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Confirmatory Factor Analysis of the Quality of Life Scale and New Proposed Factor Structure for the Quality of Life Scale-Revised

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The Quality of Life Scale (QLS) was developed over 30 years ago initially for the purpose of measuring the deficit syndrome (Heinrichs et al., 1984), a proposed subtype of schizophrenia characterized by persistent, primary negative symptoms (Carpenter et al., 1988; Kirkpatrick and Galderisi, 2008). The QLS is a semi-structured interview designed to assess four different areas of psychosocial adjustment, including Interpersonal Relations, Instrumental Role (e.g., work, school, homemaker), Intrapsychic Foundations (e.g., motivation, sense of purpose), and Common Objects and Activities (e.g., owning a watch, use of public transportation). Although the QLS was replaced by the Deficit Syndrome Scale as a measure of the deficit syndrome (Kimhy et al., 2006; Kirkpatrick et al., 1989), it has been widely used as a measure of psychosocial functioning in the intervening years since its publication (Bradley et al., 2006; Chou et al., 2012; Norman et al., 2000; Rabinowitz et al., 2012).

Numerous studies have supported the validity of the QLS as a measure of psychosocial functioning in schizophrenia and other severe mental illnesses (SMI) (Ascher-Svanum et al., 2013; Bellack et al., 1990; Faries et al., 2012; Thwin et al., 2013). Given the lack of a “gold standard” measure of psychosocial functioning in schizophrenia, the QLS has often been used in treatment studies. The QLS has enjoyed particularly widespread use in research on

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Conflict of Interest

None of the authors have any conflicts of interest to report.

Contributors

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the treatment of prodromal psychosis states (Kim et al., 2013; McFarlane et al., 2012) and people recovering from a first episode of psychosis (Baksheev et al., 2012; Grootens et al., 2011; McEvoy et al., 2007; Perkins et al., 2004; Robinson et al., 2010). Despite the popularity of the QLS as an outcome measure in schizophrenia research, the factor structure of the QLS has not been empirically evaluated. Examination of the underlying factor structure of an instrument can improve the precision of the measurement of the central domains, as well as lead to refinements in the instrument that further increase its validity and sensitivity to change. This article describes the evaluation of the factor structure of the QLS based on several study samples of people with schizophrenia-spectrum disorders and other severe mental illnesses.

Methods

The analyses were based on data from four de-identified treatment studies of people with schizophrenia and other severe mental illnesses. All of the studies received IRB approval from their corresponding institutions. For the purposes of the present study, two datasets were formed, in order to have a sufficient sample size to conduct confirmatory factor analysis, one based on three studies conducted at the Dartmouth Psychiatric Research Center and Center for Psychiatric Rehabilitation (Dataset #1, $N = 247$) and the other based on a large study that was conducted at the University of Calgary (Dataset #2, $N = 337$).

Dataset #1

Two of the three studies were two-site, randomized controlled trials evaluating a cognitive remediation program (Thinking Skills for Work) for persons enrolled in supported employment, with one site in Manchester, NH and the other site in Chicago, IL. The first study ($N = 107$) focused on people who had not benefitted from supported employment (McGurk et al., 2015), while the second study ($N = 93$), which is ongoing, is aimed at dismantling the critical components of the cognitive remediation program (McGurk, in progress). Inclusion/exclusion criteria for both studies were: 1) SMI according to States of NH or IL criteria; 2) unemployed and interested in competitive work; 3) enrolled in supported employment; 4) fluent in English; and 5) no evidence of traumatic brain injury or other medical condition with a major effect on brain functioning. An additional inclusion criterion for the first study was: participants had not benefitted from recent supported employment (i.e., had not worked competitively 3 months, or were fired or quit a job that lasted 3 months). Assessments used in these analyses included baseline, post-treatment (6–8 months later), and follow-ups 12–18 months and 24 months later.

The third study ($N = 47$) was an open pilot study of an individual adaptation of a group-based integrated psychosocial rehabilitation and healthcare intervention for older persons with severe mental illness (Mueser et al., 2010), conducted at two sites in NH. Inclusion/exclusion criteria for the study were: 1) SMI according to State of NH criteria; 2) age ≥ 50 ; 3) pervasive impairment across multiple areas of psychosocial functioning; 4) residing in the community; 5) no dementia or terminal illness with life expectancy ≤ 1 year; and 6) no cognitive impairment in moderate or worse range, as determined by Mini-Mental State

Examination score > 23 (Folstein et al., 1975). Assessments used in these analyses included baseline, post-treatment (approximately 12 months later), and a follow-up 3 months later.

For the purposes of analyses, assessments across the three studies were combined corresponding to four time periods: 1 (baseline), 2 (post-treatment), 3 (first follow-up), and 4 (second follow-up, Studies 1 and 2 only).

