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Foresight in Schizophrenia: A Potentially Unique and Relevant Factor to Functional Disability

Shaun M. Eack^{1,2} and Matcheri S. Keshavan^{1,3,4}

¹Western Psychiatric Institute and Clinic, University of Pittsburgh School of Medicine

²School of Social Work, University of Pittsburgh

³Department of Psychiatry and Behavioral Neurosciences, Wayne State University School of Medicine

Abstract

Objective—The factors that contribute to functional disability in schizophrenia are only partially known and likely consist of an array of biopsychosocial constructs. This research sought to further elucidate the factors that conspire against functional recovery from schizophrenia by introducing the concept of foresight, and exploring its unique contribution to functional outcome.

Method—Patients in the early course of schizophrenia or schizoaffective disorder were studied over the course of one year as part of a clinical trial of Cognitive Enhancement Therapy. Fifty-eight patients were assessed using measures of foresight, functional disability, neurocognitive function, and psychopathology at baseline; and 49 were reassessed on the aforementioned domains 1 year follow-up.

Results—Patients displayed significant deficits in foresightfulness throughout the study period. Cross-sectionally, measures of foresight exhibited significant and moderate to large relationships with measures of functional disability at both baseline and 1 year follow-up. Longitudinal analyses revealed that baseline levels of foresight were significantly predictive of future functional disability, after adjusting for neurocognitive function, psychopathology, and treatment assignment.

Conclusions—This exploratory investigation suggests that foresight may be an important determinant of functional disability in schizophrenia. Therapies designed to target impairments in foresightfulness, such as Cognitive Enhancement Therapy, may facilitate functional recovery by addressing impairments in this domain.

Schizophrenia is a chronic and disabling mental disorder that is frequently characterized by severe social and functional disability (1). Although a substantial proportion of individuals with schizophrenia do experience a functional recovery from the disease after years of illness (2), many remain functionally disabled, particularly in the early phases of the disease (3). Furthermore, recent evidence has indicated that despite the introduction of atypical antipsychotic medications, functional outcome in schizophrenia has not substantially improved (4), leading many to search for the “glass ceiling” of functional impairment in the disorder (5). Research over the past several decades has highlighted the importance of psychopathology (particularly negative symptoms [6]) and neurocognitive dysfunction (7) as two of the most robust and consistent predictors of functional outcome. Such factors have been shown to contribute to poor community adjustment, diminished quality of social relationships, and inhibited social skill and vocational capacity in both cross-sectional and long-term longitudinal studies of patients at various stages of the illness (6, 7, 8).

⁴Address correspondence to Western Psychiatric Institute and Clinic, 3811 O’Hara St., Pittsburgh, PA 15213.

While studies have shown negative symptoms and neurocognitive dysfunction to be related to functional disability in schizophrenia, the actual contribution of these factors is not large, pointing to the importance of elucidating other key ingredients to functional outcome in the disorder. For example, a meta-analytic review by Green and colleagues (7) found that the average effect size of the relationship between neurocognitive ability and functional outcome in schizophrenia was $r = .28$ (range of $r = .20-.40$), and longitudinal studies have frequently revealed smaller effect sizes (8). As these authors have noted (7), there are clearly other factors involved in producing the severe functional deficits associated with schizophrenia.

One factor that has been largely overlooked in schizophrenia research on functional disability, but has been a centerpiece of effective psychosocial treatment development efforts for this population for over a decade (9,10), is the ability to think of the long-term consequences of one's behavior and use this information to guide present and future actions. This concept of *foresight* is an intuitively appealing dimension to the study of functional disability in schizophrenia, as a diminished capacity for recognizing the long-term consequences of one's behavior would seem likely to have a negative impact on interpersonal relationships in many different domains (e.g., home, work), thus constituting a broad contributor to functional outcome. Studies of other psychiatric populations have examined certain aspects of foresight, such as delay discounting (i.e., the degree to which smaller rewards at shorter delays are preferred over larger rewards at longer delays [11]) and found the concept to have significant utility in the prediction of clinical outcome (12). In addition, a recent study of persons with schizophrenia examined delay discounting and found that such individuals were more likely to choose immediate, smaller rewards than healthy controls (13), providing some evidence for the presence of a foresight deficit among this population. Consequently, the concept of foresight may hold promise as a key novel contributor to functional disability in schizophrenia. Unfortunately, studies have yet to examine the relationship between foresight capacity and functional outcome, to see whether this promising concept adds any predictive utility to functional disability beyond the leading predictors of functional outcome.

This research reports on the results of an opportunistic, exploratory longitudinal study of foresight among persons in the early course of schizophrenia, and its unique predictive utility to functional outcome using data from an ongoing clinical trial of Cognitive Enhancement Therapy.

