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Childhood trauma types in relation to antipsychotic effectiveness in schizophrenia spectrum disorders: A prospective, pragmatic, randomized controlled study

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ABSTRACT

Treatment with antipsychotics (APs) for schizophrenia spectrum disorders (SSDs) is generally effective, however, a significant proportion does not respond favorably. Childhood trauma (CT) subtypes (physical, sexual, and emotional abuse, physical and emotional neglect) could influence treatment effectiveness; however, research is scarce. Heterogeneity in AP response could be explained by differentiating by CT subtype. The present study was based on the Bergen-Stavanger-Trondheim-Innsbruck (BeSt InTro) study. CTQ-SF assessed CT subtypes in SSDs (n = 98). CT subtypes were examined in relation to psychosis symptoms measured by PANSS during one year of treatment with APs, by means of linear mixed effects (LME) models. Results were significant for CT subtypes, where increased levels of sexual abuse and physical neglect were associated with increased mean levels of psychosis symptoms throughout the course of treatment from baseline to 52 weeks. AP effectiveness may thus be influenced by CT subtype in SSDs. The results support clinical guidelines recommending a focus on assessment and treatment of trauma in SSDs.

1. Introduction

Antipsychotic treatment of psychosis is generally effective in schizophrenia spectrum disorders (SSDs) (Kreyenbuhl et al., 2010; National Institute for Health and Care Excellence, 2014). However, a significant proportion, about one third to 40% of patients with SSDs, does not respond favorably to first-line (non-clozapine) antipsychotic medication (APs) (Demjaha et al., 2017; Thomas et al., 2019). Non-responsiveness is associated with worse prognosis and clinical course (Correll and Howes, 2021). Factors influencing AP effectiveness in SSDs are related to duration of untreated psychosis (DUP) (Cavalcante et al., 2020), psychosis symptom load, illness duration and onset age (Haddad and Correll, 2018). Furthermore, childhood trauma (CT) may influence AP effectiveness (Verdoux et al., 2022) or the timing of AP response (Kilian et al., 2020; Mørkved et al., 2022). However, we do not know whether this effect may be related to different types of CT, or if there is a differential effect on AP effectiveness in SSDs.

Physical, emotional, and sexual abuse, and physical and emotional neglect are typical CT and frequently reported in SSDs. CT is described as a risk factor and possibly involved in the development of SSDs (Mørkved et al., 2017; Varese et al., 2012). CT has been tied to important clinical features in SSDs, such as cognitive impairments, DUP, psychosis symptom severity, and treatment outcomes (Mørkved et al., 2020; Thomas et al., 2019). There is a lack of research on the potential effect of CT experiences, and especially the differential relationship between CT subtypes and AP effectiveness (Thomas et al., 2019). It can be argued for

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a potential specificity of childhood trauma types in relation to differences in clinical outcomes in psychosis depending on type of CT exposure, for instance related to psychosis symptoms and disorders (Coughlan and Cannon, 2017; Hegelstad et al., 2021), cognitive impairments (Li et al., 2017; Mørkved et al., 2020) as well as brain functioning and psychosis symptom dimensions (Schalinski et al., 2019), although this is also debated (Barnes et al., 2023). Childhood neglect and interpersonal trauma have been tied to more severe clinical characteristics and consequences as compared to unintentional injury and parental loss (Croft et al., 2019). Childhood sexual abuse has been linked to hallucinations and to psychosis transition in ultra-high-risk (UHR) samples, and childhood physical abuse has been associated with hallucinations and paranoia (Coughlan and Cannon, 2017). Moreover, childhood emotional abuse has been linked to paranoia in psychosis, as well as associated with hallucinations when co-occurring with sexual abuse. The literature on childhood neglect is small, and findings are mixed. Exposure to childhood neglect during critical periods of brain development has been found to be associated with positive psychosis symptoms (Schalinski et al., 2019), and neglect was associated with hallucinations in psychotic disorders (Daalman et al., 2012).

