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Further Support For the Role of Dysfunctional Attitudes in Models of Real-World Functioning in Schizophrenia

William P. Horan, Yuri Rassovsky, Robert S. Kern, Junghee Lee, Jonathan K. Wynn, and Michael F. Green

VA Greater Los Angeles Healthcare System, University of California, Los Angeles

Abstract

According to A.T. Beck and colleagues' cognitive formulation of poor functioning in schizophrenia, maladaptive cognitive appraisals play a key role in the expression and persistence of negative symptoms and associated real-world functioning deficits. They provided initial support for this model by showing that dysfunctional attitudes are elevated in schizophrenia and account for significant variance in negative symptoms and subjective quality of life. The current study used structural equation modeling to further evaluate the contribution of dysfunctional attitudes to outcome in schizophrenia. One hundred eleven outpatients and 67 healthy controls completed a dysfunctional attitudes scale, and patients completed a competence measure of functional capacity, clinical ratings of negative symptoms, and interview-based ratings of real-world functioning. Patients reported higher defeatist performance beliefs than controls and these were significantly related to lower functional capacity, higher negative symptoms, and worse community functioning. Consistent with Beck and colleagues' formulation, modeling analyses indicated a significant indirect pathway from functional capacity → dysfunctional attitudes → negative symptoms → real world functioning. These findings support the value of dysfunctional attitudes for understanding the determinants of outcome in schizophrenia and suggest that therapeutic interventions targeting these attitudes may facilitate functional recovery.

Keywords

schizophrenia; negative symptoms; dysfunctional attitudes; outcome; structural equation modeling; recovery

Introduction

There has recently been a fundamental shift in schizophrenia treatment research from psychotic symptom management to the considerably broader and more ambitious goal of "recovery" (Kern, Glynn, Horan, & Marder, 2009). Although it has been defined in several ways, recovery typically refers not only to remission of psychotic symptoms, but also achievement of productive, sustained functioning in independent living, vocational or educational activities, and satisfying interpersonal relationships (Liberman, Kopelowicz, Ventura, & Gutkind, 2002). To facilitate treatment development, much effort has been

Please address correspondence to: William P. Horan, Ph.D., VA Greater Los Angeles Healthcare System, UCLA Department of Psychiatry & Biobehavioral Sciences, 11301 Wilshire Blvd, Bldg 210A, Los Angeles, CA 90073, Tel: 310.478.3711, Ext. 44041, Fax: 310.268.4056, horan@ucla.edu.

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devoted to identifying key determinants of poor functioning that can be targeted through novel interventions. Among these factors, neurocognitive deficits and negative symptoms have received the strongest support as important correlates of functioning (Green, 2000; Kirkpatrick, Fenton, Carpenter, & Marder, 2006). However, the pathways through which these variables are ultimately linked to functioning are complex, and likely involve a host of intervening variables. A handful of recent studies have used statistical modeling approaches, such as structural equation modeling or path analysis, to delineate the complex interplay among factors that ultimately lead to poor functioning in the community (e.g., (Bowie, 2006; Sergi, 2006; Vauth, Rusch, Wirtz, & Corrigan, 2004). By testing theoretically-based models of outcome, investigators can gain insights into the mechanistic relations among the determinants of outcome, which can help guide treatment development efforts.

Although several models of outcome have been proposed (Bellack *et al.*, 2007), one useful heuristic broadly distinguishes among competence, performance, and intervening factors (Harvey, Velligan, & Bellack, 2007). Competence refers to what an individual *can do* or is capable of doing under optimal circumstances and comprises several sub-domains, including neurocognitive performance and capacity to perform everyday living and social activities on laboratory-based measures (i.e., “functional capacity”). Real-world performance, on the other hand, refers to what one *actually does* in daily life in the community. It is clear that competence does not fully predict performance in the community. For example, neurocognitive measures typically account for a moderate proportion of the variance in real-world functioning, with composite scores accounting for about 20–40% of the variance in outcome (Green, 2000). Functional capacity measures, while strongly related to neurocognitive measures, demonstrate much weaker and more variable relations with real world functioning, ranging from moderate to small and non-significant (Harvey *et al.*, 2007). To account for such discrepancies, multiple intervening factors such as motivation, willingness to take risks, and self-efficacy, as well as socio-environmental variables, including disability compensation policies and cultural factors, have been proposed. Clarification of these intervening variables may be particularly informative for treatment development, as they may be amenable to interventions that bridge the gap between competence and performance.

