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Assessment of Lifespan Functioning Attainment (ALFA) Scale: a quantitative interview for self-reported current and functional decline in schizophrenia

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Abstract

Schizophrenia has been characterized as a disorder with poor outcomes across various functional domains, especially social and occupational functioning. Although these outcomes have been investigated based on patients' current functioning, few studies have considered the assessment of functional outcomes across the lifespan in schizophrenia. We developed a novel and brief scale of adulthood lifespan functioning, the Assessment of Lifespan Functioning Attainment (ALFA). We assessed current functioning and percentage of pre- and post-psychosis onset engagement for five functional domains including paid employment, living independently, romantic partnerships, close friendships, and recreational engagement with others. Pre- to post-psychosis functional decline was observed for all domains, with paid employment having the greatest decline (d = 2.68) and living independently having the least decline (d =.59). Our exploratory factor analysis suggests that a single factor accounted for the most variance in Pre-Psychosis Functioning in ALFA domains. Two factors explain the majority of variance in Post-Psychosis Functioning and Pre-to-Post Psychosis Decline: a sociability factor (close friendships and recreational engagement with

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Contributors

Jamie Joseph conducted literature searches, analysis and interpretation of data, and wrote the initial manuscript. Elizabeth W. Twamley oversaw the data analyses and edited the manuscript. William S. Kremen, Carol E. Franz, and Stephen J. Glatt provided assistance with data interpretation and edited the manuscript. Xiaohua Liu and Barbara K. Johnson provided assistance with data management and analyses. Sharon D. Chandler and Ming T. Tsuang edited the manuscript.

others) and an independence factor (paid employment, living independently, romantic relationships). To our knowledge, this is the first study to report on a self-reported quantitative assessment of adult lifespan functioning in schizophrenia. The ALFA scale may be a useful tool for future research on functional outcomes in schizophrenia.

Keywords

functional outcome; employment; social functioning; psychosis

Introduction

Schizophrenia often results in poor psychosocial outcomes, particularly in domains related to social functioning (Bellack et al., 1990, Brekke et al., 2005, Brekke et al., 1993, Liddle, 2000, Lysaker et al., 1998), academic/occupational functioning (Beiser et al., 1994, Nordt et al., 2007, Twamley et al., 2006, Weinberg et al., 2009), and independent living (Hansson et al., 2002, Liberman et al., 1998, Mausbach et al., 2011, Twamley et al., 2002). Predictors of outcomes in schizophrenia have been extensively studied and vary greatly based on a number of factors including premorbid functioning (Addington et al., 1993, Barajas et al., 2013, Carrión et al., 2013, Mueser et al., 1990), socioeconomic status (Bratlien et al., 2014, Kwok, 2014), negative symptoms (Galderisi et al., 2013, Lin et al., 2013, Milev et al., 2005, Schell et al., 2005, Strauss et al., 2013), cortical connectivity (Reis Marques et al., 2014), genetic liability (Lett et al., 2013), functional capacity (Harvey et al., 2010, Harvey et al., 2012, Holshausen et al., 2014, Keefe et al., 2006a, Keefe et al., 2006b) and neurocognitive function (Green, 1996, Green et al., 2000), suggesting significant heterogeneity.

Studies of functional outcomes in schizophrenia have largely considered current functioning, which is a snapshot in time, rather than assessing functioning over the lifespan. Typical current functional outcome measures are assessed by either self- or informant-report (e.g., Quality of Life Interview) or performance on standardized role-play tasks (e.g., University of California San Diego Performance-based Skills Assessment; UPSA) (Bowie et al., 2007, Cardenas et al., 2013, Leifker et al., 2010, Mausbach, Depp, 2011). These measures of functional capacity are typically associated with vocational status and living independence (Mausbach et al., 2011, Mausbach et al., 2009). However, these measures primarily focus only on current functioning, and are unable to provide information regarding functioning over extended periods of adulthood encompassing specific life stages (e.g., since the onset of psychosis, or during late life). Therefore, there is a need for measures that characterize presence/absence of milestone achievement and change in various domains of functional outcome (Harvey et al., 2011, Mausbach et al., 2011). One study reported the development of a semi-structured functional attainment interview that divided lifespan into three stages: early, middle, and present/future course (Shepherd et al., 2012). This measure was a qualitative interview, did not assess functional achievements in specific domains of outcome, and was only assessed in elderly schizophrenia patients, limiting its research and clinical utility.