Dataset #2

This study ($N=337$) took place in Calgary, Canada, and included participants recovering from a first episode of psychosis who had been engaged in a specialty treatment program (Addington and Addington, 2001). Inclusion/exclusion criteria for the study were: first episode of non-affective psychosis of any duration; three months or less of prior acceptable treatment; fluent in English; and no history of neurological disorders, head injury, or epilepsy (Larsen et al., 1996). The baseline assessment was used in these analyses.

Measures

Psychiatric diagnoses were based on the Structured Clinical Interview for DSM-IV (First et al., 1996), administered by trained clinical interviewers. Diagnoses were based on information obtained from the interviews, supplemented by chart review and information from informants (usually family members) when available.

The Quality of Life Scale (QLS) (Heinrichs et al., 1984) is a 21-item interview-based assessment that evaluates the adequacy of an individual's psychosocial functioning over the past month on 7-point Likert scales, ranging from 0 (poor) to 6 (good). The items on the QLS are divided into four a priori defined constructs or subscales, including: *Interpersonal Relations* (8 items tapping quantity and quality of social relationships), *Instrumental Role* (4 items tapping occupational, school, or parental functioning), *Intrapsychic Foundations* (7 items tapping core capacities believed to underlie effective interpersonal and instrumental functioning, such as motivation, curiosity, and sense of purpose), and *Common Objects and Activities* (2 items tapping possession of objects, such as owning a watch, and engagement in regular activities, such as shopping for food, thought to reflect active participation in the community). Prior to evaluating study participants, all interviewers were trained on the QLS. Training included didactic presentations, directed reading, receiving feedback on QLS interviews, and rating and discussion of videotaped QLS interviews, with interviewers achieving ICC .80 agreement on QLS subscales.

For all four studies, the QLS was administered as part of a more extended evaluation of clinical and psychosocial functioning, including a measure of psychopathology, either the Brief Psychiatric Rating Scale (BPRS) (Lukoff et al., 1986; Overall and Gorham, 1962) or the Positive and Negative Syndrome Scale (PANSS) (Kay et al., 1987). Raters were instructed to include information obtained from the entire interview when rating each of the instruments.

Statistical Analysis

Our general statistical approach was based on one we previously developed to evaluate the factor structure of the BPRS in two samples of persons with schizophrenia-spectrum disorders (Mueser et al., 1997). In that study, we used one dataset to examine the fit of previously proposed factor structures to the data using confirmatory factor analysis (CFA), to then conduct exploratory factor analyses (EFA) when a poor fit was found, and then to use CFA to evaluate and refine the fit of the new factor structure. In the second step we conducted several EFAs on different subsamples of the first dataset, varying with respect to gender and diagnosis, in order to identify a factor structure that would be maximally reliable across different dimensions of client heterogeneity. This new factor structure was then evaluated with CFA on the independent second dataset.

Similarly, in this study we first used CFA to evaluate whether the Time 1 QLS ratings from Dataset #1 fit the four-factor model described by Heinrichs et al. (1984). When this model was found to fit the data poorly, we conducted an EFA on the same data to identify an alternative factor structure, using maximum likelihood estimation and direct oblimin rotation for the final solution. Scree plots and communalities were examined to identify a more parsimonious solution, which was then replicated with EFAs across Times 2–4 on Dataset #1. We then performed CFAs on all four assessment points for Dataset #1 to evaluate the robustness of the factor solution over time. This model was then evaluated with CFA using the independent Dataset #2. All CFAs were conducted with AMOS version 21.0.0.

Model goodness of fit was evaluated using several indices, including the model χ^2 test, the normed fit index (NFI), the Tucker-Lewis index (TLI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA). The model χ^2 test compares the proposed factor structure to the null model with significant p values indicating inadequate model fit. However, the model χ^2 test is strongly influenced by sample size, and because of the relatively large sample size of both datasets we deemphasized the importance of this index relative to the other four indices in evaluating the adequacy of model fit. We considered good indicators of fit to be NFI, TLI, and CFI > .95, and RMSEA < .06 (Brown, 2006; Hu and Bentler, 1995; Raykov, 2005).

Results

Item #12 (Work Satisfaction) was discarded in the analysis because it is rated as “not relevant” for individuals who are not working and most study participants (over than 70%) were unemployed. The means and standard deviations for the remaining 20 QLS items for Dataset #1, Times 1, 2, 3, and 4, and Dataset #2, organized according to the four factor model proposed by Heinrichs et al. (1984) are shown in Table 2.

Confirmatory Factor Analysis (CFA) of the Original Four-Factor Structure of the QLS

Heinrichs et al proposed a 4-factor structure for the QLS when they introduced the measure (Heinrichs et al., 1984), including Interpersonal Relations, Instrumental Role, Intrapsychic Foundations, and Common Objects and Activities. To evaluate whether this model adequately fit the collected data, a CFA was performed on the 247 participants at Time 1 for

Dataset #1. Although the model met a final solution, the results of the CFA showed poor fit: null model, $\chi^2(230, N=247) = 852.9$; tested model, $\chi^2(158, N=247) = 289.6$, $p < .000$, NFI = .86, TLI = .82, CFI = .83, RMSEA = .08. Many of the modification indices suggested the model did not adequately fit the collected data.

