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Posttraumatic Stress Disorder Symptoms and Social and Occupational Functioning of People With Schizophrenia

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Abstract: This study sought to clarify the contribution of posttraumatic stress disorder (PTSD) to interpersonal and occupational functioning in people with schizophrenia. Self-report questionnaires and semistructured interviews were used to evaluate PTSD and brain injury, positive symptoms, depression, substance abuse, occupational and social functioning, and intelligence. Multiple regressions assessed the relationship between predictors and functional impairment. Posttraumatic stress disorder symptoms were present in 76% of participants, with 12% of participants meeting diagnostic criteria for PTSD. Participants with PTSD had higher rates of depression and more severe positive symptoms. Results of multiple regressions indicated that PTSD symptoms were the only significant predictor of patient-rated interpersonal and occupational functioning. Posttraumatic stress disorder symptoms were not associated with interviewer-rated interpersonal or occupational functioning or employment. While more research is needed, screening and treatment for exposure to traumatic events and PTSD symptoms might be indicated for individuals with schizophrenia. Availability of PTSD assessment and evidence-based treatments for people with schizophrenia is a crucial and often unmet health service need.

Key Words: Functioning, interpersonal, occupational, PTSD, schizophrenia

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In the United States, people with schizophrenia report higher rates of traumatic events (Alvarez et al., 2015; Cohen et al., 2012; Goodman et al., 2001) than the general population (Kessler et al., 2005) and are 3.6 times more likely to have been exposed to childhood adversity (Matheson et al., 2013). Moreover, rates of posttraumatic stress disorder (PTSD) in people with schizophrenia are also elevated compared with the general population, with pooled estimates of approximately 12% from a recent meta-analysis (Achim et al., 2011) and 16% in a large cohort of patients with psychotic disorder (de Bont et al., 2015). Lifetime prevalence rates in the United States are estimated to be 7% (Kessler et al., 2005).

The high rate of co-occurring PTSD and schizophrenia is particularly concerning given that people with severe mental illness (SMI) who report experiencing traumatic events and have PTSD also have worse concurrent social, educational, occupational, and financial functioning than similar persons without PTSD (Grubaugh et al., 2011; Lysaker et al., 2004; Lysaker et al., 2009; Mueser et al., 2004a; Mueser et al., 2004b; Ramsay et al., 2011). Moreover, PTSD symptoms in people with schizophrenia have been associated with more interpersonal problems such as alienation, insecure attachment, and egocentricity, which may further contribute to worse functioning (Chapleau et al., 2014; Schenkel et al., 2005). Whereas these studies suggest that trauma exposure and PTSD are associated with worse functioning in people with SMI, they did not account for other comorbid conditions or difficulties (e.g., other psychiatric symptoms or cognitive impairment) that could confound the relationship between trauma history and functioning.

For example, people with SMI who have experienced traumatic events have more severe psychotic symptoms (Hassan et al., 2015; Heins et al., 2011; Kelleher et al., 2013; Lysaker and Larocco, 2008; Mueser et al., 2004a; Ramsay et al., 2011; Varese et al., 2012) and worse medication adherence (Conus et al., 2010), benefit less from treatment (Hassan et al., 2015), and are prescribed higher doses of typical and atypical antipsychotics and mood stabilizers (Schneeberger et al., 2014) than do those without a trauma history, which could confound the association between PTSD symptoms and functioning. In addition, people with SMI and PTSD have more severe depression (Duke et al., 2010; Lysaker et al., 2008), psychotic symptoms, overall psychopathology (Grubaugh et al., 2011; Sautter et al., 1999), and drug and alcohol abuse (Conus et al., 2010; Mueser et al., 2004b) than do people with SMI alone. Finally, although results are mixed, there is some evidence to suggest that people with SMI and PTSD have worse cognitive performance than do people with SMI and no PTSD (Aas et al., 2011; Duke et al., 2010; Fan et al., 2008; Halasz et al., 2013).

This study sought to clarify the unique contribution of PTSD symptoms to interpersonal and occupational functional impairment in people with schizophrenia by assessing this relationship after statistically controlling for functional impairment associated with potentially comorbid variables, including the severity of psychotic symptoms, time since psychosis onset, depression, alcohol and drug use, brain injury, cognitive functioning, and educational attainment.

METHODS

Participants and Procedures

This study is a secondary analysis of data collected between March 1999 and December 2002 from patients with schizophrenia. Results using these data to investigate whether participants with PTSD had more severe cognitive impairments and worse quality of life than patients without PTSD have been reported previously (Fan et al., 2008). Participants were 125 patients of outpatient mental health clinics that serve persons with SMI in Boston, Mass (Fan et al., 2008). Inclusion criteria were as follows: diagnosis of schizophrenia, age between 18 and 70 years old, English speaking, and ability to provide informed consent and complete rating scales and cognitive tests. Patients who were thought to meet inclusion criteria were referred to the study by clinicians. Schizophrenia diagnosis was confirmed by chart review and the Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV*) (SCID) (Spitzer et al., 1992) conducted by a psychiatrist or psychiatric nurse. The study received approval from the institutional review board of Partners HealthCare at Massachusetts General Hospital, and subjects provided written informed consent.