To address these issues, we developed and evaluated a novel measure of self-reported lifespan functioning, the Assessment of Lifespan Functioning Attainment (ALFA). Our goal was to assess functioning over extended periods of time in multiple domains (paid employment, living independently, close friendships, romantic relationships, and engagement in recreational activities) with an instrument that would be brief, quantitative, and amenable to use in individuals with schizophrenia. We aimed to establish the ALFA's utility in a schizophrenia outpatient sample.

Material and Methods

Participants and Diagnostic Procedure

Study participants (61 men, 32 women, aged 23-68) were recruited from the UCSD Outpatient Psychiatric Services clinic as well as the general community and enrolled in a study examining genetic predictors of cognitive and functional outcome in schizophrenia. The study protocol was approved by the Institutional Review Board of the University of California, San Diego and all participants provided written informed consent. The demographic and clinical characteristics of the study sample are shown in Table 1. All participants were prescribed antipsychotic medications and participants' total daily dosage was converted to chlorpromazine equivalents using published standards (Andreasen et al., 2010).

All participants had schizophrenia or schizoaffective disorder for a minimum of two years (as determined by a diagnostic interview and medical record review) and were assessed by trained raters over two visits occurring within one to two weeks of each other. During the first visit, the Diagnostic Interview for Genetic Studies (DIGS) (Nurnberger et al., 1994) was administered to ensure that participants met DSM IV-TR criteria for a diagnosis of schizophrenia or schizoaffective disorder. Each DIGS interview was confirmed with available medical records and reviewed by a doctoral-level clinician (EWT or WSK). When a consensus could not be reached, the participant was excluded from the study. Participants were also excluded if they: 1) had a DSM-IV TR (APA, 2000) diagnosis of substance abuse or dependence within six months; 2) had an intellectual disability, neurologic or medical disorders affecting cognitive functioning (including history of head injury with loss of consciousness >10 minutes; 3) were not fluent English speakers with at least 8 years of formal education; or 4) were pregnant. During the second visit, the remaining study measures (see below) were administered.

Self-Report Measures

Quality of Life Interview (QOLI)—(Lehman, 1988). The QOLI is a self-report measure of objective and subjective quality of life within eight domains, including 1) living situation; 2) daily activities and functioning; 3) family relations; 4) social relations; 5) finances; 6) work and school; 7) legal and safety issues; and 8) health. The reliability and validity of the QOLI has been well established in different psychiatric populations (Lehman, 1988, Russo et al., 1997a, Russo et al., 1997b).

Assessment of Lifespan Functioning Attainment (ALFA)—Our novel measure, the ALFA, was based on the Vaillant Index of Social Adjustment (Vaillant, 1977) but it was modified to assess domains of adulthood functioning relevant to individuals with schizophrenia. The scale was administered as a quantitative interview of self-reported current and adulthood achievement of functional milestones comprising five domains: 1) paid employment (including full-time child care or full-time student status); 2) living independence (defined as living in an unsupervised private or cooperative house, apartment, or boarding house (no staff or meals provided); 3) maintenance of close friendships (minimum monthly contact); 4) attainment of romantic relationships; and 5) engagement in recreational activities with non-family members. In part 1, current status for each domain was first determined by coding a 0 for "not engaged" and 1 for "currently engaged". In part 2, to determine variation in functioning for specific epochs of adulthood (i.e., age 18-20, 21-30, 31-40, 41-50, etc., up to the individual's current age) participants were queried as to the number of years that they were engaged in activities corresponding to each ALFA domain. Assessing specific epochs was also employed as a strategy to improve overall accuracy of self-reporting by study participants. The ALFA scale is shown in Table 2. We calculated the percentage of years of engagement in each functional domain from the age of 18 to age of psychosis onset ("Pre-Psychosis Functioning"), age of psychosis onset to current age ("Post-Psychosis Functioning"), and the difference in percentages between Post-Psychosis Functioning and Pre-Psychosis Functioning ("Post-Psychosis Decline").

