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Insight and theory of mind in schizophrenia

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Abstract

Theory of mind (ToM) impairment is common in individuals with schizophrenia and is associated with poor social functioning. Poor insight has also been linked to poor outcome in schizophrenia. Social developmental research has shown representations of self (insight) and representations of others (ToM) are related. In schizophrenia, contradictory reports of associations between insight and ToM have emerged, possibly due to a failure to account for neurocognitive impairments and symptoms associated with both mentalization constructs. This study investigated the relationships between ToM (intentions of others on the Hinting task) and clinical and cognitive insight, while accounting for shared variance with neurocognitive impairment and symptom severity in 193 individuals with schizophrenia. Clinical, but not cognitive, insight was associated with ToM. A unique association between Awareness of Mental Illness and Hinting Task performance was found, independent of shared variance with neurocognition and symptoms. Importantly, ToM was found to mediate Awareness of Mental Illness and neurocognition. Results suggested treatments targeting mentalization abilities that contribute to representations of self and others may improve insight deficits associated with poor outcome in schizophrenia.

Keywords

Schizophrenia; Mentalization; Cognitive Insight; Insight; Theory of Mind; Social Cognition

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1. Introduction

Theory of mind (ToM; also called mental state attribution) is, “the ability to infer intentions, dispositions and beliefs of others” (Green et al., 2008). This ability to understand the mental states of others is important for a variety of social functions, including understanding pragmatic speech, pretending, deception, imagining, understanding jokes, and empathy (Corcoran, 2001; Sperber and Wilson, 2002; Shamay-Tsoory et al., 2007). Several studies have found ToM deficits in individuals with schizophrenia (e.g., Corcoran et al., 1995; Garety and Freeman, 1999; Green et al., 2008;), and this impairment has been shown to be associated with social functioning and social competence in schizophrenia (Roncone et al., 2002; Brüne, 2005; Couture et al., 2006; Brekke et al., 2007; Brüne et al., 2007; Green et al., 2008; Couture et al., 2011). Therefore, ToM may be an important treatment target to improve real-world functioning in schizophrenia.

Poor insight has also been linked to poor outcome in schizophrenia (Amador et al., 1991; Lysaker et al., 2002; Erikson et al., 2011; Giugiario et al., 2012; for a recent review, see Lincoln et al., 2007). Insight has been widely regarded as a multidimensional construct (Amador et al., 1991). Clinical insight refers to one’s awareness of having a mental illness that requires treatment, and includes dimensions of Awareness of Illness, Relabeling of Symptoms, and Need for Treatment, which have been differentially associated with neurocognition and clinical symptoms (Konstantakopoulos et al., 2013). Cognitive insight involves metacognitive processes of re-evaluation and correction of distorted experiences (e.g., objective distancing and reappraisal of symptoms), and includes dimensions of self-reflectiveness and overconfidence in beliefs (Beck et al., 2004). Clinical and cognitive insight appear to be distinct constructs with different neurocognitive correlates (Nair et al., 2014). Clinical insight presumably requires metacognitive processes associated with cognitive insight (Beck et al., 2004).

Social developmental researchers have long posited that representations of self and others’ mental states are inextricably connected. Developmentalists propose that self representations stem from experiental learning, reflection, and extensive engagement in social interactions, and as such, understanding others’ motives, beliefs and actions aids in our own self-reflective mechanisms (Gallagher and Meltzoff, 1996). Moreover, social comparison theory suggests that individuals assess personal traits, opinions, and competency and derive self attributes by evaluating oneself relative to others (Festinger, 1954). Consequently, self representations require the representations of others and mentalization of oneself in the position of others (Decety and Sommerville, 2003). According to Barresi and Moore (1996), social understanding of self and others or ToM necessitates effective integration of first-person and third-person intentional information, that is, personal and others’ motives. Researchers have contended that failure to converge and apply both inputs results in impairments in mentalization (Barresi and Moore, 1996), and insults or abnormal activity in neural systems linked to self and other representations may underpin deficits in control of actions in psychotic disorders such as schizophrenia (Frith, 1995; Frith et al., 2000). The ability to understand and project intentionality of others and of self, therefore, rely on both internal and external social awareness. To date, the developmental sequence of mindreading