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Measures

Sociodemographics

Patients reported demographic information including sex, age, race/ethnicity, marital status, years of education, age at onset of psychosis symptoms, and a history of drug or alcohol problems.

Cognition

Full-scale IQ (FSIQ) was assessed using the Wechsler Adult Intelligence Scale III (Wechsler, 1997). Head injury was assessed using the head injury section of the Harvard Trauma Questionnaire (HTQ) (Mollica et al., 2004). Participants who endorsed experiencing a head injury with accompanying loss of consciousness on the HTQ received a score of 1; otherwise, they received a score of 0.

Psychopathology

Positive and negative psychotic symptoms were assessed with the clinician-administered Positive and Negative Syndrome Scale (PANSS) (Kay et al., 1987; Kay et al., 1989). All raters received the standard training for administering the PANSS with a required interrater reliability of $r = 0.80$. Both the positive and negative symptom subscales have 7 items, each rated from 1 (absent) to 7 (extreme), with total scores ranging between 7 and 49. Depressive symptoms were measured with the Hamilton Depression Scale, a semistructured interview used by trained raters (Hamilton, 1960). Following the scoring guidelines, the first 17 items were summed with a range of possible scores of 0 to 50. Patients scoring 8 or more were classified as meeting criteria for depression (Hamilton, 1960).

Traumatic Events and PTSD Symptoms

Traumatic events and PTSD symptoms were assessed using the HTQ (Mollica et al., 2004). The HTQ asks whether participants have experienced 20 traumatic events (17 primary traumatic events in part 1, and 3 traumatic events in the head injury section [part 3]). Participants were also asked an open-ended question about what they "consider to be the most hurtful or terrifying events [they] have experienced, if any." A measure of total traumatic events was computed based on the total number of events participants experienced. Participants who endorsed at least 1 traumatic event in part 1 were then assessed for *DSM-IV* PTSD symptoms using the first 16 items of part 4 of the HTQ. Participants who did not endorse any traumatic events were given a PTSD score of 1 ("not at all"). Participants were told that the PTSD symptoms were "symptoms that people sometimes have after experiencing hurtful or terrifying events in their lives." The mean score of the 16 PTSD items was used as an indicator of PTSD symptom severity (1 = not at all to 4 = extremely). The internal reliability of the HTQ PTSD scale was good ($\alpha = 0.92$). Participants were scored as meeting *DSM-IV* criteria for PTSD if they endorsed at least 1 traumatic event and scored at least a 3 ("quite a bit") on 1 reexperiencing question, 3 avoidance/numbing questions, and 2 arousal questions. Participants who met criteria for 2 but not all 3 of the PTSD symptom clusters were classified as having subthreshold PTSD.

Interpersonal and Occupational Functioning

Patient-rated interpersonal and occupational functioning was assessed using the *relation to self and others* and the *daily living/role functioning* subscales of the Behavior and Symptom Identification Scale (BASIS-32) (Eisen et al., 1994, 1986). The *relation to self and others* subscale consists of 7 items that assesses difficulty in relationships, getting along with others, and recognizing one's own emotions. The internal reliability of the *relation to self and others* subscale was good ($\alpha = 0.81$). The *daily living/role functioning* subscale consists of 7 items and assesses the ability to manage day-to-day life and activities as well as household, work, and school responsibilities. Items were

reverse scored 0 (extreme difficulty) to 4 (no difficulty), so that higher scores reflect better functioning. The internal reliability of the *daily living/role functioning* subscale was good ($\alpha = 0.79$). Following the BASIS-32 scoring rules, the total score for each subscale is the mean score of the items.

Interviewer-rated interpersonal and occupational functioning was assessed with the *interpersonal relations* and the *instrumental role* subscales of Heinrichs' Quality of Life Scale (QLS) (Heinrichs et al., 1984). The QLS is a semistructured interview used by trained raters to evaluate patient psychosocial functioning. The required interrater reliability for the QLS was $r = 0.80$. The *interpersonal relations* subscale has 8 items that assess social contact, active and passive social participation, and intimacy in relationships. The *instrumental role* subscale has 4 items that assess patients' abilities to function in their roles as workers, students, parents, or housekeepers. The scale is a mean score of items scored 0 to 6, with higher scores reflecting better functioning. As a second indicator of occupational functioning, patients also reported whether they were or were not currently employed.