Method

Participants

Participants consisted of 58 individuals in the early course of schizophrenia ($n = 38$, 66%) or schizoaffective disorder ($n = 20$, 34%) participating in an ongoing randomized-controlled trial of Cognitive Enhancement Therapy (CET) (14). Eligible participants included those diagnosed within the past 8 years, patients with an IQ ≥ 80 , and patients who had not been abusing substances within 2 months prior to study enrollment. Participants were young with an average age of 25.88 ± 6.27 years, primarily Caucasian ($n = 40$, 69%) or African American ($n = 11$, 19%), and over two-thirds were male ($n = 40$, 69%). Most participants had received some college education ($n = 39$, 67%), but few were employed ($n = 15$, 26%). Participants had been ill on average for 3.39 ± 2.65 years. Psychiatric diagnosis was confirmed by the Structured Clinical Interview for DSM-IV (15). In total 59 participants were recruited for this research, however only 58 had complete baseline data and only 49 participants were available for 1-year data analysis, due to patient attrition. All 58 participants with complete baseline data were included in this research, however follow-up analyses were restricted to the 49 participants with complete follow-up data. No significant differences were observed

between patients with complete 1-year data and those lost to attrition with regard to demographic characteristics, however those lost to attrition did display significantly greater levels of psychopathology at baseline, $F(1, 56) = 4.92, p < .05$.

Measures

Foresight was measured using 2 global assessment items included as part of 2 larger assessment batteries developed to assess social cognition in schizophrenia (16). These included the items, "Inability to assess long-term consequences (good and bad) of behavior; difficulty forming long range plans" and "Could see the future outcome of behavior; took a long view." Items were rated during the course of a clinical interview by clinicians who were intimately involved in the patient's treatment and had been trained to administer these measure by their original authors. Both foresight items were rated on a 5-point scale, with lower scores indicating poorer foresight, based on anchors of behavioral frequency, and averaged to compute a single foresight rating. We have previously documented adequate levels of inter-rater agreement (all $ICC > .77$, with no significant differences between raters) on the larger social-cognitive assessment batteries that these foresight measures are derived from (16). In addition, foresight items were moderately inter-correlated at baseline and year 1 (mean inter-item $r = .46$), suggesting that they both provided some shared and unique information with regard to foresight. Finally, the computed average measure of foresight was generally unrelated to psychopathology ($r = -.07$; see Table 1), cognitive ability ($r = .09$; see Table 1), and illness duration ($r = -.12$) at baseline, suggesting that our measure of foresight possessed some level of divergent validity from likely potential confounds.

Functional outcome was assessed using the Social Adjustment Scale-II (17), a widely used measure of social adjustment; the Performance Potential Inventory (16), a 55-item clinician-rated measure of functional disability based on the Social Security Administration's employability criteria (18); and the Global Assessment Scale (19). Items from these measures were scaled and combined to form a composite index of functional outcome, which displayed excellent internal consistency ($\alpha = .93$). Higher composite scores indicate better functioning. Neurocognition was assessed using a composite index employed in our previous work (16, 20) consisting of select measures from third version of the Wechsler Memory Scale (21), California Verbal Learning Test (22), Wisconsin Card Sorting Test (23), Trails B (24), and the revised Wechsler Adult Intelligence Scale (25). Higher composite scores indicate better neurocognitive ability. We found the reliability of this composite to be adequate ($\alpha = .88$). Finally, psychopathology was assessed using the Brief Psychiatric Rating Scale (26), which was found to display adequate internal consistency ($\alpha = .77$).

Procedures

Participants were recruited from Western Psychiatric Institute and Clinic in Pittsburgh and several nearby community clinics. Upon recruitment, participants were randomized to a trial of CET or an active control condition, which has been described in detail elsewhere (14, 27), and assessed yearly using a battery containing the aforementioned measures of foresight, functional outcome, neurocognition, and psychopathology. This study was approved and reviewed annually by the University of Pittsburgh Institutional Review Board, and all participants gave written, informed consent prior to participation.

Data Analysis

Descriptive and bivariate correlation analyses were used to characterized the level of foresight among participants, and examine the bivariate relationship between foresight, psychopathology, neurocognitive ability, and functional outcome. Hierarchical linear regression analyses were used to examine the unique contribution of foresight to functional

outcome, after first adjusting for psychopathology and neurocognitive ability. In addition, because this research was conducted within the context of a randomized-controlled trial, regression analyses of follow-up data adjusted for treatment assignment to account for the potential confounding effects of treatment on the constructs of interest.

Results

As can be seen by the means presented in Table 1, patients remained in the moderate to severe ranges of foresight impairment throughout the course of the study. Bivariate correlation analyses also presented in Table 1 indicated that greater foresight at both baseline and year 1 was significantly associated with better functional outcome, whereas no significant relationship was observed at any time point between foresight and neurocognition. Interestingly, while foresight was not related to psychopathology at baseline, a significant negative relationship was found at year 1. As expected, lower levels of psychopathology and greater neurocognitive ability were related to better functional outcome throughout the course of the study, although the relationship between neurocognitive ability and functional outcome at year 1 was attenuated and only marginally significant ($p = .13$).