Exploratory Factor Analyses (EFAs) of the QLS

In order to identify a more parsimonious factor structure of the QLS, we conducted an EFA on the Time 1 data from Dataset #1, followed up by conducting three EFAs on Times 2–4. The scree plot was ambiguous with respect to the number of factors to extract, and thus we extracted three-, four-, and five-factor solutions. The three-factor solution was identified as the best solution. The four-factor solution was discarded because one factor included only one item. The five-factor solution was also rejected because many of the items were cross-loaded in the different factors. Because of low communalities on items 1 (Household relationships; .179), 8 (Sociosexual functioning; .102), and 18 (Commonplace objects; .049), these items were dropped. In addition, item 16 (Anhedonia) was dropped when it was found to load inconsistently on different factors in the EFAs conducted on all four time points. The final rotated factor solution and inter-factor correlations for the QLS-Revised (QLS-R) Dataset #1 Time 1 EFA are presented in Table 3.

Confirmatory Factor Analyses (CFAs) of the QLS-R

The three-factor structure of the 16-item QLS-R, based on the EFAs described above, was estimated using a CFA with Dataset #1, Time 1. The CFA model was found to be parsimonious, but nevertheless did not adequately fit the data, $\chi^2(152, N=247) = 675.9$; tested model, $\chi^2(101, N=247) = 227.0$, $p < .000$, NFI = .87, TLI = .90, CFI = .92, RMSEA = .07. Modification indices were examined, and several items were found to have significant shared error variance, including: Items 2 (Friends) and 5 (Social network); Items 3 (Acquaintances) and 4 (Social activity); Items 6 (Social initiative) and 7 (Withdrawal); Items 13 (Sense of purpose) and 15 (Curiosity); Items 14 (Motivation) and 15 (Curiosity); Items 19 (Commonplace activities) and 21 (Emotional interaction); and Items 20 (Empathy) and 21 (Emotional interaction). We explored whether any of these pairs of items were so highly correlated that one could be dropped from the scale by computing Pearson correlations for Dataset #1 Time 1 and Dataset #2. The correlations ranged between $r=.39$ for items 19–21 (Dataset #2; $r=.58$ for Dataset #1) and $r=.87$ for items 6–7 (Dataset #1; $r=.80$ for Dataset #1), with a median $r=.71$, suggesting that no item was so redundant with another item that it could be dropped. As the shared error variance between all of these pairs of items was conceptually consistent with the domain assessed, a final model was re-specified to free these correlated errors, which was found to fit the data moderately well: null model, $\chi^2(152, N=247) = 675.9$; tested model, $\chi^2(94, N=247) = 161.8$, $p < .000$, NFI = .91, TLI = .95, CFI = .96, RMSEA = .04.

Next, this model was estimated using Times 2–4 of Dataset #1. Inspection of modification indices indicated a similar pattern for these assessment points at Time 1, and thus the model was fit freeing correlated errors among these pairs of items (see Table 4). Although the model fit was not ideal, we concluded that the three-factor structure of the QLS-R provided

the best fit for Dataset #1. We suggest the alternative name of “*Motivation*” for the *Intrapsychic Foundations* factor, as elaborated in the discussion.

Cross-Validation of the Modified QLS

Last, the three-factor structure of the QLS-R was estimated using Dataset #2. In order to match the factor structures tested between the two datasets, we freed the same correlated errors as in Dataset #1. The model was found to fit the data adequately: null model, $\chi^2(152, N=337) = 2016.4$; tested model, $\chi^2(94, N=337) = 228.5$, $p < .000$, NFI = .95, TLI = .96, CFI = .97, RMSEA = .05.

Discussion

The original four-factor structure for the QLS (Heinrichs et al., 1984), including *Interpersonal Relations*, *Instrumental Role*, *Intrapsychic Foundations*, and *Common Objects and Activities*, was evaluated with a confirmatory factor analysis (CFA) and found to be a poor fit for Dataset #1. However, subsequent exploratory factor analyses (EFAs) with the same dataset led to the identification of a more parsimonious three factor solution based on 16 of the original 21 QLS items (the QLS-Revised: QLS-R). The three factors of the QLS-R were quite similar to the first three factors of the four factors originally proposed for the QLS. A series of CFAs to evaluate the factor structure of this 16-item QLS-R indicated that the three factor model fit those data well. Finally, the three factor solution for the QLS-R was independently cross-validated using CFA on Dataset #2, and found to be a good fit as well. The findings provide robust support for the three factor structure of the QLS-R.

