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Measuring motivation in schizophrenia: Is a general state of motivation necessary for task-specific motivation?

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Abstract

Despite the important role of motivation in rehabilitation and functional outcomes in schizophrenia, to date, there has been little emphasis on how motivation is assessed. This is important, since different measures may tap potentially discrete motivational constructs, which in turn may have very different associations to important outcomes. In the current study, we used baseline data from 71 schizophrenia spectrum outpatients enrolled in a rehabilitation program to examine the relationship between task-specific motivation, as measured by the Intrinsic Motivation Inventory (IMI), and a more general state of volition/initiation, as measured by the three item Quality of Life (QLS) motivation index. We also examined the relationship of these motivation measures to demographic, clinical and functional variables relevant to rehabilitation outcomes. The two motivation measures were not correlated, and participants with low general state motivation exhibited a full range of task-specific motivation. Only the QLS motivation index correlated with variables relevant to rehabilitation outcomes. The lack of associations between QLS motivation index and IMI subscales suggests that constructs tapped by these measures may be divergent in schizophrenia, and specifically that task-specific intrinsic motivation is not contingent on a general state of motivation. That is, even in individuals with a general low motivational state (i.e. amotivation), interventions aimed at increasing task-specific motivation may still be effective. Moreover, the pattern of interrelationships between the QLS motivation

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5.1 Contributors

Authors J.C., F.R., and J.M.F. designed the study. Author K.H.C. undertook and managed the statistical analyses and results section, and authors J.C., F.R., and J.M.F. wrote the draft of the manuscript. All authors contributed to and have approved the final manuscript.

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5.2 Conflict of interest

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index and variables relevant to psychosocial rehabilitation supports its use in treatment outcome studies.

Keywords

Motivation; psychosocial rehabilitation; intrinsic motivation; quality of life scale; schizophrenia

1. Introduction

In recent years, there has been increased interest in the role of motivation in schizophrenia (Barch, 2005; Velligan et al., 2006), and in particular, how motivation may mediate important relationships between negative symptoms and functioning and/or how motivation may predict the success of psychosocial rehabilitation (Nakagami et al., 2008). Motivation is a diverse and multidimensional construct, with different components of motivation having discrete theoretical underpinnings (Trémeau et al., 2013). When motivation is examined in the context of many schizophrenia studies, an assumption is often made that the variable being assessed is the symptom of amotivation. Researchers have only recently begun to separately examine intrinsic motivation (IM) versus a general state of motivation (SM) (K.H. Choi et al., 2012). IM and SM are categorically and theoretically distinct constructs. IM is based on intact hedonic systems and the perceived ability to do well on a particular activity, as well as the value and usefulness placed on that activity (Deci and Ryan, 1985; Ryan and Deci, 2000). IM is limited to the activity itself and therefore contingent on the specific characteristics of that activity and perceptions of competency to tackle the activity or participate in it (J. Choi et al., 2010a). On the other hand, SM, as its name implies, includes a multitude of varying motivations for diverse activities that creates an overarching state of impetus. SM is based on drive theory and deficits in this domain suggest a restricted sense of volition that impresses upon every segment of living, from social functioning, to work, to hygiene. IM has been shown to be responsive to manipulations made to the specific task or activity, and a target of intervention when modifying activity parameters to encourage greater engagement for that activity (Choi and Medalia, 2010). SM, on the other hand, may be more difficult to target since it is a broader, pervasive phenomenon and more in line with negative symptomatology and the deficit syndrome.

It is not clear if motivation for a specific activity is related to or contingent on a general state of motivation. Can someone be internally motivated to participate in a particular treatment activity even if they do not possess a general state of motivation? This would be worthwhile to know in terms of psychiatric rehabilitation--is it possible to motivate patients with schizophrenia for a specific activity in the absence of a general state of motivation? These distinctions between IM and SM emphasize the need to understand what type of motivation is being measured when attempting to improve treatment engagement and outcome in schizophrenia. Despite motivation's relationship to functioning, there has not been meaningful discussion about the need to evaluate the specific types of measures used and better understand potentially different motivational constructs tapped by discrete measures.

