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Social function in schizophrenia and schizoaffective disorder: Associations with personality, symptoms and neurocognition

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Abstract

Background: Research has indicated that stable individual differences in personality exist among persons with schizophrenia spectrum disorders predating illness onset that are linked to symptoms and self appraised quality of life. Less is known about how closely individual differences in personality are uniquely related to levels of social relationships, a domain of dysfunction in schizophrenia more often linked in the literature with symptoms and neurocognitive deficits. This study tested the hypothesis that trait levels of personality as defined using the five-factor model of personality would be linked to social function in schizophrenia.

Methods: A self-report measure of the five factor model of personality was gathered along with ratings of social function, symptoms and assessments of neurocognition for 65 participants with schizophrenia or schizoaffective disorder.

Results: Univariate correlations and stepwise multiple regression indicated that frequency of social interaction was predicted by higher levels of the trait of Agreeableness, fewer negative symptoms, better verbal memory and at the trend level, lesser Neuroticism ($R^2 = .42$, $p < .0001$). In contrast, capacity for intimacy was predicted by fewer negative symptoms, higher levels of Agreeableness, Openness, and Conscientiousness and at the trend level, fewer positive symptoms ($R^2 = .67$, $p < .0001$).

Conclusions: Taken together, the findings of this study suggest that person-centered variables such as personality, may account for some of the broad differences seen in outcome in schizophrenia spectrum disorders, including social outcomes. One interpretation of the results of this study is that differences in personality combine with symptoms and neurocognitive deficits to affect how persons with schizophrenia are able to form and sustain social connections with others.

Background

Interest has increasingly grown in understanding how differences in personality may affect outcome in schizophrenia [1,2]. Just as in a wide range of other severe and

debilitating medical conditions [3-7], the manner in which people interpret and respond to a life touched by schizophrenia may deeply impact upon the recovery process [8-11].

To date, one model of personality that has shown some promise in helping to systematically document the types of individual differences that help or hinder outcome in schizophrenia, is the "Five factor" model [12]. This model posits five endogenous traits [13] along which all persons vary, regardless of their socioeconomic status or culture and which exert an enduring impact on behavior, affect and cognition across the lifespan [14]. These five dimensions are Neuroticism, or vulnerability to emotional instability and self-consciousness, Extraversion, or the tendency to be warm and outgoing; Openness, or the cognitive disposition to creativity and aesthetics; Agreeableness, or the tendency to be comfortable with social interactions, and Conscientiousness, or the tendency towards dutifulness and competence [12,15]. Each of these dimensions is conceptualized as a "basic tendency" which interacts with external influences to shape how persons adapt and form their self-concept.

Beyond its intuitive appeal as a model for understanding individual differences in schizophrenia, research has suggested that the traits of the five factor model can be detected in schizophrenia [16] and that, as in the general population, these traits are relatively stable over time [17]. Additionally, persons with schizophrenia tend to present with a different pattern of these traits, endorsing higher levels of Neuroticism and lower levels of Extraversion, Openness, Agreeableness and Conscientiousness than community controls [16,18]. Regarding clinical outcomes, levels of neuroticism and agreeableness have been linked to heightened symptom levels [18,19]. Neuroticism, Extraversion and Agreeableness have also been linked to poorer life satisfaction [20] and to more avoidant coping [18,21]. Other assessments of neuroticism and extraversion from slightly different trait models have suggested both are related to symptoms [22] and work function [23] and may predate the onset of symptoms potentially reflecting risk factors for the development of schizophrenia spectrum disorders [24,25]. Lastly, other assessments using competing models of temperament and character have also found personality variables linked with patterns of substance abuse [26] and lesser levels of quality of life [27-29].

While this literature points to a link between personality and clinical outcome, curiously less has been studied about impact of the traits of the five-factor model on the ability of persons with schizophrenia to form and sustain close interpersonal relationships. While research linking poor social function to negative symptoms and neurocognitive impairments [30-33] has generated considerable excitement, the influence of individual differences has been somewhat neglected. Might not higher levels of Neuroticism as well as lower levels of Extraversion, Openness, Agreeableness and Conscientiousness also uniquely con-

tribute to poorer level of intimate connections to others and one's community, along with levels of neurocognitive symptoms and neurocognitive deficits?