The cognitive therapy model

A promising recent development is Beck and colleagues’ cognitive formulation of poor functioning in schizophrenia (Beck, Rector, Stolar, & Grant, 2009; Rector, Beck, & Stolar, 2005). This model proposes that competence limitations do not – in and of themselves – directly contribute to poor real world functioning. Instead, the model proposes that competence and performance are only indirectly related through a causal pathway that involves multiple intervening variables, including cognitive and motivational factors. According to this model, neurocognitive deficits and related limitations in the capacity to perform daily activities contribute to discouraging life circumstances, such as difficulties performing at work or school, or engaging in conversations with family and friends. These discouraging experiences engender negative attitudes, self-beliefs, and expectancies. These attitudes, in turn, contribute to the decreased motivation, interest, and engagement in productive or enjoyable activities that manifest clinically as negative symptoms. For example, an affected individual may not initiate or persist in goal-directed behaviors (avolition) due to negative self-efficacy beliefs (“Nothing will ever work out for me”) or may withdraw (asociality) to avoid feeling overwhelmed or shamed due to negative interpersonal beliefs (“No one can understand me or care for me”). Ultimately, these negative expectancies and diminished levels of interest and motivation lead to poor real-world functioning. Thus, the model proposes an indirect pathway from functional capacity limitations → dysfunctional attitudes → negative symptoms → real-world outcome.

Only one published study, to our knowledge, has attempted to identify the determinants of outcome in schizophrenia using constructs from this model. Grant and Beck (Grant & Beck, 2009) found that schizophrenia patients differed from healthy controls on two subscales derived from the Dysfunctional Attitudes Scale (Weissman, 1978) (i.e. Defeatist Performance Beliefs and Dysfunctional Need for Acceptance). A path analysis indicated that defeatist beliefs partially mediated the relationship between neurocognition and negative symptoms. Also, a separate path analysis showed that dysfunctional beliefs partially mediated the association between neurocognition and quality of life. Although these findings provide encouraging initial evidence for the relevance of dysfunctional attitudes, the study had a relatively small sample that prevented the use of sophisticated modeling techniques. In addition, the functional outcome measure largely tapped aspects of subjective, intrapsychic functioning that are closely related to negative symptoms (anhedonia, motivation, empathy); high colinearity ($r = .81$) and shared content between the outcome and negative symptom measures precluded modeling their relations to dysfunctional attitudes simultaneously. Finally, incorporating measures of functional capacity could help test more comprehensive models of how dysfunctional attitudes contribute to poor outcome.

The current study

This study was designed to further test the contribution of dysfunctional attitudes to poor functioning by evaluating three research questions in a relatively large sample of outpatients with schizophrenia or schizoaffective disorder and healthy controls. First, we sought to replicate Grant and Beck's finding that patients report higher scores than healthy controls on the DAS subscales. Second, within the clinical sample, we used Structural Equation Modeling to simultaneously evaluate direct and indirect relations between dysfunctional attitudes, negative symptoms, and functional outcome within a single model. Based on Beck and colleagues' formulation, we predicted that negative symptoms would mediate the relation between dysfunctional attitudes and real-world functioning. Third, in line with the competence/performance framework, we predicted that a measure of functional capacity for daily activities, namely the UCSD Performance-based Skills Assessment (UPSA) (Patterson, Goldman, McKibbin, Hughs, & Jeste, 2001), would improve the model fit through a direct relationship to dysfunctional attitudes. Based on the literature (Harvey *et al.*, 2007), we did not make any predictions about direct relationships between the UPSA and both negative symptoms and real-world functioning.