In terms of AP effectiveness, extant research has varied in terms of examining overall CT versus specific CT subtypes in relation to the effectiveness of antipsychotic medication in SSDs. Findings are equivocal however on the possible influence of CT (Ajnakina et al., 2018; Hassan and De Luca, 2015; Kilian et al., 2020; Mondelli et al., 2015; Verdoux et al., 2022). Overall CT has been found to be associated with a slower treatment response in SSDs with CT compared to those with no CT, although the overall AP effectiveness did not differ (Kilian et al., 2020; Mørkved et al., 2022). Ottesen et al. (2023) did not find specific associations between types of childhood interpersonal trauma in relation to symptom remission or treatment outcomes in FEP. Moreover, AP treatment resistance was associated with childhood sexual abuse in a sample of SSDs (Hassan and De Luca, 2015), whereas AP non-responders more frequently reported CT and especially emotional abuse, compared to AP responders in a sample of FEP (Misiak and Frydecka, 2016). Ajnakina et al. (2018) reported some specificity related to CT types; parental separation was associated with antipsychotic medication non-compliance and compulsory admissions in a sample of FEP. Overall, a recent review points to an association between trauma exposure and non-remission in SSDs, although the literature is scarce (Verdoux et al., 2022).

In sum, CT has been tied to clinical aspects of SSDs, including treatment outcomes following treatment with antipsychotic medication. CT subtypes (physical, emotional, and sexual abuse, and physical and emotional neglect) could potentially have explanatory value related to the heterogeneity seen in response to treatment with antipsychotics in some patients with SSDs. The aim of the present study was to examine the relation of CT subtypes as measured by the Childhood Trauma Questionnaire Short-Form (CTQ-SF) (Bernstein et al., 2003) to antipsychotic effectiveness on symptoms of psychosis (positive, negative and general psychopathology) from baseline throughout 52 weeks of treatment in a sample of SSDs patients.

2. Methods and materials

The present study was based on data from the Bergen, Stavanger, Innsbruck, Trondheim (BeSt InTro) study, Haukeland University Hospital: a pragmatic, prospective, semi-randomized, blinded multicenter study examining the effectiveness of aripiprazole, amisulpride and olanzapine in SSDs (Johnsen et al., 2020). Semi-randomized means that patients were randomized to a sequence of study drugs. The patient could deny the first drug and start treatment with the second or third in collaboration with the psychiatrist, however, meaning that the first drug has the advantage of randomization, and the next two drugs were based on choice and prone to selection bias (see Table 1). Due to the pragmatic design where the treatment was offered as part of standard health care, there was no control group as it was deemed unethical not to offer antipsychotic medication to SSDs patients with symptoms of psychosis, in line with national and international treatment guidelines. Moreover, the BeSt InTro was ethically approved in Norway and Austria by the Regional Committee for Medical Research Ethics (2010-3387) and the Norwegian Medicines Agency, and by the ethics committee at the Medical University of Innsbruck, in Austria, and the Federal Office for Safety in Health Care (BASG). The BeSt InTro was registered as a clinical trial 10/03/2011 (NCT01446328), and clinical monitoring according to ICH-GCP was done by the Department of Research and Development (the Haukeland University Hospital, Bergen, Norway; the Clinical Trial Centre at the Medical University Innsbruck, Austria).

The current subsample ($n = 98$) from the BeSt InTro was recruited from the Haukeland University Hospital, Bergen, Norway ($n = 78$), Medical University in Innsbruck, Innsbruck, Austria ($n = 12$) as well as the Stavanger University Hospital, Stavanger, Norway ($n = 8$). Informed consent to participate was collected ahead of participation. Patients were mainly recruited from inpatient and outpatient psychosis units, see Johnsen et al. (2020) for details on recruitment and inclusion/refusal rates. Demographic and clinical information is described in Table 2 and clinical information by CT subtypes in Appendix as well as in detail in a previously published paper (Mørkved et al., 2022). The mean age was 30.9 ($SD = 12.7$ years), more than half was male (64 %), and about one third was naïve to antipsychotic medication at inclusion (35 %), i.e., no lifetime exposure to APs.

Patients included in the current study met criteria for SSDs corresponding to section F20 to F29 in the ICD-10 (World Health Organization, 1992), and the majority were diagnosed with F20 Schizophrenia ($n = 54$; Table 2). Moreover, patients were included if they were 18 years of age or older, they were required to understand the native language, and score ≥ 4 on at least one of the following items from the PANSS (Kay et al., 1987): delusions (P1), hallucinatory behavior (P3), grandiosity (P5), suspiciousness/persecution (P6) or unusual thought content (G9). Also, to be included in the current study, the patients were required to have completed the CTQ-SF assessment (Bernstein et al., 2003).

Patients were excluded from the study according to the following criteria: organic psychosis or psychosis due to psychoactive substance use, hypersensitivity to the active substance or to any of the excipients of the study drugs, prolactin-dependent tumors, phaeochromocytoma, and concomitant use of medications which could induce torsade de pointes, use of levodopa, and known risk of narrow-angle glaucoma. Suicidal ideation and/or psychoactive substance use was however not deemed reasons for exclusion.