Results from a series of hierarchical linear regression analyses examining the incremental predictive utility of foresight to functional outcome indicated that foresight continued to explain a significant proportion of the variance in functional outcome beyond psychopathology, neurocognition, and treatment assignment at both baseline, $\Delta R^2 = .10$, $\Delta F(1, 54) = 8.78$, $p = .01$, and year 1, $\Delta R^2 = .06$, $\Delta F(1, 44) = 7.09$, $p = .01$. Importantly, as can be seen in Figure 1, greater foresight at baseline also continued to significantly predict better functional outcome one year later, even after adjusting for psychopathology, neurocognitive ability, and treatment assignment, $\Delta R^2 = .07$, $\Delta F(1, 44) = 4.19$, $p = .05$.

Discussion

Elucidation of the factors that conspire against functional recovery from schizophrenia has become an important focus of schizophrenia research. To date, studies have pointed to psychopathology and cognitive dysfunction as two of the most robust contributors to functional disability in the disease (6, 7, 8), yet the magnitude of these relationships has indicated the importance of identifying other contributing factors to functional outcome. This study took the first step in exploring the unique predictive utility of foresight, a novel concept in schizophrenia research referring to one's ability to think of the long-term consequences of one's behavior and use this information to guide present and future actions, to functional outcome. Results indicated that persons with schizophrenia were impaired on global measures of foresightfulness, and that foresight was significantly predictive of future functional outcome, above and beyond the effects of psychopathology and neurocognitive ability. Such findings preliminarily point to the potential utility of this novel concept for understanding the barriers to a more complete functional recovery from schizophrenia, and lend some support to previous psychosocial treatments that have, in part targeted impairments in foresight (9, 10).

While these exploratory findings may point to a promising new area of investigation in schizophrenia research, this study is admittedly limited by its global measurement of foresight, a construct which contains a number of different domains, such as temporal myopia and delay of gratification, not all of which may be significant to persons with schizophrenia. In addition, although our measures of foresight demonstrate high degrees of face validity and adequate inter-rater reliability on the broader measures from which they were derived, as well as some level of internal consistency and divergence from likely

potential confounds, more rigorous psychometric investigation of these measures is needed before firm conclusions can be drawn from this research. Future studies will need to focus on the development and psychometric evaluation of expanded measures of foresightfulness that more broadly cover the domains of the concept, and investigate the relevance of these domains to persons with schizophrenia. The development of performance-based measures designed to more directly assess a person's foresight ability could be particularly useful, as neither interview-based nor behavioral measures can distinguish between the ability to be foresightful and the propensity to use this ability.

In addition to limitations in measurement, this research was also limited by an absence of a control group, which research precludes conclusions regarding the magnitude of impairment in foresight among persons with schizophrenia. This research was conducted with a group of young patients in the early course of the disease, whose impairment in foresight may either reflect a developmental arrest stemming from the onset of the illness, or may merely mirror the level of foresight encountered by most young individuals, regardless of disability. Some investigations of healthy individuals have conceptualized foresight as a cognitive skill that has been shown to develop with age (28), which might suggest that the foresight impairments seen in this research reflect a normal process of skill development. On the other hand, the magnitude of foresight impairment observed in this sample seems to indicate the likely possibility of a real deficit, even compared to healthy individuals of the same age, as the sample as a whole was rated as having poor foresight, particularly at baseline. Unfortunately, in the absence of an age-matched group of healthy control participants, the degree to which schizophrenia is characterized by a foresight deficit remains unclear. Consequently, it will be important for future research to investigate both the degree and specificity of foresight impairments among this population by making use of healthy and other psychiatric controls. A clear understanding of the magnitude of foresight impairments in schizophrenia could provide an impetus for the further development and dissemination of rehabilitation programs designed to improve foresight among this population.

Finally, this research is limited by its modest sample size, which may have precluded the detection of significant effects between foresight and neurocognitive ability. Studies employing larger sample sizes could provide further information regarding the cognitive correlates of foresight.

Conclusions

This first examination of the functional significance of foresight in schizophrenia indicates that persons with the disease may possess some impairments in foresightfulness, and that such impairments are significant predictors of future functional outcome, even after adjusting for psychopathology and neurocognitive ability. These findings point to foresight as a promising new domain for research on functional disability in schizophrenia that could bring us closer to understanding the factors that conspire against broader functional recovery from the disorder.

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Figure 1.
Prediction of 1 year functional outcome from baseline levels of foresight.

Table 1

Correlations Between Foresight, Functional Outcome, Psychopathology, and Cognition

Variable	1	2	3	4
1. Foresight	-	.37**	-.07	.09
2. Functional Outcome Composite	.62***	-	-.44***	.35**
3. BPRS Total	-.51***	-.75***	-	-.21
4. Neurocognitive Composite	.12	.22	-.21	-
Baseline Mean (SD)	2.17 (.51)	0.00 (1.00)	40.21 (9.82)	0.00 (1.00)
Year 1 Mean (SD)	2.86 (.70)	1.15 (1.13)	34.06 (9.33)	.22 (.83)

Note. Coefficients presented above the diagonal are at baseline ($N = 58$). Coefficients presented below the diagonal are at year 1 ($N = 49$).

BPRS = Brief Psychiatric Rating Scale

*
 $p < .05$,

**
 $p < .01$,

 $p < .001$