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The Role of Dysfunctional Attitudes in Models of Negative Symptoms and Functioning in Schizophrenia

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Abstract

Neurocognitive impairment is associated with negative symptoms and poor real world functioning in schizophrenia. Dysfunctional attitudes (e.g., “If I fail partly, it is as bad as being a complete failure”) have been found to mediate these relationships between neurocognition and negative symptoms and functioning. In this study, these relationships were examined in 179 participants with schizophrenia or schizoaffective disorder using structural equation modeling. Defeatist attitudes were found to mediate the relationship between neurocognition and negative symptoms but not the relationships between neurocognition and performance-based or self-reported functioning. A full model with the best fit showed mediation between neurocognition and self-reported functioning through two different pathways: One from neurocognition to functional skill capacity to real-world functioning, and a second from neurocognition to defeatist attitudes to negative symptoms to real-world functioning. These results may implicate skill deficits and defeatist attitudes as a separate treatment targets for negative symptoms and functioning in schizophrenia.

Keywords

schizophrenia; functioning; negative symptoms; defeatist attitudes; cognitive model

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Contributors Author Thomas Quinlan managed literature search, and analyses, as well as writing first draft of the manuscript. Author Thomas Quinlan and Scott Roesch undertook the statistical analyses. Author Eric Granholm designed the parent studies and protocols, as well as revising and adding to manuscript including both literature search and discussion section. All authors contributed to and have approved the final manuscript.

Conflict of Interest None of the authors have conflict of interests to report

1. Introduction

Schizophrenia leads to profound deficits in real world functioning, but the causes of functional impairment in schizophrenia are not fully understood. It is now well-established that neurocognitive impairment is associated with poor functioning and decreased quality of life in schizophrenia (Green, 1996; Green et al., 2004), but the relationship between neurocognitive impairment and functioning is mediated by several factors. For example, neurocognitive impairment is associated with negative symptoms, and negative symptoms have been found to mediate the relationship between neurocognitive impairment and functioning (Bowie et al., 2006; Harvey et al., 2006; Lin et al., 2013; Ventura et al., 2009). In addition, strong relationships have also been found between neurocognition and functional skill capacity, which in turn is associated with real world functioning (Bowie, et al., 2006; Bowie et al., 2008; Twamley et al., 2002). Social cognition abilities, such as perceiving and interpreting the affect and intentions of other people, have also been found to mediate the relationship between neurocognition and functional outcome (Green et al., 2008; Schmidt et al., 2011).

In a promising new theoretical model, Beck and colleagues (Rector et al., 2005; Beck et al., 2009; Grant & Beck, 2009) proposed that dysfunctional attitudes mediate the relationships between neurocognition and negative symptoms and functioning in schizophrenia. In their model, neurocognitive deficits can contribute to failure experiences and difficulties in performing daily living tasks, which may lead to the development of dysfunctional attitudes and negative appraisals about one's self and one's ability to perform goal-directed tasks. These attitudes and negative appraisals may contribute to negative symptoms, such as amotivation, apathy, and social disinterest, as well as a lack of engagement in goal-directed functioning tasks. Perivoliotis and Cather (2009) discussed the role of neurocognition in the development of defeatist performance beliefs. Their case formulation suggests that neurocognitive impairment might lead to repeated failure experiences which in turn can lead to the development of dysfunctional attitudes as a coping mechanism in which the individual has a low level of expectation for themselves and for their experience of pleasure (Perivoliotis and Cather, 2009).

Dysfunctional attitudes (e.g., “Why bother, I'll just fail again”) have typically been measured using the Defeatist Performance Attitude Scale (DPAS; Cane et al., 1986), a subscale of the Dysfunctional Attitude Scale (DAS; Weissman, 1978). Several studies have found significantly greater severity of defeatist beliefs on the DPAS in individuals with schizophrenia relative to healthy controls, as well as significant moderate correlations between severity of defeatist beliefs and neurocognition, negative symptoms and functioning (Couture et al., 2011; Grant & Beck, 2009; Rector, 2004; Horan et al., 2010). Furthermore, using Path analysis in participants with schizophrenia or schizoaffective disorder (N= 55) selected for high negative symptoms, Grant and Beck (2009) found that severity defeatist beliefs on the DPAS mediated the relationship between neurocognitive abilities and negative symptoms, as well as the relationship between neurocognitive abilities and subjective quality of life.