The patients were randomized to receive treatment with orally administered aripiprazole ($n = 34$; 34.7 %), amisulpride ($n = 37$; 37.7 %), or olanzapine ($n = 27$; 27.5 %), and dosages was decided by the

Table 1
Number of patients in the medication groups by visit number

Medication group	Baseline	week 1	week 3	week 6	week 12	week 26	week 39	week 52
Amisulpride	32	30	30	31	25	19	20	19
Aripiprazole	31	29	28	24	20	17	11	9
Olanzapine	35	33	33	33	28	19	20	21
Total	*98*	*92*	*91*	*88*	*73*	*55*	*51*	*49*

Note. Patients randomized to receive amisulpride, aripiprazole or olanzapine.

Table 2
Mean (SD) clinical and demographic characteristics in the overall sample of schizophrenia spectrum disorders (SSDs)

	Patients with SSDs (n = 98)
Age, years	30.95 (12.68)
Male	63/98 (64%)
Caucasian	80/98 (81%)
Years of education	12.2 (2.8)
Living alone (yes) (*n* = 92)	39/98 (42%)
Employed (yes) (*n* = 93)	26/98 (28%)
DDD (*n* = 94)	1.09 (.47)
DUP, weeks (*n* = 53)	63.4 (106.2)
Psychosis onset age, years (*n* = 69)	23.5 (8.6)
Diagnosis	
Schizophrenia	54/98 (55%)
Schizotypal	2/98 (2%)
Delusional disorder	13/98 (13%)
Brief psychotic disorder	14/98 (14%)
Schizo-affective disorder	7/98 (7%)
Other psychotic disorder	1/98 (1%)
Unspecified psychotic disorder	7/98 (7%)
Smoking (yes) (*n* = 90)	57/90 (63%)
CAUS (abuse or dependence) (*n* = 93)	9/93 (10%)
CDUS (abuse or dependence) (*n* = 93)	20/93 (21%)
Antipychotics naive	34/98 (34%)
PANSS total	78.2 (15.9)
PANSS positive	21.4 (4.9)
PANSS negative	17.3 (5.9)
PANSS general	39.5 (8.6)
CGI	5.1 (0.1)
GAF (*n* = 97)	35.6 (8.2)
CDSS (*n* = 91)	7.5 (5.4)
BMI (*n* = 86)	25.1 (5.2)
CTQ-SF sum	44.1 (15.6)
Emotional abuse	10.3 (5.1)
Physical abuse	7.1 (3.5)
Sexual abuse	6.3 (3.2)
Emotional neglect	12.0 (5.2)
Physical neglect	8.4 (3.5)

Note. N = 98 unless otherwise specified. DDD = Defined daily dose of antipsychotic medication. CT = Childhood trauma. CTQ-SF = Childhood trauma questionnaire short-form. PANSS = positive and negative syndrome scale. CGI = clinical global impression scale. GAF = Global assessment of functioning. CDSS = Calgary depression scale for schizophrenia. BMI = Body mass index. Other psychopharmaca registered at baseline. * *p* level significant at .05.

patient and the psychiatrist in collaboration and was within the following ranges: Amisulpride 50 -1200 mg/d, aripiprazole 5 - 30 mg/d, and olanzapine 2.5 - 20 mg/d. The randomization was prepared by statisticians not affiliated with the study, and random orders of the three study drugs were generated by computer for each participant. If a participant refused the first drug in the sequence, the reason was sought and noted, and the second drug in the sequence was offered. The same rule applied if the second drug was also refused, and the third study drug was offered. Previous experience with a study drug was not in itself reason for rejection, in adherence with a pragmatic and naturalistic study design. Drug allocation was concealed to the research personnel, but open to the patient and clinical team. Medication adherence as measured by serum medication levels were in general consistent with the prescribed doses of medication (Johnsen et al., 2020).

2.1. Measurement

CT was measured by means of the CTQ-SF; a 28 item self-report questionnaire developed by Bernstein et al. (2003), Norwegian translation by Winje et al. (2004). The CTQ-SF screens for exposure to five types of CT; emotional, physical, and sexual abuse, and physical and emotional neglect, each subscale yielding a score from 5 – 25, forming a total CT score ranging from 25 to 125. The items are scored on a five-point Likert scale ranging from 1 (never true) to 5 (very often true). Three items form the Minimization-denial subscale, a validation scale, not reported in the present study. The CTQ-SF possesses good psychometric properties related to reliability and validity (Dovran et al., 2013).