and metacognition (which precedes the other) remains a point of contention. However, several authors have suggested that data from schizophrenia research more strongly support the view that the development of mindreading precedes maturation of insight to self (Carruthers, 2009; Wiffen and David, 2009). If associations are found between impairments in representations of self and others in consumers with schizophrenia, this may indicate that treatments targeting the mentalization abilities that contribute to representaitons of self and others may improve insight and ToM deficits associated with poor outcome in schizophrenia.

The relationship between representations of self and others' mental states in schizophrenia is unclear, due to conflicting findings (Drake and Lewis, 2003; Bora et al., 2007). Bora and colleagues (2007) found an association between clinical insight and a narrative false belief task, but not with an adapted version of the Reading the Mind in the Eyes Test. Additional investigations further observed significant associations between clinical insight and ToM, as measured by a false belief task (Langdon et al., 2006; Pousa et al., 2008; Langdon and Ward, 2009), and the Hinting Task (Greig et al., 2004). Drake and Lewis (2003), however, did not find a significant association between clinical insight and a joke comprehension assessment of mental state attribution, and Langdon et al. (2006) reported a significant association between clinical and ToM measured by the joke comprehension test and a false belief narrative task, but not a story comprehenion ToM test. These inconsistent findings may be due to sample differences in severity of neurocognitive impairment or symptoms or the extent to which these factors are associated with different ToM tasks. ToM task performance and cognitive and clinical insight have all been found to be associated with neurocognitive impairment (Smith et al., 2000; Roncone et al., 2002; Drake and Lewis, 2003; Rossell et al., 2003; Sergi et al., 2007; Lepage et al., 2008; Bora et al., 2009; Nair et al., 2014), positive symptoms (Roncone et al., 2002; Mintz et al., 2003; Brüne, 2005; Sprong et al., 2007; Pousa et al., 2008; Konstantakopoulos et al., 2014), and negative symptoms (Frith, 1992; Roncone et al., 2002; Mintz et al., 2003; Rossell et al., 2003; Couture et al., 2011) in schizophrenia. One recent investigation (Konstantakopoulos et al., 2014) examined the association between clinical insight and ToM in individuals with schizophrenia, independent of shared variance with neurocognition and symptom severity, and found an independent association between clinical insight and ToM, indexed by a composite score from the False Belief Task, the Hinting Task, and the Faux Pas Recognition Task.

The present study attempted to replicate this single prior finding (Konstantakopoulos et al., 2014) of an association between clinical insight and ToM that was independent of neurocognitive impairment and symptom severity. In addition, given that insight is widely accepted as a multidimensional construct (Amador et al., 1991), associations between ToM and multiple dimensions of both clinical and cognitive insight were examined. Based on the prior research reviewed above, we predicted that both clinical and cognitive insight would be significantly associated with ToM independent of shared variance with neurocognitive impairment and symptomatology.

2. Methods

2.1 Participants

A total of 193 participants were recruited from local outpatient clinics and residential facilities. Of these, 141 (73%) were diagnosed with schizophrenia and 52 (27%) with schizoaffective disorder based on the *Structured Clinical Interview for DSM-IV* (SCID; First et al., 1995). Participants were excluded for neurological illness, traumatic brain injury, or substance dependence (*DSM-IV* criteria in the past six months). Table 1 outlines the participants' demographic information. The Positive and Negative Syndrome Scale (PANSS; Kay et al., 1987) was administered and scored according to the five-factor model (Van der Gaag et al., 2006), with the exclusion of the insight item G12. Table 1 presents these PANSS factor scores and other participant characteristics.

