

The Daily Activity Report (DAR) a Novel Measure of Functional Outcome for Serious Mental Illness

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The assessment of real-world functional outcomes in clinical trials for medications targeting negative symptoms and cognitive impairment is extremely important. We tested the psychometric properties of the Daily Activity Report (DAR), a novel assessment of productive daily activity. We administered the DAR and additional assessments of functional outcome, functional capacity, cognition and symptomatology to 50 individuals with schizophrenia at 2 time points, 1 month apart and to 25 healthy controls. The DAR records a person's daily activity for 7 consecutive days based upon phone calls made 3 times a day. A total score and scores in 3 domains; instrumental activities (ie, independent living), social and work or school related activities are generated for the DAR. Inter-item consistency was high 0.89–0.94 for each domain and 0.88 overall. Test–retest reliability across 1 month for the total DAR score was 0.67, $P < .0001$. The total DAR score as well as scores for social activity and nondomestic work/school differed significantly between control and patient participants ($P < .0001$). DAR domain scores were associated with negative symptoms and functional outcomes, but the primary score related to these measures was the work/school dimension of the DAR. DAR scores were only weakly and nonsignificantly related to positive symptoms. This study provides preliminary support for the reliability and validity of the DAR using interviewer administration. The development of a patient reported version of the DAR using smart phone technology with automatic scoring is the next step.

Key words: schizophrenia/functional outcome/real-world outcomes

Introduction

Negative and cognitive symptoms are associated with functional outcome for individuals with schizophrenia.^{1,2}

Novel medication and psychosocial treatments are being developed and tested in an attempt to address these domains and the consequent impairment in functional activity. In these trials, it is important to assess the impact of treatment on real-world functional outcomes (what the person does in day-to-day life vs his capacity).

The assessment of “real world” functional outcome in this population is complicated by a host of factors including; the difficulty in locating individuals who can accurately report on the person's daily activities, limitations in the memory and insight of patients that may make them less than ideal reporters of their own functional status over extended periods of time, disincentives to work, and living environments that limit opportunities to engage in instrumental skills (eg, not being allowed to cook your own meals in a care home).³ These issues have been discussed at length in a number of publications.³ While many instruments attempt to assess what patients are doing during the day, careful review suggests these have considerable shortcomings involving data collection methods, interpretation of scoring and lack of detail.⁴ For example, in the interview guide for the Negative Symptom Assessment (NSA), 1 item asks patients to describe how they spend a typical day (ie, what time do they usually get up, what do they do next etc.).⁵ The time budget measure by Jolley et al⁶ asks the patient to recall all activities for all hours during the preceding week and then rates each 4-hour block on a productivity measure.⁷ Both methods require recall of specific activities over an entire week. This level of recall is difficult for anyone and may be especially problematic in patients who score on average 2 SDs below controls on tests of recall.⁸ The NSA item is only 1 score, while the Jolley measure mixes multiple constructs into 1 rating. Performance-based tests of functional capacity such as the UCSD Performance Based Skills Assessment and the

Functional Assessment Battery (FAB) do not assess function in the real-world but on analog tasks performed in front of an examiner.^{9,10} What a patient can do, in an artificial clinical setting, may have little relationship to what activities are actually initiated in a typical day.¹¹

A measure of functioning that does not rely on informants, insight or recall over long periods of time, or that assesses only capacity is needed to capture what people are doing and how productive they may be. This aspect of functional outcome is likely to be related to negative symptoms and more amenable to change during a relatively short clinical trial than other types of real-world functional outcome such as work or relationship status. Individuals with schizophrenia are typically able to report on what they are doing. For example, medication taking assessed by asking patients daily whether or not medication was taken correlates well with objective measures ($r = .61$ $P < .0001$) but self-report is poorly correlated with objective measures when patients are asked about adherence over the preceding 2-week period.^{12,13} Patients are also not as good at accurately reporting how well they do specific activities.¹⁴ For example, ratings by informants and patients are often poorly correlated.^{3,9,11,13,15-18}

The goal of this study is to describe the development of a novel measure designed to capture what a patient does during the day; and provide preliminary psychometric data.⁴ The Daily Activity Report (DAR) examines real-world functioning in a unique way by obtaining a report from the patient of all activities over a 7-day period. While the data are similar in principle to data collected in the Jolley measure, the DAR differs from that measure in a number of important ways. The DAR is based on frequent contact with the patient (3 telephone calls daily for 7 days) rather than a long period (1 week) of retrospective recall.³ Moreover, the DAR uses a structured interview to rate not only the activities and their complexity in 3 different domains (domestic, social, educational/occupational) but also whether or not the activities were initiated by the patient or prompted by others, and whether the activities were done independently or with assistance. The data present a complete picture of what the person is doing during a week. The data can be summarized in multiple ways and can provide information that would allow a researcher to make ratings on global instruments assessing functional outcome such as the Personal and Social Performance Scale (PSP). Global scales are typically rated during an interview with the patient with scores based upon self-report of activities recalled over months or on the report of significant others.^{19,20}

