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The Canadian Objective Assessment of Life Skills (COALS): A new measure of functional competence in schizophrenia

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ABSTRACT

This study examined the reliability and validity of a new performance-based measure of functional competence for individuals with serious mental illness, the Canadian Objective Assessment of Life Skills (COALS). The COALS assesses both routinized procedural knowledge routines (PKR) and executive operations (EXO) in order to capture functional outcome variance. The COALS was administered to 101 outpatients with schizophrenia and schizoaffective disorder and 80 non-psychiatric controls. One month later, 95 patients and 63 controls completed a follow-up assessment. Measures of psychopathology, neurocognition, functionality and community adjustment were also administered. Results indicated that the COALS summary scores had good test–retest reliability for patient data. Further, the COALS correlated with other measures of functionality and with negative symptoms, but was independent of positive symptoms, demonstrating concurrent and discriminant validity. The overall COALS summary score added incremental validity to the prediction of community independence over and above the contribution of symptoms, intellectual ability and neurocognitive performance. Inclusion of EXO scores provided incremental validity not available with PKR scores alone. The COALS increases the number of functional competence instruments and offers the advantage of specific validity while incorporating important distinctions in cognitive performance.

1. Introduction

Cognitive performance predicts and may mediate important aspects of functional outcome in the schizophrenia population (Matza et al., 2006). Hence, the need to enhance functional status and outcomes in people with serious mental illness has spurred a search for medications and behavioral interventions to improve impaired cognitive abilities. Performance-based measures of functionality have advanced the field by providing an objective, focused assessment of practical thinking and skills needed for key aspects of daily life (Harvey et al., 2007). However, the role-play scenarios and simulations used by these measures may not represent adequately the complexity of real-life situations as skill application in the real world is influenced by varied personal, social and environmental factors (Bromley and Brekke, 2010). Nonetheless, the practical cognition indexed by functional capacity measures may be a necessary prerequisite for effective performance in real-life situations, even though skill proficiency is no guarantee that such performance will actually occur (Gupta et al., 2012).

Two major challenges for functional capacity measures are (1) indexing cognitive skills and processes required by real-life situations in a sophisticated and sensitive way and, (2) demonstrating new or incremental validity relative to standard neurocognitive tasks. The most widely used functional capacity measure, the University of California San Diego Performance-Based Skills Assessment (UPSA; Patterson et al., 2001), provides a limited sample of the kinds of problem identification and initiation skills that may be adaptive in daily life. Hence, more recent instruments incorporate stimulus items that engage executive abilities required for effective functioning (Velligan et al., 2007). However, there is little evidence to confirm that functional capacity measures add new validity to the prediction of real world outcome, validity not already provided by standard neurocognitive tests (Heinrichs et al., 2010). There is a growing literature describing the success of functional capacity measures in terms of their psychometric properties (Green et al., 2011) and

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in predicting functional outcomes across subpopulations of psychotic patients (Cardenas et al., 2008; Gould et al., 2012) and different outcome indicators (Mausbach et al., 2008). Yet it remains unclear whether these measures capture the cognitive demands of real-life problem solving or yield new information not already available from standard neuropsychological tasks.

These considerations of construct and incremental validity prompted our lab to begin development of the Canadian Objective Assessment of Life Skills (COALS). We view functional competence as a psychological construct underpinned by neurocognitive mechanisms and systems and mediated by biosocial and broader sociocultural influences. Daily living skills are in part behavior sequences and transactions that achieve pragmatic goals such as food preparation, arrival at travel destinations and appointments or management of a medication regimen. These behavior sequences can be understood and described as *procedural knowledge routines (PKRs)* or "knowing how" to carry out an adaptive action and activity as well as in terms of *executive operations (EXOs)*, which reflect "knowing what to do and when to do it".

PKRs are basic cognitive and behavioral skills refined and structured for specific life tasks. For example, preparing a meal from a recipe requires reading comprehension and instruction-following praxis with domain-specific content related to cooking. In contrast, answering questions in an employment interview can require social cognition as well as working and episodic memory, comprehension and instruction-following with highly specialized content. Thus PKRs are poly-factorial and vary in terms of their component cognitive processes and in terms of the domain knowledge required for successful action.

However, supervisory control, decision-making and regulation are also required for adequate functional competence (Koren et al., 2006). Thus, preparing a meal from a recipe in real life may require more than a cluster of content-related PKRs. Successful food preparation may require the ability to determine if appropriate ingredients are at hand and, if not, the ability to provide a way of obtaining them. Moreover, time constraints and time regulation are often involved in meal preparation. Furthermore, real life may impose unanticipated complications or the need for adjustments to sudden situational changes as when, say, expected guests fail to arrive or additional and unexpected guests suddenly materialize. Without EXOs and component supervisory abilities in problem identification, initiation, solution and management, meal preparation may be unsuccessful despite the presence of relevant PKRs in the skill repertoire.