While a few studies specifically set out to assess motivation a priori and have included motivation-specific measures in their assessment batteries, many more studies do not contain specific motivational assessments. For this larger cohort of studies, some have assembled an index of motivation from the interview-based Quality of Life Scale (QLS; Heinrichs et al., 1984). Nakagami et al (2008) developed this method to gauge a general state of intrinsic motivation by summing pertinent intrapsychic deficit items from the QLS probing sense of purpose, motivation, and curiosity. The QLS index has been used in a number of schizophrenia studies (Nakagami et al., 2010, Vohs et al., 2013), and there is

some evidence that it may predict rehabilitation outcomes (Saperstein et al., 2011)(K.H. Choi et al., 2013). Other studies have used a self-report measure of motivation called the Intrinsic Motivation Inventory (Tas et al., 2012). The IMI (Deci et al., 1994; Markland and Hardy, 1997; Plant and Ryan, 1985) is based on the Self-determinism Theory (SDT) of motivation, the most widely accepted theory on human motivation (Ryan and Deci, 2000). SDT postulates that people with internal locus of control feel self-determined to follow through with a specific activity because they see their behavior as stemming from their own choices, values, and interests rather than being controlled by an external force. The IMI has been previously tailored for a wide range of activities in non-psychiatric (McAuley et al., 1989) and psychiatric samples, including schizophrenia (J. Choi et al., 2010b).

In the current cross-sectional study, we sought to compare the two different measures of motivation: a self-report measure aimed at assessing intrinsic motivation for specific tasks--the IMI--and the more general interview-based state index of intrinsic motivation derived from a subset of quality of life items mentioned above (QLS 3-item motivation index). We were particularly interested in exploring the relationship of these two constructs to each other, as well as their relationship to demographic, illness course, neurocognitive, and functional measures. The overarching questions we asked were: (a) What is the relationship between task-specific versus a general state of IM in schizophrenia? (b) Which is more strongly associated with factors relevant to psychosocial functioning? (c) Is a high degree of general state IM necessary to possess a high degree of IM for a specific task?

2. Method

2.1 Participants

Baseline data were obtained from 71 participants enrolled in an ongoing study of cognitive remediation. In order to qualify for the study, volunteers had to meet the following criteria: diagnosis of schizophrenia spectrum disorders, aged 18-65, outpatient status, no evidence of mental retardation, no evidence of traumatic brain injury or other neurological disorder, no evidence of substance abuse in past 30 days, and clinical stability as evidenced by no hospitalizations, no changes in medications, and no changes in housing in the past 30 days. Participants were recruited from community mental health and Veterans Administration Medical Center clinics. The study had been approved by local Institutional Review Boards.

2.2 Procedure

After providing written informed consent, all participants completed comprehensive baseline assessments, as detailed in the Measures section. Assessments were administered over multiple sessions, as needed, to reduce fatigue. DSM-IV diagnoses were based on Structured Clinical Interview for DSM-IV (SCID; First et al., 1996) administered by PhD-level staff. All clinical symptom interviews were performed by highly trained raters, with inter-rater reliability ranging from 0.75 to 0.99.

2.3 Measures

2.3.1 Cognition—Neurocognitive assessment included measures of verbal memory (Logical Memory I and II scales from the Wechsler Memory Scale-Revised, WMS-R; Wechsler, 1987), visual memory (delayed recall from the Rey Osterrieth Complex Figure Test, Rey-O; Osterrieth, 1944), attention and working memory (Digit Span subtest from the Wechsler Adult Intelligence Scale-Revised, WAIS-R; Wechsler, 1981), executive function (percent perseverative errors on the Wisconsin Card Sorting Test, WCST; Heaton, 1981), sustained attention (Continuous Performance Test, A/X; Loong, 1991), and IQ estimate (2 scale estimate from Wechsler Abbreviated Scale of Intelligence, WASI; Wechsler, 1999).

2.3.2 Symptoms—To assess current (past 30 days) symptomatology, we used the Positive and Negative Syndrome Scale (PANSS; Kay et al., 1987). Each of the 30 items is rated on a 7-point Likert scale, with total scores ranging from 30 to 120. For the current analyses we used the 5-factor solution (Bell et al., 1994), which consists of the following factors: positive, negative, cognitive, emotional discomfort, and hostility. Higher scores are indicative of greater pathology. Global self-esteem was measured using the 10-item, self-report Rosenberg Self-Esteem Scale (Rosenberg, 1965), with higher scores indicative of greater self-esteem.

