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Research paper

Self versus informant reports on the specific levels of functioning scale: Relationships to depression and cognition in schizophrenia and schizoaffective disorder

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ABSTRACT

The goal of the current study was to examine the relationships between insight and both cognitive function and depression in schizophrenia and schizoaffective disorder, and to determine if there were similar relationships across diagnostic categories. We examined discrepancies between self and informant reports of function on the Specific levels of function scale as a metric of insight for interpersonal, social acceptance, work and activities. We examined two samples of individuals with schizophrenia and/or schizoaffective disorder (Ns of 188 and 67 respectively). In Sample 1, cognition was measured using the Dot Probe Expectancy Task. In Sample 2, cognition was measured by averaging several subtests from the MATRICS consensus cognitive battery, as well as additional measures of working memory. In both samples, depression was measured using the Brief Psychiatric Rating Scale. In both samples, we found significant relationships between worse cognition and overestimations of work function, as well as between higher depression levels and underestimation of interpersonal function. These relationships were specific to interpersonal and work function, with significantly stronger correlations with interpersonal and work function compared to the other areas of function. Similar results were found across diagnostic categories. These results have important implications for treatment planning, as they suggest the need to take into account depression and cognitive function when evaluating the patient's self-report of function, and highlight the utility of informant reports in evaluating function and treatment planning. Further, they add to the literature on the similarity across schizophrenia and schizoaffective disorder in a variety of pathological mechanisms.

1. Introduction

Schizophrenia is a debilitating psychiatric disorder associated with disruptions to work and educational function (Andreasen and Flaum, 1991). One frequent feature of schizophrenia is impairments in insight (Mintz et al., 2003), defined as awareness of one's psychiatric symptoms and level of functioning. Impaired insight in schizophrenia has been linked to higher rates of depression and more impaired cognition (Bowie et al., 2007), and may make it difficult for individuals with psychosis to accurately convey to clinicians and psychologists their level of function and thus to receive the medical and therapeutic attention that they need (Siu et al., 2015).

Schizophrenia is typically associated with cognitive impairments (Barch and Ceaser, 2012; Green, 1996; Green et al., 2004a), which in

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turn are associated with lower levels of social and occupational functioning (Gould et al., 2013). Gilleen and colleagues (Gilleen et al., 2016) suggested that good cognitive functioning is necessary, though not sufficient, for good insight into one's level of functioning. Importantly, individuals with schizophrenia who have poor cognitive function may overestimate their level of functioning (Bowie et al., 2007; Nair et al., 2014; Shad et al., 2006; Siu et al., 2015; Stratton et al., 2013), sometimes even to such an extreme that they will deny having a mental illness (Bedford and David, 2014).

Many individuals with schizophrenia also experience significant levels of depression (Avgustin, 2009; Bosanac and Castle, 2013), which is related to insight (Ampalam et al., 2012; Bowie et al., 2007; Gharabawi et al., 2007; Palmer et al., 2015). An extensive literature suggests that depressed people have a more realistic view, albeit often more negative, of themselves than non-depressed people (Soderstrom et al., 2011). This idea is termed “depressive realism” (Alloy and Abramson, 1979, 1988). An additional perspective is that patients who can comprehend more about how their illness negatively affects them (i.e., who have greater insight) become more depressed (Misdrahi et al., 2014; Palmer et al., 2015), a relationship termed the “insight paradox.” Both of these theories would suggest that depressed individuals with psychosis should have *better* insight. However, depression can also be associated with high levels of self-blaming and feelings of inadequacy and hopelessness (Zahn et al., 2015). Thus, depression may lead the individual to *under* estimate their level of function. Recent work by Harvey and colleagues is more consistent with the depressive realism or insight paradox hypotheses, showing that individuals with schizophrenia and schizoaffective disorder who were higher in self-reported depression were more accurate reporters as to their interpersonal, everyday activity, and vocational function (Harvey et al., 2016).