To investigate this possibility we assessed interpersonal and community function using the Quality of Life Scale [[34]; QOLS] and the five traits of the five factor model using the NEO [35]. Concurrently we also assessed positive and negative domains of psychopathology with the Positive And Negative Syndrome Scale [[36]; PANSS] and three aspects of neurocognitive function linked to community function: verbal memory, executive function and premorbid intellectual function. Three primary predictions were made: higher levels of Neuroticism and lower levels of Extraversion, Openness, Agreeableness and Conscientiousness would uniquely contribute to lesser amount of social contact, fewer of the resources needed for intimacy and poorer community function, each as assessed on the QOLS. It was also predicted that these associations would exist semi-independently of the effects of negative symptoms and neurocognitive impairments.

Methods

Participants

Sixty-five males with SCID [37] confirmed DSM IV diagnoses of schizophrenia or schizoaffective disorder were recruited from a comprehensive day hospital at a VA Medical Center. All participants were receiving ongoing outpatient treatment and were in a post-acute or stable phase of their disorder. Clinical stability was defined as no hospitalizations or changes in medication or housing in the last month. Participants with organic brain syndrome or history of mental retardation documented in a chart review were also excluded. Participants had a mean age of 47.5 (sd = 9), a mean educational level of 12.2 (sd = 1.7) and a mean of 8 (sd = 7.7) lifetime hospitalizations with the first on average occurring at the age of 25 (sd = 5.8). Thirty-six were Caucasians, 28 African-Americans, and one Latino. Forty-one had schizophrenia and 24 schizoaffective disorder. Forty were being prescribed atypical antipsychotic medication at baseline, 16 a combination of typical and atypical, and 9 typical anti-psychotic medication. The mean chlorpromazine equivalence dose was 860 mg (sd = 1010).

Instruments

Positive And Negative Syndrome Scale: [[36] PANSS; Kay et al, 1987] is a 30-item rating scale completed by clinically trained research staff at the conclusion of chart review and a semi-structured interview. It is one of the most widely used semi-structured interviews for assessing the wide range of psychopathology in schizophrenia. For the purposes of this study three of the PANSS factor analytically-derived components scores were utilized: Positive, Negative, and Emotional Discomfort [38]. The other

components scores not used here are Cognitive and Excitement symptoms. The five-factor structure of the PANSS has been replicated several times [39]. Assessment of inter-rater reliability for this study found good to excellent with intraclass correlations ranging from .84 to .93.

NEO Five-Factor Inventory (form s): [35] is a self-report assessment of personality dimensions based on the five-factor model of personality. This test presents participants with 60 statements that they are asked to rate on a likert scale as describing or not describing their attitudes and behavior. The NEO form s generates percentile scores for the personality dimensions of Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness. The short form of the NEO has been used successfully in other studies of personality and schizophrenia [16-18]. For the purposes of this study we examined the Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness scores.

Hopkins Verbal Learning Test [[40]; HVLT] is an auditory verbal memory test designed to measure verbal memory and learning potential. In this test the experimenter verbally presents a list of words each belonging to one of several semantic categories three times and then after a delay asks the participant how many words they can recall. For the purposes of this study we utilized the age corrected t score for recall after the delay.

Wisconsin Card Sorting Test [[41]; WCST] is a neuropsychological test sensitive to impairments in executive function. It asks participants to sort cards that vary according to an unarticulated matching principle that changes after a certain number of correct responses. The current study utilized the age and education corrected t score for perseverative errors. This score is of particular interest since it is hypothesized as most closely relating to inflexibility of abstract reasoning.

The Vocabulary subtest of the WAIS-III [42] assesses participants' knowledge of vocabulary. This subtest has been widely used as a brief assessment of general verbal intellectual function.