2.3.3 Functioning—In addition to several work-related self-report variables (longest full-time job, months since last full-time job and hours worked in past month), functioning was assessed using the Independent Living Skills Survey, self-report version (ILSS-SR; Wallace et al, 2000), a comprehensive, performance-focused measure of community functioning developed for use with individuals with serious and persistent mental illness. Areas of functioning assessed by ILSS-SR include: appearance & clothing, personal hygiene, care of personal possessions, food preparation, health maintenance, money management, transportation, leisure and community, job seeking, and job maintenance. Additionally, two measures of functional capacity were administered: The UCSD Performance Based Skill Assessment (UPSA; Patterson et al., 2001a) and the Social Skills Performance Assessment (SSPA; Patterson et al., 2001b). The UPSA relies on standardized role-plays to assess performance on five types of tasks: planning and recreational activities, communication, transportation, finance, and household chores. The SSPA is a standardized measure of social competence, wherein examinees engage in two brief role-plays and are rated on various components of social skills, including social appropriateness, speech clarity/fluency, assertiveness, etc. For both types of functional measures, higher scores are indicative of better functioning.

2.3.4 Motivation—Two measures of motivation were used: Intrinsic Motivation Inventory (IMI; Plant and Ryan, 1985) and a 3-item motivation index derived from the Quality of Life scale (Heinrichs et al., 1984). The IMI is a 7-point Likert-type scale designed to assess a participant's subjective experience of an activity specifically in an experimental setting. Participants are asked to rate their interest/enjoyment, ability and effort as they pertain to a given activity (e.g. “I enjoyed doing this activity very much”), with higher scores indicative of greater IM for the task. For the current study, the IMI subscales “Interest”, “Competency”, and “Effort” were used, as well as the total IMI score. Participants completed the IMI in response to their involvement in the cognitive remediation program. The Quality of Life Scale is an interviewer-rated measure of functioning that can be further subdivided into four domains: interpersonal functioning; intrapsychic foundations, instrumental role function, and common objects and activities. An average of three items contained in the intrapsychic foundations subdomain (sense of purpose, motivation, and curiosity) was originally developed as an ad-hoc proxy measure purporting to assess a general state of intrinsic motivation (Nakagami et al., 2008), and has since been used by numerous research groups (Vohs et al., 2012; Yamada et al., 2010). The interviewer rates the patient from 0 to 6 on these three domains based on functioning in the previous month: Sense of purpose--realistic and integrated life goals (i.e. no plans or plans are bizarre; realistic short and long term plans); Motivation--able to initiate and sustain goal directed activity (i.e. lack of motivation interferes with daily activities; able to meet routine demands of life); Curiosity-- interested in surroundings and questions those things he does not understand (i.e. very little curiosity or interest in new topics or events; curiosity about a number of topics and some effort to learn more about them).

2.4 Data Analysis

Once data had been examined for meeting normality assumptions of parametric tests, SPSS 17.0 was used to perform a series of correlations. Bivariate correlations were calculated between IMI subscales and the QLS 3-item motivation index. Next, bivariate correlations were calculated between each of the motivation measures and demographic, illness course, neurocognitive and functional measures. Next, a medial split was done to more closely examine the pattern of interrelations between the QLS 3-item motivation index and IMI total. This allowed us to observe the range of IMI scores in the context of high or low QLS motivation to investigate whether a threshold level of general state motivation was necessary (i.e. necessary though not necessarily sufficient) for task-specific motivation.

3. Results

The majority of the sample was male given that we recruited from a Veterans hospital. Other demographics and clinical characteristics were consistent with previous outpatient schizophrenia studies (see Table 1).

The QLS 3-item motivation index was not significantly correlated with any of the three IMI subscales (see Table 2). As shown in Table 3, the QLS 3-item index was significantly correlated with several demographic, neurocognitive, symptom and functioning measures. On the other hand, none of the IMI subscales were related to demographic, neurocognitive, symptom or functioning measures, with the single exception of IMI Effort, which was positively correlated with age.

Interestingly, when we looked at whether high or low QLS motivation influenced IMI scores, we found that IMI scores showed a wide range of task-specific intrinsic motivation despite high or low QLS motivation. In a median split of QLS motivation below or equal to 11.0 (range 2 to 18), IMI scores ran the whole gamut of motivation from 57 (moderate IM) to 126 (high IM). This held true even when the median split of QLS was higher than 11.0 (high QLS motivation), as IMI scores ranged from 67 (moderate IM) to 124 (high IM).