We examined inter-rater reliability, test-retest reliability and concurrent validity of the DAR in a sample of 50 patients with schizophrenia and how scores differentiated patients from 25 control subjects. We hypothesized that the DAR would have acceptable test-retest reliability and be correlated with negative symptoms and measures of functional outcome. We hypothesized that the DAR

would have good discriminant validity by being correlated more strongly with negative symptoms than positive symptoms, and that patients would demonstrate less productive activity than controls. An additional focus of the pilot was to provide qualitative data on activities that would allow us to scale down the DAR questions such that they would be amenable to being delivered as a patient reported outcome on a smart phone.

Methods

Study Design

Participants were assessed using the DAR for 7 days, and then they completed a structured in office assessment of functioning, symptomatology, and cognition. The DAR procedure was completed again 1 month later for the patient sample. The DAR was rated independently by raters different from those conducting the remainder of the assessments. All raters were trained on the DAR using recordings from a sample of 12 patient participants who were assessed during instrument development prior to this psychometric study. All raters received extensive training on rating scales and were required to reach an intra-class correlation coefficient (ICC) of .80 all scales prior to administering them for this study. Regular meetings were held throughout the study to prevent rater drift as recommended by Ventura et al.²¹

Subjects

Participants were 50 individuals with a clinical diagnosis of schizophrenia/ schizoaffective disorder²² recruited from community mental health clinics in South Texas. Sixty patients were approached, 53 consented and 50 participated in both baseline and follow-up. Twenty-five healthy control subjects were recruited from flyers and word of mouth. Patient participants were required to be between the ages of 18 and 60; speak and read English well enough to read all study-related material and to complete interviews, be clinically stable on antipsychotic therapy, live in the community in a family residence, apartment, or boarding home with no plans to move within the next month and have a telephone. Control participants were required to be free of an Axis I disorder²² and have no history of psychiatric treatment.

All participants signed a written consent form approved by an Institutional Review Board and procedures were consistent with internationally recognized standards for ethical conduct of human research. The study was registered with the [ClinicalTrials.gov](https://clinicaltrials.gov) database (identifier #NCT00406718).

Design

DAR Instrument Description. The DAR was developed following a comprehensive review of available instruments.⁴ In addition, we conducted focus groups with patients, family caregivers and professional caregivers

regarding functioning. Patients independently sorted various daily activities with respect to their importance to daily functioning and level of difficulty.⁴

The DAR is an assessment of a patient's daily activity for 7 consecutive days based upon phone calls 3 times daily. During these calls a semi-structured interview is followed which asks the participant to describe what he/she did for each hour during each 24-hour period. Scoring procedures and examples appear in table 1. Each hour is assigned 6 different scores; Instrumental Living Activity, Initiation/Independence of Instrumental Activity, Social Activity, Initiation/Independence of Social Activity, Work or School Activity and Initiation/Independence of Work or School Activity. Multiple types of activity can occur within the same hour. Sleep hours are scored as 0 in all domains. All other activities are scored 1–3 with lower scores reflecting more basic activities in the domain and higher scores reflecting higher level activities in the domain. Any activities engaged in for at least 15 minutes during an hour are scored greater than 0. Similar level activities (showering, dressing) are strung together to compose a 15-minute block. Each activity is then rated as to the extent to which it was initiated and carried out independently vs with prompting or assistance from another person. Higher scores indicate greater independence and self-initiation. The scoring system was based upon the data from patient ratings.

The DAR manual contains scoring rules. Scores for each day are averaged for each of the 3 domains and these are then averaged to produce a mean score for the week for every domain reflecting activity per hour. We also examined a DAR total score for the week that averaged the 3 activity domains (DAR TOTAL) and a second score calculated for average initiation/independence (DAR I) for the week. We wanted to determine if any additional information was provided by whether the patient reported that he initiated and independently carried out the activity. Thus, scores for each patient on the DAR could vary from 1–3 during waking hours and 0–3 overall. Hours asleep were calculated. Because patients are known to sleep longer than controls, scores for the DAR were examined both including and excluding sleep hours.