2.2 Measures

The Hinting Task (Greig et al., 2004) was used to assess ToM. On the Hinting Task, participants interpret the intentions of others in 10 auditory vignettes of social interactions between two characters. Within each vignette, the participant is first offered a statement pertaining to the environmental context where the characters are interacting (e.g., "Melissa goes to the bathroom to take a shower. Anne has just had a bath."). Subsequently, one character verbalizes a hint to the other (e.g., "Melissa notices that the bathtub is dirty so she called upstairs to Anne, 'Couldn't you find the Ajax, Anne?'"). The participant is then asked to explain what the hint meant (e.g., "What does Melissa really mean when she says this?"). Two points were awarded for the item when a correct response was given, and if the first response was incorrect, additional hints were provided (e.g., "Melissa goes on to say, 'You're very lazy sometimes, Anne.' What does Melissa want Anne to do?"). If the participant provided the correct response after the additional hint, 1 point was earned. The version of the Hinting Task used in this study included a manipulation of speech prosody to draw attention to the hint. Findings regarding the effect of prosody are reported elsewhere (Fish, 2009). The vignettes were presented via digital recording by a professional actor who read each item either in a neutral voice or with prosody emphasis during the hint. Two forms were devised by splitting the 10 items into even and odd items, and half the participants received even items with prosody emphasis and odd items in a neutral voice and half received odd items with prosody and even items in a neutral voice. Performance in neutral and prosody conditions did not differ significantly in the present study (Neutral: M=6.46, S.D.=2.80; Prosody: M=6.61, S.D.=2.79, $t(192)=0.63$, p=.53), and the 10-item measure was found to have adequate internal consistency ($\alpha=.80$), so the total score for the 10 items (maximum score of 20) was used.

To assess insight, the Birchwood Insight Scale (BIS; Birchwood et al., 1994) and Beck Cognitive Insight Scale (BCIS; Beck et al., 2004) were administered. The BIS contains 8 items scored on a 3-point scale (2="Agree," 1="Unsure," 0="Disagree") to generate the following subscales: Awareness of Illness (BIS-AoI; two items, e.g., "I am mentally well"), Relabeling of Symptoms (BIS-RoS; two items, e.g., "Some of the symptoms were made by my mind"), and Need for Treatment (BIS-NT; four items, e.g., "I do not need medication"). Items were summed for each subscale and the total score was the sum of all items (range=0–

16). As reported by Birchwood et al. (1994), the internal consistency of the overall BIS is α=.75, and test-retest reliabilities are BIS-NT (r=.96), BIS-AoI (r=.80), and BIS-RoS (r=.65). Higher scores on all three subscales reflect greater clinical insight. The BCIS contains 15 items scored on a 4-point scale (0="Do Not Agree At All" to 3="Agree Completely"), yielding the following subscales: 9 items for Self-Reflectiveness (BCIS-SR; e.g., "I have jumped to conclusions too fast") and 6 items for Self-Certainty (BCIS-SC; e.g., "My interpretations of my experiences are definitely right") subscales. Beck et al. (2004) reported the internal consistency for BCIS-SR and BCIS-SC were α=0.67 and α=0.61, and suggested these were adequate given the number of items per subscale. Higher BCIS-SR scores (range=0 to 27) and lower BCIS-SC scores (range=0 to 18) reflect greater cognitive insight, and a composite index score is computed by subtracting BCIS-SC from BCIS-SR scores, with higher scores reflecting greater cognitive insight.

The neuropsychological battery included *speed of information processing* (Brief Assessment Symbol Coding: Keefe et al., 2004; Trail-Making A: Reitan, 1979; Heaton et al., 1991), *working memory* (Letter-Number Span and Spatial Span: Wechsler, 1997), *verbal learning and memory* (Hopkins Verbal Learning Test-Revised: Benedict et al., 1998), *visual learning and memory* (Brief Visual Memory Test-Revised: Benedict, 1997), and *executive function* (Delis-Kaplan Executive Functions System Sorting Test, 20 Questions, and Word Context: Delis et al., 2001; BACS Letter Fluency: Keefe et al., 2004). The MATRICS Consensus Cognitive Battery (MCCB; Nuechterlein and Green, 2006) was not yet available at the time this study was initiated, so tests were selected to be comparable to the MCCB battery and capture similar cognitive ability domains. The *Global Neurocognition T-score* (age- and gender-corrected according to normative data cited for each test above) was derived by averaging the domain *T*-scores (see Table 2).