Other Study Measures

Premorbid intellectual functioning was estimated with the Wide Range Achievement Test (WRAT-III) reading subtest scaled score.(Wilkinson, 1993) The Scale for Assessment of Positive Symptoms (SAPS) (Andreasen, 1984) was used to assess four positive symptom domains of psychopathology in schizophrenia (hallucinations, delusions, bizarre behavior, and thought disorder). The Scale for Assessment of Negative Symptoms (SANS) (Andreasen, 1983) was used to assess negative symptoms of psychopathology in schizophrenia in five domains (affective flattening or blunting, alogia, avolition-apathy, attention, and anhedonia-asociality). The Hamilton Depression Rating Scale (HAMD) (Hamilton, 1960) was used to assess current depressive symptoms.

Statistical Analyses

Percentage time of Pre-Psychosis Functioning and Post-Psychosis Functioning was compared using paired sample *t*-tests. Point biserial correlations were employed to determine the relationships between current functioning of the ALFA domains and corresponding QOLI items. Principal components analysis with varimax (orthogonal) rotation was performed to determine the factor structure of Pre-Psychosis Functioning, Post-Psychosis Functioning, and Post-Psychosis Decline across the ALFA domains. Factors were retained if they had eigenvalues greater than 1. Percentage time of Pre-Psychosis Functioning was log transformed prior to principal components analysis to reduce significant positive skewness.

Results

Current Functioning and Functional Decline in ALFA Domains

The participants' current, Pre-Psychosis, and Post-Psychosis Functioning in the ALFA domains is shown in Table 3. Current participation in the functional domains ranged from 5.4% of the sample reporting current paid employment to 75.3% reporting currently living independently. Participants reported significant declines in functioning across all ALFA domains. The domain with the greatest decline was paid employment, $t(92) = 21.27$, $p < .001$, $d = 2.68$, with 74.1% of the sample reporting decline from their Pre-Psychosis Functioning level. The domain with the least decline was living independence, $t(92) = 4.72$, $p < .001$, $d = 0.59$, with 13.6% of the sample reporting decline from their Pre-Psychosis Functioning level. The participants' percentage of time engaged in ALFA domain activities declined during each decade of adulthood, as shown in Table 3. Figure 1 shows the mean percent adulthood engagement in ALFA domain activities for younger vs. older study participants. There were no significant differences in ALFA domain engagement in younger vs. older participants throughout their adult lives.

Correlations between ALFA Items and QOLI and SANS Items

Correlations between the ALFA items and similar items from the QOLI and SANS were used to examine convergent validity for current functioning. Three QOLI items ("worked in the past year", "current living situation," and "spending time with a spouse, boyfriend, or girlfriend") were significantly correlated with the corresponding ALFA domains of current paid employment ($r(93) = .572$, $p < .001$), currently living independently ($r(93) = .554$, $p < .001$), and current romantic partnerships ($r(93) = .540$, $p < .001$). The SANS item measuring impairment in "relationships with friends and peers" was inversely correlated with the ALFA domain of current close friendships ($r(91) = -.302$, $p = .004$); the SANS item measuring impairment in "recreational interests and activities" was not significantly correlated with the ALFA domain of current recreational engagement ($r(91) = -.161$, $p = .128$).

Exploratory Factor Analysis of the ALFA

The Pre-Psychosis Functioning items loaded onto a single factor that accounted for 58.4% of the total variance. For Post-Psychosis Functioning and Post-Psychosis Decline, the component loadings and scree plots indicated that there were two factors: 1) a sociability factor composed of friendship and recreational engagement with others; and an independence factor, composed of employment, living independence, and romantic partnership functioning (see Table 4 for factor loadings). These factors accounted for a similar amount of variance (60.0% and 62.7% of variance in Post-Psychosis Functioning and Post Psychosis Decline, respectively).

Discussion

The goal of this study was to perform an initial assessment of the first known quantitative self-report assessment of adult lifespan functioning in schizophrenia. The difference between participants' self-reported Pre- and Post-Psychosis Functioning is consistent with

what is currently known about functional decline in schizophrenia (Chemerinski et al., 2006, Friedman et al., 1999, Harvey et al., 1999a, Harvey et al., 2010, Harvey et al., 1999b). For example, we found that the highest degree of functional decline occurred in paid employment (d = 2.58), which is consistent with recent data showing that less than 15% of people with schizophrenia work (Tandberg et al., 2013). Our results are also consistent with recent data showing that vocational decline is normative in schizophrenia and tends to occur early in the illness (Vargas et al., 2014).