Quality of Life Scale [[34] QOLS] is a 21-item scale completed by clinically trained research staff following a semi-structured interview and chart review. For the purposes of this study, we were interested in three of the four factor scores of the QOL. The first, "Interpersonal Relations," measures the frequency of recent social contacts and includes separate assessments, for example, of frequency of contacts with friends and acquaintances. The second, "Intrapsychic Foundations," measures qualitative aspects of interpersonal relationships and includes assessments, for example, of empathy for others. The third, "Common

Objects and Activities," assesses community involvement in terms of participation in common activities and possession of common objects that denote such participation. The fourth, "Instrumental Role," was not of interest, as this scale taps vocational function and all participants were entering vocational rehabilitation because they were unemployed and thus there was no variation in this scale. Good to excellent inter-rater reliability was found for the three QOL factor scores for this study, with intraclass correlations for blind raters observing the same interview ranging from .85 to .93. Although originally created to assess negative symptoms in schizophrenia the QOLS has been widely used to study social function among persons with schizophrenia [43].

Procedures

Following informed consent diagnoses were determined using the Structured Clinical Interview for DSM IV [37] conducted by a clinical psychologist (PL). Following the SCID, participants were administered the PANSS and QOLS interviews, NEO and neurocognitive testing. PANSS and QOLS ratings were performed blind to responses to the NEO and neurocognitive test scores. Neurocognitive testing, QOLS and PANSS interviews were conducted by trained research assistants with a minimum of a B.A. degree in a field related to psychology.

Results

Mean NEO percentile scores were: Neuroticism $M = 61.8$ ($SD = 9.9$), Extraversion $M = 44.4$ ($SD = 9.8$), Openness $M = 45.5$ ($SD = 8.3$), Agreeableness $M = 44.6$ ($SD = 11.2$), and Conscientiousness $M = 44.4$ ($SD = 9.8$). Mean PANSS components scores were: Positive $M = 17.3$ ($SD = 5.5$), and Negative $M = 20.4$ ($SD = 5.1$). Mean neurocognitive testing scores were: HVLT delayed recall T score: $M = 34.3$ ($SD = 10.6$) WCST Perseverative errors T score $M = 38.4$ ($SD = 12.2$) and Vocabulary subtest: $M = 7.5$ ($SD = 2.8$). Correlations of NEO scores with PANSS and neurocognitive test scores revealed Positive symptoms were related to Neuroticism ($r = .28, p < .05$) and Agreeableness ($r = -.49, p < .001$). Openness was related to Negative symptoms ($r = -.29, p < .05$) HVLT ($r = .38, p < .01$) and Vocabulary subtest ($r = .32, p < .05$). Extraversion was related to WCST ($r = -.27, p < .05$) and Conscientiousness was related to Vocabulary ($r = -.28, P < .05$). The NEO, PANSS and QOLS scores of participants with schizoaffective disorder did not differ significantly from those of participants with schizophrenia.

Univariate correlations of NEO, PANSS and neurocognitive testing with QOLS are presented in Table 1. Given the large number of correlations conducted, two tailed tests were employed despite the presence of unidirectional hypotheses and alpha was set at the .01 level. As this revealed, multiple NEO, PANSS and neurocognitive test

Table 1: Personality, symptom and neurocognitive correlates of three dimensions of social function (n = 65)

	Interpersonal relationships	Quality of life subscales	
		Intrapsychic foundations	Common objects and activities
NEO Neuroticism	-.40**	-.37**	.05
NEO Extraversion	.24	.18	.00
NEO Openness	.12	.40**	.16
NEO Agreeableness	.51***	.50***	.20
NEO Conscientiousness	.26	.42***	.16
HVLT Delayed Recall	.35**	.29*	.12
WCST Perseverative Errors	.04	.19	.32**
WAIS III Vocabulary	.34**	.08	.20
PANSS Positive symptoms	-.33**	-.39**	-.13
PANSS Negative symptoms	-.47***	-.57***	-.23

** p < .01; *** P < .001

Table 2: Multiple regressions predicting QOL scores from NEO, PANSS, and neurocognitive test scores

Measure of social function	Contributing PANSS and NEO components	F	Partial R ²	Model R ²
QOL Interpersonal relationships	NEO Agreeableness	12.9**	.22***	.22
	PANSS Negative symptoms		.12*	.34
	HVLT		.05*	.39
	NEO Neuroticism		.03 ¹	.42
QOL Intrapsychic foundations	PANSS Negative symptoms	20.4***	.32**	.32**
	NEO Agreeableness		.20**	.52**
	NEO Conscientiousness		.07*	.59
	NEO Openness		.05*	.64
	PANSS Positive symptoms		.03 ¹	.67