Statistical Analysis

First, descriptive analyses were performed for all study variables. Second, Pearson product-moment correlation coefficients were computed to assess the association between functional outcomes, PTSD symptoms, and covariates. Multiple imputation using 20 imputed datasets was used to account for missing data. Most of the participants (70.4%) had complete data, and the variable with the most missing data was FSIQ, which was missing for 12 participants. All analyses were conducted using Stata version 12 (StataCorp, 2011). To assess the relationship between the severity of PTSD symptoms and functional impairment after statistically controlling for other clinical variables, multiple linear regressions were performed on the self- and interviewer-rated measures of interpersonal and occupational functioning. A multiple logistic regression was performed to predict current employment as an indicator of occupational functioning. Multicolinearity between the predictor variables was assessed by examination of the correlation matrix and by computing the variance inflation factors (VIFs). Graphs of the regression residuals against the fitted values were examined to assess for violations of least-squares assumptions.

RESULTS

Sample Characteristics

Table 1 summarizes the sociodemographic characteristics of the participants and the number of participants with available data for each variable. Most participants were white (75%), single (77%), and male (75%) with a mean age of 44 (SD, 10) years. The average age at onset of psychosis symptoms was 24 (SD, 7.5) years. Participants had an average of 12 (SD, 2.5) years of education, and 70% had at least a high school diploma. The average FSIQ score was 85 (SD, 14). Only 24% of participants were currently employed. More than half of the participants reported a history of drug (63%) and alcohol problems (53%), and 39% of participants reported having a head injury with loss of consciousness. Participants with a history of head injury were more likely to meet criteria for subthreshold PTSD (odds ratio, 2.66; $p = 0.02$). None of the other sociodemographic variables were related to PTSD or subthreshold PTSD diagnosis (Table 1).

Clinical Characteristics

Most participants (82%) reported experiencing at least 1 traumatic event, and 76% reported PTSD symptoms, with 12% of participants meeting *DSM-IV* diagnostic criteria for PTSD and 26% meeting criteria for at least subthreshold PTSD (Table 1). Table 2 summarizes the other clinical symptoms of the participants. Scores on the PANSS

TABLE 1. Sociodemographic Characteristics of Participants by PTSD and Subthreshold PTSD

Sociodemographics	n	n (%)	PTSD, n (%)	OR (95% CI)	p	Subthreshold PTSD	OR (95% CI)	p
PTSD diagnosis	114	15 (13.16)	—	—	—	—	—	
Subthreshold PTSD	114	32 (28.07)	—	—	—	—	—	
Sex	125							
Male		94 (75.20)	12 (14.12)	Ref		23 (27.06)	Ref	
Female		31 (24.80)	3 (10.34)	0.70 (0.18–2.69)	0.61	9 (31.03)	1.21 (0.48–3.05)	0.68
Race/ethnicity	125							
White		94 (75.20)	11 (12.79)	Ref		24 (27.91)	Ref	
Black/Asian/Hispanic		31 (24.80)	4 (14.29)	1.14 (0.33–3.90)	0.84	8 (28.57)	1.03 (0.40–2.66)	0.95
Marital status	123							
Single		95 (77.24)	9 (10.47)	Ref		24 (27.91)	Ref	
Married/divorced/widowed		28 (22.76)	6 (23.08)	2.57 (0.82–8.06)	0.11	8 (30.77)	1.15 (0.44–2.99)	0.77
Education	122							
Less than high school		37 (30.33)	6 (18.18)	Ref		11 (33.33)	Ref	
High school diploma		47 (38.52)	5 (11.90)	0.61 (0.17–2.20)	0.45	10 (23.81)	0.63 (0.23–1.72)	0.36
At least some college		38 (31.15)	4 (11.11)	0.56 (0.14–2.20)	0.41	10 (27.78)	0.77 (0.28–2.15)	0.62
Head injury	118							
No		72 (61.02)	8 (11.59)	Ref		13 (18.84)	Ref	
Yes		46 (38.98)	6 (14.29)	1.27 (0.41–3.96)	0.68	17 (40.48)	2.93 (1.24–6.94)	0.02
History of drug misuse	117							
No		43 (36.75)	6 (15.00)	Ref		12 (30.00)	Ref	
Yes		74 (63.25)	7 (10.61)	0.67 (0.21–2.16)	0.51	16 (24.24)	0.75 (0.31–1.80)	0.52
History of alcohol misuse	116							
No		54 (46.55)	7 (14.29)	Ref		15 (30.61)	Ref	
Yes		62 (53.45)	5 (8.93)	0.59 (0.17–1.99)	0.39	13 (23.21)	0.69 (0.29–1.63)	0.39
		Total, Mean (SD)						
Age, y	124	44.05 (9.51)	—	1.00 (0.94–1.06)	0.99	—	0.99 (0.95–1.04)	0.78
Age at psychosis onset, y	122	24.26 (7.46)	—	0.98 (0.91–1.06)	0.68	—	0.98 (0.93–1.04)	0.47
FSIQ	113	84.91 (13.81)	—	0.95 (0.91–1.00)	0.06	—	0.98 (0.95–1.01)	0.17

indicated high severity of symptoms on the positive and negative subscales of the PANSS. In addition, 72% of participants met the clinical diagnostic threshold for depression. There was very high comorbidity between depression and PTSD diagnoses, with all participants with PTSD meeting criteria for depression and 15% of those meeting criteria for depression also meeting criteria for PTSD. Positive symptoms predicted PTSD (OR, 1.20; 95% confidence interval [CI], 1.08–1.33) and subthreshold PTSD diagnoses (OR, 1.13; 95% CI, 1.05–1.22), as did depression symptoms (ORs, 1.45 [95% CI, 1.18–1.78] and 1.35 [95% CI, 1.16–1.58], respectively).