4. Discussion

We attempted to clarify the relationship between activity-specific motivation versus a general state of motivation in schizophrenia. It was rather unexpected that we did not find *any* relationship between the two measures. Although theoretically distinct, we expected at least some degree of overlap or interplay between the two constructs. Although the QLS 3-item motivation index and the IMI assess unique characteristics of motivation, one would expect a general state of motivation to play some role in motivation for a specific activity. The observed lack of association between these motivation scales suggests that motivation may be a more heterogeneous construct in schizophrenia than initially believed. Moreover, these constructs may be divergent, i.e. a general state of motivation may not be necessary for activity-specific motivation. Indeed, we found patients to have a wide range of intrinsic motivation for the cognitive remediation activity including high intrinsic motivation for learning despite low levels of general state motivation. Intrinsic motivation did not seem contingent on general state motivation. This is important, since it suggests that someone with schizophrenia may be internally motivated to participate in a particular treatment activity regardless of his or her general motivational state. If we had found that low state motivation impinged on task-specific motivation, the unfortunate conclusion would have been that trying to increase IM by manipulating activity-specific features would only benefit a select group of patients--those with adequate general state motivation. The lack of association between these two measures, however, suggests that even in individuals with a

general low motivational state (i.e. amotivation), interventions aimed at increasing task-specific motivation may still be effective.

In terms of their relationships to psychosocial rehabilitation, the pattern of correlations between the QLS motivation index and variables relevant to psychosocial rehabilitation supports its use in schizophrenia. The QLS motivation index seems to be a more appropriate measure than the IMI for overall treatment outcome given its relationship to cognitive performance, negative symptomatology, social functioning, and real-world functional abilities—a relationship missing when the IMI was correlated to these same measures.

Similar to previous studies, the IMI subscales or total score were not related to negative symptoms (J. Choi et al., 2010b). We also did not find a relationship between IM and self-esteem, which is quite surprising given the established relationship between self-efficacy and intrinsic motivation in the non-psychiatric and schizophrenia literature (Deci and Ryan, 2008; Elliot and Dweck, 2005). A study caveat may explain this lack of association. We used an early original version of the IMI (Plant and Ryan, 1985), not the IMI for Schizophrenia Research (IMI-SR; J. Choi et al., 2010b), which contains a task usefulness/value subscale that is associated with self-efficacy for learning in schizophrenia (Eccles and Wigfield, 2002). The IMI-SR has been found to be helpful in gauging changes in intrinsic motivation and learning over time (Choi and Medalia, 2010), which we were not able to examine in this cross-sectional analysis. Longitudinal data on cognitive remediation outcome in this cohort, including behaviors related to motivation such as attendance and attrition, will better answer whether the original IMI has a role in predicting self-efficacy for treatment and overall treatment outcome. That being said, the core construct of IM, according to SDT which was used to develop the IMI and the IMI-SR, is the construct of inherent interest and enjoyment without external rewards, as measured by items on the Interest subscale. The items on the Interest subscale in both the IMI and IMI-SR are nearly identical, and so it would be fair to assume that the original IMI did tap into the core construct of IM.

Regarding the divergent findings between the QLS motivation index and the IMI, one must also consider how motivation was captured by the two instruments, how and why the QLS motivation index was created, and what it measures. Methodological variance between interviewer ratings of behavior related to functional capacity (QLS motivation index) compared to a self-report of interest and enjoyment for an activity (IMI) may explain some of the divergent findings between the two instruments. Perhaps more importantly, it is also worthwhile to consider the QLS motivation index itself. As we mentioned, it was developed by Nakagami et al. (2008) as a posthoc proxy measure of motivation, since there was no established barometer of IM available at that time. In hindsight, one can surmise that the QLS motivation index may be better classified as a measure of general motivation rather than intrinsic motivation. According to Self-determinism theory (SDT)--and other theories of motivation cited by Nakagami et al., IM is task or activity specific. IM varies widely depending on the activity and so IM is not considered a general state of being (you can't be intrinsically motivated for everything). We also argue that IM can only be assessed by self-report. In SDT, all measures of IM are self-report questionnaires because it is difficult to interview someone and objectively rate how much he or she enjoys or enjoyed an activity. Although the two items on the QLS motivation index--curiosity and a sense of purpose--may seem related to IM, the core of IM according to SDT is the construct of inherent interest and enjoyment without external rewards. Only the individual can actually report how much inherent pleasure he or she is experiencing or felt from an activity. The anchor behaviors rated by the interviewer in relation to curiosity and a sense of purpose on the QLS motivation index are behavioral consequences of IM rather than a measure of it. That being said, the *invaluable contribution* by Nakagami et al. was to empirically study the potential

link between personality and social theories on motivation and psychosocial rehabilitation for the first time. Since then, their paper has been at the center of this line of questioning and investigation in a number of studies on motivation and psychiatric recovery (K.H. Choi et al., 2013; Saperstein et al., 2011; Vohs et al., 2013).

