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Assessing risk factors and levels of functioning across the continuum of psychosis

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ASSESSING RISK FACTORS AND LEVELS OF FUNCTIONING ACROSS THE CONTINUUM OF PSYCHOSIS

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Dedication

I would like to dedicate this research to my parents, James Castorina Sr. and Linda Cuozzo-Cole, for always believing in me and supporting me through thick and thin. I would not be here if it were not for their love and guidance.

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Abstract

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Schizophrenia and other related psychotic disorders are often associated with impairments in social and general functioning. It has been proposed that there may be underlying factors such as personality traits or cognitive abilities that contribute to one's "psychosis proneness," or levels of "schizotypy." In the current study, we expect to see a decline in overall functioning and verbal memory according to symptom severity. Particularly, we hypothesize a similar pattern with overall functioning and verbal memory in regards to negative symptomology with comparable results between an outpatient sample and those with high levels of schizotypy. Furthermore, based on prior research, we anticipate specific cognitive abilities like verbal memory and certain personality traits to predict success on performance-based tasks related to social and general functioning. One-way analyses of variance (ANOVA) will be conducted to examine the differences in performance-based tasks (SSPA, UPSA-B, and verbal memory task scores) across the 5 groups based on overall and negative symptom severity (3 subclinical from an undergraduate sample & 2 clinical from an outpatient sample). Hierarchical linear regression analyses will be run to examine how well verbal memory and the 5 personality characteristics (while controlling for symptom severity) predict scores on performance-based tasks (SSPA and UPSA=B scores).

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Chapter 1

Introduction and Literature Review

Schizophrenia affects roughly one-percent of the American population (American Psychiatric Association, 2013). The various symptoms of schizophrenia can lead to a wide range of impairments in cognitive, social, and daily functioning (Addington & Addington, 1998; Bowie, Reichenberg, Patterson, Heaton, & Harvey, 2006). Similarly, roughly ten-percent of the population may exhibit high levels of "schizotypy," or "psychosis proneness," defined as a collection of underlying predisposed traits for experiencing psychosis (Aguirre, Sergi, & Levy, 1998; Camisa, Bockbrader, Lysaker, Rae, Brenner, & O'Donnell, 2005; Cohen, Callaway, Najolia, Larsen, & Strauss, 2012; Johns & van Os, 2001). Research suggests that individuals with high levels of schizotypy also exhibit deficits in cognitive, social, and occupational status (Dickey et al., 2005). The range between schizotypy and full schizophrenia is often referred to as the "schizophrenia spectrum." We will first review the current body of literature on the schizophrenia spectrum as it relates to personality traits and the aforementioned social and cognitive deficits. This will provide the basis for our present study assessing risk factors (i.e. personality traits and cognitive abilities) and functioning (i.e. social and daily) along the schizophrenia spectrum.

Social Functioning in Schizophrenia-Spectrum Disorders

Poor social functioning is one of the most prominent symptoms associated with psychosis and can certainly be one of the most devastating (Addington, Penn, Woods, Addington, & Perkins, 2008). When social functioning deficits exist, they affect multiple facets of the individual's well-being. Researchers conceptualize social functioning as a

multivariate construct which includes specific social skills such as social cognition, related cognitive abilities, and everyday functioning (Addington & Addington, 1999; Cohen, Forbes, Mann, & Blanchard, 2006; Leifker, Bowie, & Harvey, 2009). Therefore, due to these symptoms, these areas are damaged causing interpersonal conflict and difficulty communicating (Addington et al., 2008).

Aspects of social functioning are often measured through their respective performance-based measures. Social skills encompass one's ability to communicate with others in a given situational context through sending and receiving signals between one another (Addington et al., 2008; Patterson, Moscona, McKibbin, Davidson, & Jeste, 2001). This could include meeting someone new, social problem solving, conflict resolution, etc. (Addington & Addington, 1999, Patterson et al., 2001). Impairments in social skills stretch across the continuum in the upper echelon of the subclinical range into the clinical arena. A study by Addington et al. (2008) examined the level of social functioning in those who may be at a clinical high risk for developing psychosis in comparison to nonpsychiatric controls, first-episode psychoses patients, and multiepisode psychoses patients. To assess social skills in these groups, they were given a performance-based assessment battery. Those who were at clinically high risk were equivalent to the patient groups in social skills. Thus, there is evidence that social functioning deficits may appear long before the onset of psychosis in those who are at high risk. As marked in prior research, the best predictors for these social functioning deficits have been cognitive impairments and symptomology (specifically negative symptoms) (Patterson et al., 2001).

Cognitive Contribution to Social Functioning Impairments

Prior studies have shown the role that specific cognitive deficits might play in impaired social functioning and social cognition in psychosis (Addington & Addington, 1999; Addington & Addington, 2008; Cohen, Forbes, Mann, & Blanchard, 2006). These cognitive impairments could potentially create obstacles in one's representation of themselves, others, and their relationships with others, or their "social cognition." Those with schizophrenia or higher levels of schizotypy experience difficulties with complex social cognitive skills such as emotional intelligence, cognitive empathy, and theory of mind (Aguirre et al., 1998). For example, a study by Addington and Addington (2008) examined the relationship between social and cognitive functioning across three different groups experiencing psychosis (first episode, chronic psychosis, and nonpsychiatric controls). All three groups were provided the same testing battery of fifteen different social functioning and neurocognitive measures. The results indicated that impaired social functioning coincided with cognitive impairments over time and longitudinally.

Primarily, executive functioning, verbal fluency, and verbal memory have been examined. Deficits in all three have been associated with high levels of schizotypy and schizophrenia with the exception of verbal fluency with higher levels of positive schizotypy, and those deficits mainly correlated with negative symptoms. Particularly, deficits in executive functioning, verbal memory, and verbal fluency were significantly related to increases in negative schizotypy and symptomology (Addington & Addington, 2008; Tsakanikos, & Claridge, 2005; Vollema, & Postma, 2002). Of the specific cognitive abilities, verbal memory has been considered an executive function that is closely tied into more complex social cognitive abilities (Addington & Addington, 2008).

Research has not only examined the relationship of cognitive abilities to social functioning and negative symptoms, but also the relationship between social functioning and negative symptomology.

The Relationship of Negative Symptomology to Social Functioning

As another significant predictor, social functioning deficits have been coupled with the specific symptom clusters of schizophrenia spectrum disorders, but they have been most highly associated with negative symptomology at both the clinical and subclinical levels (Henry, Bailey, & Rendell, 2008; Piskulic et al., 2012). To illustrate, a study by Kwapil, Gross, Silvia, and Barrantes-Vidal (2013) tested the predictive validity of the positive and negative schizotypy dimensions on differential patterns of impairment and psychopathology. The data was pulled from a 10-year longitudinal study conducted by Chapman, Chapman, Kwapil, Eckblad, and Zinser (1994) who administered the Wisconsin Schizotypy Scale to undergraduate students. They found negative schizotypy to be related to diminished closeness of significant relationships and schizoid traits. This shows that the relationship between social functioning deficits and negative symptomology exists before the onset of psychosis. The empirical evidence also suggests that this relationship continues after the onset of psychosis. A study by Piskulic (2012) observed the negative symptomology of 138 individuals at clinical high risk for psychosis longitudinally to see if their symptoms were predictive of psychosis. It turned out that those who converted into full-blown psychosis experienced more persistent and severe negative symptomology such as deterioration in role functioning and social withdrawal.

The combination of symptoms and impairments can greatly impact a person's general functioning. A study by Leifker, Bowie, and Harvey (2009) ran an exploratory

study looking at schizophrenia symptoms, cognitive abilities, and real-world functional outcome. Results showed that both positive and negative symptoms predicted real-world functional outcome, and that it could be negatively affected by symptom severity. Much like verbal memory, there was a strong relationship between real-world functional outcome and negative symptoms.

Personality

Underlying social functioning and symptomology, personality has become an emphasized area of interest in schizophrenia and schizotypy research (Camisa, Bockbrader, Lysaker, Rae, Brenner, & O'Donnell, 2005; Edmundson, Lynam, Miller, Gore, & Widiger, 2011). The relationship between personality and schizophrenia-related disorders has been evaluated from various perspectives, but the model receiving the most attention is Costa and McCrae's Five Factor Model (FFM) (Asai, Sugimori, Bando, & Tanno, 2011; Camisa, Bockbrader, Lysaker, Rae, Brenner, & O'Donnell, 2005; Edmundson, Lynam, Miller, Gore, & Widiger, 2011). The FFM consists of five personality dimensions: openness to experience (O), conscientiousness (C), extraversion (E), agreeableness (A), and neuroticism (N). It is also the most representative of normal and abnormal personality traits (Edmundson, Lynam, Miller, Gore, & Widiger, 2011). When comparing a group of those diagnosed with schizophrenia to a control group, only the dimension of N yielded a higher score in those diagnosed with schizophrenia, while there were lower scores in the remaining four traits (Camisa, Bockbrader, Lysaker, Rae, Brenner, & O'Donnell, 2005). Similar results have been seen in a subclinical sample in a study that examined the relationships between FFM personality traits and levels of schizotypy and schizotypy subtypes across four groups of college students (Asai,

Sugimori, Bando, & Tanno, 2011). N was positively correlated with positive schizotypy, while E was negatively correlated with negative schizotypy in all groups. In three of the four groups, N was observed to be positively correlated with negative schizotypy, O was positively related to positive schizotypy, and C was negatively correlated to disorganized schizotypy. Seeing the parallels in results between the two studies, particular personality domains could contribute to one's susceptibility towards developing psychosis and potentially specific symptomology.