TABLE 2. Clinical Symptoms and Functioning Characteristics of Sample

	n	Mean (SD)	Observed Range	Possible Range	PTSD, OR (95% CI)	p	Subthreshold PTSD, OR (95% CI)	p
Clinical								
PTSD symptoms	114	1.65 (0.59)	1.00–3.25	1–4	—	—	—	—
Positive symptoms	120	14.96 (5.69)	7–30	7–49	1.20 (1.08–1.33)	0.001	1.13 (1.05–1.22)	0.002
Negative symptoms	120	18.56 (4.23)	9–35	7–49	0.95 (0.83–1.09)	0.45	1.01 (0.92–1.12)	0.79
Depression symptoms	118	9.58 (4.08)	0–29	0–50	1.45 (1.18–1.78)	<0.001	1.35 (1.16–1.58)	<0.001
Interpersonal functioning								
Patient rated	122	2.72 (0.82)	0.71–4.00	0–4	0.19 (0.08–0.47)	<0.001	0.27 (0.14–0.50)	<0.001
Interviewer rated	117	2.67 (0.91)	0.25–5.25	0–6	0.67 (0.35–1.28)	0.22	1.10 (0.70–1.73)	0.68
Occupational functioning								
Patient rated	122	2.58 (0.82)	0.75–4.00	0–4	0.24 (0.10–0.55)	0.001	0.25 (0.13–0.47)	<0.001
Interviewer rated	117	2.01 (1.07)	0.00–5.33	0–6	0.96 (0.56–1.66)	0.88	0.88 (0.59–1.32)	0.55
		n (%)	**PTSD, n (%)**					
Employed, n (%)	124	30 (24.19)	4 (13.79)	—	1.06 (0.31–3.64)	0.92	0.75 (0.28–1.98)	0.56

TABLE 3. Potentially Traumatic Events

Event	n	n (%)	Male, n (%)	Female, n (%)	PTSD, OR (95% CI)	p	Subthreshold PTSD, OR (95% CI)	p
Serious injury	121	50 (41.32)	41 (45.56)	9 (29.03)	4.61 (1.37–15.53)	.01	2.67 (1.16–6.18)	.02
Any other situation that was frightening	116	44 (37.93)	33 (37.93)	11 (37.93)	1.88 (0.61–5.81)	.27	3.89 (1.61–9.38)	.003
Experienced a beating to the head	121	42 (34.71)	31 (34.44)	11 (35.48)	3.14 (1.03–9.58)	.04	2.74 (1.18–6.35)	.02
Lack of shelter	120	40 (33.33)	31 (34.83)	9 (22.50)	2.47 (0.82–7.42)	.11	2.52 (1.08–5.87)	.03
Forced separation from family members	121	38 (31.40)	29 (32.33)	9 (29.03)	3.62 (1.18–11.10)	.02	2.26 (0.97–5.27)	.06
Being close to death	120	37 (30.83)	29 (32.58)	8 (25.81)	3.75 (1.22–11.52)	.02	2.86 (1.22–6.70)	.02
Forced isolation from others	121	35 (28.93)	25 (27.78)	10 (32.26)	2.22 (0.74–6.70)	.16	3.32 (1.40–7.85)	.006
Lack of food or water	121	34 (28.10)	26 (28.89)	8 (23.53)	1.87 (0.61–5.77)	.28	1.86 (0.78–4.46)	.17
Imprisonment	121	33 (27.27)	30 (33.33)	3 (9.09)*	1.97 (0.64–6.10)	.24	1.62 (0.67–3.94)	.28
Unnatural death of family or friend	120	29 (24.17)	18 (20.22)	11 (35.48)	2.30 (0.74–7.18)	.15	1.97 (0.80–4.87)	.14
Ill health without access to medical care	121	29 (23.97)	20 (22.22)	9 (31.03)	1.14 (0.33–3.90)	.84	2.00 (0.81–4.95)	.13
Drowning experience	121	27 (22.31)	20 (22.22)	7 (22.58)	0.54 (0.11–2.57)	.44	2.21 (0.86–5.67)	.10
Rape or sexual abuse	121	26 (21.49)	13 (14.44)	13 (50.00)**	0.83 (0.21–3.18)	.78	2.91 (1.16–7.30)	.02
Lost or kidnapped	121	18 (14.88)	15 (16.67)	3 (9.68)	2.21 (0.62–7.91)	.22	2.40 (0.85–6.78)	.10
Brainwashing	121	16 (13.22)	14 (15.56)	2 (6.45)	7.58 (2.15–26.75)	.002	6.03 (1.84–19.77)	.003
Combat situation	120	15 (12.50)	11 (12.36)	4 (12.90)	6.59 (1.91–22.78)	.003	3.52 (1.16–10.74)	.03
Suffocation experience	121	15 (12.40)	12 (13.33)	3 (9.68)	5.00 (1.40–17.87)	.01	6.03 (1.84–19.77)	.003
Torture	121	14 (11.57)	10 (11.11)	4 (12.90)	5.69 (1.56–20.75)	.008	5.13 (1.53–17.17)	.008
Murder of family or friend	121	7 (5.79)	4 (4.44)	3 (9.68)	5.94 (1.18–29.79)	.03	3.76 (0.79–17.86)	.10
Murder of stranger or strangers	121	7 (5.79)	4 (4.44)	3 (9.68)	1.11 (0.12–9.90)	.93	2.02 (0.43–9.57)	.38
Experienced any traumatic event	121	99 (81.82)	73 (81.11)	26 (83.87)	—		—	
Total traumatic events, mean (SD)	121	4.60 (4.56)	4.62 (4.75)	4.52 (4.03)	1.16 (1.04–1.29)	.008	1.18 (1.07–1.29)	<.001