The consistency of the ALFA paid employment, romantic relationships, and living independently items with corresponding QOLI items suggests that our ALFA responses may reflect current occupational, romantic and living independence in schizophrenia outpatients and provides preliminary convergent validity for some of the ALFA scale current functioning items. However, the ALFA requires further validation in future studies (e.g., test-retest reliability, convergent validity). The factor structures for Post-Psychosis Functioning and Post-Psychosis Decline explained a significant percentage of variance, suggesting that outcomes at these time points may be explained by sociability and independence factors. Pre-Psychosis Functioning was explained best by one factor, perhaps because it is a relatively early period of adulthood with limited opportunity for mature, independent functioning. Because percentage of Pre-Psychosis Functioning for ALFA domain engagement had a skewed distribution before and after data transformation, the Pre-Psychosis Functioning factor analysis may be limited in interpretability and generalizability.

Our study has other significant limitations that must be considered. First, we did not acquire informant data for comparison to self-reported functioning on the ALFA scale. Prior studies suggest that schizophrenia patients overestimate their levels of everyday functioning compared to informant reports (Sabbag et al., 2012). The utility of self-report scales such as the ALFA may be limited by participant memory problems. The memory problems of schizophrenia are consistent with an encoding deficit, not a storage or forgetting problem (i.e., information that is learned tends to be retained) (Cirillo and Seidman, 2003). However, it is not established whether people with schizophrenia are impaired in their recall of this type of general autobiographical information, and the ALFA does not ask for detailed information about past events, but rather the number of years per decade engaged in basic activities (e.g., living independently, working). Moreover, informant data reliability has not been consistent across studies, with some reports of high correlations between self-reported and informant data (Dickerson et al., 1997, Ventura et al., 2010) and other reports of low correlations (Harvey et al., 2013, Sabbag et al., 2011, Sabbag et al., 2012). Many people with schizophrenia do not have someone who is able to serve as a reliable informant regarding their current and past functioning. The frequent lack of appropriate informants highlights the importance of improving the validity and reliability of self-reported assessments in schizophrenia studies.

Our sample also consisted of outpatients who were mainly living independently. Therefore, replication of our results in inpatient and supervised-living settings will improve the generalizability of our study findings. While our study only considered Pre-Psychosis Functioning from adulthood on, modifications of the ALFA scale domains relevant to childhood could be employed to determine functioning across the entire lifespan for future

studies. As the mean age of our study sample was 49.2, it will be important for future studies to assess individuals under the age of 40 and over the age of 60 to improve quantification of specific epochs with the most significant Post-Psychosis Decline and better determine early vs. chronic illness effects on self-reported functioning. However, the study was able to cover a wide adult age range, suggesting the ALFA scale has adulthood lifespan generalizability.

When Vaillant originally developed his scale of lifespan functioning, his primary aim was to determine potential adaptive mechanisms that occur during the lifespan to overcome difficulties in functioning (Vaillant, 1977). Based on our study findings from a schizophrenia outpatient population, all areas of functioning appear to decline after onset of psychosis. Although many studies have shown that predictors of functional outcomes associated with schizophrenia encompass a wide spectrum (Green et al., 2000, Harvey, 2001, Niendam et al., 2009), modeling predictors of functional decline on the ALFA may help better determine specific factors that mediate or moderate decline in these functional domains. The ALFA is a brief assessment with the ability to determine pre- and post-psychosis functional attainment covering long periods of time, rather than assessing only current functioning. These features make it a potentially useful tool for functional outcome studies of schizophrenia.

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Highlights

- The Assessment of Lifespan Functioning Attainment (ALFA) is a new scale of adult lifespan functioning relevant to people with schizophrenia
- ALFA domains include employment, living independence, romantic partnerships, friendships, and recreational engagement
- Participants reported the greatest functional decline in paid employment following psychosis onset
- The ALFA scale may be a useful tool for future research on functional outcomes in schizophrenia