These connections between FFM personality domains and symptomology have been shown to further impairments in social and overall functioning. A Skodol et al. (2005) study surveyed several personality disorders (including schizotypal personality disorder) across three different dimensional approaches towards personality (including the FFM). They were looking to see what effect symptomology and personality had on functional impairment. In relation to the FFM, they found that those with schizotypal personality disorder ranked high on neuroticism and low on extraversion. The schizotypal dimensions furthermore were consistently correlated with all aspects of functional impairments including employment and social relationships (except for with their spouse/partner). These findings illustrate a common gap in the literature on the effects that both personality and symptomology may have on social and general functioning. Little research has examined the combined contribution of personality and symptomology and how much of an impact they have independent of one another on functioning deficits. Our study hopes to explore these areas more in-depth and build upon the foundation of prior research on the topic.

The Present Study

In an effort to replicate the findings of prior research, the first aim of the current study is to examine how overall functioning (interpersonal/everyday tasks) varies according to schizophrenia symptom severity. To indicate symptom severity, the samples are to be divided into four separate groups in total to represent the continuum of psychosis (Cohen et al., 2012; Johns & van Os, 2001). The subclinical schizotypy sample will fall into one of three categories (low, mid, or high levels of schizotypy) based on total schizotypy scores. Symptom severity amongst the clinical sample will include those diagnosed with mood disorders exhibiting episodic psychosis, and those diagnosed with schizophrenia spectrum disorders exhibiting more chronic psychosis. The latter will represent the more extreme end of the spectrum due to the stronger persistence of symptomology. Hypothesis 1 of the present study involves an attempt to replicate previous research; We anticipate that as the severity of symptoms become more severe that there will be a corresponding decline in scores on performance-based tasks across the groups (i.e., the SSPA , UPSA-B, and verbal memory task, --- described in our Methods section).

Closely related to our first hypothesis, this study is to observe how overall functioning and cognitive abilities (specifically verbal memory) differ across the domain of negative symptomology. The subclinical sample will be divided into three groups (low, mid, and high) based on scores derived from the interpersonal domain of the SPQ-BR. This subscale best represents negative schizotypy, or the subclinical manifestation of negative symptoms of a schizophrenia spectrum disorder. Therefore, we anticipate scores on the performance-based tasks (UPSA-B, SSPA, and verbal memory task) in those with

high levels of negative schizotypy to be significantly lower than those with low to mid-levels of negative schizotypy, but not as low as scores in the clinical sample.

The second aim of this study is to extend prior research by examining how well specific cognitive abilities and personality traits will predict interpersonal skills and ability to do everyday tasks (Addington & Addington, 2008; Skodol et al., 2005). More specifically, for our second hypothesis we anticipated that extraversion and verbal memory will both be independent predictors for increased scores on our performance-based tasks (i.e., SSPA & UPSA-B) while controlling for overall symptomology. We anticipate both extraversion and verbal memory should be better predictors of scores on the SSPA for interpersonal skills, and the financial and communication subscales of the UPSA-B for everyday tasks, than other personality variables (i.e., the remaining four personality traits of the FFM) or levels of symptom severity in both our subclinical and clinical samples. On a related note, if we find that negative symptomology is significantly correlated with performance-based tasks in our first set of hypotheses, we expect verbal memory and extraversion independently predicting increased SSPA and UPSA-B scores while controlling for negative symptomology.

Chapter 2

Method

Participants

Participants were selected either from a sample of Rowan University undergraduate students or outpatients from a community mental health facility. Exclusion criteria for participants in either sample included those who provided incomplete data or who indicated a history of significant head injury/organic brain disease. Pertaining to the sample of undergraduate students, those who violated one of the two infrequency statements in the SPQ-BR were excluded from the final sample (e.g., "I walk with a limp as a result of a sky diving accident").

Undergraduate sample. Two hundred ninety undergraduate students were recruited using the online SONA research database. Of the 290 students, 109 students were excluded from the final sample for providing incomplete data, having suffered from a significant head injury, or violating either infrequency statement on the SPQ-BR. The remaining 181 participants (93 males, 88 females) ranged in age from 18 to 26 (M=19.45, SD= 1.51) and were primarily Caucasian (75.7%). Students received course credit in exchange for their participation upon completion of the study.

Clinical sample. Twenty-six outpatients from a nearby community mental health facility were recruited as part of a larger study (not reported here) through advertisements hanging in the main lobby of the facility and via clinician referral. They underwent the Structured Clinical Interview for DSM Disorders (SCID) to determine if they have a diagnosis of schizophrenia spectrum disorder to be included in the study (n=24). IRB permission was also obtained to recruit participants with affective psychosis (n=2). In

total, seven of the 26 outpatients were ultimately excluded from final analyses due to missing data. A breakdown of the diagnoses of those excluded reveal 1 individual diagnosed with schizophrenia, undifferentiated type, 1 participants with schizoaffective disorder, 2 participants diagnosed with schizophrenia, paranoid type, and 3 individuals who were missing data pertaining to their diagnosis. The 19 outpatients (12 males, 7 females) in the clinical sample had an average age of 44.42 years (Range=25-59, SD=10.37) and were mainly Caucasian (84.2%). Participants who were recruited through the primary study received monetary compensation upon completion of the initial and follow-up assessments ($40.00 per assessment cycle). Participants recruited solely for this project received a one-year free subscription to lumosity.com (a web-based cognitive enhancement program) upon completion of the clinical interview and assessments. Further demographic information pertaining to marital status and education level are provided in Table 1.

Measures

The Schizotypal Personality Questionnaire (SPQ)–Brief Revised. The SPQ-BR (Cohen et al., 2010) is used to measure the construct of schizotypy. This self-report measure is comprised of 34 assorted statements and questions including, “Other people see me as slightly eccentric (odd).” The statements are rated on a Likert-type scale from 1 (Not at all like me) to 5 (Very much like me) with a total score between 34 and 170. A higher total score indicates higher levels of schizotypy. The measure also has three subscales, which include interpersonal, cognitive-perceptual, and disorganized. These subscales are meant to mimic the three symptom clusters (positive, negative, and disorganized) of schizophrenia, allowing for comparison across groups. The updated

SPQ-BR yields a high convergent validity and internal reliability with a Cronbach's alpha of 0.95 (Cohen & Matthews, 2010).

Table 1

Demographic Information for Undergraduate and Clinical Samples

	Undergraduate sample (n = 181)		Clinical sample (n = 19)	
Demographic variable/measure	f (%) or M (SD)	Range	f (%) or M (SD)	Range
Age	19.45 (1.51)	18–26	44.42 (10.37)	25–59
Gender				
Male	93 (51.4%)		12 (63.2%)	
Female	88 (48.6%)		7 (36.8%)	
Race				
White/Caucasian	137 (75.7%)		16 (84.2%)	
African American	18 (9.9%)		3 (15.8%)	
Hispanic/ Latino	16 (8.8%)			
Asian/pacific islander	10 (5.5%)			
Educational level[a]				
High school diploma/GED			10 (52.6%)	
0–1 years of college complete			3 (15.8%)	
2 years of college complete			2 (10.5%)	
4 years of college complete			2 (10.5%)	
Marital status[b]				
Single, never married	180 (99.4%)		8 (42.1%)	
Married	1 (0.6%)		6 (31.6%)	
Divorced			2 (10.5%)	

Note. Frequencies (%) are reported for categorical variables, and standard deviations (SD) and ranges are reported for continuous variables.

[a] Data not collected for undergraduate sample, but all participants currently enrolled as undergraduates at Rowan University. Information for clinical sample based on 17 out of the 19 participants.

[b] Data based on 16 of the 19 participants from the clinical sample.