Asterisks in the column "female" indicate significant differences by sex.

*$p < 0.01$.

**$p < 0.001$.

Traumatic Events

Table 3 summarizes the traumatic events reported by participants, who indicated experiencing an average of 4.60 (SD, 4.75) of the 20 assessed events. The most common traumatic events were serious injury (41%), beatings to the head (35%), lack of shelter (33%), and forced separation from family members (31%). In addition, 31% of participants reported having been close to death, 12% reported experiencing torture, and 6% reported experiencing the murder of family or friend. One-third (33%) of the men reported being imprisoned versus 10% of the women, whereas 42% of the women reported having experienced rape or sexual abuse compared with 14% of the men.

There was a positive relationship between the number of traumatic events reported and PTSD symptoms ($r = 0.52$, $p < 0.001$) and PTSD diagnosis (OR, 1.16; $p = 0.006$). Of the 20 traumatic events, 9 were associated with increased risk of a PTSD diagnosis, with the highest risk being conferred by experiencing combat (OR, 7.11; $p = 0.002$), brainwashing (OR, 6.40; $p = 0.003$), and the murder of a family member or a friend (OR, 6.34; $p = 0.02$) (Table 3). Rape/sexual abuse was not predictive of PTSD diagnosis (OR, 0.90; $p = 0.88$), but did predict increased risk of subthreshold PTSD (OR, 3.21; $p = 0.01$).

PTSD, Functioning, and Comorbid Clinical Outcomes

Results indicated that patients who rated themselves higher in interpersonal (OR, 0.22, $p < 0.001$) and occupational functioning (OR, 0.26; $p = 0.001$) on the BASIS-32 were less likely to have PTSD (Tables 2 and 4). Indeed, for every point improvement in interpersonal functioning, patient risk of PTSD decreased more than 5 times (OR, 5.17; $p < 0.001$), and for every point improvement in occupational

functioning, patient risk of PTSD decreased more than 4 times (OR, 4.22; $p = 0.001$). However, interviewer-rated interpersonal functioning (OR, 0.66; $p = 0.22$) and occupational functioning (OR, 0.97; $p = 0.93$) on the QLS were not associated with PTSD diagnosis or symptoms, nor was current employment status (OR, 1.10; $p = 0.87$).

Potential confounders of the association between PTSD and functioning were also observed. Both patient-rated interpersonal functioning and occupational functioning were negatively associated with positive and depression symptoms (Table 4). Patients with more PTSD symptoms also reported more positive symptoms ($r = 0.32$, $p < 0.001$) and depression ($r = 0.43$, $p < 0.001$). For every point increase in positive symptoms, the risk of PTSD increased by 20% (OR, 1.20; $p = 0.001$; Table 2), so a 5-point increase in positive symptoms doubles the risk of PTSD. Moreover, for every point increase in depression symptoms, the risk of PTSD increases by 45% (OR, 1.45; $p < 0.001$), so that for every 5-point increase in depression symptoms, the risk of PTSD is more than 3 times higher. In addition, interviewer-rated interpersonal functioning was positively associated with the participant being female and negatively associated with participant age, age at onset of psychosis, positive and negative symptom severity, and depression severity. Interviewer-rated occupational functioning and current employment were predicted by severity of negative symptoms.

Multiple Regressions Predicting Functioning

Results of the multicolinearity analysis found no evidence of colinearity between predictors, as the highest correlation was $r = -0.59$ between education and FSIQ, and the mean VIF was 1.62, with the highest VIF being 2.40. No violations of least-squares assumptions were found in the plots of residuals against fitted values.