Methods

Participants

111 patients were recruited from outpatient treatment clinics at the Veterans Affairs (VA) Greater Los Angeles Healthcare System and through presentations in the community. Patients met criteria for schizophrenia ($n = 97$) or schizoaffective disorder ($n = 12$) based on the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID; (First, Gibbon, Spitzer, & Williams, 1996)). 90 patients were receiving atypical antipsychotic medications, 8 were receiving typical antipsychotic medications, 6 were receiving both types of medication, and 5 were not taking an antipsychotic.

67 nonpatient control participants were recruited through newspaper and internet advertisements, and flyers posted in the local community. Control participants were screened with the SCID and SCID-II (First, Spitzer, Gibbon, Williams, & Benjamin, 1994) and were excluded if they met criteria for any lifetime psychotic disorder; bipolar mood disorder; recurrent depression; substance dependence; paranoid, schizotypal, or schizoid personality disorder; any evidence (according to participant report) of a history of psychotic disorder among their first-degree relatives. Additional exclusion criteria for both groups

included age less than 18 or over 60 years, active substance use disorder in the past 6 months, identifiable neurological disorder, mental retardation, history of loss of consciousness for more than one hour, or insufficient fluency in English. All participants had the capacity to give informed consent and provided written informed consent after all procedures were fully explained in accordance with procedures approved by the Institutional Review Boards at UCLA and the VA Greater Los Angeles Healthcare System.

Clinical Ratings

Scale for the Assessment of Negative Symptoms (SANS)—Negative symptoms during the preceding month were evaluated using the SANS (Andreasen, 1984). Four SANS global scales (excluding the Attention scale (Blanchard & Cohen, 2006)) were used: Affective flattening, Alogia, Anhedonia-Asociality, and Avolition-Apathy (total mean SANS score = 2.1 (SD = .92)).

Brief Psychiatric Rating Scale (BPRS)—For all patients, psychiatric symptoms during the previous month were rated using the expanded 24-item UCLA version of the BPRS (Lukoff, Nuechterlein, & Ventura, 1986; Overall & Gorham, 1962). Each item is rated on a scale ranging from 1 – 7. The current study used two of these subscales (Ventura, Nuechterlein, Subotnik, Gutkind, & Gilbert, 2000): Depression/Anxiety (M = 2.0; SD = .80; mean of anxiety, depression, suicidality, and guilt items) and Thought Disturbance (M = 2.3; SD = 1.07; mean of suspiciousness, hallucinations, unusual thought content, bizarre behavior, and disorientation items).

All SCID, SANS, and BPRS interviewers were trained through the Treatment Unit of the Department of Veterans Affairs VISN 22 Mental Illness Research, Education, and Clinical Center (MIRECC) based on established procedures (Ventura, Green, Shaner, & Liberman, 1993; Ventura, 1998). The process included formal didactics, achieving a minimum level of reliability using an extensive library of videotaped interviews as well as live, co-rated interviews conducted with faculty members. After certification, all raters participated in a continuous quality assurance program that involved periodic reliability checks and co-rated live interview with faculty.

Other measures

Dysfunctional Attitudes Scale (DAS)—Following Grant & Beck (2009), two subscales were derived from this self-report measure (Weissman, 1978). The defeatist performance belief subscale consists of 15 statements describing overgeneralized conclusions about one's ability to perform tasks (e.g., "If you cannot do something well, there is little point in doing it at all"). The dysfunctional need for acceptance subscale consists of 10 statements that exaggerate the importance of being accepted by other people (e.g., "I cannot be happy unless most people I know admire me"). Chronbach's alpha coefficient for defeatist beliefs was .88 for patients and .85 for controls, and for need for acceptance was .77 for patients and .71 controls.