The Brief Psychiatric Rating Scale (BPRS). The BPRS (Expanded Version; Lukoff, Nuechterlein, & Ventura, 1986) is a 24-item measure that assesses a wide range of psychiatric symptoms (hallucinations, affect, anxiety, and depression to name a few). It is to be completed by the researcher following the clinical interview who rates each item on a Likert-type scale ranging from 1 (symptom absent) to 7 (extremely severe). Items 1-10 and 19–22 are rated based on the participant's self-report of his or her symptoms, while items 11–18, 23, and 24 are based on behavioral observations made by the researcher. The 24 items fall under one of four subscales: positive, negative, depressive, and mania/excitement (as defined by Ventura, Nuechterlein, Subotnik, Gutkind, & Gilbert, 2000).

According to Hafkenschied (as cited in Jacobs, Ryba, & Zapf, 2008), the BPRS is the most commonly utilized instrument for assessing symptomology in both research and clinical settings. Multiple studies across different settings have shown strong inter-rater reliability for the BPRS ranging anywhere from 0.65 to 0.88 (Burlingame et al., 2006; Hafkenscheid, 2000; Jacobs, Ryba, & Zapf, 2008).

The NEO-Five Factor Inventory (NEO-FFI). The NEO-FFI (Costa & McCrae, 1992) is a 60-item self-report questionnaire used to measure the FFM of personality including neuroticism, extraversion, agreeableness, conscientiousness, and openness. Participants rate their agreement with various statements using a Likert-type scale from 1 (Strongly Disagree) to 5 (Strongly Agree). There are a total of 12 items for each subscale giving a maximum score of 60 for each dimension.

The NEO-FFI is one of the most widely used measures for the FFM mainly due to its extensive use across diverse populations and large sample sizes, including clinical

populations (Costa & McCrae, 2005). The NEO-FFI has also shown its durability in analyzing the five factors reliably. Costa and McCrae (2007) found a median internal reliability score for the NEO-FFI of .82, and a factor analysis displayed that all 60 items on the questionnaire had a correlation of at least .30. Only two items ended up on an unintended factor.

Verbal Memory Task from the Brief Assessment of Cognition in Schizophrenia (BACS). Verbal memory is to be measured using the verbal memory section of the Brief Assessment of Cognition in Schizophrenia (BACS; Keefe et al., 2004). It consists of a list of 15 words that the researcher would read off at a rate of 1 word per second. The participant is then asked to recall as many of the 15 words as they could in any order. This procedure is repeated a total of 5 times. The total score from all 5 trials is considered to indicate a participant's performance on the task.

The BACS was specifically designed and normed for a population diagnosed with schizophrenia. It takes into account practice effects by providing multiple versions of the test. Keefe et al. (2004) also found that it was as sensitive to cognitive impairments as other similar neurocognitive batteries and that the verbal memory portion yielded internal consistency coefficients between 0.78 and 0.93 in a sample of schizophrenia patients.

UCSD Performance-Based Skills Assessment- Brief Version (UPSA-B). To look at real-world functional outcome in this current study, the UPSA-B (Patterson, 2008) appears to be the best fit. The UPSA-B (Patterson, 2001) is a daily skills task that measures general competent functioning among 2 main sections: financial skills and communication skills. The financial skills portion asks the participant to fulfill tasks like counting money by hand and filling out a check appropriately for a total raw score

between 0 and 11. The communication skills section includes using a telephone (i.e. calling 911), rescheduling a medical appointment, and memory recall for a total raw score between 0 and 9.

It has been used in prior research to see significant relationships between neurocognitive abilities and functional outcome (Bowie, Reichenberg, Patterson, Heaton, & Harvey, 2006). It also provides strong ecological validity translating real-world performance into a measureable construct. Prior research on the development of the UPSA-B indicated excellent inter-rater reliability with a coefficient of 0.91 (Patterson, Goldman, McKibbin, Hughs, and Jeste, 2001). The UPSA-B has been shown to correlate substantially with the UPSA-B total scores (Leifker, Bowie, & Harvey, 2009).

Social Skills Performance Assessment (SSPA). The SSPA (Patterson, 2001) is a performance-based task that measures social skills through 3 role-playing scenarios. This involves a one-minute practice scene and 2 3-minute role plays that will later be scored. Throughout the role plays, the test administrator takes on a specific social role, while the participant is asked to carry out the situation in a way they would approach it as if it were happening in real life. The situations involve social skills like conflict resolution, social problem solving, and interpersonal communication. Scores are given a Likert-type scale ranging from 1 (Very Poor) to 5 (Very Good) with 4 being the norm. Participants can earn a total score between 0 and 40 on 8 subscales on the first role play and 0 and 45 on 9 subscales on the second one based on how well they handle the given situations.

This is the measure of choice for this study based on its direct assessment over self-report measures (ecological validity), relatively short time administering and scoring (approximately 10-15 minutes total), and good psychometric properties. Patterson et al.

(2001) showed a strong inter-rater reliability coefficient of 0.91 and a test-retest reliability of 0.92 for the SSPA.

Procedure

This study employed a between-subjects, cross-sectional research design. To carry out this design, participants interested in partaking in the study were greeted by the primary researcher or a trained research assistant at one of our two laboratories either at the university or at the outpatient facility. The researcher provided an IRB-approved informed consent to each participant, covering confidentiality, risks and benefits of the study, and special consideration for recording the SSPA portion of the assessment battery. If the participant understood the informed consent and granted their permission, the testing battery began.

Overall, the study consisted of 4 groups using similar classification procedures as Cohen et al. (2012). The undergraduate sample was divided into low, mid-, and high levels of schizotypy (during data analysis), while the outpatients diagnosed with affective disorders and schizophrenia spectrum disorders comprised the fourth and final group. The undergraduates were placed into one of the 3 subclinical groups according to their SPQ-BR total scores. Any score below the sample mean was considered "low," any score between the sample mean and 1.65 SD represented "mid-levels" schizotypy, and anything above 1.65 SD placed the participant in the high level group. Some studies have suggested that high levels of schizotypy occur in up to ten-percent of the subclinical population, but the 1.65 SD cutoff represents the top five-percent of the undergraduate sample in a more conservative approach (Cohen et al., 2012; Lenzenweger, 2006). On the other hand, the outpatient sample was provided with a brief clinical interview based on

the SCID in place of the SPQ-BR as their diagnostic tool. Through conducting the interview, the researcher determined if the participant fit the criteria for either an affective disorder or schizophrenia spectrum disorder.

The remaining elements of the assessment battery were essentially the same for all of the participants and took approximately 45-60 minutes to complete. However, the clinical participants diagnosed with schizophrenia or schizoaffective disorder (from the larger study) also completed additional measures not discussed in this paper. Therefore, the order of the test/questionnaire administration may have varied somewhat from the administration order described below which was used primarily with the undergraduate participants and outpatients with affective psychosis.

A typical session started with the administration of a short demographic questionnaire that gathered basic information like gender, race, age, marital status, handedness, and history of head injury. This was followed by the NEO-FFI to assess personality traits.

The researcher then engaged the participant in the 3 performance-based tasks of the SSPA, the UPSA-B, and the verbal memory portion of the BACS. Starting with the SSPA, the researcher reminded the participant that the following portion would be recorded with a voice recorder. They were instructed to act as if they were responding to a real-life situation. The researcher then handed a practice vignette to the participant to be read aloud. The researcher then tested their understanding of the vignette by asking what their specific role was in the situation described in the practice vignette. Then, the participant was asked to respond (in character) to the practice scene for 1-minute. This was intended to help the participant get acquainted to the role play (e.g. 2 friends trying

to figure out what to do on a Friday night). The first role play involved a new neighbor moving in across the hall and the participant introduced themselves to the new neighbor that is played by the researcher. The second role play revolved around an angry tenant attempting to get their difficult landlord/lady to come fix a leak by using conflict resolution skills. The role plays lasted the full 3 minutes, and the researcher used prompts if the participant did not speak for around 10 seconds.

The UPSA-B was then administered. The researcher began by placing an assortment of play money and coins on the table in front of the participant and proceeded to ask them to count out requested amounts. The participant moved onto reading a utility bill and filling out a corresponding check to pay the bill. The researcher then removed these items and replaced them with a telephone to test some basis communication skills like emergency numbers and directory assistance. The researcher handed the participant a letter from a doctor to be read aloud. After reading the letter, the participant called the doctor's office to reschedule their appointment for the following day at the same time and then was asked to recall some information provided in the letter.

Finally, the researcher administered the verbal memory section of the BACS to the participant. In doing so, the researcher read a list of 15 words to the participant at a rate of 1 per second. The participant recalled as many as words as possible in any order for the researcher to record their responses. The researcher could not tell the participant what words are on the list, but they could say what words the participant has already said if asked. This process took place a total of 5 times even if the participant got all 15 words before the fifth trial.