Severity of psychosis symptoms were measured by the structured clinical interview for the positive and negative syndrome scale (SCI-PANSS), which is a clinician administered interview developed for clinical settings (Kay et al., 1987). For the BeSt InTro, raters completed training from the PANSS Institute (www.panss.org) ahead of data collection until satisfactory inter-rater reliability and agreement with expert scoring was obtained. The PANSS consists of three symptom subscales; positive, negative, and general psychopathology symptoms, and the items are scored on a 7-point Likert scale ranging from 1 (absent) to 7 (extreme). The PANSS total score ranges from 30 to 210 points. As for psychometric properties, the PANSS has shown satisfying reliability, validity and sensitivity (Leucht et al., 2005).

2.2. Procedure

The PANSS was administered at baseline and at all follow-up points throughout the study period; 1, 3, 6, 12, 26, 39 and 52 weeks after inclusion to BeSt InTro. The CTQ-SF was administered at the 6 weeks follow-up to avoid acute phases for increased validity. The SCID diagnostic interview (Spitzer et al., 1992) was administered as soon as possible to determine inclusion according to diagnosis within the F20 – F29 spectrum, and all other assessment instruments, such as Calgary depression scale for schizophrenia (Addington et al., 1993), alcohol or substance abuse by means of the CAUS or CDUS (Drake et al., 1990; Mueser et al., 1995), were administered at all follow-up visits.

3. Statistical analyses

Categorical and continuous variables were analyzed by means of t-tests and chi-square tests in STATAmp version 17.0. A p-level of 0.05 was considered threshold for statistical significance for all analyses. All analyses were performed by or in collaboration with a statistician. Numbers are given as mean (M) and standard deviations (SD) or numbers (n) and percentages (%). The CTQ-SF scores were not categorized into levels of severity: after visual inspection of the variables, it was decided to keep the variables continuous using the subscale range of scores from 5 to 25, also increasing power in the analyses.

Linear mixed effects (LME) models were fitted using R (www.r-project.org). LME was chosen for its ability to account for dependency in the data due to the longitudinal design and repeated measures, and for handling missing data (assumed missing at random). Models were fitted to PANSS total and subscale scores to examine the effect of CT subtypes on psychosis symptoms from baseline throughout 52 weeks of treatment in the sample of SSDs, which were n = 98 at baseline and n = 49 at end of treatment (see Table 3). Relevant confounders were included in the models: gender, age, onset age, DUP, years of education, dosage of antipsychotic medication, previous exposure to antipsychotics ahead of study participation, and substance use. Dosages of medication were converted to Defined Daily Doses (DDD), defined as the assumed average maintenance dose per day for a drug used for its main indication in adults (https://www.whocc.no/atc_ddd_index/). Data on sample size by visit number and medication group is provided in Table 1.

4. Results

4.1. Clinical and demographic characteristics

Of the total sample of SSDs patients (*n* = 98), any moderate to severe CT was reported by 55 (56.1%). Within each CT subtype the following moderate to severe levels were reported; 17 (17.5 %) reported physical abuse, 31 (31.6%) reported emotional abuse, 16 (16.3 %) reported sexual abuse, 31 (31.6%) reported emotional neglect, and 28 (28.6 %) reported physical neglect. Thirty-four percent was antipsychotics naïve, while 66 % of the sample reported previous exposure to antipsychotic

Table 3
Linear mixed effects (LME) models of the estimated mean effect of CT subtypes on psychosis symptoms as measured by the PANSS from baseline to 52 weeks of treatment with antipsychotic medication

	Estimated effects	p-values
PANSS total		
Emotional abuse	0.397	0.371
Physical abuse	-1.684	0.072
Sexual abuse	0.961	0.15
Physical neglect	0.926	0.193
Emotional neglect	0.531	0.242
PANSS positive		
Emotional abuse	0.095	0.402
Physical abuse	-0.293	0.218
Sexual abuse	**0.418**	**0.018***
Physical neglect	0.192	0.296
Emotional neglect	0.158	0.178
PANSS negative		
Emotional abuse	-0.018	0.929
Physical abuse	-0.528	0.209
Sexual abuse	0.127	0.674
Physical neglect	-0.002	0.995
Emotional neglect	0.346	0.099
PANSS general		
Emotional abuse	0.313	0.159
Physical abuse	-0.819	0.079
Sexual abuse	0.409	0.217
Physical neglect	**0.747**	**0.039***
Emotional neglect	0.011	0.961

Note.
* Significant <.05. Estimated effects in the Linear mixed effects (LME) models, childhood trauma subtypes kept continously, predicting psychosis symptoms from baseline to 52 weeks of treatment, adjusted for gender, age, onset age, duration of untreated psychosis, naive to antipsychotics before study inclusion, defined daily doses (DDD), years of education, and substance use. PANSS = positive and negative syndrome scale.

medication. Baseline demographic data by CT subtype for the sample is shown in Table 2 (see Appendix for demographic and clinical data by CT subtype).