2.3 Data Analysis

Pearson correlations were computed among all variables included in the regressions. The primary analyses were hierarchical linear regressions examining whether ToM accounted for additional variance in insight independent of shared variance with neurocognitive impairment and symptom severity. Global neurocognition and the five PANSS symptom factors were entered in step 1, and ToM was added in step 2 as a predictor of each insight variable in separate regressions. Finally, when ToM was a signficant predictor of insight in the regressions, a Path Model (utilizing Mplus v7.11) was estimated to test whether ToM mediated the relationship between neurocognition and insight, and one thousand bootstrap samples were used to produce the 95% confidence interval of the indirect effect, according to methods described by Preacher and Hayes (2004). All tests were two-tailed.

3. Results

3.1 Correlation Analyses

Table 2 presents descriptive statistics for all variables in the regression analyses and Table 3 presents correlations among these variables. ToM (Hinting) task performance was signficantly correlated with clinical insight on Relabeling of Symptoms and Awareness of Illness indices, but not Need for Treatment. In contrast, correlations between ToM and

cognitive insight were not significant. Greater severity of neurocognitive impairment was significantly correlated with poorer ToM task performance and poorer clinical insight on all three indices, but was not significantly correlated with cognitive insight. Greater severity of disorganization was significantly correlated with poorer ToM task performance and poorer clinical insight on Awareness of Illness and Relabeling of Symptoms indices, and weak but significant correlations were found between positive symptoms and ToM and excitement and Need for Treatment. In contrast, cognitive insight was not significantly correlated with any symptom factor. Both cognitive insight indices were correlated with Awareness of Illness and Self-Reflectiveness was correlated with Relabeling of Symptoms.

3.2 Linear Regressions

Results of the linear regressions are presented in Table 4. In step 1, neurocognitive impairment was significantly associated with Relabeling of Symptoms and marginally associated with Awareness of Illness, but not with Need for Treatment or either cognitive insight variable. Greater excitement was significantly associated with greater Need for Treatment and less Self Certainty. Greater emotional distress was significantly associated with greater Awareness of Illness and Self-Reflectiveness, and less Self-Certainty, and marginally associated with Need for Treatment. Negative, positive, and disorganization symptoms were not significantly associated with any insight subtype, in the context of neurocognition and the other symptom factors.

In step 2, only one significant independent association was found between ToM and clinical insight on the Awareness of Illness index. ToM accounted for a modest but significant 4.4% additional variance in Awareness of Illness independent of shared variance with neurocognitive impairment and symptoms. ToM was not an independent predictor of any other clinical or cognitive insight index. In the context of symptoms and ToM, neurocognitive impairment was only associated with Relabeling of Syptoms. Neurocognitive impairment was no longer a significant predictor of Awareness of Illness when ToM was added to the model.

3.3 Mediation Analysis

Given that ToM was uniquely associated with Awareness of Illness, and that neurocognition was no longer a signficant predictor of Awareness of Illness when ToM was added to the model, a Path Model was computed to test whether ToM mediated the relationship between neurocognition and Awareness of Illness. The direct effects of neurocognition on ToM (β=0.176, S.E.=0.019, p<.001, std. β=0.542) and of ToM on Awareness of Illness (β=0.138, S.E.=0.045, p=.002, std. β=0.244) were statistically significant, but the direct effect of neurocognition on Awareness of Illness (β=0.007, S.E.=0.014, p=.630, std. β=0.038) was not significant. The indirect (mediation) effect of neurocognition on Awareness of Illness through ToM (β=0.024, S.E.=0.008, 95% CI= [0.009, 0.040], std. β=0.132) was significant.

