median time from treatment to assessment was 94 days with a range of 456 days. As mentioned above, this may have affected some participants' metacognitive abilities.

Study strengths include the organization of the Danish Health Service ensuring that almost anyone with a first-episode psychosis is included in the OPUS treatment and therefore in our study. However, as mentioned in the results, 50 % of the eligible participants were included in this study. Furthermore, we found good inter-rater reliability on both symptoms and metacognition, as mentioned in the method section.

In conclusion, we recommend future studies to examine the relation between childhood trauma and metacognition in longitudinal designs with the inclusion of executive functioning, intelligence, emotion regulation, attachment and social support.

4.1.

There were no conflicts of interest

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Table 1. *Demographic and clinical data for persons with first-episode psychosis (n=92)*

Demographic variable	FEP, *n* (%)	
Gender		
Male	67 (72.8)	
Female	25 (27.2)	
Age, median (range)	22.4 (18.3 – 32.6)	
First Degree Psychiatric Disorder [b]	22 (23.9)	
Diagnosis		
Schizophrenia	83 (90.2)	
Schizophrenia simplex	3 (3.3)	
Schizoaffective psychosis	4 (4.3)	
Unspecified	5 (5.4)	
Ethnicity		
Caucasian, white	84 (86.0)	
Black African	1 (1)	
Asian	1 (1)	
Institutionalization [c]	20 (21.7)	
Separation [d]	36 (39.1)	
CTQ scores, mean (*SD*)		
Physical Abuse	6.38 (2.48)	
Sexual Abuse	6.83 (4.36)	
Emotional Abuse	10.9 (5.17)	
Emotional Neglect	12.0 (4.91)	
Physical Neglect	8.13 (3.11)	
Number of adversities (*SD*) [e]	2.87 (1.93)	
	Mean (*SD*)	Median (range)
Metacognition (MAS-A)		
Self-reflectivity	5.28 (1.52)	5.00 (5.50)
AoM	3.43 (0.95)	3.00 (5.00)
Decentration	1.20 (0.62)	1.00 (3.00)
Mastery	4.74 (1.50)	5.00 (7.00)
Metacognition total score	14.6 (3.83)	15.0 (19.5)
PANSS 5 factors [f]		
Positive	11.7 (4.75)	11.0 (20.0)
Negative	16.1 (6.00)	16.0 (21.0)
Excitatory	5.04 (1.58)	4.00 (6.00)
Disorganized	8.47 (2.81)	8.00 (15.0)
Emotional	8.73 (3.36)	8.00 (14.0)

Notes: CTQ, childhood trauma questionnaire; AoM, awareness of the mind of the other; DUP, duration of untreated psychosis

[a] Mann-Whitney test

[b] Reported psychosis, bipolar, autism and depression in first degree relatives

[c] Institutionalization or fostercare, N = 88

[d] Separation from primary caregivers for other reasons than divorce, N = 86

[e] Including institutionalization, separation and CTQ subcategories with moderate-severe cut-off scores

[f] Van der Gaag's 5 factor model (van der Gaag 2006)

Table 2. *Spearman ranks correlations of demographic data, childhood trauma, negative symptoms and metacognition (n=92)*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1. Gender	1.000																
2. Age	-.165	1.000															
3. First degree psychiatric disorder [a]	.116	.111	1.000														
4. Negative symptoms [b]	-.110	-.187	-.218*	1.000													
5. Institutionalization [c]	-.028	.111	.063	.063	1.000												
6. Separation [d]	-.002	.018	.011	.079	.603**	1.000											
7. Physical Abuse	.168	.151	.060	-.046	.342	.243	1.000										
8. Sexual Abuse	.368**	.056	.116	-.174	.121	.055	.340**	1.000									
9. Emotional Abuse	.358**	.005	.087	-.175	.092	.180	.352**	.421**	1.000								
10. Emotional Neglect	.167	.044	.140	-.069	.024	.098	.353**	.286**	.639**	1.000							
11. Physical Neglect	.178	.070	.139	-.113	.137	.141	.353**	.282**	.475**	.692**	1.000						
12. Number Of Adversities [e]	.244*	.074	.161	-.079	.475	.518	.648**	.520**	.681**	.692**	.676**	1.000					
13. Self-reflectivity	.108	.222*	.166	-.414**	-.067	-.135	.002	.317**	.275**	.244*	.172	.155	1.000				
14. Awareness Of the Mind of the other	.177	.096	.079	-.359**	.118	-.070	.020	.145	.233*	-.002	-.032	.124	.557**	1.000			
15. Decentration	.169	.130	.095	-.341**	.030	-.039	-.003	.291**	.294**	.151	.054	.171	.653**	.688**	1.000		
16. Mastery	.155	.244*	.142	-.389**	-.155	-.177	.085	.202	.308**	.151	.090	.066	.711**	.469**	.479**	1.000	
17. MAS-A total	.175	.207*	.159	-.438**	-.046	-.136	.031	.265*	.335**	.204	.113	.160	.917**	.746**	.778**	.827**	1.000

