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Sensitivity and specificity of the UCSD Performance-based Skills Assessment (UPSA-B) for identifying functional milestones in schizophrenia

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ABSTRACT

Schizophrenia is a highly debilitating illness that often results in disruption to independent living and employment. However, "gold standard" methods of assessing functional abilities to achieve these milestones are still lacking. In a sample of 367 individuals with schizophrenia, we examined the sensitivity and specificity of the Brief UCSD Performance-based Skills Assessment (UPSA-B) to predict both residential and employment status. Of all individuals residing independently, 75.9% scored 78 or above on the UPSA-B, and of all individuals not residing independently, 59% scored below 78 on the UPSA-B. Of individuals who were employed, 73.9% scored above 82 on the UPSA-B, and of those not employed, 57.8% scored below 82. These results expand upon both the population base and functional milestones with which the UPSA-B is validated, although future work should examine whether the UPSA-B can be used as a decision aid in the likelihood of success in a longitudinal study, such as at critical transitions (post-hospitalization, cessation of supported housing).

1. Introduction

Schizophrenia is a highly debilitating illness that has a chronic course, and the high degree of disability adds greatly to its societal and treatment costs (Green, 1996; American Psychiatric Association, 2004). Functional deficits span a variety of areas of life-functioning including independent living, employment, and interpersonal skills (Liberman, 1982; Green, 1996; Green et al., 2000; Bowie et al., 2006).

Although functional limitations are notable aspects to the illness, "gold standard" methods of assessing functional abilities are still lacking. Over the years, methods of assessing functioning in patients with schizophrenia have varied from clinician assessments, direct observation, self-report, proxy report, and performance-based methods (Patterson and Mausbach, 2010). Of these methods, recent reviews have suggested that performance-based measures provide balance between ease of administration, reliability, and validity in relating to real world functional outcomes (Harvey et al., 2007; Mausbach et al., 2009). The UCSD Performance-based Skills Assessment (UPSA) has shown promise in terms of its ability to predict real-world functioning in middle-aged and older adults with schizophrenia. Specifically, the UPSA has demonstrated high correlations with measures of personal care skills, interpersonal skills, and community activities (Twamley et al., 2002; Bowie et al., 2006), was found to be most highly related to neuropsychological performance of an array of functional capacity measures(Green et al., 2011a), and has demonstrated ability to predict residential independence (Mausbach et al., 2008a). Yet, ease of administration for the UPSA is a limitation given its relatively large number of props, which may make it a difficult test to administer in field settings (Mausbach et al., 2008a).

In 2007, the UPSA-Brief (UPSA-B) was developed as an abbreviated alternative to the full version of the UPSA (Mausbach et al., 2007). The UPSA-B contains 2 of the original 5 subscales of the full UPSA (i.e., finance and communications subscales), which allows for shorter administration time (10–15 min) and reduced reliance on testing props. These changes make the UPSA-B significantly easier to administer in a variety of treatment and field settings. While relatively few studies have examined the validity of the UPSA-B, early data suggest it is equally suited to the full UPSA as a test for predicting ability to reside independently (Mausbach et al., 2007) and to participate in community responsibilities (Mausbach et al., 2008b). Two studies of the UPSA-B found substantial evidence for validity of the measure in Western European (Harvey et al., 2009) and Chinese (McIntosh et al., 2011) populations. Further, the UPSA-B was found to be substantially related to real-world functional ratings in a large-scale systematic study (Harvey et al., in press) and to be the most suitable short form for

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relationships to the MATRICS consensus cognitive battery (Green et al., 2001b). Specifically, we previously demonstrated that scores of 60 or above were most sensitive to identifying individuals residing independently in a sample of middle-aged and older adults with schizophrenia (Mausbach et al., 2007). However, this earlier study was not without limitations. First, the sample was limited by a relatively low base-rate of individuals residing independently in the community (i.e., <25%). Second, assessment of residential independence was limited to individuals residing completely independently or completely dependently. That is, participants who resided with others (i.e., family, friends, etc.) were excluded because investigators could not determine how much assistance they needed in day-to-day functional tasks. Third, the study did not assess other functional milestones such as employment status. Finally, the prior study was limited to middle-aged and older adults, thereby limiting the generalization of findings to younger patients who may be more likely to reside independently or seek or maintain employment. Evidence from studies using the full version of the UPSA indicates a strong relationship between this measure of functional competence and work skills (Bowie et al., 2006; Bowie et al., 2008). To date, however, the relationship between competence and work outcomes in the community has not been reported.