Most of the items on the original QLS *Interpersonal Relations* factor loaded on the same factor in the three factor solution of the QLS-R, with two exceptions (#1: Household relationships; #8: Sociosexual relations), which were dropped because of low communalities. The remaining six items on the scale tap an individual’s general disposition towards actively seeking out friends and acquaintances, beyond the social environment in which the person lives. In contrast, the two dropped items evaluate how well the person gets along with others with whom they live such as family members, including the satisfaction and quality of their intimate relationships. The findings are consistent with other measures of social functioning in schizophrenia and other severe mental illnesses, such as the Social Adjustment Scale (Mueser et al., 2001; Schooler et al., 1979; Weissman and Bothwell, 1976), which suggest the importance of distinguishing social drive from the quality of close personal relationships.

As with the *Interpersonal Relations* factor, both the *Instrumental Role* and *Intrapsychic Foundations* factors of the QLS-R structure were quite similar to those factors on the QLS proposed by Heinrichs et al. After dropping Subjective satisfaction with role functioning (item #12), the remaining three items on the instrumental role factor were the same as the Heinrich’s solution. For the *Intrapsychic Foundations / Motivation* factor, only one item in the QLS factor structure was dropped for the QLS-R due to inconsistent loadings across different exploratory factor analyses (Anhedonia, #16), and one additional item from the original *Common Objects and Activities* factor was included in this factor (*Common activities*, #19).

The Intrapyschic Foundations / Motivation factor on the QLS-R taps a set of personal qualities reflecting interest in and engagement with the environment, including Sense of purpose (and its opposite, Aimless inactivity), Curiosity, Motivation, Empathy, Emotional interaction, and involvement in Commonplace activities. Heinrichs et al. (1984) posited that intrapsychic foundations were “were the building blocks from which interpersonal and instrumental role functioning are derived” (p. 390), and argued that impairments in these areas were close to the core of deficit symptoms of schizophrenia (Carpenter et al., 1988). Consistent with the hypothesized importance of these capacities, in the CFAs for Datasets #1 and #2 (Tables 3 and 4) the Intrapyschic Foundations / Motivation factor was significantly correlated with both the Interpersonal Relations (.40, .53, respectively) and Instrumental Role factors (.41, .65, respectively), while those two factors were less strongly correlated with each other (.21, .37, respectively).

The term “intrapyschic foundations” is unfamiliar to most mental health professions and is rarely used in the field outside of discussion of the QLS. For this reason we propose *Motivation* as an alternative name for this factor, as it is more familiar concept to clinicians and researchers in the mental health field, and has particular relevance to schizophrenia. In the CFA of the cross-validation sample, Motivation (item #12) was the item most strongly associated with the Intrapyschic Foundations / Motivation factor ($r^2 = .70$) among seven items on this factor, followed by Sense of purpose (item #13; $r^2 = .58$), Curiosity (item #15; $r^2 = .51$), and Aimless inactivity (item #17; $r^2 = .40$).

In addition to the argument that “motivation” is a suitable alternative term to describe the items included on this subscale, it is useful to consider the importance of the items on this factor to newer perspectives on recovery that have emerged from the consumer movement (Ralph and Corrigan, 2005; Slade, 2009). In recent years medical definitions of recovery from mental illness that emphasize the total remission of symptoms and impairments have been challenged, and alternative concepts have been proposed that focus on recovering a sense of identity, self-determination, and developing a personally meaningful and rewarding life (Chamberlin, 1997; Deegan, 1996; Lysaker and Lysaker, 2012). One widely cited definition of recovery states, “Recovery involves the development of new meaning and purpose in one’s life as one grows beyond the catastrophic effects of mental illness” (Anthony, 1993). The President’s New Freedom Commission on Mental Health defines recovery as “the process in which people are able to live, work, learn, and participate fully in their communities” (2003). Three of the items in the Intrapyschic Foundations / Motivation factor (Sense of purpose, Aimless inactivity, Curiosity, and Motivation) are thematically related to the emphasis in recovery on having a meaningful life, while several other items (Empathy, Emotional interaction, Commonplace activities) reflect the importance of social or community participation in recovery. Thus, the evaluation of changes in this factor, and its relationship to other measures of recovery (Girard et al., 2015), may have special relevance for understanding the process of recovery from schizophrenia and other serious mental illnesses.

The only subscale in the original QLS that we did not find support for was Common Objects and Activities, which only contained two items. The involvement in Commonplace activities item (e.g., reading a newspaper, paying a bill, going to a movie, taking a book out of the

library) was included in the QLS-R Intrapyschic Foundations / Motivation factor, whereas the ownership of Common objects (e.g., owning a wallet, purse, map, credit card, library card, comb, alarm clock) was dropped. These items were created over 30 years ago, and the Common objects item in particular is in need of updating if the QLS is to continue to be used. However, in contrast to the other three factors on the QLS (which also comprise the QLS-R), there is relatively little research literature addressing the importance of the Common Objects and Activities subscale.

The present study provides support for the Instrumental Functioning, Instrumental Role, and Intrapyschic Foundations factors proposed in the original QLS factor structure, but not the Common Objects and Activities factor. The close replication of these three primary factors of the QLS, with only minor modifications to each one, is remarkable considering that this instrument was developed over 30 years ago. Furthermore, the slightly revised three factor structure for the 16-item QLS-R reported here was robust across samples of both schizophrenia-spectrum disorders and more diagnostically heterogeneous groups of persons, supporting its use as an outcome measure in the broad population of people with serious mental illness.