Likely of much interest to the psychosocial rehabilitation field is how future studies will determine what type of motivation systems--intrinsic, state, trait, extrinsic, situation--predict rehabilitation potential (Trémeau et al., 2013). Future studies will need to continue to look at the possible overlap and disparity and psychometric properties of different motivation measures to guide the accurate assessment of motivation in treatment outcome trials, and develop and evaluate more measures for specific subdomains of motivation. Lastly, it is important to point out that the QLS motivation index was significantly associated with measures of functional capacity (i.e. UPSA), but we did not study this relationship in terms of actual functioning, such as that measured by The Specific Level of Function Scale (SLOF). If general state motivation is presumed to predict rehabilitation outcomes, this important relationship between motivation, performance-based functional capacity, and actual real world functioning will require further investigation (Bowie et al., 2007, 2008; Gupta et al., 2012).

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6. References

- Barch DM. The relationships among cognition, motivation, and emotion in schizophrenia: how much and how little we know. *Schizophrenia Bulletin*. 2005; 31(4):875–881. [PubMed: 16079388]
- Bell MD, Lysaker PH, Beam-Goulet JL, Milstein RM, Lindenmayer JP. Five component model of schizophrenia: Assessing the factorial invariance of the Positive and Negative Syndrome Scale. *Psychiatry Research*. 1994; 52:295–303. [PubMed: 7991723]
- Bowie CR, Twamley EW, Anderson H, Halpern B, Patterson TL, Harvey PD. Self-assessment of functional status in schizophrenia. *Journal of Psychiatric Research*. 2007; 41(12):1012–1018. [PubMed: 17014866]
- Bowie CR, Leung WW, Reichenberg A, McClure MM, Patterson TL, Heaton RK, Harvey PD. Predicting schizophrenia patients' real world behavior with specific neuropsychological and functional capacity measures. *Biological Psychiatry*. 2008; 63(5):505–511. [PubMed: 17662256]
- Choi J, Fiszdon JM, Medalia A. Expectancy-value theory in persistence of learning effects in schizophrenia: role of task value and perceived competency. *Schizophrenia Bulletin*. 2010a; 36(5): 957–965. [PubMed: 20634277]
- Choi J, Medalia A. Intrinsic motivation and learning in a schizophrenia spectrum sample. *Schizophrenia Research*. 2010; 118(1-3):12–19. [PubMed: 19716270]
- Choi J, Mogami T, Medalia A. Intrinsic Motivation Inventory (IMI): An adapted scale for schizophrenia research. *Schizophrenia Bulletin*. 2010b; 36(5):957–965.
- Choi KH, Saperstein AM, Medalia A. The relationship of trait to state motivation: The role of self-competency beliefs. *Schizophrenia research*. 2012; 139(1):73–77. [PubMed: 22627122]
- Choi KH, Fiszdon JM, Bell MD. Beyond cognition: a longitudinal investigation of the role of motivation during a vocational rehabilitation program. *Journal of Nervous and Mental Disease*. 2013; 201(3):173–178. [PubMed: 23417014]
- Deci, E.; Ryan, R. *Intrinsic motivation and self-determination in human behavior*. Springer; 1985.