TABLE 4. Correlations Between Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	—																	
2	0.09	—																
3	0.79*	0.10	—															
4	0.15	0.40*	0.09	—														
5	0.16	0.26**	0.08	0.64*	—													
6	−0.48*	0.11	−0.51*	0.01	−0.01	—												
7	−0.11	0.32*	−0.02	0.12	0.03	0.06	—											
8	0.06	−0.24*	0.00	−0.08	−0.01	−0.05	−0.05	—										
9	−0.14	−0.03	−0.08	0.03	0.11	−0.02	−0.06	0.10	—									
10	0.07	0.07	0.07	0.01	−0.11	−0.05	−0.01	−0.35*	0.00	—								
11	−0.16	−0.02	−0.10	−0.04	0.00	−0.01	0.08	−0.06	0.09	0.10	—							
12	−0.03	−0.11	0.05	0.06	0.01	−0.10	−0.13	−0.01	0.11	0.09	0.59*	—						
13	−0.01	0.19***	0.02	0.01	−0.07	0.24***	0.09	−0.04	−0.09	0.06	0.06	0.01	—					
14	0.09	−0.08	0.03	0.00	−0.03	−0.22***	0.16	0.12	0.01	−0.08	0.02	−0.14	−0.24***	—				
15	0.18	−0.10	0.16	0.04	−0.10	−0.15	0.04	0.07	0.02	0.02	0.13	0.11	−0.19***	0.37*	—			
16	0.00	−0.45*	0.00	−0.07	−0.10	−0.12	−0.05	0.36*	0.16	−0.33*	−0.13	0.08	−0.14	0.21***	0.08	—		
17	−0.33*	−0.24***	−0.34*	−0.17	−0.02	0.33*	−0.09	0.09	0.04	−0.10	0.13	−0.07	0.08	0.03	−0.12	−0.03	—	
18	0.07	−0.31*	−0.01	−0.44*	−0.26**	−0.01	−0.23***	0.06	0.12	0.02	−0.13	−0.21***	0.02	−0.12	−0.07	0.06	0.14	—
19	−0.25**	−0.20***	−0.32*	−0.13	−0.12	0.41*	−0.03	−0.03	−0.06	0.03	0.09	−0.02	0.04	−0.05	0.01	0.08	0.41*	0.10

1 Indicates patient-rated interpersonal functioning; 2, interviewer-rated interpersonal functioning; 3, patient-rated occupational functioning; 4, Interviewer-rated occupational functioning; 5, employed; 6, PTSD symptoms; 7, female; 8, age; 9, white; 10, single; 11, education (in years); 12, FSIQ; 13, head injury; 14, drug misuse history; 15, alcohol misuse history; 16, age of psychosis onset; 17, positive symptoms; 18, negative symptoms; 19, depression symptoms.

*p < 0.001.
**p < 0.01.
***p < 0.05.

TABLE 5. Multiple Regressions Predicting Interpersonal and Occupational Functioning and Employment