Additional research is needed to evaluate the validity of the three factor QLS-R compared to the traditional four factor QLS in areas such as social and occupational functioning, and psychological dimensions related to the process and experience of recovery. Further research is needed to determine whether the somewhat briefer 16-item QLS-R should be used instead of the 21-item QLS. Finally, consideration should be given to replacing the name of the *Intrapyschic Foundations* factor, originally coined by Heinrichs et al. (1984), with *Motivation*, given the lack of understanding of the former term in the field.

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References

- Addington J, Addington D. Early intervention for psychosis: The Calgary Early Psychosis Treatment and Prevention Program. *CPA Bulletin*. 2001 Fall;:11–16.
- Anthony WA. Recovery from mental illness: The guiding vision of the mental health service system in the 1990s. *Psychosocial Rehabilitation Journal*. 1993; 16:11–23.
- Ascher-Svanum H, Novick D, Haro JM, Aguado J, Cui Z. Empirically driven definitions of “good,” “moderate,” and “poor” levels of functioning in the treatment of schizophrenia. *Quality of Life Research*. 2013; 22:2085–2094. [PubMed: 23239123]
- Baksheev GN, Allott K, Jackson HJ, McGorry PD, Killackey E. Predictors of vocational recovery among young people with first-episode psychosis: Findings from a randomized controlled trial. *Psychiatric Rehabilitation Journal*. 2012; 35:421–427. [PubMed: 23276234]
- Bellack AS, Morrison RL, Wixted JT, Mueser KT. An analysis of social competence in schizophrenia. *British Journal of Psychiatry*. 1990; 156:809–818. [PubMed: 2207511]

- Bradley GM, Couchman GM, Perlesz A, Nguyen AT, Singh B, Riess C. Multiple-family group treatment for English- and Vietnamese-speaking families living with schizophrenia. *Psychiatric Services*. 2006; 57:521–530. [PubMed: 16603748]
- Brown, TA. *Confirmatory Factor Analysis for Applied Research*. New York: Guilford Press; 2006.
- Carpenter WT Jr, Heinrichs DW, Wagman AMI. Deficit and nondeficit forms of schizophrenia: The concept. *American Journal of Psychiatry*. 1988; 145:578–583. [PubMed: 3358462]
- Chamberlin J. Confessions of a non-compliant patient. *National Empowerment Center Newsletter*. 1997 Summer-Fall;:8–9.
- Chou KR, Shih YW, Chang C, Chou YY, Hu WH, Cheng JS, Yang CY, Hsieh CJ. Psychosocial rehabilitation activities, empowerment, and quality of community-based life for people with schizophrenia. *Archives of Psychiatric Nursing*. 2012; 26:285–294. [PubMed: 22835748]
- Deegan PE. Recovery as a journey of the heart. *Psychosocial Rehabilitation Journal*. 1996; 19:91–97.
- Faries D, Ascher-Svanum H, Phillips G, Nyhuis AW, Sugihara T, Stauffer V, Kinon BJ. Construct validity of 2 measures to assess reasons for antipsychotic discontinuation and continuation from patients' and clinicians' perspectives in a clinical trial. *BMC Medical Research Methodology*. 2012; 12:142–152. [PubMed: 22974273]
- First, MB., Spitzer, RL., Gibbon, M., Williams, JBW. *Structured Clinical Interview for DSM-IV Axis-I Disorders - Patient Edition (SCID-I/P, Version 2.0)*. New York: Biometrics Research Department, New York State Psychiatric Institute; 1996.
- Folstein MF, Folstein SE, McHugh PR. Mini Mental State: A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research*. 1975; 12:189–198. [PubMed: 1202204]
- Girard V, Tinland A, Mohamed eH, Boyer L, Auquier P. French Housing First Study Group. Psychometric properties of the recovery measurement in homeless people with severe mental illness. *Schizophrenia Research*. 2015; 169:292–7. [PubMed: 26522850]
- Grootens KP, van Veelen NM, Peuskens J, Sabbe BG, Thys E, Buitelaar JK, Verkes JJ, Kahn RS. Ziprasidone vs olanzapine in recent-onset schizophrenia and schizoaffective disorder: Results of an 8-week double-blind randomized controlled trial. *Schizophrenia Bulletin*. 2011; 37:352–361. [PubMed: 19542525]
- Heinrichs DW, Hanlon TE, Carpenter WT Jr. The Quality of Life Scale: An instrument for rating the schizophrenia deficit syndrome. *Schizophrenia Bulletin*. 1984; 10:388–396. [PubMed: 6474101]
- Hu, LT., Bentler, P. Evaluating model fit. In: Hoyle, RH., editor. *Structural Equation Modeling. Concepts, Issues, and Applications*. London: Sage; 1995. p. 76-99.
- Kay SR, Opler LA, Fiszbein A. The Positive and Negative Syndrome Scale (PANSS) for schizophrenia. *Schizophrenia Bulletin*. 1987; 13:261–276. [PubMed: 3616518]
- Kim KR, Song YY, Park JY, Lee EH, Lee M, Lee SY, Kang JI, Yoo SWY, An SK, Kwon JS. The relationship between psychosocial functioning and resilience and negative symptoms in individuals at ultra-high risk for psychosis. *Australian & New Zealand Journal of Psychiatry*. 2013; 47:762–771. [PubMed: 23661784]
- Kimhy D, Yale S, Goetz RR, McFarr LM, Malaspina D. The factorial structure of the Schedule for the Deficit Syndrome in Schizophrenia. *Schizophrenia Bulletin*. 2006; 32:274–278. [PubMed: 16177274]
- Kirkpatrick B, Buchanan RW, McKenney PD, Alphas LD, Carpenter WTJ. The Schedule for the Deficit syndrome: An instrument for research in schizophrenia. *Psychiatry Research*. 1989; 30:119–123. [PubMed: 2616682]
- Kirkpatrick B, Galderisi S. Deficit schizophrenia: An update. *World Psychiatry*. 2008; 7:143–147. [PubMed: 18836581]
- Larsen TK, McGlashan TH, Moe LC. First-episode schizophrenia: I. Early course parameters. *Schizophrenia Bulletin*. 1996; 22:241–256. [PubMed: 8782284]
- Lukoff D, Nuechterlein KH, Ventura J. *Manual for the Expanded Brief Psychiatric Rating Scale (BPRS)*. *Schizophrenia Bulletin*. 1986; 12:594–602.
- Lysaker, PH., Lysaker, JT. From being subjected to being a subject: Recovery in relation to schizophrenia. In: Rudnick, A., editor. *Recovery of People with Mental Illness: Philosophical and Related Perspectives*. Oxford: Oxford University Press; 2012. p. 166-177.

