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Stability and change in symptoms, cognition, and community outcome in schizophrenia

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ABSTRACT

It has been well established that neurocognitive deficits are a core feature in schizophrenia and predict difficulties in functional independence. However, few studies have assessed the longitudinal stability of cognition and key aspects of functional outcome concurrently. Even less attention has been directed at the contingency of cognitive change on real world outcome changes. Accordingly, this study will assess the extent to which significant changes in cognition and community status are independent or related. As a point of comparison, the stability of clinical symptom status and the relationship between symptom and outcome change are evaluated. Symptoms, cognitive abilities, and community outcome was assessed in 128 patients with schizophrenia at baseline and again one year later. Intraclass correlation coefficients were used to index stability and reliable change index analyses quantified the prevalence of significant improvement or deterioration in each of the three illness features. Results from these analyses revealed that symptom status, cognitive functioning, and community outcome are similarly stable in treated schizophrenia outpatients. A small proportion of the sample demonstrated significant improvement or deterioration in these domains, with only weak evidence that such change was predicted by changes in symptoms or cognition. Further, there was no strong evidence of a preferential relationship for cognition relative to symptoms in relation to functional outcome. These results shed light on the strength and nature of the cognition-real world outcome relationship in schizophrenia and have implications for pharmacological and behavioral interventions aimed at improving real world outcome.

1. Introduction

Enhancing cognitive performance is a key research and treatment challenge and a promising route to improved community functioning for patients with schizophrenia. Relationships between cognition and functional outcome are well established (e.g., Green, 1996; Green et al., 2004). Links between the two are indexed by findings that cognitive performance accounts for up to 60% of the variance in real world outcome (Green et al., 2000), with some of the strongest correlations seen in older and/or institutionalized patients with significant cognitive impairment (e.g., Harvey et al., 1998). However, a recent meta-analysis of almost two decades of research revealed more modest findings, with cognitive measures accounting for 4% to 23% of functional outcome variance (Fett et al., 2011). The relationship between symptoms and functional outcome has also been studied (e.g., Bowie et al., 2008, 2010; Sabbag et al., 2012), with the most reliable correlations reported between negative symptoms and vocational functioning (Tsang et al., 2010; Erickson et al., 2011), and depression and everyday functioning impairments (Sabbag et al., 2012).

Nonetheless, whether cognitive performance determines, mediates, or merely correlates with functional outcome remains unresolved. Reviews and meta-analyses support a contingency between cognitive and functional change (Matza et al., 2006; Wykes et al., 2011). Yet this evidence is qualified by modest effects and reliance on composite cognitive scores often derived from measures not designed for schizophrenia patients. Additional limitations include unrepresentative patients (e.g. inpatients) and a lack of long term outcome data (i.e. >6 month follow-up). Finally, little is known about change contingencies in outpatient populations receiving "treatment as usual." This treatment may include case management, vocational and rehabilitation counseling, but not specialized cognitive remediation or related services.

Broadly speaking, both cognitive performance and symptoms are relatively stable over the course of schizophrenia, with some evidence of late-life cognitive decline in a minority (Kurtz, 2005). Less is known about medium-term (e.g., 1–2 year) stabilities and still less about functional status, although recent data suggest that poor long term recovery rates persist in schizophrenia (Jääskeläinen et al., 2012). Moreover, the stability of "real world" community outcomes is unclear, with most

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findings reflecting cross-sectional assessment points (Bromley and Brekke, 2010). Thus, it is not surprising that data on cognitive-outcome change contingencies are scarce, especially in terms of medium-term timeframes and representative populations. Arguably, however, understanding the frequency, strength, and persistence of these contingencies is necessary for informed research into specialized interventions aimed at both cognitive and community adjustment.

Accordingly, the present investigation addressed two key questions. First, how prevalent are changes in cognitive performance, symptoms, and community functioning over a one-year period in chronically ill schizophrenia outpatients not receiving specialized cognitive intervention services? Second, when change in cognition or symptom severity occurs, do changes in community functioning follow?

2. Materials and methods

2.1. Study participants

Community-dwelling patients with a DSM-IV diagnosis of schizophrenia or schizoaffective disorder were recruited from outpatient clinics in the Greater Toronto Area. These included Community Schizophrenia Service and Cleghorn Early Intervention in Psychosis Program (St. Joseph's Healthcare Hamilton), Hamilton Program for Schizophrenia, Canadian Mental Health Association (Toronto Branch), and Challenging Directions (Whitby Mental Health Centre). Exclusionary criteria included history of neurological or endocrine disorder, learning or developmental disability, older than age 65, and current DSM-IV diagnosis of substance abuse. These criteria yielded 128 patients who completed the study.