Of the total BeSt InTro study sample of 144, n = 98 (68.1 %) completed the CTQ-SF. There were no significant group differences in PANSS levels at baseline (p = .826) or end of treatment (p = .824) between those completing CTQ-SF compared to those that did not complete CTQ-SF. Also, there were no group differences between study completers Vs. study non-completers in terms of baseline PANSS scores ((p = .824) or CTQ-SF sum scores (p = .824). Please see Mørkved et al. (2022) for more details on overall CT in relation to antipsychotic medication in the current sample.

4.2. The effect of CT subtypes on PANSS total and PANSS negative subscale scores

The analyses were performed on the total sample of SSDs patients (n = 98 at baseline), irrespective of randomization drug. The first LME model examined the effect of CT subtypes sexual, physical and emotional abuse and physical and emotional neglect on PANSS total scores from baseline to 52 weeks of antipsychotic treatment in the SSDs group, and for PANSS negative subscale scores from baseline to 52 weeks of antipsychotic treatment. There were no significant estimated effects on CT subtypes on overall psychosis symptoms or negative psychosis symptom levels after controlling for gender, age, onset age, DUP, years of education, dosage of antipsychotic medication, previous exposure to antipsychotics ahead of study participation, and substance use (see Table 3).

4.3. The association of CT subtypes on PANSS positive psychosis symptoms

An LME model was fitted to the PANSS positive subscale scores using CT subtypes sexual, physical and emotional abuse and physical and emotional neglect as predictors, controlling for gender, age, onset age, DUP, years of education, dosage of antipsychotic medication, previous exposure to antipsychotics ahead of study participation, and substance use. Increased levels of sexual abuse were associated with higher positive psychosis symptoms scores throughout the course of treatment (p = .018).

4.4. The association of CT subtypes on PANSS general psychopathology symptoms

Lastly, an LME model was fitted to the PANSS general psychopathology subscale scores using CT subtypes sexual, physical and emotional abuse and physical and emotional neglect as predictors, controlling for controlling for gender, age, onset age, DUP, years of education, dosage of antipsychotic medication, previous exposure to antipsychotics ahead of study participation, and substance use. Increased levels of physical neglect were associated with higher general psychopathology symptom scores throughout the course of treatment (p = .039).

5. Discussion

CT subtypes significantly predicted psychosis symptom levels and antipsychotic effectiveness in a prospective, semi-randomized, pragmatic RCT. After controlling for gender, age, onset age, DUP, years of education, dosage of antipsychotic medication, previous exposure to antipsychotics ahead of study participation, and substance use, childhood sexual abuse was associated with worse outcomes, especially more psychosis symptoms throughout 52 weeks of antipsychotic treatment. Further, there was an effect of physical neglect and decreased treatment effectiveness shown by increased levels of general psychopathology symptoms. No significant results were found for the CT subtypes on negative psychosis symptoms nor overall PANSS scores. These findings are important, as it shows that type of childhood trauma reported by SSDs patients could have implications for the effectiveness of antipsychotic treatment.

Extant research on CT and antipsychotic treatment effectiveness are equivocal and the literature is scarce (Kilian et al., 2020; Ottesen et al., 2023). A recent narrative review reported that five out of eight identified studies on the association between CT and antipsychotic treatment reported associations with poorer treatment response in SSDs reporting CT exposure (Verdoux et al., 2022). While CT in SSDs has been associated with lower rates of remission following treatment with AP (Kilian et al., 2020) as well as variability in antipsychotic treatment response (Hassan and De Luca, 2015), other studies have failed to find relations between CT and treatment with antipsychotics (Ottesen et al., 2023). Non-significant differences between CT and antipsychotics after 1 – 2 years after treatment start (Kilian et al., 2020; Mørkved et al., 2022) has also been reported. A previous study from our research group reported a slower treatment effect in SSDs patients with CT compared to those with no CT, and the present results indicate that the previous finding may partly be explained by type of CT exposure (Mørkved et al., 2022). The present results are in line with the extant, albeit scarce, body of literature on CT and CT subtypes and AP effectiveness (Ajnakina et al., 2018; Kilian et al., 2020; Schalinski et al., 2015), and the observed heterogeneity in treatment response could possibly be related to type of CT exposure.

