Behavioral approach and avoidance in schizophrenia: An evaluation of motivational profiles

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ABSTRACT

Schizophrenia is associated with motivational deficits that interfere with a wide range of goal directed activities. Despite their clinical importance, our current understanding of these motivational impairments is limited. Furthermore, different types of motivational problems are commonly seen among individuals within the broad diagnosis of schizophrenia. The goal of the current study was to examine whether clinically meaningful subgroups could be identified based on approach and avoidance motivational tendencies. We measured these tendencies in 151 individuals with schizophrenia. Although prior studies demonstrate elevated BIS sensitivity in schizophrenia at the overall group level, none have explored various combinations of BIS/BAS sensitivities within this disorder. Cluster analyses yielded five subgroups with different combinations of low, moderate, or high BIS and BAS. The subgroups had interpretable differences in clinically rated negative symptoms and self-reported anhedonia/socio-emotional attitudes, which were not detectable with the more commonly used linear BIS/BAS scores. Two of the subgroups had significantly elevated negative symptoms but different approach/avoidance profiles: one was characterized by markedly low BIS, low BAS and an overall lack of social approach motivation; the other had markedly high BIS but moderate BAS and elevated social avoidance motivation. The two subgroups with relatively good clinical functioning showed patterns of BAS greater than BIS. Our findings indicate that there are distinct motivational pathways that can lead to asociality in schizophrenia and highlight the value of considering profiles based on combined patterns of BIS and BAS in schizophrenia.

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1. Introduction

Schizophrenia is associated with deficits in initiating and persisting in a wide range of goal directed activities in the social, vocational, and independent living realms (Blanchard et al., 2011). Although it is believed that these difficulties stem largely from disturbances in motivation, our understanding of motivational impairments in schizophrenia is limited. In addition, it is well known that schizophrenia is a heterogeneous disorder and the causes of problems in motivation can differ across individuals. For example, some patients show a profound disinterest in social interactions in the apparent absence of loneliness or other negative emotions, while others are interested in social connections but avoid engaging in social activities because of fear of rejection, social anxiety, or concerns about the harmful intentions of others (Horan and Blanchard, 2003; Horan et al., 2006b). Building on affective

science models of motivation, we attempted to identify valid subgroups of schizophrenia patients with different motivational profiles.

Across several prominent models of motivation, a basic distinction is made between behavioral approach and behavioral avoidance (Gray, 1987; Gable and Gosnell, 2013; Spielberg et al., 2013). According to J.A. Gray's model, behavioral approach (i.e. behavioral activation system; BAS) relies on a reward system sensitive to appetitive stimuli and the termination of punishment. Behavioral avoidance (i.e. behavioral inhibition system; BIS), in contrast, is sensitive to aversive stimuli and activated by anxiety, novelty, and innate fear stimuli and is responsible for ceasing or inhibiting behavior. These systems are thought to be relatively independent and to rely on distinct neurobiological substrates (Sutton and Davidson, 1997; Coan and Allen, 2003; Peterson et al., 2008). Gray's original approach and avoidance model (Gray, 1987) has been extensively studied with the BIS/BAS self-report scales (Carver and Whilte, 1994). On these scales, psychologically healthy people tend to score in the middle for both BIS and BAS sensitivities (Johnson et al., 2003; Mitchell and Nelson-Gray, 2006). However, extreme scores
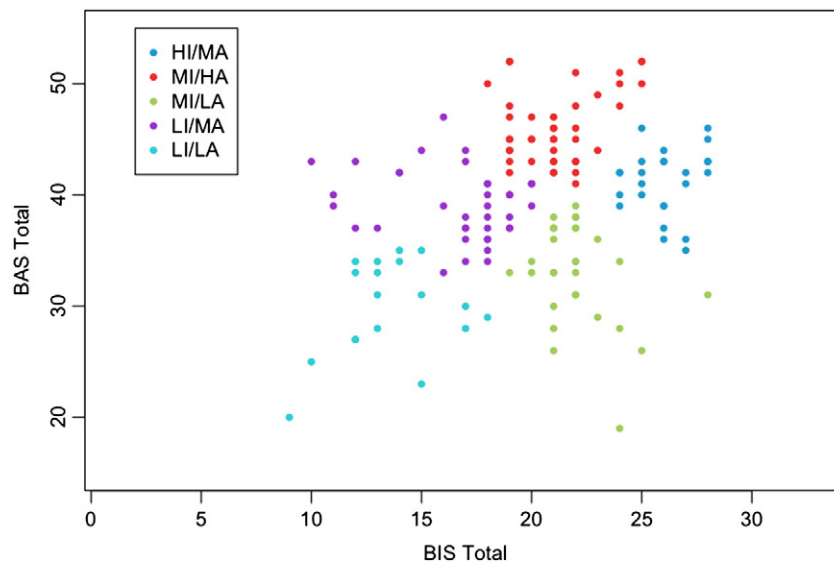
Fig. 1. BIS and BAS score distributions for the five clusters.

on either scale are associated with various forms of psychopathology. For example, depression is frequently associated with diminished BAS, mania is associated with elevated BAS, and certain anxiety disorders are associated with elevated BIS (Kasch et al., 2002; Mitchell and Nelson-Gray, 2006; Bijttebier et al., 2009).