- Deci EL, Eghrari H, Patrick BC, Leone DR. Facilitating internalization: the self-determination theory perspective. *Journal of Personality*. 1994; 62(1):119–142. [PubMed: 8169757]
- Deci EL, Ryan RM. Facilitating optimal motivation and psychological well-being across life's domains. *Canadian Psychology/Psychologie canadienne*. 2008; 49(1):14–23.
- Delis, DC.; Kramer, JH.; Kaplan, E.; Ober, BA. California Verbal Learning Test, Second Edition, Adult Version Manual. Psychological Corporation; San Antonio, TX.: 2000.
- Eccles JS, Wigfield A. Motivation beliefs, values, and goals. *Annual Review of Psychology*. 2002; 53(1):109–132.
- Elliot AJ, Dweck CS. Elliot, Andrew J.; Dweck, Carol S. Competence and Motivation: Competence as the Core of Achievement Motivation. 2005
- First, MBS.; Gibbon, M.; Williams, JB. Structured Clinical Interview for DSM-IV Axis I Disorders-- Patient Edition (SCID-I/P, Version 2.0). Biometrics Research Department, New York State Psychiatric Institute; New York: 1996. R.L.
- Gard DE, Fisher M, Garrett C, Genevsky A, Vinogradov S. Motivation and its relationship to neurocognition, social cognition, and functional outcome in schizophrenia. *Schizophrenia Research*. 2009; 115(1):74–81. [PubMed: 19783407]
- Gupta M, Bassett E, Iftene F, Bowie CR. Functional outcomes in schizophrenia: understanding the competence-performance discrepancy. *Journal of Psychiatric Research*. 2012; 46(2):205–211. [PubMed: 21944429]
- Heaton, R. The Wisconsin Card Sorting Test Manual. Psychological Assessment Resources, Inc.; Odessa, FL: 1981.
- Heinrichs DW, Hanlon TE, Carpenter WT Jr. The Quality of Life Scale: an instrument for rating the schizophrenic deficit syndrome. *Schizophrenia Bulletin*. 1984; 10(3):388–398. [PubMed: 6474101]
- Kay SR, Fiszbein A, Opler LA. The positive and negative syndrome scale (PANSS) for schizophrenia. *Schizophrenia Bulletin*. 1987; 13(2):261–276. [PubMed: 3616518]
- Loong, J. The Manual for the Continuous Performance Test. Wang Neuropsychological Laboratory; San Louis Obispo, CA: 1991.
- Markland D, Hardy L. On the factorial and construct validity of the Intrinsic Motivation Inventory: conceptual and operational concerns. *Research Quarterly for Exercise & Sport*. 1997; 68(1):20–32. [PubMed: 9094760]
- McAuley E, Duncan T, Tammen VV. Psychometric properties of the Intrinsic Motivation Inventory in a competitive sport setting: a confirmatory factor analysis. *Research Quarterly for Exercise & Sport*. 1989; 60(1):48–58. [PubMed: 2489825]
- Nakagami E, Hoe M, Brekke JS. The prospective relationships among intrinsic motivation, neurocognition, and psychosocial functioning in schizophrenia. *Schizophrenia Bulletin*. 2010; 35(6):935–948. [PubMed: 20462998]
- Nakagami E, Xie B, Hoe M, Brekke JS. Intrinsic motivation, neurocognition, and psychosocial functioning in schizophrenia: Testing mediator and moderator effects. *Schizophrenia Research*. 2008; 105:95–104. [PubMed: 18715756]
- Osterrieth PA. Le test de copie d'une figure complexe. *Archives de Psychologie*. 1944; 30:206–356.
- Patterson TL, Goldman S, McKibbin CL, Hughs T, Jeste DV. UCSD performance-based skills assessment: Development of a new measure of everyday functioning for severely mentally ill adults. *Schizophrenia Bulletin*. 2001a; 27:235–245. [PubMed: 11354591]
- Patterson TL, Moscona S, McKibbin CL, Davidson K, Jeste DV. Social skills performance assessment among older patients with schizophrenia. *Schizophrenia Research*. 2001b; 48(2-3):351–360. [PubMed: 11295387]
- Plant RW, Ryan RM. Intrinsic motivation and the effects of self-consciousness, self-awareness, and ego-involvement: An investigation of internally controlling styles. *Journal of Personality*. 1985; 53(3):435–449.
- Rosenberg, M. Society and the adolescent self-image. Princeton University Press; Princeton, NJ: 1965.
- Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*. 2000; 55(1):68–78. [PubMed: 11392867]