One important question not yet clearly addressed in the prior literature is the degree to which the relationships among insight, depression and cognition are similar among putatively different diagnostic categories among the schizophrenia spectrum disorders, such as schizophrenia versus schizoaffective disorder. There is some evidence that insight may be more intact among individuals with schizoaffective disorder versus schizophrenia (Birindelli et al., 2014; Wiffen et al., 2010), though recent work by Harvey and colleagues did not see evidence for greater insight among individuals with schizoaffective disorder (Harvey et al., 2016). There is also evidence for higher depression levels in schizoaffective disorder (e.g., Birindelli et al., 2014; Harvey et al., 2016; Woodberry et al., 2008). However, the level of cognitive impairment is similar across schizophrenia and schizoaffective disorder (Bora et al., 2009; Fiszdon et al., 2007; Owoso et al., 2013; Reichenberg et al., 2009). Several previous studies included both individuals with schizophrenia and schizoaffective disorder, and some studies explicitly controlled for diagnosis when examining such relationships (Onwuameze et al., 2016). However, no study has yet directly compared the magnitude of these interrelationships across schizophrenia and schizoaffective disorder.

Our goal was to examine the relationships between insight and both cognitive function and depression in both schizophrenia and schizoaffective disorder. We used the discrepancies between self and a knowledgeable informant's report of function on the Specific Levels of Function (SLOF) scale as a metric of insight (Bowie et al., 2007; Corriveau and Sousa, 2013). We predicted that individuals with psychosis with more severe cognitive impairment would *over-estimate* their level of function (Bowie et al., 2007). Further, we wished to determine whether depression in schizophrenia would be associated with greater insight or with impaired insight. If impaired, we predicted that greater depression would lead patients to *under-estimate* their level of function (Siu et al., 2015). Lastly, we asked whether there were any significant differences between individuals with schizophrenia and schizoaffective disorder in these relationships.

2. Materials and methods

2.1. Participants

Participant data were taken from several samples recruited by the Cognitive Neuroscience Test Reliability and Clinical Applications for Schizophrenia Consortium (CNTRACS). The recruitment, assessment and inclusion/exclusion procedures both Sample 1 (a combination of two studies) (Henderson et al., 2012) (Strauss et al., 2013) and Sample 2 (Barch et al., 2017) are described in *Supplemental materials*. We examined only those participants who had informant rated functional status. This resulted in a total of 188 individuals with schizophrenia (N = 138) or schizoaffective disorder (N = 50) in Sample 1 and 67 in Sample 2 (35 schizophrenia, 32 schizoaffective).

2.2. Specific levels of functioning scale

The specific levels of functioning (SLOF) scale assess the level of functioning on four different subscales: interpersonal, social acceptance, activities, and work. Participants completed the SLOF during one of their testing sessions and provided the name of a knowledgeable informant. Study staff then either conducted a phone interview to obtain informant SLOF scores, or sent the informant a paper version with a stamped return envelope. The informant received $10 for completing the SLOF. We used the difference between self and informant SLOF reports as a proxy for insight (Figs. S1-S4 for histograms). A positive value meant that the patient rated themselves as doing better than the informant rated them. A negative value meant that the patient rated themselves as doing worse than the informant rated them.

2.3. Cognitive tasks

In Sample 1, the Dot Probe Expectancy (DPX) task was used to assess cognitive function, as described in (Henderson et al., 2012) and in *Supplemental materials*. The testing for Sample 2 did not include the DPX. Thus, instead we created an average cognition variable by combining the following tasks: 1) three subtests of the MATRICs consensus cognitive battery (Digit Symbol, Hopkins Verbal Learning (HVLT), and letter number sequencing (LNS)(Green et al., 2004b; Kern et al., 2008); 2) two versions of a running span working memory task (Broadway and Engle, 2010) (*Supplemental materials)*; 3) two versions of a change detection working memory task (*Supplemental materials*); and 4) two versions of a change localization working memory task (*Supplemental materials*)(Gold et al., 2010; Gold et al., 2003). We z-scored (using the patient data) the primary dependent variable from each task and averaged them. This approach meant that we used different measures of cognition across samples, but provides greater evidence for generalizability across samples.

2.4. Diagnosis and clinical assessment

Diagnostic assessments were conducted or supervised by a master's level clinician using the Structured Clinical Interview for DSM-IV-Text Revision and the 24-item Brief Psychiatric Rating Scale (First et al., 2002; Ventura et al., 1993a; Ventura et al., 1993b). See *Supplemental materials* for details. We focused on the BPRS depression subscale (items 2, 3, 4 and 5; anxiety, depression, suicidality, and guilt) (Ventura et al., 1993b), but examined positive, negative, and disorganized symptoms as potential confounders in *Supplemental materials*.

2.5. Data processing and statistical analyses

We first examined the correlations between individual self-informant SLOF report discrepancy scores and BPRS depression and cognition measures separately for Samples 1 and 2. We used False Discovery