2.2. Measures

2.2.1. Diagnostic and symptom

Each participant was administered the Structured Clinical Interview for DSM-IV Axis I Disorder-Patient Version (First et al., 1996) to confirm a diagnosis of schizophrenia or schizoaffective disorder and the Positive and Negative Syndrome Scale (Kay et al., 2005), from which syndrome (positive, negative, general psychopathology) and cluster scores (anergia, thought disturbance, activation, paranoid belligerence, depression) were obtained.

2.2.2. Cognitive

Neuropsychological tests that represented the most commonly impaired cognitive domains in schizophrenia were administered. Specifically, four subtests were selected from the Wechsler Adult Intelligence Scale (WAIS-III; Wechsler, 1997). Vocabulary indexed verbal ability, matrix reasoning assessed perceptual reasoning skills, letter–number sequencing measured working memory, and symbol search indicated information processing speed. The California Verbal Learning Test, second edition (CVLT-II; Delis et al., 2000) assessed verbal learning and memory. The following indices were included: trials 1–5, short delay free recall, long delay free recall, and intrusions. The alternate form was used for follow-up assessments to circumvent practice effects. Oral fluency was assessed using the phonemic and semantic trials of the Controlled Oral Word Association Test (i.e., as adapted by Benton et al., 1994), with alternate stimuli used at follow-up.

2.2.3. Functional

Real world community functioning was assessed using the Multidimensional Scale of Independent Functioning (MSIF; Jaeger et al., 2003), which is a structured interview and self-report measure with verification of information provided by history, proxy reports, and informant interviews. Global functioning ratings are calculated for three environments (work, education/training/rehabilitation, residential) and for three domains (role position, support, performance). Role position assesses responsibilities that an individual has in their environment; support ratings reflect support required in order to perform specific role responsibilities; and performance indexes quality, timeliness, and reliability of specific tasks for which individuals are responsible in each domain. An overall global independent functioning rating is then calculated, reflecting role functioning in at least one environment while correcting for the degree of responsibility, support utilized, and actual performance across environments. The education domain was not included in these analyses (see Miles et al., 2011 for discussion). Functioning is rated on a scale ranging from normal performance (1) to complete dependence (7).

Inter-rater reliability of the MSIF, as shown by the developers using intraclass correlations ranged from .72 to 1.00 (Jaeger et al., 2003). High external validity was also reported with respect to correlations between individual subscale ratings and indicators of real world outcome (e.g., work role position and number of hours worked in the community). In the current study, the MSIF was administered by a research assistant or graduate student who was blind to the results of the cognitive testing. Inter-rater reliability ranged from .75 to .92, which approximates values indicated above.

2.3. Statistical analyses

Intraclass correlations (ICC) were calculated to indicate stability of symptom severity, cognitive performance, and community independence over one year. Paired samples *t*-tests provided corroborative evidence of score consistency. In order to examine the question of significant change over time, change scores were obtained using reliable change indices (RCI) with 90% confidence intervals (Eq. (1)). This provides the "theoretical distribution of a respondent's score distribution under the null hypothesis that no true change occurred" (Maassen, 2004, p.890). Practice effects (i.e., M_D) were included for the cognitive tests only.

$$90\%\ CI = (X_1 + M_D) \pm \left(1.645 \times SE_{diff}\right). \quad (1)$$

Lastly, multiple regression models were examined in which cognitive and symptom change variables were entered simultaneously into the model. Separate blocks of symptom and cognitive change variables were also used to determine if adding one set of predictors improved the prediction of outcome relative to the other predictor set alone.

3. Results

Demographic and clinical characteristic data are provided in Table 1. Information on test–retest performance for the symptom, cognitive, and community outcome data are provided in Tables 2, 3, and 4, respectively. There was no bivariate relationship between age and symptom, cognitive, or community outcome change scores. The mean test–retest window was 10.3 months ($SD = 1.68$). Participants showed levels of symptom

Table 1
Demographic characteristics.

Variable[a]	
Age, years[b]	41.45 (9.0)
High school graduate	91 (71%)
Sex (males)	82 (64%)
Employment status	
Full-time	9 (7%)
Part-time	58 (45%)
Volunteer	14 (11%)
Unemployed	44 (34%)
Student	3 (2%)
First language English	107 (84%)

Note. Sample size is 128 and data is based on information collected at baseline.

[a] Data presented as raw number of patients (percentage of sample) unless otherwise stated.

[b] Data presented as mean, standard deviation.