	Patient-Rated Interpersonal Functioning[a]			Interviewer-Rated Interpersonal Functioning[a]			Patient-Rated Occupational Functioning[a]			Interviewer-Rated Occupational Functioning[a]			Employed[b]		
	B	95% CI	P	B	95% CI	P	B	95% CI	P	B	95% CI	P	OR	95% CI	P
Female	−0.13	(−0.45 to 0.19)	0.44	0.42	(0.08 to 0.76)	0.02	0.04	(−0.28 to 0.37)	0.80	0.07	(−0.39 to 0.52)	0.77	0.97	(0.30 to 3.15)	0.96
Age	0.01	(−0.01 to 0.02)	0.31	−0.01	(−0.03 to 0.01)	0.29	0.002	(−0.01 to 0.02)	0.85	−0.01	(−0.03 to 0.01)	0.43	1.00	(0.95 to 1.05)	0.99
White	−0.21	(−0.51 to 0.10)	0.18	0.24	(−0.09 to 0.56)	0.16	−0.09	(−0.40 to 0.22)	0.58	0.25	(−0.18 to 0.69)	0.25	20.67	(0.80 to 8.96)	0.11
Single	0.07	(−0.27 to 0.42)	0.68	−0.24	(−0.64 to 0.16)	0.24	0.03	(−0.33 to 0.39)	0.85	−0.13	(−0.68 to 0.41)	0.63	00.48	(0.15 to 1.55)	0.22
Age at onset	−0.01	(−0.03 to 0.01)	0.33	−0.05	(−0.07 to −0.03)	<0.001	−0.01	(−0.03 to 0.02)	0.63	−0.01	(−0.04 to 0.02)	0.68	0.94	(0.87 to 1.02)	0.14
FSIQ	0.001	(−0.01 to 0.01)	0.86	−0.007	(−0.02 to 0.01)	0.29	0.004	(−0.01 to 0.02)	0.58	0.004	(−0.01 to 0.02)	0.61	1.01	(0.97 to 1.06)	0.63
Education	−0.05	(−0.13 to 0.02)	0.14	0.001	(−0.08 to 0.08)	1.00	−0.05	(−0.13 to 0.02)	0.17	−0.05	(−0.16 to 0.05)	0.33	0.91	(0.70 to 1.19)	0.49
Drug use	0.01	(−0.33 to 0.35)	0.95	0.04	(−0.32 to 0.40)	0.82	−0.13	(−0.46 to 0.20)	0.43	−0.06	(−0.52 to 0.41)	0.81	0.88	(0.26 to 2.98)	0.84
Alcohol	0.22	(−0.07 to 0.51)	0.13	−0.09	(−0.40 to 0.22)	0.55	0.24	(−0.05 to 0.54)	0.10	−0.003	(−0.42 to 0.43)	0.99	0.54	(0.17 to 1.65)	0.28
Head injury	0.19	(−0.10 to 0.47)	0.20	0.22	(−0.08 to 0.52)	0.15	0.22	(−0.08 to 0.51)	0.15	0.06	(−0.33 to 0.46)	0.75	00.64	(0.22 to 1.85)	0.41
Positive symptoms	−0.02	(−0.05 to 0.003)	0.08	−0.04	(−0.07 to −0.01)	0.01	−0.02	(−0.05 to 0.01)	0.21	−0.01	(−0.05 to 0.02)	0.45	1.03	(0.93 to 1.14)	0.59
Negative symptoms	0.01	(−0.02 to 0.05)	0.40	−0.05	(−0.09 to −0.02)	0.005	0.001	(−0.03 to 0.03)	0.95	−0.11	(−0.16 to −0.06)	<0.001	0.84	(0.73 to 0.96)	0.01
Depression symptoms	<0.001	(−0.04 to 0.04)	0.99	−0.02	(−0.06 to 0.02)	0.43	−0.01	(−0.05 to 0.03)	0.46	−0.01	(−0.06 to 0.05)	0.73	0.96	(0.83 to 1.11)	0.54
PTSD symptoms	−0.62	(−0.88 to −0.36)	<0.001	0.17	(−0.11 to 0.45)	0.23	−0.66	(−0.93 to −0.38)	<0.001	0.02	(−0.38 to 0.42)	0.92	0.88	(0.31 to 2.50)	0.31

[a]Linear regression.
[b]Logistic regression.

See Table 5 for the results of the multiple linear regressions. These analyses indicated that when all hypothesized predictors were in the models, higher PTSD symptom severity was the only unique predictor of worse self-rated interpersonal ($B = −0.53$; $p = 0.001$) and occupational ($B = −0.69$, $p < 0.001$) functioning, but was not predictive of interviewer-rated interpersonal ($B = 0.21$; $p = 0.16$) or occupational ($B = 0.09$; $p = 0.68$) functioning, or of employment status (OR, 0.98; $p = 0.96$).

Interviewer-rated interpersonal functioning was positively predicted by female sex ($B = 0.39$; $p = 0.03$) and was negatively predicted by age at onset of psychosis symptoms ($B = −0.05$, $p < 0.001$) and positive ($B = −0.04$; $p = 0.007$) and negative ($B = −0.05$; $p = 0.004$) symptoms. Negative symptoms were the only significant predictor of interviewer-rated occupational functioning ($B = −0.11$, $p < 0.001$). Multiple logistic regression found that negative symptoms were also the only unique predictor of current employment status (OR, 0.84; $p = 0.01$).

DISCUSSION

The great majority of participants (82%) reported experiencing traumatic events, which is similar to the rates of traumatic events reported in other studies of people with SMI and much higher than rates reported by the general public (Kessler et al., 1995). In addition, 76% of participants reported at least 1 PTSD symptom, 1 in 4 participants had subthreshold PTSD (meaning they met 3 of the 4 criteria *DSM-IV* criteria for PTSD), and 12% met full criteria for current PTSD. In addition, participants with PTSD reported higher rates of depression (72%) and also had more severe psychosis symptoms than did those without PTSD. Indeed participants with psychosis, depression, and PTSD are all highly comorbid, and our current diagnostic and treatment approaches often do not account for multiple overlapping comorbidities, which may negatively impact functioning in both additive and multiplicative ways. Because PTSD, depression, and psychosis can all compromise functioning, understanding their unique contributions to functioning could have implications for clinical care and the identification of patients who may be having more difficulty.