Functional Capacity - UCSD Performance-based Skills Assessment (UPSA (Patterson et al., 2001))—The UPSA involves role-play tasks to assess five skill areas that are considered essential to functioning in the community: General Organization; Finance; Social/Communications; Transportation; and Household Chores. Inter-rater reliability of ratings are excellent (Patterson et al., 2001). The patients' mean UPSA summary score (possible rating = 0 – 100) = 73.3 (SD = 12.4).

Real-world functioning - Community Adjustment Form (CAF(Stein & Test, 1980))—The independent living skills, social functioning, and work functioning subscales

of the Role Functioning Scale (McPheeters, 1984). were used to assess functional status based on a comprehensive semi-structured interview (intraclass correlation coefficient of 0.80) (37). Each subscale includes anchored descriptions for seven levels of functioning that capture both the quantity and quality of the functioning in each domain (1 = severely impaired to 7 = no impairment). The patients' means and (SDs) for the subscales were: independent living = 4.4 (1.6), work = 2.6 (1.8), and social = 3.6 (2.0).

Data Analysis

For demographic and self-report trait data, group differences for continuous variables were evaluated with t-tests and for categorical variables with chi-square tests. Inspection of the main study variables indicated that their distributions were appropriate for parametric statistical tests. T-tests compared between-group differences on the DAS. Within the patient group, Pearson correlation coefficients were computed among dysfunctional attitudes, negative symptoms, functional outcome, and functional capacity measures.

The structural equation modeling (SEM) technique was then used to examine the models hypothesized to explain the relationships among the latent variables and indicators or measured variables. SEM is conceptually similar to a combination of confirmatory factor analysis and multiple regressions (Bentler, 1996; Ullman, 2001a). Concerning the factor analytic properties of SEM, constructs (identified as “unobserved” or “latent” variables in SEM) are estimated by a factor analysis of data from theoretically related measures (identified as “observed” or “indicator” variables). Factor loadings are used to specify the association between an indicator variable and a latent variable. Multiple regression equations are used to determine the relations between the latent variables. Each association reported between two latent variables is a path coefficient, typically reported in a standardized form. An important advantage of this approach is that it can be used to simultaneously examine the relationships among measured variables and their respective latent constructs, as well as the direct and indirect relationships among these constructs. In addition, by maximizing shared variance within and between latent variables, this technique offers a powerful way of detecting meaningful relations among latent variables, even in cases where zero-order correlations among individual variables are relatively small.

SEM analyses were conducted in two steps. First, we examined the hypothesis that negative symptoms mediate the relationship between dysfunctional attitudes and real-world functioning. Second, we evaluated whether an expanded model that incorporated a direct relation between the competence measure of functional capacity and dysfunctional attitudes significantly improved the model fit. The specific indicator and latent variables assessed in the current study are detailed in the following section. All analyses were conducted using the EQS Structural Equation Package (Bentler, 1996). A good fitting model is typically indicated by a non-significant chi-square. However, because the chi-square is very sensitive to sample size, it often rejects good-fitting models (Ullman, 2001b). Therefore, two additional fit indices were also included. One is the Comparative Fit Index (CFI), which employs the noncentral chi-square distribution and performs well even in small samples (Bentler, 1990). The CFI ranges from 0 to 1, with values above .90 typically indicate good fit (Hu and Bentler, 1999). The second index is the Root Mean Square Error of Approximation (RMSEA), which estimates the lack of fit in a model compared to a perfect or saturated model. RMSEA values below 0.1 typically indicate good model fit relative to the model degrees of freedom (Hu and Bentler, 1999).

Results

Demographic and clinical information

As shown in Table 1, patients and controls did not significantly differ in sex composition or parental education level. However, the patients were older and had lower education levels than controls. (This project attempted to match subjects on parental education, not personal education). Preliminary analyses within the patient group indicated that age did not significantly correlate with any other study variable, and that there were no significant differences between patients with schizophrenia vs. schizoaffective disorder (all p 's $> .05$). Among controls, age was not significantly related to defeatist beliefs, but was negatively related to need for approval ($r = -.28$, $p < .05$).