The purpose of this study is to examine the usefulness of the UPSA-B as a valid measure for assessing real-world functioning in a novel sample of patients with schizophrenia and with novel outcomes (i.e., employment status). In a sample of 367 individuals with schizophrenia or schizoaffective disorder representing a broad age range (21 to 78), we examined the degree to which the UPSA-B was able to predict both residential and employment status. Specifically, we utilized receiver operator characteristic curve analyses to determine the optimal cutoff for predicting residential independence and employment status. We hypothesized that the UPSA-B would be associated with acceptable sensitivity and specificity for both residential independence and employment milestones.

2. Methods

2.1. Participants

A total of 367 individuals with schizophrenia (including schizoaffective disorder) have participated thus far in this study of functional capacity and outcomes. These participants are part of a larger group which includes subjects with bipolar I disorder, all of whom had previously participated in genetic studies within the Epidemiology-Genetics Program in Psychiatry (Epigen) at the Johns Hopkins School of Medicine.

All genetics study participants were of full or mixed Ashkenazi Jewish (AJ) background, which was determined from ancestry of four grandparents. The restriction to AJ ancestry was made to take potential advantage of founder effects in this population (Bray et al., 2010). Participants were recruited nationally through advertisements in newspapers and Jewish publications, talks given at community centers and synagogues, and through the Epidemiology-Genetics Program website. Details of recruitment, assessment and consensus diagnostic procedures for the genetics studies are available in several publications (Fallin et al., 2003, 2004, 2005; Chen et al., 2009).

For the present functional capacity study, previous genetic study subjects were recontacted by letter and/or telephone to solicit their participation. Assessments were conducted at places chosen by the participants (for the most part, at their primary places of residence).

2.2. Measures

2.2.1. Functional outcomes

Participants were interviewed by research staff regarding their current living arrangement and were consequently coded by assessors into one of four residential statuses: a) head of household, independent (i.e., live alone or with others and have primary or co-equal financial and/or logistical responsibility for the household), b) head of household, semi-independent (bears only partial and not co-equal financial and/or logistical responsibility for the household, c) not head of household, but in community (i.e., living in a group home, or as a dependent in the home of their parents or children, etc.), and d) residential treatment facility (i.e., have a degree of community exposure but require residence in a treatment environment). For the purposes of our primary analyses, participants who were heads of household and either independent or semi-independent were classified as "independent", and those who were not heads of household or were residing in a treatment facility were classified as "not independent."

Similarly, assessors interviewed participants as to their current working status. From the interview three details regarding work status were determined: a) if they were currently working, b) if the work was 'sheltered', and c) the total number of hours per week they worked. From these data, participants were classified as either "working" or "not working", with working being defined as currently employed in a non-sheltered job for at least 20 h per week.

2.2.2. Functional capacity

Participants were administered the brief version of the UCSD Performance-based Skills Assessment (UPSA-B)(Mausbach et al., 2007). The UPSA-B assesses the participant's capacity to perform tasks similar to those encountered in daily life. Two domains are assessed on the UPSA-B: 1) *Financial skills*, in which participants are required to count change, make change from an item purchased at a store, and write a check for a utility bill, and 2) *Communication skills*, in which participants are asked to demonstrate how to use a telephone to dial emergency services, call information to ask for a telephone number, and call a physician to reschedule a medical appointment. For each domain, the total percent correct is calculated and converted to a standardized score ranging from 0 to 50. A summary score is then calculated by summing the two domain scores (range = 0–100), with higher scores indicating better functional capacity.

2.2.3. Clinical symptoms

All participants were administered the Positive and Negative Syndromes Scale (PANSS) (Kay et al., 1987). This 30 item scale assesses positive (7 items) and negative (7 items) symptoms of psychosis, as well as general symptoms of psychopathology (16 items), with a *PANSS total* score reflecting the sum of all 30 items. The research staff making this as well as all other assessments was psychologists who had also conducted many of the psychiatric direct assessment interviews in the original genetics studies.

2.2.4. Medications

Antipsychotic medication doses were converted to chlorpromazine equivalents using the formula provided by Andreasen et al.(2010).

2.3. Analyses

A series of Receiver Operating Characteristic (ROC) curves was plotted for the UPSA-Brief. The ROC curve shows the sensitivity versus one minus the specificity for every possible cutoff point; optimal cutoff points are determined by visually assessing which score combines maximum sensitivity and specificity. The area under curve (AUC) with 95% confidence intervals was used as an indicator of the ability of the UPSA-Brief to differentiate patients who were a) residing independently in the community vs those living with greater assistance, and b) those who were employed vs those who were not employed. Because residential independence and employment may occur simultaneously in some participants and independently in others, we also conducted a series of exploratory (secondary) analyses to determine the sensitivity and specificity of the UPSA-B for