These results from Grant and Beck (2009) were only partially replicated in subsequent modeling studies. Using structural equation modeling (SEM) in consumers with schizophrenia or schizoaffective disorder (N=111), Horan et al. (2010) found that defeatist beliefs on the DPAS mediated the relationship between functional capacity and negative symptoms, but not the relationship between functional capacity and interviewer-rated real world functioning. In a global model with the best fit, Horan et al. (2010) found the link between defeatist attitudes and functioning was mediated by severity of negative symptoms. Using SEM in a large sample of individuals with schizophrenia or schizoaffective disorder (N=191), Green et al. (2012) also found that the link between defeatist attitudes and functioning was mediated by negative symptoms, and the model with the best fit was a single pathway model from visual information processing (backward masking), to social cognition abilities, to defeatist beliefs (DPAS), to experiential negative symptoms (amotivation/asociality), and finally to interviewer-rated functioning.

The present study attempted to replicate and extend prior modeling research on the role of defeatist attitudes as a mediator in the relationships between neurocognition and negative symptoms and functioning in schizophrenia in a large sample of consumers with schizophrenia or schizoaffective disorder (N=179). All models included only experiential negative symptoms, because prior research found stronger associations between defeatist attitudes and experiential, relative to expressive, negative symptoms (Couture et al., 2011; Green et al., 2012). All models tested were *a priori* models based on prior research. First, following the original models presented by Grant and Beck (2009), models were tested to examine whether defeatist attitudes (DPAS) mediated the relationships between neurocognition and negative symptoms and between neurocognition and functioning, using performance-based and self-report measures of functioning. Two global models were then tested. First, a dual-pathway model with two mediational paths between neurocognition and real-world functioning was tested: One well-replicated pathway from neurocognition to functional skill capacity to real-world functioning (Bowie, et al., 2006; Twamley et al., 2002), and a second pathway following the Beck model from neurocognition to defeatist attitudes to negative symptoms to real-world functioning. This dual-path model was compared with the single-path model reported by Green et al. (2012). Based on prior modeling research reviewed above, we hypothesized that defeatist attitudes would mediate the relationship between neurocognition and negative symptoms, but not the more objective functioning measures in this study, and that the link between defeatist attitudes and functioning would be mediated by experiential negative symptoms. We also predicted the single-path model would result in a better fit than the dual-path model, since Green et al. (2012) found that a similar single-path model could not be improved by adding additional paths.

2. Methods

2.1 Participants

This study was approved by the Human Research Protections Program of the University of California, San Diego, and written informed consent was obtained from all participants or their legal guardians. Participants were consumers (N= 179) with a diagnosis of

schizophrenia (N= 127) or schizoaffective disorder (N= 52) based on the Structured Clinical Interview for DSM-IV (SCID; First et al., 1994) and available record review, as determined by a Ph.D. level clinical psychologist. Participants were stable, community-dwelling outpatients. Acutely ill participants who could not participate in outpatient psychotherapy in the parent trial were excluded. The measures used in this study were collected during the baseline assessment in psychosocial clinical trials (Granholm et al., 2013; Granholm et al., submitted). Participants were at least 18 years old **(range= 18 – 78)** and were excluded for comorbid medical conditions or active current substance abuse that would interfere with assessments or participation in outpatient group therapy, non-fluent in English, or receiving cognitive-behavioral therapy in the past five years (N=39/495, or 7.8% of screened patients were excluded for prior CBT). Nearly all (97%) participants reported taking at least one antipsychotic medication, and 26% reported taking an antidepressant or mood stabilizer. Demographic and symptom characteristics of the sample are provided in Table 1. Written informed consent was obtained from all participants, or for persons under conservatorship (N=12; 6.7%), consent was obtained from participants and their conservator/legal guardian.