Although most studies of psychopathology have considered BIS and BAS scores as separate continuous variables, individuals can show different combinations across high, medium, and low levels of both BIS and BAS. According to the joint subsystem hypothesis (Corr, 2001, 2002), the BIS and BAS are conceptualized as interdependent systems and behavioral outcomes are predicted to depend on the strengths of the BIS and BAS systems in relation to each other. Consistent with this hypothesis, initial studies in clinical populations also suggest maladaptive behaviors, such as anxiety and impulsivity, may be better explained with categorical profiles in which BIS or BAS overpowers the other system (Corr, 2002; Newman et al., 2005; Nash et al., 2012).

The BIS/BAS scales have been used in only a few studies of schizophrenia, all of which treated the scales as separate continuous variables. Compared to healthy controls, individuals with schizophrenia report higher BIS sensitivity and no difference in BAS sensitivity (Horan et al., 2006b; Scholten et al., 2006; Barch et al., 2008; Strauss et al., 2011). However, as noted above, schizophrenia is a heterogeneous disorder in which motivational difficulties may reflect different mechanisms, and no studies have explored unique BIS/BAS profiles within this population. Examining BIS and BAS as joint systems within a large schizophrenia sample may help identify sub-groups with distinctive motivational impairments. For example, recent studies suggest that a categorical approach to motivation-related variables, such as negative symptoms, may show greater validity and clinical utility than a continuous approach (Strauss and Gold, 2012; Deserno et al., 2013; Strauss et al., 2013).

The goal of the current study was to examine whether clinically meaningful subgroups of people with schizophrenia could be identified

based on BIS and BAS sensitivities. The validity of motivation-based subgroups was evaluated with respect to clinical symptoms, socio-emotional attitudes, and functional outcomes. We were particularly interested in whether two separable motivation profiles could be distinguished: one rooted in social disinterest and another in active social avoidance.

2. Method

2.1. Participants

Participants included 151 community outpatients diagnosed with schizophrenia (N = 131) or schizoaffective disorder (N = 20) as determined with the Structured Clinical Interview for DSM-IV (First et al., 1997). Exclusion criteria included mood episode within the past month; substance dependence in the past 6 months; substance abuse in the past month; IQ < 70; and history of head injury or neurological disorder. The sample was 57% male with a mean age of 47 (9.5) and average length of illness of 24 (11.5) years. The sample had an average of 12.6 (2.5) years of education, and 13.9 (3.7) years of parental education. Fifty-percent of the sample was African-American, 40% was Caucasian, and 10% was Asian, multi-racial, or other. All participants were receiving antipsychotic medications at clinically determined dosages.

2.2. Procedure

Participants were recruited at four sites as part of a larger study designed to validate a new negative symptom instrument (Kring et al., 2013). After the informed consent process (approved by each site's Institutional Review Board), participants were administered with self-report measures, clinical rating scales, and functional outcome assessments in a fixed order. Interviewers were credentialed for all clinical rating scales with videotaped and in-person co-rated interviews. The

Table 1
Descriptives for BIS/BAS raw scores in the five subgroups.

	N	BIS	BAS	BAS—Drive	BAS—Fun Seeking	BAS—Reward Responsivity
Moderate Inhibition/Low Activation (MI/LA)	32	21.4 (1.8)	32.7 (4.5)	9.0 (2.3)	8.6 (1.8)	15.1 (2.7)
Low Inhibition/Low Activation (LI/LA)	15	12.8 (1.7)	30.0 (4.7)	8.1 (1.8)	9.1 (2.4)	12.7 (4.0)
Low Inhibition/Moderate Activation (LI/MA)	37	16.6 (2.7)	39.1 (3.2)	10.9 (2.4)	11.2 (1.8)	16.9 (1.8)
Moderate Inhibition/High Activation (MI/HA)	42	21.2 (2.0)	49.1 (3.2)	13.5 (1.7)	13.8 (1.8)	18.8 (1.4)
High Inhibition/Moderate Activation (HI/MA)	25	26.2 (1.4)	40.6 (3.5)	11.0 (2.6)	11.4 (1.9)	18.1 (1.6)

Note: Standard deviations are presented in parentheses.