Between-group differences in dysfunctional attitudes

On the DAS, patients reported significantly higher scores than controls for both subscales (see Table 1). The magnitudes of the group differences were large for both defeatist beliefs ($d = 1.10$) and need for acceptance ($d = .97$). These between-group differences remained statistically significant with age included as a covariate (p 's $< .001$) and, among patients, there were no significant differences on the DAS subscales between those with schizophrenia versus schizoaffective disorder (p 's $> .05$).

Correlational analyses

Zero-order correlations among the main study variables within the patients group are presented in Table 2. Higher defeatist beliefs and need for acceptance significantly correlated with higher SANS total scores. Defeatist beliefs and need for acceptance were not significantly related to BPRS thought disturbance, though defeatist beliefs were related to higher depression/anxiety. Higher defeatist beliefs and need for acceptance also correlated with lower overall functioning on the RFS and functional capacity on the UPSA. It is noteworthy that functional capacity was not significantly correlated with either negative symptoms or community functioning, suggesting that this competence measure taps into a relatively distinct construct.

Supplemental analyses evaluated whether the significant correlates of defeatist beliefs and need for acceptance were accounted for by age or depression/anxiety ratings. In a series of partial correlations, all of the originally significant correlations remained significant after accounting for age and depression/anxiety. Overall, defeatist beliefs and need for acceptance were similar in terms of the pattern and generally small magnitude of correlations with the other study variables. Because defeatist beliefs provide a more direct assessment of dysfunctional attitudes as conceptualized in Beck and colleagues' theory (Beck et al., 2009; Rector et al., 2005), we elected to use the defeatist beliefs subscale as the indicator of "dysfunctional attitudes" in the following SEM analyses¹.

SEM analyses

Dysfunctional attitudes, negative symptoms, and real-world functioning—In these analyses, Dysfunctional Attitudes had a single indicator variable (defeatist beliefs subscale), Negative Symptoms had a single indicator variable (i.e., sum of the four SANS subscales), and the community functioning was a latent variable with three indicators (work,

¹Given that the pattern of correlates was similar for defeatist beliefs and need for acceptance (which were relatively strongly correlated with each other), we also ran the SEM analyses with both DAS subscales as indicators of a latent "dysfunctional attitudes" factor. The pattern of SEM results was virtually identical. Because defeatist beliefs provide a more direct assessment of the Beck and colleagues theoretical model, we report here only the first set of results.

independent living, and social subscales of the RFS). Basic and mediation models were estimated for these analyses.

The basic model examined the direct connection between dysfunctional attitudes and community functioning. The independence model, testing whether or not the observed data fit the expected data, was readily rejected, $\chi^2 (6, N = 111) = 60.7, p < 0.01$. (The chi-square for the independence model should always be significant, indicating that there is a relationship among the variables.) The indicators of real-world functioning had moderate-to-high loadings on the corresponding latent variable, and all were significant at the 0.05 level. The basic model provided a good fit for the data, $\chi^2 (2, N = 111) = 1.57, p = 0.46$, CFI = 0.99, RMSEA = 0.01. Importantly, the latent variable dysfunctional attitudes had a significant direct effect on community functioning (standardized coefficient = $-0.32, p < 0.05$).