2.2 Measures

Negative Symptoms—Based on factor analytic studies (Blanchard & Cohen, 2006; Sayers et al., 1996) two factor scores were created from the Scale for Assessment of Negative Symptoms (SANS; Andreasen, 1984): Experiential Negative Symptoms (mean of Avolition/Apathy -Item 17- and Anhedonia/Asociality -Item 22- global scores) and Expressive Negative Symptoms (mean of Affective Flattening -Item 8- and Alogia -Item 13- global scores). These items are scored from 0 (not at all) to 5 (severe). The global score for Attention was dropped due the fact that attention is now considered to overlap with domains of neurocognition and thought disorder dimensions (Sayers et al., 1996; Blanchard & Cohen, 2006). Inter-rater reliability (ICC) was .83 for the SANS. Consistent with prior research (Couture et al., 2011; Green et al., 2012), we focused on Experiential Negative Symptoms in the models.

Defeatist Performance Attitudes—A subscale of the Dysfunctional Attitudes Scale (DAS; Weissman, 1978), the Defeatist Performance Attitude Scale (DPAS), was administered. The original DAS has shown good internal consistency in an adult population of .85 (Oliver & Baumgart, 1985), and good test-retest reliability of .84 over a 2 month period (Cane et al., 1986). The DPAS contains 15 items assessing an individual's tendency to overgeneralize from past failures to expected future failures (e.g. “If I fail partly, it is as bad as being a complete failure”, “People will probably think less of me if I make a mistake”, “If I ask a question, it makes me look inferior”). Scoring for these items is on a 7 point scale (1–7) with higher scores indicating greater severity of defeatist attitudes (range for DPAS total = 15–105).

Functional Capacity—A performance-based role play measure of social problem solving, the Maryland Assessment of Social Competence (MASC) (Sayers et al., 1995), was administered. The MASC consists of three 3-minute role play communication scenarios, during which the participant interacts with a live confederate. In two assertive communication scenes, a participant is asked to make a request of the confederate (e.g. ask

for a change of shift at work), and in the other scene, the participant attempts to initiate and maintain a conversation. A video recording of participant responses were coded by blinded raters on dimensions of verbal content, nonverbal communication behavior, and an overall effectiveness score that incorporates consideration of the other two ratings (scores range from 1–5 with lower scores indicating poorer functional capacity; inter-rater reliability (ICC) = .86). These three MASC scores were used as indicators for a latent variable of functional capacity.

Functioning—Self-reported functioning was assessed using the Independent Living Skills Survey (ILSS) (Wallace et al., 2000), which assesses functioning across ten domains over the past 30 days: *Personal Hygiene* (12 items), *Appearance and Care of Clothing* (9 items), *Care of Personal Possessions* (6 items on everyday household chores), *Food Preparation/ Storage* (7 items), *Health Maintenance* (7 items), *Money Management* (5 items), *Transportation* (5 items), *Leisure and Community* (12 items), *Job Seeking* (4 items), and *Job Maintenance* (3 items). The scale was administered in an interview format with the examiner reading items and making ratings. Each item is answered "yes" (the activity was performed) or "no" (the activity was not performed) (0 = "No," 1 = Yes") or "unable to demonstrate" (e.g. meals are prepared for the participant in an assisted-living facility). Available items rated "yes" or "no" in each domain were averaged and the mean of all available domains was used in the analyses (ILSS Total range = 0 – 1).

Neurocognition—The neuropsychological test battery included tests from the MATRICS Consensus Cognitive Battery (MCCB; Nuechterlein, et al., 2008), and the Delis-Kaplan Executive Functioning System (D-KEFS; Delis et al., 2001). Domain scores were created by averaging demographically-corrected T-scores according to the following tests and referenced normative data, and a global T-score was computed as the mean of all T-scores: 1) *Speed of Processing:* Trail Making Test A (Reitan & Wolfson, 1993) time to complete, and Brief Assessment of Cognition in Schizophrenia (BACS; Keefe et al., 2004) Symbol Coding total correct coding; 2) *Working Memory:* Wechsler Adult Intelligence Scale-III (WAIS-III; Wechsler, 1997a) Letter-Numbering Sequencing total number of correct items, and Wechsler Memory Scale-III (WMS-III; Wechsler, 1997b) Spatial Span total score for forward and backward conditions; 3) *Verbal Learning:* Hopkins Verbal Learning Test (HVLT; Brandt, 1991) total learning score; and 4) *Frontal/Executive:* D-KEFS Card Sorting (Delis et al., 2001) correct number of sorts, 20 Questions initial abstraction and total number of questions asked, Word Context number of consecutively correct responses, and BACS Letter Fluency (Keefe et al., 2004) total number of different words.