Upon completion of the testing battery, the participant was provided a copy of the informed consent, a debriefing, and their respective form of compensation. The entire procedure took about 60 minutes for the undergraduate sample and between 1.5 and 2 hours for the outpatient sample.

Analyses

Hypothesis 1: We anticipated that overall functioning (interpersonal/ everyday tasks/verbal memory) would vary according to overall symptom severity. Two separate one-way ANOVAs were used to examine the differences between social and general functioning (SSPA & UPSA-B scores) according to symptom severity. These analyses looked at differences across the 4 rank-ordered groups (described in the procedures section) that make up the independent variable of symptom severity. Posthoc tests using Bonferroni corrections were used to compare the differences between specific groups and counteract the problems with multiple comparisons.

Subhypothesis 1: We predicted that scores on the performance-based tasks (UPSA-B, SSPA, and verbal memory task) in those with high levels of negative schizotypy would be significantly lower than those with low to mid-levels of negative schizotypy, but not as low as scores in the clinical sample. In order to survey the variance across social functioning (SSPA scores), daily functioning (UPSA-B scores, and verbal memory in respect to negative symptomology, two different ANOVAs were employed. The analyses looked at variance between 4 discrete, hierarchical groups according to negative symptomology as the independent variable. There were 3 subclinical groups and 1 clinical group much like in our first hypothesis. The subclinical group was split up based on their scores on the interpersonal schizotypy subscale

("negative schizotypy") of the SPQ-BR. Also, like in our first hypothesis, this was done ad hoc with "low" levels being below the sample mean, "mid" levels being between the sample mean and 1.65 SD, and with "high" levels being all remaining scores above the 1.65 SD threshold. The clinical sample included those diagnosed with affective psychosis and schizophrenia spectrum disorders. Negative symptomology for the clinical sample was determined using a proxy score consisting of the self-neglect, blunted affect, motor retardation, and emotional withdrawal items of the BPRS. To compare and contrast the variance between distinct groups and counteract the problems with multiple comparisons, post hoc tests using Bonferroni corrections were implemented.

Hypothesis 2: Based on prior research, we hypothesized that verbal ability and extraversion would predict interpersonal skills and ability to do everyday tasks. Hierarchical linear regression models were created to see how much verbal memory and levels of the FFM personality characteristics contributed to the prediction of performance-based scores (SSPA and UPSA-B scores) while controlling for symptom severity. Regression models were conducted separately for both samples because they both used different symptom rating scales.

Subhypothesis 2: We expected that verbal memory and extraversion would independently predict increased SSPA and UPSA-B scores while controlling for negative symptomology. If the first subhypothesis yields significant relationships between negative symptomology and performance-based tasks, a hierarchical linear regression was to be utilized to see how well verbal memory and the FFM personality traits (while controlling for negative symptomology) predict scores on the performance-

based tasks. Both samples were analyzed separately since they used two different symptom rating scales.

Chapter 3

Results

Prior to conducting the planned analyses, the data was examined for outliers/influential data points and to ensure the normal assumptions were met for the respective analyses (including significant correlations among independent variables, normality of data distributions, homogeneity of variance, multicollinearity, homoscedasticity, etc.). Pearson bivariate correlations and analyses of variance (ANOVA) were used to identify potential confounding variables that could bias our main analyses such as age, ethnicity, gender, and education level. Unless otherwise noted, reported significance levels will be two-tailed, and descriptive analyses will also be provided.

Descriptive Statistics

The sample of 181 undergraduates was broken into 3 separate groups to represent overall and negative schizotypy: low levels (n=99-overall; n=104-negative), "mid"-levels (n=69-overall; n=66-negative), and high levels (n=13-overall; n=11-negative). For those with low levels of schizotypy, the group included slightly more males (51.5%-overall, 52.9%-negative), mostly Caucasian (79.8% for both overall and negative schizotypy), and almost entirely single or never married (100%-overall; 99%-negative). The "mid" levels group consisted of mostly males (52.2%-overall; 51.5%-negative), Caucasians (73.9%-overall; 74.2%-negative), and nearly all single or never married (98.6%-overall, 100%-negative). Finally, those with high levels of schizotypy were primarily females (53.8%-overall; 63.6%-negative), Caucasian (53.8%-overall; 45.5%), and all never married or single (100% in both overall and negative). The participants

yielded mean scores of 2.13 (SD=0.62) for overall symptomatology and 2.22 (SD=0.78) for negative symptomatology (both based on the mean of SPQ-BR items). They possessed a mean score of 31.83 (SD=6.37) on the extraversion scale of the NEO-FFI. Combined scores for both scenarios in the SSPA provided a mean of 76.72 (SD=6.42), or 4.5 per item replicating the mean score from Patterson et al.'s (2001) study. On the remainder of performance-based tasks, the undergraduates recorded mean scores of 75.63 (SD=12.06) on the UPSA-B and 49.05 (SD=8.29) on the verbal memory task.

Of the 19 outpatients in the clinical sample, the participants generated mean scores of 1.97 (SD=0.66) for overall symptomatology and 1.53 (SD=0.75) for negative symptomatology (based on the mean of BPRS items). On the extraversion scale of the NEO-FFI, the mean score for the clinical sample was 23.47 (SD=6.93). On the performance-based measures, the clinical sample had mean scores of 69.16 (SD=10.37) on the SSPA, 81.82 (SD=12.07) on the UPSA-B, and 37.11 (SD=11.81) on the verbal memory task (see Table 2). Specifically on the SSPA, the average score was 4.06 per item. This is compared to the original Patterson et al. (2001) study where the average score per item was only 3.0 in the schizophrenia sample (n=83), so there were relatively higher scores in our sample overall.

Inferential Statistics

Pearson bivariate correlations were calculated to examine the relationships between symptomatology, personality traits, and the performance-based tasks. In regards to symptom severity, overall schizotypy showed a strong negative correlation with extraversion, $r(179) = -0.48$, $p<0.001$, and conscientiousness, $r(179) = -0.46$, $p<0.001$. Overall SPQ-BR scores also showed a strong positive correlation with neuroticism,

Table 2

Descriptive Statistics for Undergraduate and Clinical Samples

	Undergraduate sample (n = 181)			Clinical sample (n = 19)		
Demographic variable/measure	f (%) or M (SD)	Range	α	f (%) or M (SD)	Range	α
Symptomatology[a]						
Overall symptoms	2.13 (0.62)	1.06–3.84	0.92	1.97 (0.66)	1.13-3.29	0.82
Negative symptoms	2.22 (0.78)	1.00–4.70	0.86	1.53 (0.75)	1.00–3.50	0.62
Personality[b]						
Extraversion	31.83 (6.37)	10–48		23.47 (6.93)	11–35	
Neuroticism	20.93 (8.46)	4–45		27.63 (7.65)	13–45	
Agreeableness	32.96 (6.00)	17–47		32.42 (6.37)	19–41	
Conscientiousness	33.09 (7.89)	10–48		28.53 (8.70)	16–43	
Openness to experience	31.14 (6.36)	14–46		28.21 (6.21)	21–44	
UPSA-B total scores[c]	75.63 (12.06)	34.85–100		81.82 (12.07)	55.05–100	
SSPA total scores[d]	76.72 (6.42)	58–85	0.87	69.16 (10.37)	43–85	0.92
Verbal memory total scores[c]	49.05 (8.29)	25–67		37.11 (11.81)	16–54	

Note. Frequencies (%) are reported for categorical variables, and standard deviations (SD) and ranges are reported for continuous variables.

[a] Undergraduate sample scores based on mean of SPQ-BR items, and clinical sample scores based on mean of BPRS items.

[b] Unable to calculate Cronbach's alpha. A Costa and McCrae (2007) study found a median internal reliability score for the NEO-FFI of 0.82.

[c] Cronbach's alpha unable to be calculated for UPSA-B and verbal memory task given nature of the categorical scale and multiple trials of each measure respectively.

[d] SSPA- Social Skills Performance Assessment.

$r(179) = 0.61$, $p<0.001$. Similar relationships were seen between negative schizotypy and personality traits. Interpersonal SPQ-BR scores displayed a strong negative correlation with extraversion, $r(179) = -0.59$, $p<0.001$, and a moderate negative correlation with conscientiousness, $r(179) = -0.36$, $p<0.001$. There was also a strong positive relationship between negative schizotypy and neuroticism, $r(179) = 0.53$, $p<0.001$. Among the performance-based measures, the SSPA scores were weakly related to openness to experience, $r(198) = 0.15$, $p<0.001$, and extraversion, $r(198) = 0.20$, $p<0.001$. The results of the bivariate correlations are discussed further in Table 3.