In the mediation model, both the direct path from dysfunctional attitudes to community functioning and the indirect path through negative symptoms were evaluated. Evidence for mediation requires that an initially significant direct relationship between dysfunctional attitudes and community functioning is significantly decreased when negative symptoms is included in the model, or a significant indirect effect of dysfunctional attitudes on community functioning in the mediation model (Baron & Kenny, 1986; Mackinnon, Warsi, & Dwyer, 1995). The independence model was again rejected, $\chi^2 (10, N = 111) = 116.0, p < 0.01$. All indicators of real-world functioning were significantly related to the corresponding latent variable, and the mediation model provided a good fit for the data, $\chi^2 (4, N = 111) = 3.22, p = 0.52$, CFI = 0.99, RMSEA = 0.01 (see Figure 1). Negative symptoms were significantly predicted by dysfunctional attitudes (standardized coefficient = $0.29, p < 0.05$), as well as predictive of community functioning (standardized coefficient = $-0.70, p < 0.05$). The initially significant direct path from dysfunctional attitudes to functional status (standardized coefficient = $-0.32, p < .05$) was significantly reduced in the mediation model and was no longer significant (standardized coefficient = $-0.13, ns$). Additionally, the indirect path between dysfunctional attitudes and community functioning was significant (standardized coefficient for indirect effect = $-0.20, p < .05$). Thus, negative symptoms mediated the relationship between the predictor and outcome measures.

Expanded model including functional capacity

To examine whether an expanded model that incorporated a competence measure of functional capacity (UPSA) would significantly improve model fit, we conducted a chi-square difference test between two nested models. The expanded model included a direct connection from the UPSA to dysfunctional attitudes. This model was compared against the reduced model nested within the expanded model, with UPSA disconnected from any other variable (which is the same as not having UPSA in the model at all). The independence model was rejected, $\chi^2 (15, N = 111) = 127.7, p < 0.01$.

The expanded model, in which UPSA was connected to dysfunctional attitudes, offered a significant improvement in model fit as compared to the reduced model, $\chi^2_{\text{diff}} (1, N = 111) = 10.4, p < 0.01$. The direct path coefficients from UPSA to real-world functioning (standardized coefficient = $0.08, ns$) and from dysfunctional attitudes to real-world functioning (standardized coefficient = $-0.10, ns$) were not significant. However, the direct path coefficients were significant from UPSA to dysfunctional attitudes (standardized coefficient = $-0.30, p < 0.05$), from dysfunctional attitudes to SANS (standardized coefficient = $0.29, p < 0.05$), and from SANS to real-world functioning (standardized coefficient = $-0.74, p < 0.05$).

As shown in Figure 2, the final model (after removing the aforementioned two non-significant paths) provided a very good fit for the data, $\chi^2 (9, N = 111) = 6.33, p = 0.71$, CFI = 0.99, RMSEA = 0.01. Notably, the indirect paths from UPSA to 1) SANS (standardized coefficient = $-0.09, p < .05$) and to 2) real-world functioning (standardized coefficient for indirect effect = $0.07, p < 0.05$) were significant. Thus, although UPSA was not directly related to real-world functioning, there was a significant indirect pathway from UPSA to real-world functioning via the intervening variables of dysfunctional attitudes and SANS. Overall, UPSA, dysfunctional attitudes, and SANS accounted for 54% of the variance in real-world functioning

Discussion

This study further supports the contribution of dysfunctional attitudes to poor outcome in schizophrenia as proposed by Beck and colleagues' cognitive formulation. Patients reported substantial elevations of both defeatist beliefs and need for acceptance, reflecting strongly held maladaptive beliefs about their capacity to engage in productive activities and the importance of how they are perceived by others. Among patients, these attitudes were significantly related to variables that are more typically studied in models of outcome, including negative symptoms, real-world functioning, and functional capacity. Furthermore, modeling analyses were consistent with the notion that defeatist beliefs play a key intervening role in an indirect pathway from what one can do (competence) to what one actually does in the community (performance). These findings support the value of dysfunctional attitudes for understanding the determinants of outcome in schizophrenia and suggest that therapeutic interventions targeting these attitudes may facilitate functional recovery.