2.3 Statistical Analyses

Mediational analyses were conducted utilizing Structural Equation Modeling (SEM), according to procedures recommended by Shrout and Bolger (2002). Analyses were conducted using EQS version 6.1 (Bentler, 2005). Maximum likelihood estimation was used to analyze the data and the data were checked for multivariate normality. We evaluated the data for multivariate non-normality using Mardia's (1970, 1974) Normalized Coefficient. Based on the recommendation of Bentler (2005) we considered values of Mardia's Coefficient greater than 5.00 as indicative of multivariate non-normality. All models

demonstrated multivariate normality. The criteria to establish mediation were: 1) a significant relationship between the antecedent (e.g., neurocognition) and mediator (e.g., defeatist attitudes) variables, and 2) a significant relationship between the mediator (e.g., defeatist attitudes) and outcome (e.g., negative symptoms) variables (Cohen & Cohen, 1983; Allison, 1995; Shrout and Bolger, 2002). In the current study, it was expected that the direct pathway between neurocognition and negative symptoms might be weaker than found in some previous studies, due to the exclusion of the attention domain from the SANS. The procedures allow for testing of meditational models when the direct pathway may not be significant, because testing the direct relationship is not required to establish mediation (Shrout and Bolger, 2002).

Testing for mediation also typically involves comparing the goodness of fit of direct and indirect (mediational) models. A good-fitting model is generally considered one that produces a non-significant chi-square value. Unfortunately, the chi-squared statistic is highly influenced by sample size and can lead to rejecting good-fitting models with large samples (Ullman, 2001). Therefore, two fit indices are often included in the analysis of structural models and these fit statistics were emphasized in this study with a large sample. Acceptable levels of goodness of fit were established using cutoffs suggested in the literature (Bentler, 2007). The Comparative Fit Index (CFI) ranges from 0 to 1, with higher values indicating better fit, and a cut-off value of CFI>.90 has been proposed (Bentler, 1992). The Root Mean Square Error of Approximation (RMSEA) estimates the lack of fit in a given model compared to a completely saturated model, and values >.08 on the RMSEA indicate poor fit (Bentler, 1992). Additionally, to directly compare the goodness of fit of two mediational models, the Akaike's Information Criteria (AIC; Akaike, 1974), was used. This method is not used for hypothesis testing, but for ranking models, with a lower score indicating a better fitting model (Akaike, 1974); therefore, the magnitude of the quantitative difference is not interpreted.

3. Results

3.1 Correlations

Table 1 shows descriptive statistics for all variables included in the models, and correlations among these variables are shown in Table 2. Significant but modest relationships were found between defeatist attitudes (DPAS) and neurocognitive impairment (global T-score: r= −.190, p< .05), social competence on MASC effectiveness (r= −.199, p<.01), and experiential negative symptoms (r= .190, p< .05), but not for expressive negative symptoms (r= .131, p> .05). Importantly, the correlation between the hypothesized mediator (DPAS) and self-reported functioning (ILSS) was not significant (r= −.031, p> .05), so the indirect path between the mediator and the outcome, which is required to demonstrate mediation, cannot be significant in SEM.[1]

[1]For ILSS as outcome, the direct effect model fit the data well ($\chi 2$ [5, N= 179] = 5.94, p > .05; CFI = .995, RMSEA = .033), and the path from neurocognition to ILSS was significant (.16, p < .05). The meditational model also fit the data well ($\chi 2$ [8, N= 179] = 5.97, p > .05; CFI = 1.00 RMSEA = .000), and the path from neurocognition to DPAS was significant (−.210, P < .05), but the coefficient for indirect path between DPAS and ILSS, which is required for mediation, was not significant (−.012, p > .05).

3.2 Mediation Between Neurocognition and Negative Symptoms

The direct relationship between neurocognition and experiential negative symptoms is shown in Figure 1A. This model fit well (χ^2 [5, N= 179] = 7.78, p > .05; CFI = .985, RMSEA = .056), and all indicators for the latent variable (neurocognition) had significant moderate to high loadings. The direct pathway between neurocognition and negative symptoms (−.03) was not significant. The meditation model (see Figure 1B) that examined the role of defeatist performance beliefs showed improvement with respect to fit indices (χ^2 [8, N= 179] = 8.71, p > .05; CFI = .996, RMSEA = .022), and all latent variable indicators were significant with moderate to high loadings. The pathways between neurocognition and defeatist beliefs (−.24) and between defeatist beliefs and negative symptoms (.20) were significant. The standardized pathway between neurocognition and negative symptoms reduced from an already-weak −.03 to .02 in the mediation model.