Hypothesis 1: We anticipated that overall functioning (interpersonal/ everyday tasks/verbal memory) would vary according to overall symptom severity. The 2 samples were broken into 4 groups based on overall symptomology: low levels of schizotypy (N=99), "mid" levels of schizotypy (N=69), high levels of schizotypy (N=13), and the clinical group (N=19). As illustrated in Figure 1, there was a statistically significant trend across the groups for social functioning as determined by a one-way ANOVA ($F(3,196) = 7.896$, $p = 0.000$). Posthoc analyses using Bonferroni corrections revealed that the clinical sample (69.16 ± 10.37) scored significantly lower than the mid (76.16 ± 5.92, $p=0.001$) and the low (77.40 ± 6.64, $p=0.000$) levels of schizotypy. There were no statistically significant differences between the clinical sample and those with high levels of schizotypy ($p=0.183$).

As for our proxy for everyday functioning, a one-way ANOVA produced a statistically significant trend across the groups too ($F(3,196) = 3.032$, $p = 0.030$) (see Figure 2). Through posthoc analyses, the clinical sample (82.82 ± 12.07) scored significantly higher than those with high levels of schizotypy (69.27 ± 14.00, $p=0.024$).

Table 3

Correlations of Primary Constructs Between All Participants

	1-a	2-a	3-b	4-b	5	6	7	8	9	10	11	12
SPQ-BR Overall (1)-a		—	—	—	—	—	—	—	—	—	—	—
SPQ-BR Interpersonal (2)-a	**.83****		—	—	—	—	—	—	—	—	—	—
BPRS Total Score (3)-b	NA	NA		—	—	—	—	—	—	—	—	—
BPRS Negative Score (4)-b	NA	NA	**.53***		—	—	—	—	—	—	—	—
Openness to Experience (5)	**.24****	.08	-.41	-.28		—	—	—	—	—	—	—
Extraversion (6)	**-.48****	**-.59****	.-29	-.07	.08		—	—	—	—	—	-
Neuroticism (7)	**.61****	**.53****	**.49***	.08	.13	**-.53****		—	—	—	—	—
Conscientiousness (8)	**-.46****	**-.36****	-.10	.05	**-.19****	**.36****	**-.46****		—	—	—	—
Agreeableness (9)	**-.36****	**-.27****	-.23	.16	.08	**.16***	**-.17***	**.28****		—	—	—
UPSA-B Total Score (10)	-.04	-.10	.16	.16	.02	.07	.02	-.01	.07		—	—
SSPA Total Score (11)	-.07	-.12	-.12	-.12	**.15****	**.20****	-.12	.11	.12	.11		—
Verbal Memory Total (12)	.02	.04	.31	.31	.07	.04	-.08	.06	-.01	.04	**.22****	

Note. a- Denotes undergraduate sample only (n = 181); b- Denotes clinical sample only (n = 20); NA- Denotes not applicable. SSPA = Social Skills Performance Assessment.

* = $p < .05$. ** = $p < .01$.

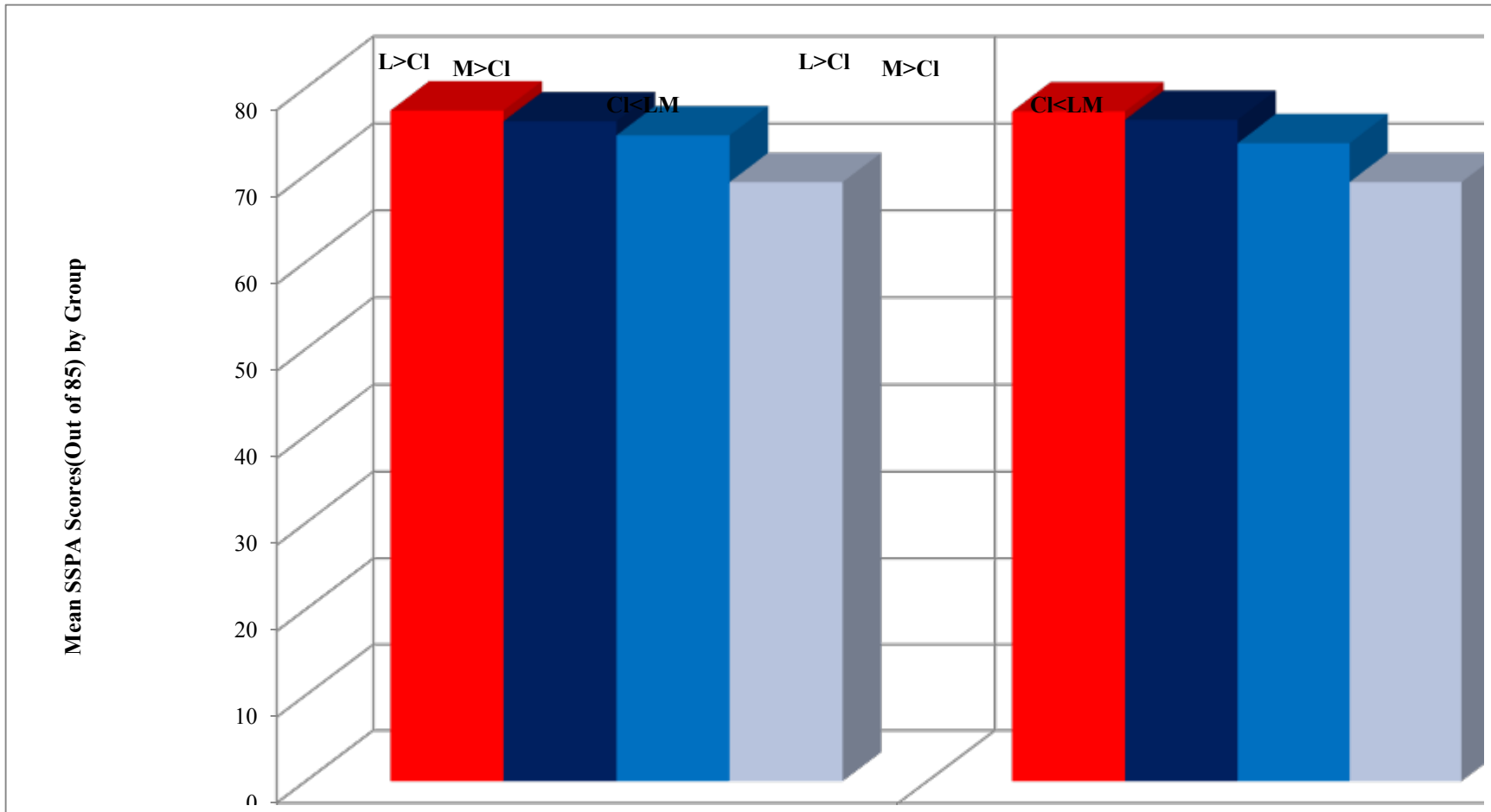


Figure 1. Mean Social Functioning (SSPA) scores based on overall and negative symptom severity. * Denotes $p < .05$ in overall model. Posthoc analyses calculated specific group differences using Bonferroni corrections. Significant group differences are displayed above bar graphs.