The majority of extant research has reported on high and low CT exposure groups or only reported the overall CT score (e.g. Kilian et al., 2020), and our results points to the importance of addressing the potential impact of trauma subtypes in relation to treatment effectiveness.

Our results are in line with findings on increased symptom severity associated specifically with emotional and physical neglect in inpatients with SSDs (Schalinski et al., 2015). Previous research from our research group found physical neglect in particular to influence cognitive functioning in the same sample of SSDs (Mørkved et al., 2020). Furthermore, childhood sexual abuse may show an effect on positive psychosis symptoms in SSDs. Other lines of inquiry have linked sexual abuse to clinical features in psychosis and SSDs, that has been associated with treatment effect (Turner et al., 2020). Possibly, incidents of sexual abuse could profit from tailored interventions, in addition to standard AP treatment. Our results support recommendations concerning assessing and addressing trauma histories in patients with psychosis and SSDs (National Institute for Health and Care Excellence, 2014; Norwegian Directorate of Health, 2013), possibly more so in patients with treatment-resistant SSDs (Verdoux et al., 2022).

Some studies on FEP samples show a lack of influence of CT on AP effectiveness (Mondelli et al., 2015; Ottesen et al., 2023). It is possible that CT in SSDs, characterized by longer duration of illness and more chronic courses, could exert differential impact on treatment outcomes in chronic cases as compared to in FEP. For instance, CT was more strongly associated with dissociation, a suggested mediator for CT and psychosis, in chronic SSDs as compared to FEP (Braehler et al., 2013). Also, more severe CT was reported by the chronic SSDs sample compared to FEP and community controls (Braehler et al., 2013). The majority of our sample (about 70%) had previous exposure to antipsychotics, i.e., longer duration of illness, which was controlled for in the analyses in addition to DUP and onset age. Future research should aim to compare CT exposure in FEP to more chronic samples in relation to treatment effectiveness, to clarify this.

There are some limitations to consider in the present study. The results may be prone to selection bias related to patient selection in clinical trials, limiting generalizability. We were not able to include clinical variables such as symptoms of dissociation found to mediate the relation between CT and treatment outcome in psychosis and SSDs. Relatedly, we were not able to control for characteristics of trauma possibly of influence in differentiating the relation between CT types and outcomes, such as trauma exposure during different sensitive time periods as well as relation to perpetrator (Schalinski et al., 2019). We were not able to control for concomitant psychological interventions, which could influence the results. CT was assessed retrospectively through self-report, which is associated with concerns related to validity and potential recall bias, however research support findings from retrospective CT assessment in SSDs (Fisher et al., 2011). Furthermore, the study may be under-powered, the sample size was only moderate, increasing the risk of Type II error. On the other hand, the BeSt InTro was designed as a pragmatic RCT to mimic real life clinical practice, which may increase generalizability and ecological validity of our results.

This is the first prospective, pragmatic, semi-randomized study linking a potential differential relation of CT subtypes to antipsychotic treatment outcome following 52 weeks of treatment in a sample of patients with SSDs, as shown by higher levels of positive psychosis symptoms and general psychopathology symptoms following higher levels of sexual abuse and physical neglect. Building on previous research on overall CT and treatment outcomes, we have shown that the influence of CT on treatment outcome may be related to type of trauma exposure; knowledge that may aid in developing more tailored, personalized care for patients with SSDs, and influence on clinical decision-making processes if confirmed by other research. Our results add to the evidence highlighting the importance of targeting trauma in psychosis services.

CRediT authorship contribution statement

N. Mørkved: Formal analysis, Writing – original draft, Writing – review & editing. **E. Johnsen:** Funding acquisition, Investigation, Project administration, Writing – review & editing. **R.A. Kroken:** Funding acquisition, Investigation, Project administration, Writing – review & editing. **I. Joa:** Investigation, Project administration, Writing – review & editing. **E. Kjelby:** Investigation, Writing – review & editing. **M.A. Rettenbacher:** Investigation, Project administration. **C.A. Bartz-Johannessen:** Formal analysis, Methodology. **E-M Løberg:** Conceptualization, Funding acquisition, Supervision, Investigation, Project administration, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no conflict of interest.

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Supplementary materials

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