¹ = p < .10; * = p < .05; ** = p < .01; *** = p < .001

scores were related to both QOLS Interpersonal Relations and Intrapsychic Foundations scores, while the WCST score was solely related to common objects and activities

To understand the extent to which personality, symptoms and neurocognition were independently related to Interpersonal Relations and Intrapsychic Foundations two stepwise multiple regression analyses were conducted allowing variables with significant univariate correlations to enter to predict both QOLS scores. As summarized in Table 2, these analyses revealed that 42% of the variance in Interpersonal Relations could be accounted for by the predictor variables, with higher quality of interpersonal relationships predicted by higher levels of Agreeableness, fewer negative symptoms, better verbal memory and at the trend level, lesser Neuroticism. In contrast, more than two thirds of the variance in Intrapsychic Foundations could be accounted for by the predictor variables, with greater capacity for intimacy predicted by fewer negative symptoms, higher levels of Agreeableness, Openness, Conscientiousness and at the trend level, fewer positive symptoms.

Discussion

Results of this study are consistent with previous studies linking personality with general outcome including sense of well being in schizophrenia spectrum disorders. In particular, participants with more social ties tended to have lesser levels of Neuroticism, and higher levels of Agreeableness. Participants with greater capacities for intimacy similarly tended to have lesser levels of Neuroticism, higher levels of Openness, Agreeableness and Conscientiousness. Replicating previous studies, better verbal memory and premorbid intellectual function and fewer Positive and Negative Symptoms also predicted more social ties, while better verbal memory and fewer Positive and Negative Symptoms predicted a greater capacity for intimacy.

Given the complex interrelationships among personality, symptoms, neurocognition and social function, it is even more striking that when entered into a regression, personality variables tended to capture unique and significant proportions of the variances, despite levels of negative symptoms and in the case of interpersonal relations, ver-

bal memory also capturing unique portions of the variance. Also notable, was that taken together, personality, symptoms and neurocognition were able to account for between two fifths and two thirds of the variance in two of the three QOLS measures.

Explanations for heterogeneity within schizophrenia have included issues ranging from differences in pathophysiology [44,45] to prevailing social conditions [46,47]. Taken together, the findings of this study suggest that person centered variables such as personality, may also account for some of the broad differences seen in outcome in this disorder, including social outcomes. One intuitively appealing interpretation of this data is that differences in personality combine with symptoms and neurocognitive deficits to affect how persons with schizophrenia are able to form and sustain social connections with others. Of note, the correlational nature of this study precludes drawing any firm conclusions about causality and thus it may be that other factors not measured, such as stigma, account for the observed relationships between personality and social function. It is also possible that the experience of social rejection affects personality as measured using the NEO.

While the general hypotheses regarding personality and social function were confirmed, surprisingly, Extraversion did not seem to be related to any QOLS measure. This may suggest that Extraversion is not particularly advantageous to persons with schizophrenia, at least in terms of sociability. As we have hypothesized elsewhere [22,23] perhaps being socially outgoing when one has numerous deficits and idiosyncratic views may make one a target for stigmatization and rejection, thus negating perhaps any social gains. Clearly, however, this is speculation at present and future studies are needed to examine this question. Also, community function was related to neurocognition alone and no relationships were found with personality. This may suggest that participation in community is more greatly mediated by biological factors and social factors not assessed here.

Lastly, there are several other methodological limitations to this study. Generalization of findings is limited by sample composition. Participants were almost exclusively male and in their 40's who were involved in treatment. It may be that a different relationship exists between personality and social function among females or among younger males with schizophrenia, or persons who decline treatment. The battery assessing neurocognition was also limited in size and scope. Thus more research is necessary with broader samples and instrumentation. In particular, more "fine-grained" assessments of function as well as longitudinal assessments of personality, behavior and psychopathology may find associations between

behavior and personality that have important implications for treatment and rehabilitation. For instance, personality may prove to be an easily measurable personal characteristic that predicts outcome. Thus it may prove efficacious to identify subgroups of persons who may receive special benefit from interventions that emphasize identifying and coping with painful affects [e.g. [2,48]], or help to manage chronically unstable emotional states.

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