This study examines the reliability and validity of the COALS in a sample of patients with schizophrenia and in non-psychiatric control participants. We report statistics indexing test–retest reliability and correlations between COALS data and symptom severity, neurocognitive performance and community adjustment. Additionally, we test the incremental validity of COALS performance relative to symptom severity and standard cognitive data. Results will provide a preliminary indication of the value of this new instrument in the assessment of functionality.

2. Methods

2.1. Participants

The sample consisted of 101 patients (23 females, 78 males) who met diagnostic criteria for schizophrenia (79) or schizoaffective disorder (22) and 80 non-psychiatric controls (26 females, 54 males). The mean interval between index and follow-up assessment was 34.7 days (S.D.=9.92) and 95 patients (23 males, 72 females) and 63 non-psychiatric controls (22 females, 41 males) completed the follow-up assessment. Diagnosis was confirmed by the Structured Clinical Interview for DSM IV-TR Axis I Disorders, Research Version, Patient Edition (SCID-I/P; First et al., 2002). Patients were included if they met the following criteria: (1) age 18–65 years; (2) no history of developmental disability or serious neurological or endocrine disorder; (3) no concurrent DSM-IV diagnosis of substance abuse or substance dependence; and (4) willingness and ability to sign informed consent. Patients were recruited from outpatient settings in south central Ontario, Canada. Non-psychiatric controls were recruited by postings and advertisements for paid research participation in community newspapers and internet-based classified advertisements. Potential participants were screened for medical and psychiatric illness and history of substance abuse. All participants signed informed consent and were paid for their time. The project was approved by the Research Ethics Board at St. Joseph's Healthcare, Hamilton, and by the institutional review board at each research site.

2.2. Measures

2.2.1. COALS

The test items, content, and structure for the COALS were generated through focus groups and feedback sessions with clinicians including psychiatrists, psychologists, care coordinators/case managers, occupational therapists, and peer support workers. We also conducted a review and content analysis of existing instruments and used patient feedback and clinical observations during the administration of other functional outcome measures in previous studies conducted by our research lab (Heinrichs et al., 2006).

The COALS takes approximately 25 min to administer and is a structured role-play demonstration of skills in five domains relevant to independent functioning in the community: (1) Health and Hygiene, (2) Time Management, (3) Transportation, (4) Crisis Management and (5) Domestic Activities. In each of the domains participants are presented with situations and stimulus material and instructed to role-play tasks or respond to scenarios designed to test procedural knowledge routines (PKR) and executive operations (EXO) important for independent living.

(1) *Health and Hygiene Domain*: in the first section the participant is presented with two types of medications and a dosette and told that they will be going on a trip and must plan to take their medications with them. The task requires the participant to sort varied doses of medication (PKR) and problem-solve a situation wherein the medication supply is insufficient for their trip (EXO). In the second section the participant is presented with several medications indicating specific instructions (i.e., to be taken with food, should not operate a motor vehicle) and then asked a series of scenario questions to assess proper medication management (EXO). They are then asked to prioritize with appropriate explanations the purchasing of personal hygiene items for the coming week (EXO).
(2) *Time Management Domain*: a simulated phone message describing details for scheduling a job interview is presented to the participant. The participant is asked a series of questions regarding the details of the message (PKR). They are then instructed to find an appropriate interview time based on their scheduled activities as outlined in a week-long calendar that is presented to them (PKR). A problem situation arises in that possible appointment times and scheduled activities conflict. The participant must identify the problem, generate a solution and simulate leaving a phone message confirming their appointment with all of the relevant details (EXO).
(3) *Transportation Domain*: the participant is instructed to read a flyer detailing a Cultural Festival being held in the city, and is asked a series of questions regarding the details (PKR). They are then presented with a bus schedule and a route map, and asked to work through a series of problem-solving scenarios involving trips to several events occurring at varied times throughout the day (EXO).
(4) *Crisis Management Domain*: the participant is presented with a problem-solving scenario in which the lights in their home have just gone out. They are given the opportunity to propose responses to the situation (EXO). They are then presented with a simulated fuse box and accompanying instructions and a flashlight and are asked questions about the outlined procedure (PKR). The lights are turned off (with the participant's permission) and the participant is asked a series of questions to determine their response repertoire in dealing with the situation (EXO) and the steps needed to change the fuses (PKR).
(5) *Domestic Activities Domain*: this involves presenting the participant with two recipe cards, a life-size picture of pantry items, and instructions to work through a number of questions and scenarios (e.g., which recipe to make, which items needed to buy) as they plan an appropriate meal (PKR). They are then faced with a situation where they have to revise their plans to accommodate additional guests (EXO).

2.2.2. Psychopathology, neurocognitive and functionality measures

Symptom, cognitive, functional competence and real world outcome measures were administered to patient and non-psychiatric participants at index and 1-month follow-up. Current symptoms were evaluated with the Positive, Negative, and General Psychopathology subscales of the Positive and Negative Syndrome Scale (PANSS; Kay et al., 1999). Neurocognitive assessment included the MATRICS Consensus Cognitive Battery (MCCB; Nuechterlein et al., 2008) with the MCCB Composite score representing an overall measure of cognitive performance.