3.3 Mediation Between Neurocognition and Functioning

As described above, the indirect path required for mediation between DPAS and ILSS was not significant[1], so the models for self-reported functioning are not shown. Figure 2 shows the SEM models for performance-based functioning. The model for the direct relationship between neurocognition and performance-based functioning (functional capacity) fit relatively well (χ^2 [13, N= 179] = 36.66, p < .05; CFI = .967, RMSEA = .101), and all indicators for the latent variables (neurocognition and functional capacity) were significant with moderate to high loadings (see Figure 2A). The direct pathway between neurocognition and functional capacity (.40) was significant.

The meditation model (see Figure 2B) that examined the role of defeatist performance beliefs showed poorer fit on one fit index and improved fit on the other (χ^2 [18, N= 179] = 44.06, p < .05; CFI = .964, RMSEA = .090). In addition, the pathway between defeatist performance beliefs and functional capacity (−.11), which is required for mediation, was not significant, and the pathway between neurocognition and functional capacity showed a minimal reduction from .40 to .38 and remained significant. Therefore, the meditation model did not fit better than the direct model.

3.4 Single vs. Dual Pathway Models

The models described above were consistent with prior modeling studies and suggested two mediational pathways between neurocognition and functioning, one through defeatist attitudes and negative symptoms that is consistent with the Beck model (Beck et al., 2009; Grant & Beck, 2009), and another well-replicated pathway through functional skill capacity (Bowie et al., 2006; Twamley et al., 2002) that is not associated with defeatist attitudes. This dual-pathway model (see Figure 3) fit well (χ^2 [31, N= 179] = 63.94, p < .05; CFI = .957, RMSEA = .077), and all indicators for the latent variables had significant moderate to high loadings.

A single-path model similar to the final best-fit models reported by Horan et al. (2010) and Green et al. (2012) was also examined (i.e., neurocognition → capacity/ability → defeatist beliefs → experiential negative symptoms → real world functioning). This single-path model fit well on the CFI index, but just exceeded recommended cutoffs (>.08) on the

RMSEA index (χ^2 [32, N= 179] = 72.56, $p < .05$; CFI = .946, RMSEA = .084), and all pathways were significant (neurocognition → MASC=.40; MASC → DPAS=−.20; DPAS → negative symptoms=.19; negative symptoms → ILSS=−.35).

To test whether this single-path model or the dual-path model shown in Figure 3 fit better, we compared differences in chi-squared values ($\Delta\chi^2 = 8.62$, $\Delta df = 1$, $p < .01$). The significant chi-squared difference indicates that the dual-path model with fewer degrees of freedom (and therefore more estimated parameters) fits significantly better than the one pathway model. Additionally, using Akaike's Information Criteria (AIC), the dual pathway model fit better than the single pathway model (1.941 versus 8.560, respectively).

4. Discussion

The present study examined whether dysfunctional attitudes mediated the relationships between neurocognition and negative symptoms and functioning in schizophrenia. Significant but modest associations were found between dysfunctional attitudes and neurocognition, experiential negative symptoms, and performance-based functioning (functional capacity), but not expressive negative symptoms or self-reported real world functioning. Furthermore, defeatist performance beliefs were found to mediate the relationship between neurocognition and experiential negative symptoms, but not the relationships between neurocognition and either performance-based or self-reported functioning. A final global model with the best fit was a dual-path model with two mediational paths between neurocognition and real-world functioning: One well-replicated pathway from neurocognition to functional skill capacity to real-world functioning, and a second pathway from neurocognition to defeatist attitudes to negative symptoms to real-world functioning.