Additional Assessments

Symptomatology and Functional Outcome. *Symptomatology* Positive symptoms were assessed using the Marder factor from the Positive Symptoms from the Positive and Negative Syndrome Scale (PANSS).²³ Negative symptoms were assessed using the PANSS Negative symptom factor and the NSA-16.²⁴ A mean of the items was calculated. NSA item 14 rates daily activity specifically by asking the patient to describe a typical day from the time of waking up through bedtime.²⁴ NSA subscales rating motivation, and social interest were also examined as they have direct

Table 1. Daily Activity Report Example Scoring

Domain	Example Behaviors	Score	
Instrumental activities	Lying in bed or sleeping; pacing	0	
	Low activity (Sitting, watching TV, eating, riding as a passenger in a car)	1	
	Basic activities of daily living (showering, dressing, taking medication)	2	
	Simple household chores (cleaning, dishes, laundry, pet care, preparing simple foods)		
	Participating in treatment (attending a treatment program, doctor's appointment, self-help group)		
	Difficult chores or errands (taking care of children, paying bills, painting the house, cooking a large meal, grocery shopping, mowing, vacuuming)	3	
	Exercise (walking, running, biking)		
	Leisure activities (hobbies, crafts, personal email video games)		
	Work or school	Asleep or not engaged in work or school activity	0
		Job search, registering or applying for school, GED classes,	1
Volunteer job, odd jobs, sheltered work, job interview, Meeting with school advisors/financial aid		2	
Paid employment, college or technical classes or homework for these		3	
Social	Alone or asleep	0	
	With another person or people but not talking or doing anything together (eg, others in the room, no interaction)	1	
	Talking or doing an activity with one other person, interacting by phone, or social media	2	
	Talking or doing an activity with more than one other person	3	

relevance to the DAR. Scores vary from 0 to 6. Higher scores indicate a higher level of symptoms.

Interview Measures of Functional Outcome The Schizophrenia Objective Functioning Instrument or SOFI is a 49-item instrument used to rate functioning in multiple areas including living situation, instrumental

skills, productivity and social functioning.²⁵ A total score ranging from 0 to 100 is generated reflecting overall functioning for the individual. Global functioning over the past 3 months was also assessed on a scale from 1 to 100 using the Social and Occupational Functioning Scale (SOFAS).²⁰ Higher scores indicate better functioning.

Functional Capacity Measure Functional Capacity was assessed using the Brief Version of the UCSD Performance-Based Skills Assessment.²⁶ The participant is asked to perform a number of tasks in front of the examiner dealing with communication and money management. Scores vary from 0 to 100 with higher scores indicating better functioning. A total score reflects functional capacity.²⁶

Cognition We administered the Brief Cognitive Assessment (BCA) which assesses executive functions, attention, memory, and psychomotor speed.²⁷ Scores are transformed into Z scores based on the whole sample and averaged for a total score.

Data Analysis

All score distributions were normal or were transformed to approximate normal distributions. No meaningful differences in test statistics were found using parametric vs nonparametric tests or transformed vs nontransformed scores.

We used split half reliability²⁸ to examine the internal consistency of the DAR. We randomly split the scores for each hour into 2 sets and calculated Pearson correlation coefficients between halves. For the DAR total score we calculated the reliability of the linear combination of tests based on the estimated reliabilities and variances of the 3 DAR components as suggested by Nunnally (pg 227).²⁸ For test-retest reliability, we examined Pearson correlation coefficients. The concordance between 2 separate raters on the DAR was measured using the ICC. Potential sources of variance in DAR scores are patients, day of the week, time of day, raters, diagnostic groups, and occasions. Generalizability theory provided a framework for analyzing the data with respect to these sources of variability.²⁹ We examined convergent and discriminant validity as well as the ability of the DAR to differentiate between patient and control samples. Group comparisons on individual continuous measures were done with *t* tests. With respect to convergent validity we examined correlations between the DAR domains and measures of negative symptoms, cognition, and functional outcomes. With respect to discriminant validity, we examined correlations between measures of positive symptoms and the DAR. All analyses were repeated for DAR scores calculated using only waking hours. To determine whether the DAR added to the prediction of outcome scores over and above simply knowing the person was awake, we examined whether the change in *R*² was significant when adding DAR scores to number of sleep hours.

For correlational analyses within the patient group, we estimated a power of approximately 0.86 to detect a correlation of .4 and higher. For the tests examining differences between controls and patients we estimated a power of about 0.8 to detect a moderate effect size of 0.7.

Results

Demographics and baseline variables for the control and patient samples appear in table 2. All participants spoke English as their primary language. There were no statistically significant differences between control and patient participants with respect to demographic data (all *P*s > .30) with the exception of education and being employed which were higher in controls. As expected, the scores on the UPSA-B, SOFAS, and the BCA were significantly higher in control vs patient participants. Hours of sleep differed by group with controls spending approximately 8 hours and patients spending nearly 11. Controls and patients did not differ in number of calls completed.