- McEvoy JP, Lieberman JA, Perkins DO, Hamer RM, Gu H, Lazarus A, Sweitzer D, Olexy C, Weiden P, Strakowski SD. Efficacy and tolerability of olanzapine, quetiapine, and risperidone in the treatment of early psychosis: A randomized, double-blind 52-week comparison. *American Journal of Psychiatry*. 2007; 164:1050–1060. [PubMed: 17606657]
- McFarlane WR, Cook WL, Downing D, Ruff A, Lynch S, Adelsheim S, Calkins R, Carter CS, Cornblatt B, Milner K. Early detection, intervention, and prevention of psychosis program: Rationale, design, and sample description. *Adolescent Psychiatry*. 2012; 2:112–124.
- McGurk, SR. A Dismantling Study of Cognitive Remediation for Supported Employment. National Institute of Mental Health; in progress RO1 MH077210: 5/13–14/17
- McGurk SR, Mueser KT, Xie H, Welsh J, Bailey E, Guarino S, Kaiser S, Frasier V, Drake RE, Becker DR, Wolfe R, McHugo GJ. Cognitive enhancement treatment for people with mental illness who do not respond to supported employment: A randomized controlled trial. *American Journal of Psychiatry*. 2015; 172:852–861. [PubMed: 25998278]
- Mueser KT, Curran PJ, McHugo GJ. Factor structure of the Brief Psychiatric Rating Scale in schizophrenia. *Psychological Assessment*. 1997; 9:196–204.
- Mueser KT, Pratt SI, Bartels SJ, Swain K, Forester B, Cather C, Feldman J. Randomized trial of social rehabilitation and integrated health care for older people with severe mental illness. *Journal of Consulting and Clinical Psychology*. 2010; 78:561–574. [PubMed: 20658812]
- Mueser KT, Sengupta A, Schooler NR, Bellack AS, Xie H, Glick ID, Keith SJ. Family treatment and medication dosage reduction in schizophrenia: Effects on patient social functioning, family attitudes, and burden. *Journal of Consulting and Clinical Psychology*. 2001; 69:3–12. [PubMed: 11302274]
- Norman RM, Malla AK, McLean T, Voruganti LP, Cortese L, McIntosh E, Cheng S, Rickwood A. The relationship of symptoms and level of functioning in schizophrenia to general wellbeing and the quality of life scale. *Acta Psychiatrica Scandinavica*. 2000; 102:303–309. [PubMed: 11089732]
- Overall JE, Gorham DR. The Brief Psychiatric Rating Scale. *Psychological Reports*. 1962; 10:799–812.
- Perkins DO, Lieberman JA, Gu H, Tohen M, McEvoy JP, Green AI, Zipursky RB, Strakowski SD, Sharma T, Kahn RL, Gur R, Tollefson G. Predictors of antipsychotic treatment response in patients with first-episode schizophrenia, schizoaffective and schizophreniform disorders. *British Journal of Psychiatry*. 2004; 185:18–24. [PubMed: 15231551]
- President's New Freedom Commission on Mental Health. *Achieving the Promise: Transforming Mental Health Care in America: Final Report*. Rockville, MD: Substance Abuse and Mental Health Services Administration; 2003.
- Rabinowitz J, Levine SZ, Garibaldi G, Bugarski-Kirola D, Berardo CG, Kapur S. Negative symptoms have greater impact on functioning than positive symptoms in schizophrenia: Analysis of CATIE data. *Schizophrenia Research*. 2012; 137:147–150. [PubMed: 22316568]
- Ralph, RO., Corrigan, PW., editors. *Recovery in Mental Illness: Broadening Our Understanding of Wellness*. Washington, DC: American Psychological Association; 2005.
- Raykov T. Bias-corrected estimation of noncentrality parameters of covariance structure models. *Structural Equation Modeling*. 2005; 12:120–29.
- Robinson J, Bruxner A, Harrigan S, Bendall S, Killackey E, Tonin V, Monson K, Thurley M, Shona F, Yung AR. Study protocol: The development of a pilot study employing a randomized controlled design to investigate the feasibility and effects of a peer support program following discharge from a specialist first-episode psychosis treatment centre. *BMC Psychiatry*. 2010; 10 ArtID: 37.
- Schooler, N., Hogarty, G., Weissman, M. Social Adjustment Scale II (SAS-II). In: Hargreaves, WA, Atkinson, CC., Sorenson, JE., editors. *Resource Materials for Community Mental Health Program Evaluations*. Rockville, MD: NIMH; 1979. p. 290-303.
- Slade, M. *Personal Recovery and Mental Illness: A Guide for Mental Health Professionals*. Cambridge: Cambridge University Press; 2009.
- Thwin SS, Hermes E, RL, Barnett P, Liang M, Valley D, Rosenheck R. Assessment of the minimum clinically important difference in quality of life in schizophrenia measured by the Quality of Well-Being Scale and disease-specific measures. *Psychiatry Research*. 2013; 209:291–296. [PubMed: 23473656]