4. Discussion

The present study examined the association between ToM and insight in schizophrenia. ToM (as indexed by Hinting Task performance) was signficantly correlated with clinical,

but not cognitive, insight, and the association between Awareness of Illness remained significant independent of shared variance with neurocognition and clinical symptoms. ToM accounted for an additional 4.4% of variance in Awareness of Illness. This finding suggests an association between awareness of personal mental health and awareness of others intentions that was not solely related to neurocognitive impairment or symptom severity. In fact, neurocognition was no longer a significant predictor of Awareness of Illness after ToM was added to the regression model, and mediation analyses showed that ToM was a significant mediator of the relationship between neurocognition and Awareness of Illness. Neurocognition, however, remained the strongest predictor of Relabeling of Symptoms, and ToM was not associated with any other dimension of insight in the regression analyses, suggesting specificity of the relationship between ToM and Awareness of Illness.

These results were only partially consistent with the findings of Konstantakopoulos and colleagues (2014). Both studies found associations between ToM and Awareness of Illness, but the present study did not replicate their findings of associations between ToM and Relabeling of Symptoms or Treatment Compliance. Notably, Konstantakopoulos et al. (2014) used a composite of several indices of ToM, including the Hinting Task, False-Belief task and Faux Pas Recognition Test. The present study also used a brief self-report measures of insight, whereas Konstantakopoulos et al. (2014) used a a more comprehensive clinician-rated insight interview. The additional measures of ToM and, in particular, the more objective and extensive interview measure of insight used in the Konstantakopoulos et al. (2014) study may have resulted in greater sensitivity to detect relationships between ToM and other domains of clinical insight.

The association found between awareness of mental illness and ToM may suggest that some aspects of clinical insight require the capacity to adopt a third-person perspective. To date, the few studies investigating the correlation between properties of clinical insight and ToM in schizophrenia have reported conflicting findings with different ToM tasks (Drake and Lewis, 2003; Bora et al., 2007). Tasks like the Hinting Task used in the present study that tap awareness of others' intentions may show stronger associations with awareness of self. The relationship found between insight about one's illness and ToM is consistent with the hypothesis that impaired ability to assume the stance of others may contribute to deficits in awareness of illness and interpersonal functioning (Lysaker et al., 1998; Bora et al., 2007). This finding is also consistent with social cognitive and simulation theories contending that self awareness requires the objective distancing and flexible perspective taking of others (Langdon and Colhearth, 2001; Decety and Sommerville, 2003). Thus, social cognition training interventions that teach consumers with schizophrenia to use perspective-taking and self-reflection skills to consider symptoms from the standpoint of others or read social cues (e.g., decipher gesture, linguistic, and affective expression hints) in social interactions may lead to improvements in insight and/or ToM. However, more systematic research will need to be conducted to determine the therapies that would promote insight to self and others. Given that clinical insight and ToM have both been linked to poor outcome and social disability in schizophrenia, treatments that target insight and ToM are much needed.

Consistent with prior research (Nair et al., 2014), neurocognitive impairment was significantly correlated with poor clinical, but not cognitive, insight, and ToM was uniquely

associated with Awareness of Illness. This different pattern of associations found for different dimensions of insight supports the notion that insight is a multidimensional construct (Amador et al., 1991), and that cognitive insight is different from clinical insight. However, it is important to note that greater cognitive insight was significantly correlated with greater clinical insight, especially for Awareness of Illness. The BCIS was originally developed as a measure of metacognitive abilities involved in the evaluation and reappraisal of anomolous experiences and use of feedback to correct distorted beliefs about these experiences (Beck et al., 2004). The associations found between cognitive and clinical insight are consistent with the hypothesis that these metacognitive abilities involving self-reflectiveness and belief flexibility contribute to clinical insight (Beck et al., 2004). It is, therefore, possible that metacognitive treatments targeting these abilities may improve clinical insight. Indeed, recent development in metacognitive training with patients with schizophrenia have provided promising preliminary results, including decreased positive symptomatology (Aghotor et al., 2010; Moritz et al., 2011; Moritz & Woodward, 2007).