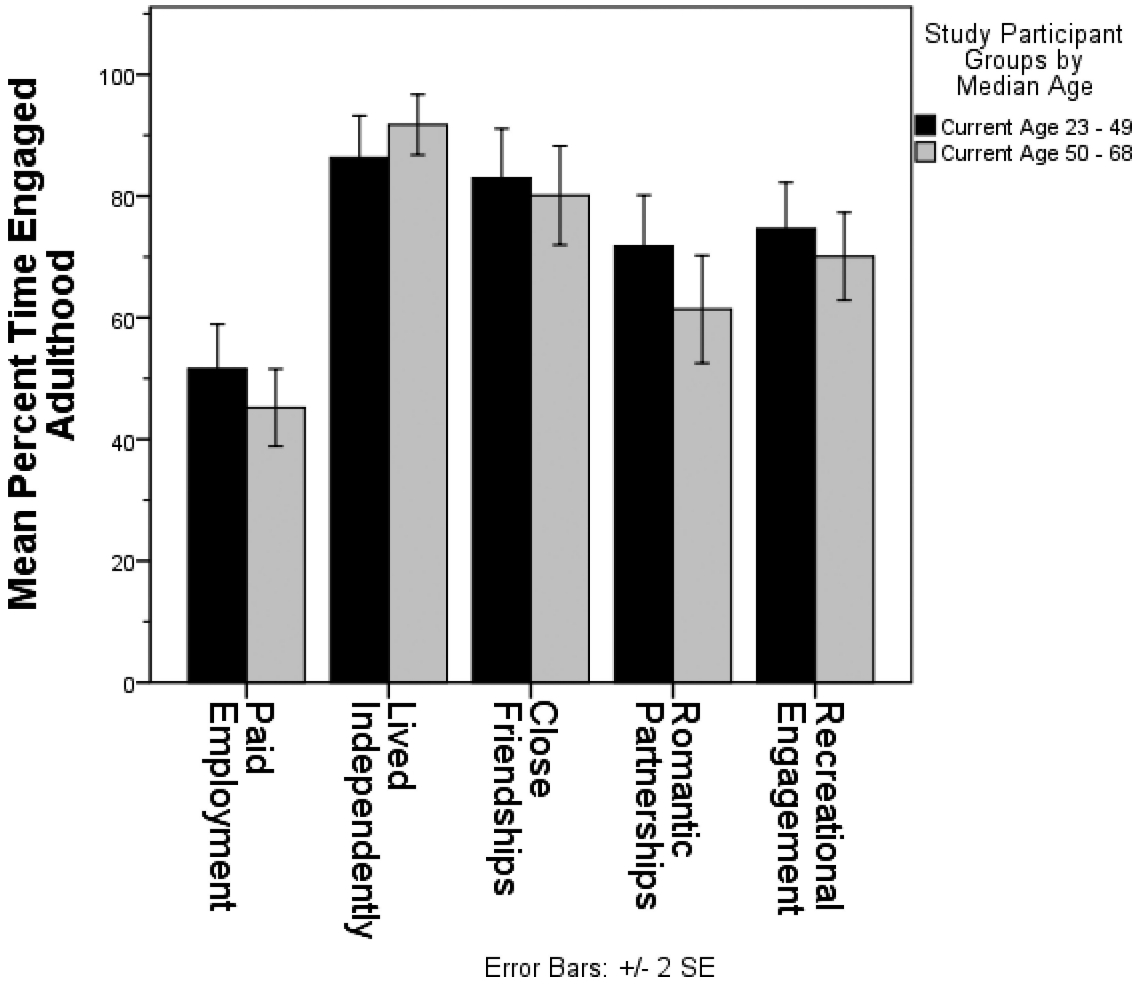

Figure 1.

Mean percent time ALFA domain engagement in younger vs. older study participants. The mean percentage of time of adulthood engagement for each ALFA domain was determined for younger vs. older study participants.

Table 1

Demographic and clinical characteristics of the study sample (n=93).

Demographic and clinical factors	*M*	*SD*
Age, years	49.2	8.9
Age of psychosis onset, years	28.4	8.3
Illness duration, years	20.6	9.4
Education, years	12.6	2.4
WRAT-III reading standard score	92.0	14.3
Total SAPS score	20.0	13.0
Total SANS score	22.1	15.9
Total HAMD score	6.0	6.3
Total chlorpromazine equivalent (mg)	342.7	182.1
Sex (% Male)	65.2	-
Race (% Caucasian)	38.0	-
Ethnicity (% Hispanic)	15.6	-
Current marital status (% Single, Never Married)	51.1	-
Antipsychotics (%Atypical/%Typical/%Both)	89.5/8.1/2.3	-

Note. HAMD = Hamilton Rating Scale for Depression; SANS = Scale for the Assessment of Negative Symptoms; SAPS = Scale for the Assessment of Positive Symptoms; WRAT-III = Wide Range Achievement Test-Third Edition

Table 2

The Assessment of Lifespan Functioning Attainment (ALFA) scale.