- Saperstein AM, Fiszdon JM, Bell MD. Intrinsic motivation as a predictor of work outcome after vocational rehabilitation in schizophrenia. *The Journal of nervous and mental disease*. 2011; 199(9):672–677. [PubMed: 21878781]
- Trémeau F, Goldman J, Antonius D, Javitt DC. Inpatients with schizophrenia report impaired situational motivation but intact global and social motivation. *Psychiatry Research*. 2013
- Velligan DI, Kern RS, Gold JM. Cognitive rehabilitation for schizophrenia and the putative role of motivation and expectancies. *Schizophrenia Bulletin*. 2006; 32(3):474–485. [PubMed: 16641424]
- Vohs JL, Lysaker PH, Nabors L. Associations of personality with intrinsic motivation in schizophrenia. *Psychiatry Research*. 2013; 208(1):78–80. [PubMed: 23566367]
- Wallace CJ, Liberman RP, Tauber R, Wallace J. The Independent Living Skills Survey: A comprehensive measure of the community functioning of severely and persistently mentally ill individuals. *Schizophrenia Bulletin*. 2000; 26:631–658. [PubMed: 10993403]
- Wechsler, D. Wechsler Abbreviated Scale of Intelligence (WASI) Manual. Psychological Corporation; San Antonio, TX: 1999.
- Yamada AM, Lee KK, Dinh TQ, Barrio C, Brekke JS. Intrinsic motivation as a mediator of relationships between symptoms and functioning among individuals with schizophrenia spectrum disorders in a diverse urban community. *Journal of Nervous and Mental Disease*. 2010; 198(1):28–34. [PubMed: 20061866]

Table 1

Demographic and clinical characteristics of the sample (n=71).

	Mean (or %)	SD
Age	47.99	9.38
Education (years)	12.48	1.93
Age at Onset	21.66	6.67
Number of Hospitalizations*	9.12	7.93
Chlorpromazine Equivalents	363.03	346.36
Gender, (% Male)	74.6	
Marital Status (n)		
Single (Never married)	64.8	
Married	12.7	
Divorced/Separated	21.1	
Widowed	1.4	
Diagnosis		
Schizophrenia	78.9	
Schizoaffective	15.5	
Other psychotic disorders	5.6	
Race		
African American	40.9	
Caucasian	50.7	
Hispanic	5.6	
Other	2.8	

* Outliers who had more than 40 psychiatric hospitalizations were excluded

Table 2

Correlations between Intrinsic Motivation Inventory (IMI) subscales and Quality of Life Scale (QLS) 3-item motivation index (n=71).

	IMI Interest	IMI Effort	IMI Competence	QLS Motivation
IMI Total	0.92 ***	0.71 ***	0.86 ***	-0.1
IMI Interest	1	.53 ***	.70 ***	-.11
IMI Effort	--	1	.38 **	-.10
IMI Competency	--	--		-.03
QLS Motivation	--	--		1

**
 $p < .01$.

 $p < .001$.

Table 3

Correlations between IMI subscales and QLS 3-item motivation index with demographic, neurocognitive, symptoms and functioning variables.

	IMI Total	IMI Interest	IMI Effort	IMI Competence	QLS Motivation
Demographic Variables					
Education	-.15	-.12	-.12	-.13	.35 **
Age	.18	.12	.34 **	.05	-.04
Age of Illness Onset	.09	.10	.24	-.08	-. .29 *
Number of Hospitalizations	.05	.05	.13	-.04	.06
Cognition					
WASIFS IQ	-.19	-.18	-.21	-.09	.24 *
WMS Logical Memory I	-.06	-.05	-.09	-.02	.34 **
WMS Logical Memory II	.07	.08	-.01	.09	.40 **
REY-0 Delayed Recall	.04	.05	.06	.00	.28 *
Trails A	-.07	-.03	-.19	.01	.09
Trails B	-.13	-.12	-.18	-.06	.09
Digit Span	-.06	-.01	.01	-.14	.18
CPT	.09	.01	-.22	-.07	.16
WCST % PE	-.08	-.12	-.08	.00	.32 **
Psychiatric Symptoms					
PANSS Positive	-.11	-.12	.01	-.12	-.16
PANSS Negative	-.09	-.09	-.12	-.02	-. .49 **
PANSS Cognitive	.15	.11	.09	.18	-. .47 **
PANSS Emotional	-.01	.00	-.09	.04	-.09
PANSS Hostility	.04	.00	-.08	.14	.05
Self-esteem					
Rosenberg	.19	.18	.09	.18	.01
Functioning					
Longest FT job (months)	-.02	-.06	.13	-.06	.05
Months since last FT job	-.04	-.03	-.12	.02	-.22
Work/volunteer hours past month	.11	.06	.20	.03	.01
ILSS Total	.00	-.01	-.11	.00	-.06
UPSA	-.08	.03	-.10	-.16	.36 **
SSPA	.02	.03	.01	.01	.28 *

*** $p < .001$.

*
 $p < .05$.

**
 $p < .01$.