[a] Reported psychosis, bipolar, autism and depression in first degree relatives
[b] Van der Gaag's 5 factor model (van der Gaag 2006)
[c] Institutionalization or fostercare, N = 88
[d] Separation from primary caregivers for other reasons than divorce, N = 86
[e] Including institutionalization, separation and CTQ subcategories with moderate-severe cut-off scores
* Correlation is significant at the 0.05 level
** Correlation is significant at the 0.01 level

Table 3. *Hierarchical regression analyses for variables predicting Self-reflectivity, MAS-A (n=92)*

Variable	Model 1			Model 2			Model 3		
	B	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Gender	.515	.347	.152	.352	.330	.104	-.088	.364	-.026
Age	.126	.049	.266	.091	.047	.192	.062	.047	.131
First degree psychiatric disorder	.478	.362	.135	.262	.346	.074	.178	.339	.050
Negative symptoms				-.088	.025	-.350	-.083	.025	-.328
Sexual abuse							.071	.038	.204
Emotional abuse							.017	.040	.057
Emotional neglect							.039	.038	.125
R^2		.115			.225			.297	
F for change in R^2		3.82*			12.4**			2.85*	

[a] Reported psychosis, bipolar, autism and depression in first degree relatives, N = 92
[b] Van der Gaag's 5 factor model (van der Gaag 2006)
* Correlation is significant at the 0.05 level
** Correlation is significant at the 0.01 level

Table 4. *Hierarchical regression analyses for variables predicting Awareness Of the Mind of the other, MAS-A (n=92)*

Variable	Model 1			Model 2			Model 3		
	B	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Gender	.496	.221	.233	.416	.216	.195	.315	.232	.148
Age	.059	.031	.197	.042	.031	.139	.038	.031	.129
First degree psychiatric disorder [a]	.180	.230	.081	.075	.227	.034	.071	.226	.032
Negative symptoms [b]				-.043	.016	-.270	-.040	.017	-.253
Emotional abuse							.024	.020	.128
R^2		.095			.160			.174	
F for change in R^2		3.07*			6.80*			1.41	

[a] Reported psychosis, bipolar, autism and depression in first degree relatives, N = 92
[b] Van der Gaag's 5 factor model (van der Gaag 2006)
* Correlation is significant at the 0.05 level
** Correlation is significant at the 0.01 level

Table 5. *Hierarchical regression analyses for variables predicting Decentration, MAS-A (n=92)*

Variable	Model 1			Model 2			Model 3		
	B	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Gender	.308	.145	.220	.251	.141	.180	.026	.153	.018
Age	.038	.020	.193	.026	.020	.131	.011	.020	.058
First degree psychiatric disorder [a]	.114	.151	.078	.040	.148	.027	.020	.142	.014
Negative symptoms [b]				-.030	.011	-.292	-.027	.010	-.264
Sexual abuse							.039	.016	.275
Emotional abuse							.015	.013	.121
R^2		.088			.164			.252	
F for change in R^2		2.81*			8.00**			4.98**	

[a] Reported psychosis, bipolar, autism and depression in first degree relatives, N = 92
[b] Van der Gaag's 5 factor model (van der Gaag 2006)
* Correlation is significant at the 0.05 level
** Correlation is significant at the 0.01 level

Table 6. *Hierarchical regression analyses for variables predicting Mastery, MAS-A (n=92)*

Variable	Model 1			Model 2			Model 3		
	B	$SE\ B$	β	B	$SE\ B$	β	B	$SE\ B$	β
Gender	.308	.145	.220	.251	.141	.180	.145	.149	.104
Age	.038	.020	.193	.026	.020	.131	.022	.020	.113
First degree psychiatric disorder [a]	.114	.151	.078	.040	.148	.027	.035	.146	.024
Negative symptoms [b]				-.030	.011	-.292	-.028	.011	-.265
Emotional abuse							.025	.013	.205
R^2		.088			.164			.199	
F for change in R^2		2.81*			8.00**			3.74	

[a] Reported psychosis, bipolar, autism and depression in first degree relatives, N = 92
[b] Van der Gaag's 5 factor model (van der Gaag 2006)
* Correlation is significant at the 0.05 level
** Correlation is significant at the 0.01 level