This study extends prior research by demonstrating that lower competence as defined by level of performance on the UPSA, a functional capacity measure that is strongly related to neurocognitive functioning (Harvey *et al.*, 2007), is associated with higher dysfunctional attitudes. This finding bolsters support for Beck and colleagues' model, which proposes that patients develop dysfunctional attitudes as a consequence of discouraging life experiences engendered by competence limitations. One interpretation of these findings is that the patients' high levels of defeatist beliefs reflect a "defeatist-realist" attitude that corresponds to the well-documented cognitive and functional capacity limitations associated with schizophrenia (Harvey *et al.*, 2007). However, recent evidence that many people with schizophrenia demonstrate substantial impairment on objective cognitive tests yet fail to report difficulties on self-evaluations of cognitive functioning appears at odds with this interpretation (e.g., (Medalia, Thysen, & Freilich, 2008)); such unrealistically positive self-evaluations would not be expected to lead to defeatism. Thus, consideration of other patient characteristics, such as insight into cognitive and functional capacity, may be needed to fully understand this relationship.

The SEM analyses provide the first direct support for the predicted relations among dysfunctional attitudes, negative symptoms, and real-world functioning in Beck and colleagues' model. The initial set of analyses indicated that negative symptoms mediate the relation between dysfunctional attitudes and functioning, consistent with the theory that dysfunctional attitudes contribute to lower levels of interest and motivation to engage in productive activities (as reflected by SANS ratings), which ultimately manifests in poor real-world functioning. This conceptualization fits well with theoretical models of the cognition-motivation interface, particularly the expectancy-value theory of motivation (Eccles & Wigfield, 2002), and the importance of motivational factors is increasingly recognized in schizophrenia (Barch, Yodkovik, Sypher-Locke, & Hanewinkel, 2008; Choi, Mogami, & Medalia, in press).

In an expanded model, the UPSA did not demonstrate a significant direct relation to real-world functioning. This result is consistent with the conceptualization of the UPSA as a functional competence measure of what one is capable of doing rather than a measure of actual real-world functioning (Harvey *et al.*, 2007). However, UPSA scores did demonstrate a significant indirect relation to functioning via the intervening variables of dysfunctional attitudes and negative symptoms. This suggests that dysfunctional attitudes are more proximally related to real-world functioning than competence limitations. Clinically, this implies that addressing dysfunctional attitudes will likely be important for optimal generalization of any benefits from basic skills training interventions. Although rehabilitation programs may help patients develop new skills, patients' willingness to actually apply these skills in daily life may be significantly limited by deeply engrained dysfunctional attitudes about their capacities and relationships. Indeed, a recent group-based psychosocial treatment study of people with schizophrenia demonstrated that improvements in a specific type of dysfunctional beliefs, namely social disinterest attitudes, were associated with better real-world functioning at the conclusion of treatment (Granholt, Been-Zeev, & Link, in press). Thus, addressing dysfunctional attitudes may facilitate generalization of newly acquired skills, which has historically been disappointing in psychosocial treatments for schizophrenia.

The current study built on Grant and Beck's initial study of dysfunctional attitudes by using larger samples, a more objective measure real-world functioning, a measure of functional capacity, and a more powerful statistical modeling approach. While generally consistent with their findings, the current results differed in two ways. First, whereas their study found a stronger pattern of correlations for defeatist beliefs than need for acceptance, the pattern and strength of correlations in this study were relatively comparable for both scales. Second, the magnitudes of the correlations in the current study were generally smaller. Our lower correlations with functional outcome may be attributable to the more objective outcome measure used in the current study. The discrepancy for negative symptoms is more challenging to explain as both studies used the SANS and evaluated chronically ill outpatients. This difference could partly reflect sample characteristics, as the patients in our study were generally older and were partially recruited through a Veterans Administration facility.

The current study should be interpreted in light of several limitations. First, all analyses are cross-sectional and therefore cannot establish any causal relations. Although the modeling analyses followed theoretically based predictions and converge with earlier empirical findings, alternative relations are logically possible (e.g., negative symptoms could lead to dysfunctional attitudes). Second, there are many different reasons why an individual may function poorly and the current study focused on only a subset of potentially relevant determinants. Including additional variables, such as neurocognitive and social cognitive functioning, insight, and broader socio-environmental factors, can provide a more comprehensive test of the role of dysfunctional attitudes, but will require larger sample sizes for SEM analyses. Third, this study examined medicated, chronically ill outpatients, many of whom had lengthy histories of inactivity and low productivity. It will be useful to evaluate whether these findings generalize to recent-onset and prodromal patients.