The finding that defeatist attitudes mediated the relationship between neurocognition and experiential negative symptoms is consistent with previous research (Horan et al., 2010; Grant & Beck, 2009; Green et al., 2012). The finding that defeatist attitudes did not mediate the relationship between neurocognition and functioning is consistent with the findings of Horan and colleagues (2010), but not the findings of Grant and Beck (2009). These inconsistent findings might be related to the types of functioning measures used. Grant and Beck (2009) used a subjective quality of life measure, whereas the current study used both a performance-based social competence measure and a self-report measure of real world functioning behaviors. Similarly, Horan et al. (2010) used a more objective semi-structured interview measure of real world functioning. Dysfunctional attitudes may have a stronger association with subjective self-report measures of quality of life than with more objective functioning measures. It is important to note in this regard that, although the ILSS used in the present study is a self-report measure, the ILSS only queries whether or not specific everyday functioning behaviors were recently performed, and does not ask for subjective ratings about the quality of performance.

Contrary to the study hypothesis and the findings of Green et al. (2012), the results showed that the dual-path model presented in Figure 3, which includes two separate mediational pathways between neurocognition and real-world functioning, was a better fit than a single-

path model. One well-replicated pathway was found, in which greater severity of neurocognitive impairment was associated with poorer functional capacity, which was associated with poorer real-world functioning (Bowie, et al., 2006; Twamley et al., 2002). In a second pathway, neurocognitive impairment was associated with defeatist performance beliefs, which were associated with experiential negative symptoms, which were associated with poorer real world functioning. Consistent with the Beck model (Beck et al., 2009), this second pathway supports the hypothesis that dysfunctional attitudes play an important role in linking neurocognitive abilities to negative symptoms and, ultimately, functional outcome in schizophrenia. According to this model, poor neurocognitive abilities contribute to discouraging experiences that lead to development of defeatist attitudes, which are associated with decreased motivation and social disinterest, which interfere with effortful engagement in goal-directed functioning tasks.

These results may have implications for matching consumers to treatments based on whether problems are identified in functional skills or dysfunctional attitudes (or both). A single behavioral skills training intervention may be appropriate for some consumers with skills deficits, whereas a single cognitive intervention aimed at challenging defeatist attitudes may be sufficient for others with severe defeatist beliefs. The dual-path model is intuitively appealing from the perspective of a clinician who encounters some consumers who are motivated to work on social functioning goals, but lack adequate communication and everyday living skills needed to succeed, whereas other consumers have adequate skills, but are not motivated to try to use them, due to failure expectations. In addition, the dual-path model may suggest that incorporating cognitive therapy interventions that target dysfunctional attitudes into psychosocial treatment approaches may be more likely to lead to improvements in negative symptoms than behavioral skills training interventions, alone. Improvements in negative symptoms have been found in cognitive therapy interventions that target defeatist attitudes (Grant et al., 2012) and interventions that bundle cognitive therapy and social skills training interventions (Granholm et al., submitted). Importantly, a dual-path model theoretically does not preclude the possibility that a treatment aimed at basic neurocognitive abilities could improve both skills and attitudes and motivation downstream; ultimately, impacting functional outcome.

There are several important methodological differences between the present study and previous modeling research, which might explain discrepant findings. In addition to differences in the nature of functioning measures mentioned above, a comprehensive neuropsychological battery was used in the present study, unlike the Horan et al. (2010) study, which did not include neurocognition in the models, and the Green et al. (2012) study, which included only visual information processing (backward masking). A performance-based measure of social competence (MASC) was also used to measure functional capacity in the present study, whereas Green et al. (2012) and Horan et al. (2010) used the UCSD Performance-based Skills Assessment (UPSA), a measure of everyday living skills, like shopping, using public transportation, and paying bills (Patterson et al., 2001). The MASC was used in this study instead of a more general functional capacity measure, because the data for this study were collected as part of two clinical trials of an intervention focused on improving social functioning. Despite differences in the nature of functional capacities examined across studies, the consistent finding that functional capacity mediates the

relationship between neurocognition and real-world functioning (Bowie, et al., 2006; Twamley et al., 2002) was replicated in this study using the MASC. Of note, Green et al. (2012) dropped functional capacity (UPSA) from their final model and instead kept social cognition abilities for statistical reasons. While social cognition is thought of as a separate construct from functional capacity, the two constructs were highly correlated in their study.