When all of the predictor variables were included in the multiple linear or logistic regression models, PTSD symptom severity was the only unique predictor of worse self-rated interpersonal and occupational functioning on the BASIS-32, whereas PTSD was not predictive of interviewer ratings on the QLS or current employment status. These apparently discrepant findings may reflect differences between the subjective versus objective nature of ratings from the 2 instruments. The BASIS-32 requires participants to provide subjective ratings regarding how much difficulty they experience in different life domains (e.g., household responsibilities, getting along with people, and feeling close to others), which are significantly correlated with severity of depression and PTSD symptoms. In contrast, the QLS yields objective ratings based on the interviewer's ascertainment of the quality of the participant's interpersonal and occupational functioning, irrespective of the individual's feelings about their functioning, and these ratings are not significantly correlated with either the subjective ratings of functioning on the BASIS-32 or severity of depression or PTSD. Thus, the association between PTSD symptoms severity and worse self-reported interpersonal and occupational functioning appears to reflect the greater impact of PTSD-related distress on the evaluation of one's own functioning than more objective indicators of functioning. Because the self-appraisal of one's own functioning may be an important factor contributing to quality of life and goal setting, reducing PTSD symptoms in patients with schizophrenia could improve their subjective sense of interpersonal and occupational competency and could increase self-efficacy for achieving important personal goals.

Aside from the differences between the BASIS-32 and QLS in the subjective versus objective criteria for ratings, this discrepancy

may also be due in part to the context of an SMI treatment center in which interviewers, and perhaps clinicians, may be more attuned to clinical manifestations of psychotic disorders than they are to PTSD symptoms and trauma histories. Indeed, studies have found that despite severe trauma histories and high rates of PTSD, few patients receiving clinical services for SMI had a PTSD diagnosis in their medical charts, and clinicians were often unaware of their trauma histories (Cascardi et al., 1996; Craine et al., 1988; Cusack et al., 2006; Lommen and Restifo, 2009; Mueser et al., 1998). By neglecting PTSD symptoms and trauma histories, clinicians may be missing critical aspects of patients' experiences and distress related to them, which may compromise the subjective functioning and quality of life in patients with schizophrenia.

Our results suggest that screening for exposure to traumatic events and PTSD symptoms may inform the treatment of individuals with schizophrenia. While more research is needed on the appropriateness and effectiveness of existing PTSD treatments for patients with schizophrenia and whether adaptations or alternatives may be beneficial, evidence-based interventions for PTSD in patients with psychosis have demonstrated significant improvements in PTSD symptoms (de Bont et al., 2013; Frueh et al., 2009b; Mueser et al., 2008; van den Berg et al., 2015), general mental health and depression symptoms (Frueh et al., 2009b; Mueser et al., 2008; Trappler and Newville, 2007), and self-reported functional improvements in interpersonal relationships (Frueh et al., 2009b). Moreover, 1 study demonstrated that frontline clinicians were able to successfully deliver evidence-based PTSD interventions to patients with SMI (Lu et al., 2012; Mueser et al., 2015).

Unfortunately, integration of assessment and intervention within services remains minimal (Chernomas et al., 2013; Chessen et al., 2011; Frueh et al., 2002; Read and Ross, 2003; Salyers et al., 2004; Tucker, 2002), and there are many barriers to integrating PTSD treatment into existing mental health services (Frueh et al., 2009a). One barrier is that many clinicians are hesitant to provide trauma-focused interventions to patients with psychosis because of fear of symptom exacerbations (Frueh et al., 2006; Gairns et al., 2015). However, recent research has found that patients with psychosis who received trauma-focused therapy had fewer symptom exacerbations, adverse events, and revictimization experiences compared with patients in a waitlist control (Silverstein and Bellack, 2008; van den Berg et al., 2015).

Our findings should be interpreted in light of some limitations. Posttraumatic stress disorder, distressing symptoms, and functioning problems may have been exacerbated and intercorrelated because they were associated with experiencing psychotic symptoms or negative treatment experiences such as involuntary hospitalization and the use of seclusion and restraints (Lu et al., 2011; Mueser et al., 2010). Therefore, although not evaluated in this study, traumatic events related to illness and treatment may have contributed to the observed associations. Moreover, the cross-sectional design of this study prevents making causal associations between PTSD symptoms and decreased functioning among individuals with schizophrenia. The retrospective nature of the study and the use of a self-report measure to determine the presence of PTSD could also increase the likelihood of reporting bias by study participants. In addition, participants were drawn from patients being seen at a mental health clinic that serves people with chronic mental illness who often have low socioeconomic status, and so findings may not be generalizable to first-episode patients or those from higher socioeconomic backgrounds. The sample was also primarily male and almost exclusively participants who identified as white or black, and thus results may not be as generalizable to women or patients with other racial or ethnic backgrounds. Finally, this is a secondary data analysis, and therefore, the data were not collected to answer this exact question, and other unmeasured variables may be confounding the results.

CONCLUSIONS

Attention to trauma history and PTSD symptoms of patients with schizophrenia is critical, not only because of the distress conferred by PTSD symptoms, but also because it may play a role in subjective interpersonal and occupational functioning. Moreover, given the association between PTSD symptoms and the severity of positive psychosis symptoms, neglect of PTSD symptoms may hinder recovery not only from trauma, but also from psychosis, perhaps resulting in use of higher doses of antipsychotic medication and impaired recovery. Availability of PTSD assessment and evidence-based treatments for people with schizophrenia is a crucial and often unmet health service need.

DISCLOSURE

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