Questions to determine current age and age of psychosis onset: How old are you now? How old were you when you first experienced symptoms of your psychiatric illness, such as hearing voices, feeling paranoid, or believing things that you later realized were not true? What year did that happen? Draw a vertical line on the table below to mark the participant's age of onset and his/her current age.								
Interview Questions: Now I'm going to ask you to think about some different periods of your life. How many years during each period did you do these activities? (Anchors to assist the participant if applicable: grade level, age at first employment, age when he/she met best friend, etc.)								
Epoch of life	**18-20**	**21-30**	**31-40**	**41-50**	**51-60**	**61-70**	**Do you currently...**	
1. Paid Employment (Full-time student or full time child care provision counts as working)							__Yes (1)	__ No (0)
2. Living Independently (i.e., Non-supervised setting)							__Yes (1)	__ No (0)
3. Close Friendships (Someone you had contact with at least once a month)							__Yes (1)	__ No (0)
4. Romantic Relationships (Someone you would consider a significant other)							__Yes (1)	__ No (0)
5. Recreational Engagement (Engage in activities with people who were not part of your family)							__Yes (1)	__ No (0)

Table 3

ALFA Current, Post-Psychosis Decline, Pre-Psychosis, Post-Psychosis and domain functioning by epoch of adulthood.

ALFA Domain	% of sample Current functioning	% of sample reporting Post Psychosis Decline	% Pre-Psychosis functioning		% Post-Psychosis functioning		*t*	*d*	Mean % time engaged age 18 - 20 (N = 91)	Mean % time engaged age 21 - 30 (N = 91)	Mean % time engaged age 31 - 40 (N = 87)	Mean % time engaged age 41 - 50 (N = 75)	Mean % time engaged age 51 - 60 (N = 39)	Mean % time engaged age 61 - 70 (N = 5)
			M	*SD*	*M*	*SD*								
Paid Employment	5.4	74.1	88.5	23.0	22.9	25.9	21.3***	2.7	90.8	66.0	40.3	14.0	3.33	0.0
Living Independently	75.3	13.6	95.4	14.4	82.4	28.3	4.7***	0.6	93.1	89.9	85.3	70.3	51.4	23.3
Close Friendships	72.0	21.9	93.3	16.2	72.9	35.7	6.1***	0.7	91.4	86.1	77.2	57.6	39.2	30.0
Romantic Relationships	44.1	39.4	88.5	28.1	53.6	35.8	8.3***	1.0	85.9	78.3	64.3	36.0	19.5	5.0
Recreational Engagement	57.0	39.6	93.3	13.5	60.0	33.8	9.8***	1.3	90.6	82.7	66.4	47.3	26.8	18.3

Note. ALFA = Assessment of Lifespan Functioning Attainment

*** $p < .001$

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Table 4

Principal Components Analysis. Factor loadings for Pre-Psychosis, Post-Psychosis and Post-Psychosis Decline ALFA domain functioning.

Pre-Psychosis	**Functioning**	**Communality**
Close Friendships	.867	.752
Recreational Engagement	.867	.752
Romantic Relationships	.727	.528
Paid Employment	.630	.396
Living Independently	.700	.490
Eigenvalue	2.92	
%Variance	58.36	
Total Variance	58.36%	

Post-Psychosis	**Sociability**	**Independence**	**Communality**
Recreational Engagement	**.855**	.092	.739
Close Friendships	**.846**	.097	.726
Living Independently	−.193	**.815**	.701
Romantic Relationships	.334	**.680**	.574
Paid Employment	.298	**.413**	.259
Eigenvalue	1.68	1.32	
% Variance	33.7	26.3	
Total Variance		60.0%	

Post-Psychosis Decline	**Sociability**	**Independence**	**Communality**
Recreational Engagement	**.859**	.064	.743
Close Friendships	**.788**	.166	.649
Living Independently	−.141	**.793**	.650
Romantic Relationships	.306	**.697**	.579
Paid Employment	.245	**.673**	.512
Eigenvalue	1.53	1.60	
% Variance	30.7	32.0	
Total Variance		62.7%	