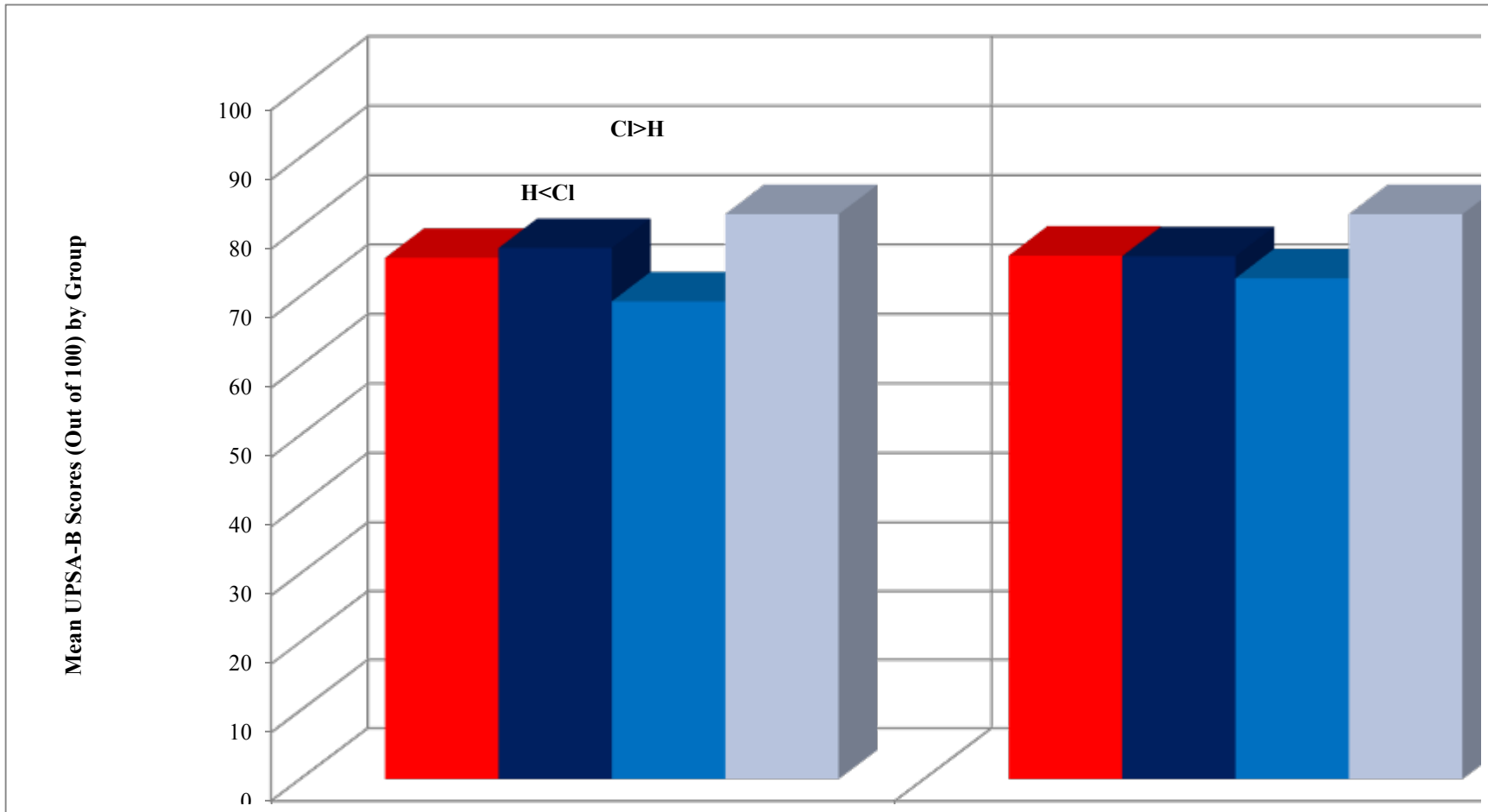
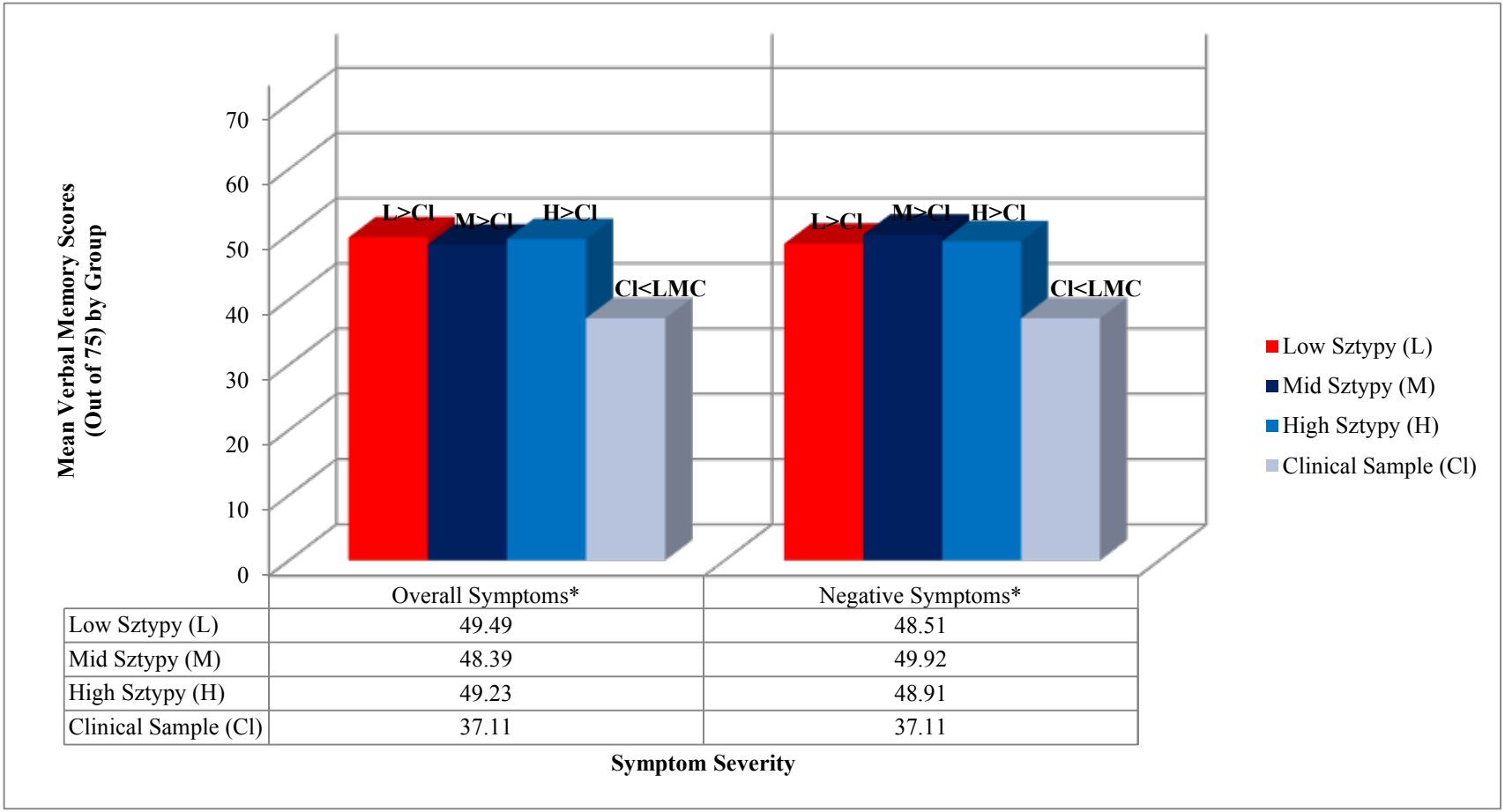


Figure 2. Mean General Functioning (UPSA-B) scores based on overall and negative symptom severity. * Denotes $p < .05$ in overall model. Posthoc analyses calculated specific group differences using Bonferroni corrections. Significant group differences are displayed above bar graphs.

In the case of verbal memory scores, Levene's test for homogeneity of variance revealed that normality had been violated (unequal variances across groups), and therefore a Kruskal-Wallis was run instead. The test showed that there was a statistically significant difference in verbal memory scores between the groups x^2 (3) =16.522, p = 0.001, with a mean rank score of 108.07 for those with low levels of schizotypy, 102.47 for those with "mid" levels of schizotypy, 106.54 for those with high levels of schizotypy, and 49.79 for the clinical sample (see Figure 3).

Subhypothesis 1: We anticipated scores on the performance-based tasks (UPSA-B, SSPA, and verbal memory task) in those with high levels of negative schizotypy to be significantly lower than those with low to mid-levels of negative schizotypy, but not as low as scores in the clinical sample. Similar to our first hypothesis, a one-way ANOVA was used to examine the group differences across the performance-based measures, but now only across negative symptom severity instead of overall symptom severity. The 2 samples were again broken into 4 groups based on negative symptomology this time: low levels of schizotypy (N=104), "mid" levels of schizotypy (N=66), high levels of schizotypy (N=11), and a clinical group (N=19). A one-way ANOVA displayed significant differences in social functioning across the groups (F(3,196) = 8.050, p = 0.000) (See Figure 1). In regards to specific group differences, similar results were found as seen in our first hypothesis. Posthoc analyses using Bonferroni corrections showed that those with mid (76.33 ± 6.35, p=0.000) and low (77.30 ± 6.36, p=0.000) scored significantly higher than the clinical sample (69.16 ± 10.37). Once again, there were no significant differences between high levels of schizotypy and the clinical sample (p= 0.516).



	Overall Symptoms*	Negative Symptoms*
Low Sztypy (L)	49.49	48.51
Mid Sztypy (M)	48.39	49.92
High Sztypy (H)	49.23	48.91
Clinical Sample (Cl)	37.11	37.11

Figure 3. Mean verbal memory scores based on overall and negative symptom severity. * Denotes $p < .05$ in overall mode.

As seen in Figure 2 for everyday functioning, there were no statistically significant differences between groups as determined by one-way ANOVA ($F(3,196) = 1.746$, $p = 0.159$).

For verbal memory scores across negative symptomology, Levene's test for homogeneity of variance showed that the assumption of normality had been violated again due to unequal variance across the groups. A Kruskal-Wallis test was utilized to examine these scores. There was a statistically significant group difference in the verbal memory task, x^2 (3) =18.079, $p = 0.000$ (see Figure 3). Those with low levels of schizotypy possessed a mean rank score of 100.93, while those with "mid" levels of schizotypy have a mean rank score of 113.61. Participants with higher levels of schizotypy had a mean rank score of 105.36 and the clinical sample had a mean rank score of 49.79.