One potentially fruitful direction for future research is to develop new instruments to assess dysfunctional attitudes associated with negative symptoms and functioning in schizophrenia. According to the Beck and colleagues' formulation (Beck *et al.*, 2009; Rector *et al.*, 2005), specific negative symptoms are differentially associated with particular beliefs, expectancies, and social attitudes. The development of new measures based on this model could help maximize reliability and robustness of relations with alternative measures, improve measurement precision in model evaluation, and guide treatment development.

efforts. Models of outcome that incorporate variables grounded in cognitive therapy are particularly appealing because they may be amenable to intervention through well-established therapeutic principles. The current findings are consistent with recent recommendations that multimodal treatment approaches are needed to address the multiple determinants of poor real-world functioning (Kern *et al.*, 2009). A combination of social skills training to address basic social competence limitations plus CBT to address dysfunctional beliefs that undermine motivation to actually use newly developed skills may be particularly effective. Efforts to integrate these complementary approaches have already begun (e.g., (Granholm *et al.*, 2007)) and further development of interventions to address dysfunctional beliefs may help achieve the ambitious goal of functional recovery.

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Figure 1. Basic model of the relationship of dysfunctional attitudes and real-world functioning in schizophrenia and Mediation model showing negative symptoms as a mediator of the relationship ^a. ^aRectangles represent observed variables. Circles represent unobserved latent variables. Numbers on single-headed arrows indicate standardized regression weights. * $p < .05$, multiple regression analysis.

Figure 2.

Final expanded model incorporating functional capacity (non-significant paths are excluded)^a. ^aRectangles represent observed variables. Circles represent unobserved latent variables. Numbers on single-headed arrows indicate standardized regression weights. * $p < .05$, multiple regression analysis.

Table 1

Demographic, Clinical, and DAS data

	Patients	Controls	Statistic
Sex (% male)	76.1	67.2	$\chi^2 (1,178) = 1.69$
Age (SD)	45.8 (10.3)	38.0 (9.7)	$t(176) = 4.98^{***}$
Education (SD)	12.7 (1.6)	14.6 (1.6)	$t(176) = -7.77^{***}$
Parental education (SD)	14.7 (3.3)	14.2 (2.5)	$t(176) = .67$
Age of onset (SD)	21.6 (10.4)		
Dysfunctional Attitudes Scale			
Defeatist Beliefs (SD)	51.2 (18.0)	35.5 (13.1)	$t(176) = 6.19^{****}$
Need for Acceptance (SD)	30.7 (12.1)	25.1 (10.6)	$t(176) = 3.03^{***}$

Notes: Means are presented with accompanying *SD* s.

*
 $p < .05$;

**
 $p < .005$;

 $p < .001$

Correlations among Dysfunctional Attitudes, Negative Symptoms, Real-World Functioning, and Functional Capacity Within the Patient Group

Table 2

	1	2	3	4	5	6	7	8	9
1. DAS Defeatist Attitudes	--								
2. DAS Need for Acceptance	.63****	--							
3. SANS Total	.29**	.23*	--						
4. BPRS Thought disturbance	.11	.03	.05	--					
5. BPRS Depression/Anxiety	.22*	.13	.01	.44****	--				
6. RFS Total	-.27***	-.23*	-.60***	-.04	-.02				
7. RFS Work	-.22*	-.16	-.38****	.07	-.03	.73****	--		
8. RFS Independent Living	-.22*	-.30**	-.52****	.01	.05	.80****	.44****	--	
9. RFS Social	-.18	-.10	-.49****	-.13	-.05	.78****	.27**	.46****	--
10. UPSA Total	-.30***	-.21*	-.05	-.08	-.01	.16	.14	.11	.08