Weissman MM, Bothwell S. Assessment of social adjustment by patient self-report. Archives of General Psychiatry. 1976; 33:1111–1115. [PubMed: 962494]

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Table 1

Demographic and Diagnostic Characteristics of Study Participants

	Dataset #1	Dataset #2
Continuous Variables		
	M (SD)	M (SD)
Age	47.2 (12.5)	24.4(8.2)
Categorical Variables		
	N (%)	N (%)
Gender		
Male	134 (54.3%)	221 (65.6%)
Female	113 (45.7%)	116 (34.4%)
Race		
White	192 (77.7%)	267 (79.3%)
African American	44 (17.8%)	6 (1.8%)
Asian	3 (1.2%)	37 (10.7%)
Native Indian	1 (0.4%)	4 (1.2%)
Mixed race	7 (2.8%)	24 (7.1%)
Ethnicity		
Hispanic/Latino	19 (7.7%)	10 (8.2 %)
Not Hispanic/Latino	228 (92.3%)	327 (91.8%)
Marital Status		
Never married	142 (57.5%)	295 (87.5%)
Married	23 (9.3%)	28 (8.3%)
Separated/Divorced/Widowed	82(33.2%)	14 (4.2%)
Educational Level		
Less than high school	61 (24.6%)	136 (40.4%)
High school graduate	146 (59.2%)	150 (44.4%)
College graduate	40 (15.2%)	51 (15.2%)
Diagnosis		
Bipolar/Cyclothymic Disorder	57 (27.0%)	--
Major Depression	46 (18.6%)	---
Schizoaffective Disorder	45 (18.2%)	3 (0.9%)
Schizophrenia	58 (23.5%)	128 (38.0%)
Schizophreniform Disorder	--	128 (38.0%)
Brief Psychotic Dis./Psychotic Dis. NOS	9 (3.6%)	64 (19.0%)
Other	22 (8.9%)	14 (4.1%)
Total	247 (100.0%)	337 (100.0%)