Hypothesis 2: Based on prior research, we hypothesized that verbal ability and extraversion would predict interpersonal skills and ability to do everyday tasks. A total of four hierarchical linear regression analyses were performed to examine this hypothesis. Two analyses looked at how well verbal memory and personality traits predicted social functioning across both samples separately, and the process was repeated once more with everyday functioning as the dependent variable instead.

Before assessing the effects of verbal memory and personality traits (specifically extraversion) on social functioning in the undergraduate sample, the initial model using only overall symptom severity showed no statistical significance, $F(1,179)= 0.82$, $p=0.368$, $R^2 =0.005$, adj. $R^2 = -0.001$. Overall symptom severity did not significantly predict social functioning in this first model, $\beta= -0.70$, $t = -0.91$, $p= 0.368$. When verbal

memory and the FFM personality traits were added to the model, a significant trend was seen, $F(7,173)= 2.04$, $p= 0.053$, $R^2 = 0.076$, adj. $R^2 = 0.039$. None of the predictor variables significantly contributed when added to the model. See Table 4 for details.

We then looked at the same model, but this time in the clinical sample. The initial model showed no statistical significance, $F(1,18)= 0.13$, $p=0.727$, $R^2 =0.007$, adj. $R^2 = -0.051$. Overall symptom severity did not statistically predict social functioning, $\beta= 1.36$, $t = 0.36$, $p= 0.727$. The model yielded no statistical significance even when supplemented with the predictor variables, $F(7,11)= 1.879$, $p= 0.168$, $R^2 = 0.545$, adj. $R^2 = 0.255$. As illustrated in Table 5, there were no significant individual contributors.

Table 4

Hierarchical Linear Regression Model Analysis Predicting Social Functioning (SSPA scores) Controlling for Overall Symptom Severity in Undergraduate Sample

	Social functioning		
Variable	Model 1 B	Model 2 B	95% *CI*
Constant	78.22**	59.92**	[47.00, 72.84]
Overall symptom severity	-0.70	0.12	[-2.08, 2.32]
Verbal memory		0.05	[-0.06, 0.16]
Extraversion		0.15	[-0.02, 0.33]
Neuroticism		0.00	[-0.15, 0.15]
Agreeableness		0.13	[-0.04, 0.30]
Openness to experience		0.15	[0.00, 0.31]
Conscientiousness		0.00	[-0.14, 0.14]
R^2	0.01	0.08	
F	0.82	2.04	
ΔR^2		0.08	
ΔF		2.23*	

Note. $N = 181$.

*$p < .05$. ** $p < .01$.

Table 5

Hierarchical Linear Regression Model Analysis Predicting Social Functioning (SSPA scores) Controlling for Overall Symptom Severity in Clinical Sample

	Social functioning		
Variable	Model 1 B	Model 2 B	95% *CI*
Constant	66.48**	104.38**	[27.00, 181.78]
Overall symptom severity	1.36	-0.33	[-12.20, 11.54]
Verbal memory		0.23	[-0.25, 0.70]
Extraversion		-1.21	[-2.49, 0.06]
Neuroticism		-0.52	[-1.94, 0.89]
Agreeableness		-0.83	[-1.78, 0.12]
Openness to experience		0.12	[-1.12, 1.35]
Conscientiousness		0.83	[0.00, 1.66]
R^2	0.01	0.55	
F	0.13	1.88	
ΔR^2		0.54	
ΔF		2.16	

Note. $N = 19$.

*$p < .05$. ** $p < .01$.

Our study next examined the influence of our predictor variables on everyday functioning with the undergraduate sample. With overall symptom severity as the sole predictor variable, the model yielded no statistical significance, $F(1,179)= 0.24$, $p= 0.624$, $R^2 = 0.001$, adj. $R^2 = -0.004$. Like with social functioning in this sample, overall symptom severity did not significantly predict everyday functioning, $\beta= -0.72$, $t = -0.49$, $p= 0.624$. The model did not yield statistical significance when the remaining predictor variables were added, $F(7,173)= 1.61$, $p= 0.136$, $R^2 = 0.061$, adj. $R^2 = 0.023$. Only extraversion considered a significant contributor of the predictor variables, $\beta= 0.47$, $t = 2.80$, $p= 0.006$. See Table 6 for more details.

Table 6

Hierarchical Linear Regression Model Analysis Predicting General Functioning (UPSA-B scores) Controlling for Overall Symptom Severity in Undergraduate Sample

	Social functioning		
Variable	Model 1 B	Model 2 B	95% *CI*
Constant	77.16**	45.89**	[21.41, 70.36]
Overall symptom severity	-0.72	0.58	[-3.59, 4.74]
Verbal memory		0.14	[-0.07, 0.35]
Extraversion		0.47**	[0.14, 0.81]
Neuroticism		0.11	[-0.17, 0.38]
Agreeableness		0.13	[-0.20, 0.45]
Openness to experience		0.07	[-0.23, 0.37]
Conscientiousness		-0.06	[-0.32, 0.20]
R^2	0.00	0.06	
F	0.24	1.61	
ΔR^2		0.06	
ΔF		1.84	

Note. $N = 181$.

*$p < .05$. ** $p < .01$.

The same analysis for everyday functioning was conducted again this time with the clinical sample in place. The model with only overall symptom severity did not show statistical significance, $F(1,18)= 0.90$, $p= 0.356$, $R^2 = 0.050$, adj. $R^2 = -0.006$, and, overall symptom severity did not contribute significantly in this model as well, $\beta= 4.12$, $t = 0.95$, $p= 0.356$. After adding verbal memory and the personality traits to the equation, there was a statistically significant trend in the model, $F(7,11)= 2.389$, $p= 0.095$, $R^2 = 0.603$, adj. $R^2 = 0.351$. As seen in Table 7, individual evaluation of the variables indicates that there were no significant contributors.

Table 7

Hierarchical Linear Regression Model Analysis Predicting General Functioning (UPSA-B scores) Controlling Overall Symptom Severity in Clinical Sample

	Social functioning		
Variable	Model 1 B	Model 2 B	95% *CI*
Constant	73.69**	142.97**	[58.90, 227.05]
Overall symptom severity	4.12	7.13	[-5.77, 20.02]
Verbal memory		0.12	[-0.39, 0.64]
Extraversion		-1.73*	[-3.12, -0.35]
Neuroticism		-1.47	[-3.01, 0.07]
Agreeableness		-0.42	[-1.45, 0.61]
Openness to experience		0.13	[-1.21, 1.48]
Conscientiousness		0.40	[-0.50, 1.31]
R^2	0.01	0.55	
F	0.13	1.88	
ΔR^2		0.54	
ΔF		2.16	

Note. $N = 19$.

*$p < .05$. ** $p < .01$.

Subhypothesis 2: We expected verbal memory and extraversion independently predicting increased SSPA and UPSA-B scores while controlling for negative symptomology. To test this hypothesis, we ran two hierarchical linear regression analyses to see how well verbal memory and the FFM personality traits predicted social functioning in both of our samples. The only difference in these analyses from our previous set of analyses is the inclusion of negative symptom severity versus overall symptom severity.

We first evaluated the model in the undergraduate sample using only negative symptom severity. There was no statistical significance seen within this model,

$F(1,179)= 2.61$, $p= 0.108$, $R^2 = 0.014$, adj. $R^2 = 0.009$. The beta coefficient for the predictor variable of negative symptom severity was not significant, β= -0.99, $t = -1.62$, $p= 0.108$. Once verbal memory and the FFM personality traits were added to the model, there was a statistically trend seen, $F(7,173)= 2.05$, $p= 0.052$, $R^2 = 0.076$, adj. $R^2 = 0.039$. Of the predictor variables, openness to experience was the only significant contributor, β= 0.16, $t = 2.07$, $p= 0.040$. See Table 8 for further details.

Table 8

Hierarchical Linear Regression Model Analysis Predicting Social Functioning (SSPA scores) Controlling for Negative Symptom Severity in Undergraduate Sample

	Social functioning		
Variable	Model 1 B	Model 2 B	95% *CI*
Constant	78.92**	61.23**	[48.25, 74.20]
Overall symptom severity	-0.99	-0.25	[-1.87, 1.37]
Verbal memory		0.05	[-0.06, 0.16]
Extraversion		0.14	[-0.05, 0.33]
Neuroticism		0.01	[-0.13, 0.15]
Agreeableness		0.12	[-0.04, 0.29]
Openness to experience		0.16*	[0.01, 0.31]
Conscientiousness		0.00	[-0.14, 0.13]
R^2	0.01	0.08	
F	2.61	2.05	
ΔR^2		0.06	
ΔF		1.94	

Note. $N = 181$.