This study had several limitations. As noted above, the choice of measures for each construct in the model might impact model fit and which model appears superior to other models. The sample in the present study was a convenience sample of participants who volunteered for a clinical trial of a 9-month psychosocial intervention targeting functioning in schizophrenia, which may have created a sampling bias that could impact the generalizability of the findings (e.g., to individuals less motivated to work on functioning goals). Finally, mediation was tested in a cross-sectional design. It was not possible to establish temporal precedence and determine causation. This has been the case for the studies that have looked at these models previously (Horan et al., 2010; Grant & Beck, 2009; Green et al., 2012), and this study offers additional support for these possible relationships. However, future work would be needed to replicate these findings with temporal precedence clearly established using longitudinal data.

Overall, the above results suggest that the attitudes or beliefs that people hold about their performance are viable treatment targets for cognitive therapy to improve negative symptoms and functioning in schizophrenia. The models supported in this study are consistent with the cognitive model of schizophrenia in which thoughts about failure experiences affect feelings and impact motivation and behaviors. By challenging and reducing defeatist performance beliefs in cognitive therapy, negative symptoms and functioning may improve in individuals with schizophrenia.

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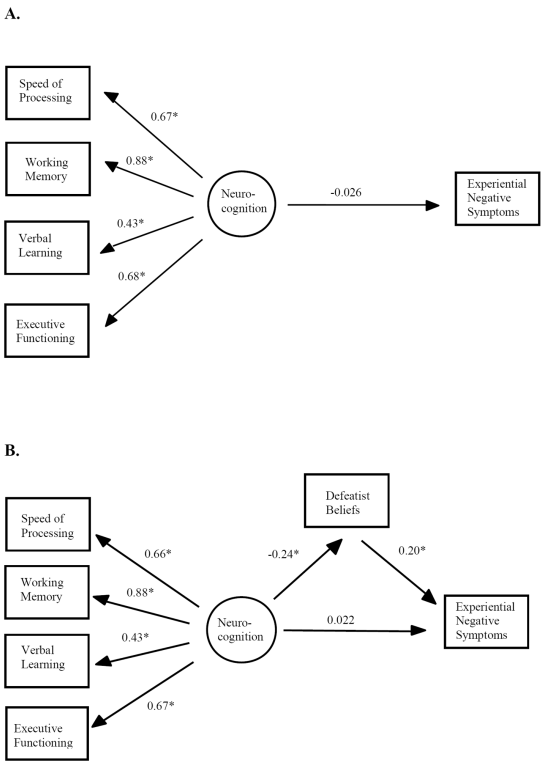

Figure 1.

Basic direct-path model between neurocognition and experiential negative symptoms (A), and mediation model (B) showing defeatist beliefs as a significant mediator of this relationship. Rectangles represent observed variables and circles represent latent variables. Standardized regression weights are shown for each path (*p<.05).

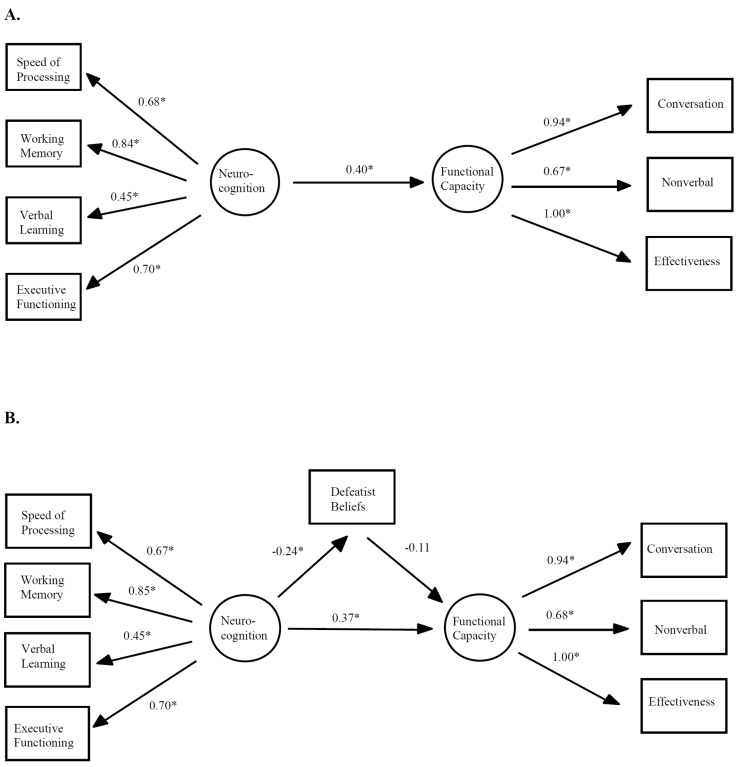

Figure 2.