This study had several limitations. First, brief self-report insight measures were employed, and more detailed structured interview measures that more comprehensively index the multiple dimensions of insight may yield different findings. Similarly, there are a variety of tasks that measure ToM, and different tasks with varying verbal ability required and affective processing may yield different results. Thus, although we applied the Hinting Task as a measure of ToM, a stronger measure of this metacognitive construct might include multiple indices that assess varying degrees of complex mental state attribution. Notably, most correlations between insight and ToM were modest and ToM accounted for only 4.4% of additional variance in Awareness of Illness, after accounting for symptoms and neurocognition; thus, significant variance in clinical insight remains unexplained by symptomatology, neurocognition, and ToM. Additional research is needed to identify factors associated with poor insight. Finally, this was a cross-sectional study and only longitudinal studies can confirm whether the association between neurocognition and insight is mediated by ToM and whether ToM causes poor insight or poor insight causes deficits in ToM.

Despite these limitations, this correlational study with a large sample suggested an association between awareness of illness and the ability to understanding the intentions of others, which was independent of other important illness-related variables. Further, ToM was found to mediate the relationship between neurocognition and Awareness of Illness. In contrast, results showed an absence of associations between ToM and cognitive insight. Taken together, the study offers evidence that insight is a multidimensional construct with different dimensions showing varying strength of associations with ToM that may inform treatment development.

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- Theory of mind (ToM) deficits and poor insight are associated with poor outcome in schizophrenia
- Social developmental research suggests representations of others (ToM) and representations of the self (insight) are related
- Results showed insight is multidimensional, with ToM uniquely associated with awareness of illness, but not other aspects of clinical or cognitive insight
- ToM also mediated the relationship between neurocognition and awareness of illness
- Findings may suggest social cognition interventions that teach ToM (e.g., perspective-taking) skills may improve awareness of illness and functional outcome in schizophrenia

Table 1

Participant Characteristics (*N*=193).

	M or %	SD
Demographic		
Gender (male)	64.25%	---
Age (years)	46.19	10.81
Education (years)	12.35	2.00
Ethnicity (Caucasian)	57.00%	---
Housing		
Board and Care Housing	60.10%	---
Residing Alone	12.40%	---
Residing with Companion/Family	23.30%	---
Homeless	1.00%	---
Medication		
Antipsychotic	97.69%	---
Mood	67.63%	---
PANSS		
Positive Symptoms	16.80	6.60
Negative Symptoms	15.06	6.70
Disorganization	18.99	6.75
Excitement	15.35	5.60
Emotional Distress	20.48	7.05

Note. PANSS subscales were computed according to the five-factor scoring (Van der Gaag et al., 2006).

Table 2

Theory of Mind, Insight, and Neurocognitive Functioning in Participants with Schizophrenia (*N*=193).

	M	SD
Hinting Task Total	13.06	4.57
Birchwood Insight Scale		
Total	8.69	2.48
Relabeling of Symptoms	2.74	1.19
Awareness of Illness	2.74	1.29
Need For Treatment	3.21	0.95
Beck Cognitive Insight Scale		
Composite Index	4.76	5.67
Self-Reflectiveness	12.51	5.20
Self-Certainty	7.75	3.49
Neurocognition (T-scores)		
Global	34.42	7.05
Speed of Processing	35.60	8.62
Working Memory	39.72	8.85
Verbal Learning and Memory	28.87	10.47
Visual Learning and Memory	28.93	11.54
Executive Function	38.96	8.54

Table 3

Pearson Correlations Among Theory of Mind, Insight, Symptom Severity, and Neurocognitive Functioning (N=193).