Table 2

Mean and Standard Deviations of QLS Items for Study Samples

	Sample														
	Dataset #1			Time 2 (N=180)			Time 3 (N=134)			Time 4 (N=104)			Dataset #2		
	M	SD	N	M	SD	N	M	SD	N	M	SD	N	M	SD	N
Interpersonal Relations															
1. Household	3.90	2.05	4.12	1.97	4.31	2.02	4.60	2.24	3.43	1.54					
2. Friends	2.56	2.11	2.86	2.15	3.14	2.14	3.00	2.19	2.56	1.80					
3. Acquaintances	2.18	1.86	2.57	2.10	2.66	2.18	2.73	2.15	2.59	1.41					
4. Social activity	2.54	1.76	3.06	1.76	3.39	1.88	3.44	1.85	2.50	1.58					
5. Social network	2.96	1.65	3.31	1.77	3.35	1.80	3.30	1.90	2.77	1.35					
6. Social initiative	2.44	1.93	2.93	1.96	3.22	2.05	2.99	2.11	2.62	1.66					
7. Withdrawal	3.40	1.65	3.73	1.69	3.77	1.60	3.84	1.74	2.89	1.48					
8. Sociosexual	1.96	1.59	1.98	1.65	2.22	1.82	2.01	1.54	2.06	1.64					
Instrumental Role															
9. Occupational role	1.51	1.29	1.76	1.48	1.54	1.57	1.59	1.44	2.34	2.34					
10. Work functioning	1.55	1.35	1.89	1.67	1.73	1.91	1.54	1.84	2.08	2.06					
11. Work level	1.60	1.34	2.06	1.76	2.03	1.92	2.03	1.93	2.43	2.23					
Intrapsychic Foundations															
13. Sense of purpose	2.56	1.43	2.57	1.58	2.75	1.61	2.58	1.73	2.99	1.29					
14. Motivation	2.62	1.40	3.06	1.47	3.16	1.72	2.86	1.73	2.90	1.34					
15. Curiosity	2.66	1.78	2.94	1.81	3.37	1.75	3.30	1.81	2.74	1.48					
16. Anhedonia	3.26	1.70	3.80	1.79	4.10	1.73	3.91	1.64	3.15	1.43					
17. Aimless inactivity	2.85	1.96	3.26	1.98	3.43	2.08	3.66	2.08	2.93	1.76					
20. Empathy	3.86	1.44	3.88	1.47	3.90	1.49	3.72	1.38	3.35	1.15					
21. Emotional interaction	4.43	1.37	4.42	1.45	4.90	1.22	4.79	1.38	3.44	1.12					
Common Objects and Activities															
18. Commonplace objects	4.57	1.17	4.69	1.07	4.77	1.10	4.70	1.12	4.00	1.23					
19. Commonplace activities	3.19	1.22	3.17	1.17	3.38	1.14	3.28	1.27	3.02	1.13					

Table 3

Rotated factor Pattern Matrix and Interfactor Correlations

Item	Factor			Communality
	1. Interpersonal	2. Instrumental	3. Intrapsychic Foundations/Motivation	
2. Friends	.79	-.09	-.14	.53
3. Acquaintances	.50	-.02	.08	.31
4. Social activity	.71	.10	.10	.57
5. Social network	.68	-.03	.06	.53
6. Social initiative	.82	.04	.03	.69
7. Withdrawal	.78	-.02	.05	.67
9. Occupational role	-.11	.74	.20	.66
10. Work functioning	.12	.89	-.08	.78
11. Work level	.02	.73	.03	.56
13. Sense of purpose	-.02	-.07	.69	.50
14. Motivation	.04	-.13	.66	.56
15. Curiosity	.02	.00	.51	.37
17. Aimless inactivity	.00	-.10	.67	.51
19. Commonplace activities	.21	.08	.31	.23
20. Empathy	.12	-.15	.28	.36
21. Emotional interaction	.00	.07	.53	.33
Intercorrelations				
1. Interpersonal	-			
2. Instrumental	.21	-		
3. Intrapsychic/Motivation	.41	.40	-	

Table 4

Goodness-of-fit Indexes in the Measurement Models by Times of Data

Indexes	Sample								
	Dataset #1				Dataset #2				
	Time 1	Time 2	Time 3	Time 4	Time 1	Time 2	Time 3	Time 4	
N	247	180	134	104	337				
χ^2	161.8	169.7	155.0	128.0	228.5				
<i>df</i>	94	94	94	94	94				
χ^2/df	1.72	1.81	1.65	1.36	2.43				
NFI	.91	.89	.87	.87	.95				
TLI	.95	.93	.93	.95	.96				
CFI	.96	.94	.94	.96	.97				
RMSEA	.04	.06	.07	.05	.05				

Notes. NFI = normed fit index; TLI = Tucker-Lewis index; CFI = comparative fit index; RMSEA = root mean square error of approximation

Table 5

Final Standardized Parameter Estimates and Z Ratio from Cross-Validation of the QLS-Revised

Item	1. Interpersonal	2. Instrumental	3. Intrapsychic Foundations/Motivation	r ²
Interpersonal Functioning				
2. Friends	.79***			.62
3. Acquaintances	.79***			.63
4. Social activity	.90***			.81
5. Social network	.84***			.70
6. Social initiative	.85***			.73
7. Withdrawal	.83***			.69
Instrumental Functioning				
9. Occupational role		.93***		.86
10. Work functioning		.94***		.87
11. Work level		.76***		.85
Intrapsychic Foundations/Motivation				
13. Sense of purpose			.76***	.58
14. Motivation			.84***	.70
15. Curiosity			.72***	.51
17. Aimless inactivity			.63***	.40
19. Commonplace activities			.51***	.26
20. Empathy			.54***	.29
21. Emotional interaction			.53***	.28
Intercorrelations				
1. Interpersonal	-			
2. Instrumental	.37	-		
3. Intrapsychic/Motivation	.53	.65	-	