*$p < .05$. ** $p < .01$.

In our clinical sample, the first model with negative symptom severity displayed statistical significance, $F(1,18)= 0.27$, $p= 0.613$, $R^2 = 0.015$, adj. $R^2 = -0.043$, and negative symptom severity did not significantly contribute to the overall model, β= -1.71, $t = -$

0.52, p= 0.613. The model still did not show significance when the six other predictors were included in the model, $F(7,11)$= 1.901, p= 0.164, R^2 = 0.547, adj. R^2 = 0.259. As demonstrated in Table 9, neither verbal memory nor any of the FFM personality traits significantly contributed to the model.

Table 9

Hierarchical Linear Regression Model Analysis Predicting Social Functioning (SSPA scores) Controlling for Negative Symptom Severity in Clinical Sample

	Social functioning		
Variable	Model 1 B	Model 2 B	95% *CI*
Constant	71.77**	99.14*	[11.28, 187.01]
Overall symptom severity	-1.71	-1.19	[-10.82, 8.45]
Verbal memory		0.27	[-0.31, 0.85]
Extraversion		-1.10	[-2.66, 0.46]
Neuroticism		-0.45	[-1.77, 0.88]
Agreeableness		-0.75	[-1.10, 0.41]
Openness to experience		-0.05	[-1.10, 1.20]
Conscientiousness		0.80	[-0.06, 1.66]
R^2	0.02	0.55	
F	0.27	1.90	
ΔR^2		0.53	
ΔF		2.16	

Note. N = 19.

*p < .05. ** p < .01.

Regression analyses were not calculated for everyday functioning seeing that significance was not found in subhypothesis 1 looking at group differences in everyday functioning according to negative symptomology.

Chapter 4

Discussion

The present study tested two sets of hypotheses. The first set of hypotheses examined group differences in social functioning, everyday functioning, and verbal memory across both overall and negative symptomology. The expectation was a stepwise decline in scores from low levels of schizotypy towards the chronic, more persistently severe symptomology we saw in the clinical sample. Generally speaking, these hypotheses were mostly supported by findings consistent with the prior research. The anticipated stepwise decline was most evident in social functioning (See Figure 1). Social functioning scores were significantly higher in those with low to "mid" levels of schizotypy compared to our clinical sample. Undergraduates with high levels of schizotypy were somewhat lower in their social functioning when compared to low and moderate schizotypy groups, but their scores were higher than the patient group. Our posthoc tests then revealed no significant differences between those with high levels of schizotypy and our patient sample. Similar results have been seen in previous research between control groups, the clinically high risk, and clinical groups (Addington et al., 2008). These findings provide evidence consistent with the stress-vulnerability model and continuum of psychosis. Those with high levels of schizotypy might show some evidence of functional impairment and symptomology comparable to clinical samples long before onset and associated with future risk for developing schizophrenia spectrum disorders.

Although it was not a stepwise decline, verbal memory scores in all three undergraduate groups were significantly higher than the clinical sample. Therefore, as with two other studies (Addington & Addington, 2008; Vollema & Postma, 2002),

deficits were related to the presence of a psychiatric diagnosis and negative symptoms. However, the findings for our sample suggest that there may be a threshold of severity that exists (e.g., clinically significant symptoms) before a verbal memory decline is observed. Further complicating the picture, there is a possibility that the characteristics of our sample (19-year-old college undergraduates) contributed to the null findings for verbal memory with our schizotypy severity categories. Stated another way, our nonclinical sample could undoubtedly be characterized as relatively "high functioning" group that may not fully represent the range of verbal memory functioning in the general population (e.g., our undergraduates were younger and pursuing higher education). This restricted range of functioning may have limited our ability to find a significant relationship between symptom level and verbal memory.

On the other hand, there was an unanticipated increase in everyday functioning (UPSA-B scores) in the clinical group when compared to the high schizotypy group who scored the lowest on the measure. A similar pattern emerged with negative symptomology as well, although this relationship did not achieve statistical significance. This is unlike other studies that found symptomology (primarily negative symptomology) considerably impaired one's ability to function on tasks encountered in the real-world (Leifker, Bowie, & Harvey 2009). For example, one of the UPSA-B tasks required participants to write a check. Our older participants, mainly represented in the clinical sample, probably had more experience and familiarity with this process. In fact, this may be a skill that is becoming increasingly less relevant as new developments in technology make this form of payment less necessary. Although, it is interesting to note that scores for the UPSA-B were lowest in the high schizotypy group (albeit nonsignificant)

suggesting that the measure may be capturing some general impairment. This suggests that there might be a confounding variable (e.g. age, measure items) at play. The potential cohort and measure-related issues will be discussed further in the limitations portion of this paper.

Our second set of hypotheses looked at how well verbal memory and extraversion predicted success in social functioning and everyday functioning while controlling for symptomology. Contrary to our main predictions, we found no evidence for the role of verbal memory in any of the outcome indicators that we included in our study. However, levels of extraversion did contribute independently to the prediction of everyday functioning. While we initially anticipated that extraversion would be related to functioning (particularly social functioning as reflected in SSPA scores), we were surprised that is was more associated with general functioning (USPA-B) than verbal memory. These findings can, perhaps, be understood in the context of previous research suggesting that higher levels extraversion might act as a protective factor or buffer towards developing psychosis and deficits in social and everyday functioning (Dinzeo & Docherty, 2007). In all, these findings suggest that the constructs of social and everyday functioning might be more complex than we originally envisioned , or there are other variables that we did not examine that could be part of the equation like other symptom clusters or other neurocognitive abilities (Addington & Addington, 1999; Cohen, Forbes, Mann, & Blanchard, 2006; Leifker, Bowie, & Harvey, 2009).

There are limitations to this study that warrant mention. Foremost, the high schizotypy (N=13) and clinical samples (N=19) had small sample sizes. With the high schizotypy sample, we took a conservative approach with a 1.65 cutoff to define the

sample versus the estimated eight to ten-percent of the population estimated in some research (Cohen, Callaway, Najolia, Larsen, & Strauss, 2012; Lenzenweger, 2006). On the other hand, slow recruitment affected our clinical sample. Second, there was a large age gap between our undergraduate sample (M=19.45) and clinical sample (M=44.42). Age could have accounted for the group differences on the performance-based tasks, particularly the UPSA-B. Possibly a limitation in itself was the use of the UPSA-B, which was originally designed for older adults diagnosed with schizophrenia. The measure also possesses outdated items (i.e. writing a check, dialing directory assistance, etc.) that pertain more to the older generations and not the younger college-aged generations. In our study, the average item score was 4.06 for the clinical sample. Moreover, our study utilized a convenience sample of Rowan University undergraduate students. These students may differ in important ways from the general population (e.g., age range, primarily Caucasian, relatively high functioning, are likely to come from a more economically advantaged background, etc.), which limits our ability to generalize our findings. Finally, our study relied on several self-report measures. Self-report may contain biases such as response bias (an individual's tendency to answer questions honestly) or social desirability bias (an individual's tendency to answer questions in a manner that will be viewed favorably by others). We attempted to control certain forms of bias, such as random responding, by the inclusion of low probability items like the infrequency statements we included on the SPQ-BR (e.g., "I walk with a limp as a result of a sky diving accident"). Those who endorsed one or more of the items were excluded.

Despite these limitations, we believe that there are implications that can be taken away from the study. This study provides some information about a gap in the literature

involving our understanding of how personality characteristics and neurocognitive abilities (specifically verbal memory) in the predication of functional deficits. Prior to this study and to the best of our knowledge, there was little to no research conducted on these models. Thus, we have provided some evidence for how these variable independently (vs. combined) contribute to functioning. This basic approach (i.e., looking for complex interactions), especially when applied to longitudinal research, should help the field advance by identifying more nuanced predictive markers for psychosis that provide a more power risk identification tool that will more accurately catch people before they cross the barrier into psychosis. Once markers are identified, then specific subgroups can be targeted in the clinical realm using tailored interventions that increase the likelihood of effectively intervening prior to the development of psychosis.

This study offers a new direction for researchers to look towards within this line of research. Primarily, future research should study the predictive quality of other neurocognitive abilities besides verbal memory and other symptom clusters other than negative symptomology. Past research has surveyed neurocognitive abilities like executive functioning and verbal fluency as well as the positive and disorganized symptoms in relation to other areas of psychosis research. They could have a profound effect on social and daily functioning deficits that were not looked at in this study or in any prior research. Future studies should also gather data from larger sample sizes and from a variety of clinical populations. This way more can be inferred from the results, and there is a means of comparison across the groups respectively.

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