Basic direct-path model between neurocognition and functional capacity (A), and mediation model (B) showing defeatist beliefs as a non-significant mediator of this relationship. Rectangles represent observed variables and circles represent latent variables. Standardized regression weights are shown for each path (*p<.05).

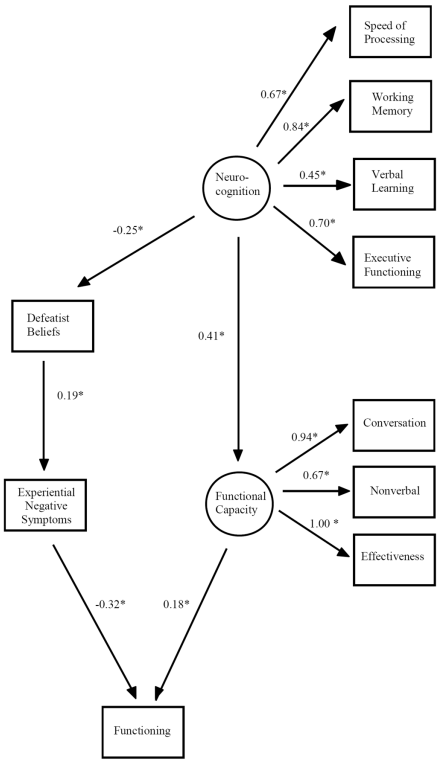

Figure 3.

Final full model showing dual mediational pathways between neurocognition and real world functioning: One pathway through defeatist attitudes and negative symptoms and one through functional capacity. Rectangles represent observed variables and circles represent latent variables. Standardized regression weights are shown for each path (*p<.05).

Table 1

Demographic Information and Descriptive Statistics

Variable	Mean(SD)
Age	46.4 (11.0)
Years of Education	12.3 (1.9)
Caucasian, %	59
Male, %	63
Assisted Living, %	65
Duration of Illness	20.9 (12.1)
PANSS Total	68.3 (18.8)
PANSS Positive	19.0 (6.5)
PANSS Negative	15.6 (6.1)
Expressive Negative Symptoms	3.4 (2.3)
Experiential Negative Symptoms	4.2 (2.3)
Defeatist Beliefe (DPAS)	52.2 (17.2)
Speed of Processing	35.8 (8.4)
Working Memory	39.6 (8.7)
Verbal Learning	28.6 (10.6)
Frontal/Executive Functioning	39.3 (8.5)
MASC Verbal	3.29 (1.08)
MASC Non-Verbal	3.32 (1.06)
MASC Effectiveness	3.33 (1.17)
ILSS	0.666 (.098)

Note: PANSS=Positive and Negative Syndrome Scale; DP AS = Defeatist Performance Attitude Scale; MASC=Maryland Assessment of Social Competence; ILSS=Independent Living Skills Scale.

Table 2

Correlations Among Measures Included in the Models

	DPAS	Expressive Negative	Experiential Negative	MASC Verbal	MASC Nonverbal	MASC Effectiveness	Speed of Processing	Working Memory	Verbal Learning	Frontal/ Executive
Expressive Negative	.131									
Experiential Negative	.190*	.488***								
MASC Verbal	−.155*	−.279***	−.147*							
MASC Nonverbal	−.227**	−.469**	−.220**	.548***						
MASC Effectiveness	−.199**	−.350***	−.167*	.937***	.670***					
Speed of Processing	−.116	−.239**	−.026	.302***	.173*	.290***				
Working Memory	−.215**	−.044	.009	.320***	.073	.284***	.597***			
Verbal Learning	−.148*	−.148*	−.148*	.274***	.162*	.264***	.275***	.359***		
Frontal/ Executive	−.170*	−.087	−.052	.358***	.176*	.339***	.426***	.592***	.358***	
Real World Functioning	−.031	−.176*	−.352***	.221**	.152*	.231**	.208**	.138	.097	.159*

Note: MASC=Maryland Assessment of Social Competence.

* p<.05;

** p<.01;

*** p<.001