	ToM	BIS-RoS	BIS-AoI	BIS-NT	BCIS-SR	BCIS-SC	Positive Symptoms	Negative Symptoms	Disorganization	Excitement	Emotional Distress	Neurocognition
ToM	---	0.15*	0.26***	0.10	0.12	0.00	0.16*	−0.11	−0.32***	0.04	0.06	0.54***
BIS-RoS		---	0.27***	0.18*	0.29***	−0.14	−0.03	−0.07	−0.12	−0.11	−0.07	0.23**
BIS-AoI			---	0.39***	0.18*	−0.18*	0.02	0.03	−0.19**	−0.11	0.06	0.17*
BIS-NT				---	0.13	−0.06	−0.06	−0.09	−0.24**	−0.16*	−0.02	0.15*
BCIS-SR					---	0.20**	0.06	0.00	−0.11	0.02	0.12	0.13
BCIS-SC						---	0.03	−0.10	0.07	0.08	−0.10	−0.07
Positive Symptoms							---	0.28***	0.28***	0.59***	0.71***	0.07
Negative Symptoms								---	0.21**	0.45***	0.41***	−0.05
Disorganization									---	0.52***	0.35***	−0.38***
Excitement										---	0.64***	−0.04
Emotional Distress											---	−0.04
Neurocognition												---

*** $p < .001$

** $p < .01$

* $p <. 05$

Note. ToM: Theory of Mind (Hinting Task); BIS-RoS: Relabeling of Symptoms; BIS-AoI: Awareness of Illness; BIS-NT: Need for Treatment; BCIS-SR: Self-Reflectiveness, BCIS-SC: Self-Certainty.

Table 4

Hierarchical Regression Analysis Showing the Independent Association Between Insight and Theory of Mind Contolling for Cognitive Impairment and Symptom Severity (N=193).

	BIS Relabeling of Symptoms	BIS Awareness of Illness	BIS Need for Treatment	BCIS Self-Reflectiveness	BCIS Self-Certainty
Step 1					
Global Neurocognition	0.24(3.00)**	0.13(1.72)+	0.10(1.22)	0.09(1.15)	−0.09(1.20)
Positive Symptoms	0.02(0.16)	−0.03(0.27)	−0.07(0.70)	−0.07(0.67)	0.15(1.42)
Negative Symptoms	−0.02(0.25)	0.07(0.83)	−0.05(0.73)	−0.05(0.63)	−0.14(1.68)
Disorganization	0.03(0.34)	−0.12(1.32)	−0.18(1.94)	−0.14(1.46)	0.00(0.03)
Excitement	−0.13(1.17)	0.21(1.97)+	−0.12(1.06)	0.01(0.10)	0.26(2.35)*
Emotional Distress	0.01(0.10)	0.24(2.17)*	0.20(1.73)+	0.23(2.04)*	−0.32(2.80)**
R^2	0.07	0.09	0.08	0.05	0.08
F	2.17*	2.94**	3.69*	1.65	2.56*
Step 2					
Global Neurocognition	0.22(2.45)*	0.02(0.26)	0.10(1.12)	0.08(0.89)	−0.11(1.21)
Positive Symptoms	0.01(0.11)	−0.06(0.56)	−0.07(0.69)	−0.08(0.70)	0.15(1.38)
Negative Symptoms	−0.01(0.16)	0.11(1.34)	−0.06(0.73)	−0.05(0.56)	−0.13(1.59)
Disorganization	0.04(0.46)	−0.05(0.59)	−0.18(1.89)	−0.13(1.33)	0.01(0.05)
Excitement	−0.14(1.23)	−0.26(2.40)	−0.12(1.04)	0.01(0.05)	0.25(2.27)*
Emotional Distress	0.01(0.08)	0.23(2.13)	0.20(1.73)+	0.23(2.03)*	−0.32(2.80)**
Hinting Task	0.05(0.51)	0.25(2.95)**	−0.01(0.06)	0.03(0.33)	0.03(0.32)
R^2 Change	0.00	0.04	0.00	0.00	0.00
F-Change	0.26	8.69**	0.00	0.11	0.10

** $p < .01$

* $p < .05$

+ $p < .10$

Note. BIS=Birchwood Insight Scale; BCIS=Beck Cognitive Insight Scale. Standardized betas and t-statistics (within parentheses).