Measures of Independence/Initiation were highly redundant with DAR scores in the 3 domains and added nothing to the prediction of outcome variables. Therefore, because they increase the complexity of data collection, and would

Table 2. Baseline Characteristics of Control and Patient Samples

	Control	Patient
Male gender	12 (48%)	30 (60%)
Hispanic	16 (64%)	27 (54%)
Non-Hispanic White	5 (20%)	10 (20%)
African American	3 (12%)	13 (26%)
Mean age	41.44 (15.68)	43.98 (9.43)
Mean years of education	13.28 (1.06)	12.31 (2.44)
Number employed	24 (96%)	14 (28%)*
competitively at least part time		
DAR instrumental activity	.93 (.21)	.87 (.24)
DAR social activity	.80 (.30)	.44 (.29)*
DAR work/school activity	.78 (.31)	.07 (.14)*
DAR TOT	2.51 (.33)	1.38 (0.45)*
Hours of sleep per day	7.97 (1.04)	11.03 (2.51)*
Brief cognitive assessment	.45 (.48)	-0.22 (.77)*
UPSA-B	72.77 (11.63)	56.41 (17.79)*
Social and Occupational Functioning Scale	78.55 (7.5)	44.48 (10.26)*
SOFI (patients only)		52.11 (14.78)
PANSS positive symptom factor mean score (patients only)		2.51 (.88)
PANSS negative symptom factor mean score		2.19 (.91)
NSA-16 mean score		2.69 (.75)
NSA social domain		2.87 (.99)
NSA motivation domain		3.51 (.82)
NSA activity item 14		4.62 (.80)
Completed calls	18.32 (2.53)	17.77 (3.83)

Note: DAR, daily activity report; SOFI, Schizophrenia Objective Functioning Instrument; PANSS, Positive and Negative Syndrome Scale; NSA, Negative Symptom Assessment. **P* < .0001.

likely complicate transfer of the DAR to smart phone application, these scores were dropped from further analysis.

Reliability of the DAR

Correlations among DAR scores at baseline within the patient sample were .23 for Instrumental Activity with Social Activity, .09 for Instrumental Activity with Work/School Activity, and .13 for Social Activity with Work/School Activity (all P s > .09). The 3 domains are not significantly correlated. This makes sense in that being at work typically precludes Social and Instrumental Activity.

The internal consistency of the DAR was .81 for Instrumental Activities, .93 for Social Activity, .94 for Work/School, and .97 for the DAR Total. Test-retest reliability across 1 month was .67 ($P < .0001$) for the DAR Total and .46 ($P < .001$) for Instrumental Activity, .75 ($P < .0001$) for Social Involvement and .48 nondomestic work ($P < .0005$). However, there were no significant differences across time for DAR total, or domain scores (all t s < $[-1.07]$ all P s > .29). Two raters rated audiotapes reflecting 264 hours of activity and the weighted kappa for agreement between raters was .83. Inter-rater reliability for individual items was .82 for instrumental, .77 for social and .89 for nondomestic work.

Validity of the DAR

The DAR total scores reflecting the average amount of activity in each domain per hour are graphed for

patients and control participants in [figure 1](#). The DAR total score as well as scores for social activity and non-domestic work/school activity differed significantly between control and patient participants ($t(1,73) = 10.96$ $P < .0001$, $t(1,73) = 5.05$ $P < .0001$, $t(1,73) = 13.54$ $P < .0001$; respectively). Patient participants engage in less total activity and less social and work/school activity. The amount of instrumental activities performed did not differ significantly by group ($t(1,73) = 0.96$; $P < .34$). [Figure 2](#) presents instrumental activities by hour of the day for patients and control participants. The figure indicates that patients spent much of the day doing the same amount of instrumental activity that controls did before work, during lunch hour and after work.

[Table 3](#) presents univariate correlations among symptom and outcome measures as well as the amount of variance accounted for when the DAR components were used to predict various outcomes in multiple regression analyses. With respect to convergent validity within the patient sample, regression analyses indicate the DAR is related to negative symptoms, NSA daily activity, SOFAS and SOFI scores as predicted. With respect to discriminant validity, the DAR was only weakly related to positive symptoms as hypothesized and this correlation was not significant. As predicted DAR total score was significantly correlated with the PANSS and NSA mean, NSA daily activity and community functioning as rated by the SOFAS. As can be seen from the univariate correlations and multiple R s, PANSS negative symptoms are

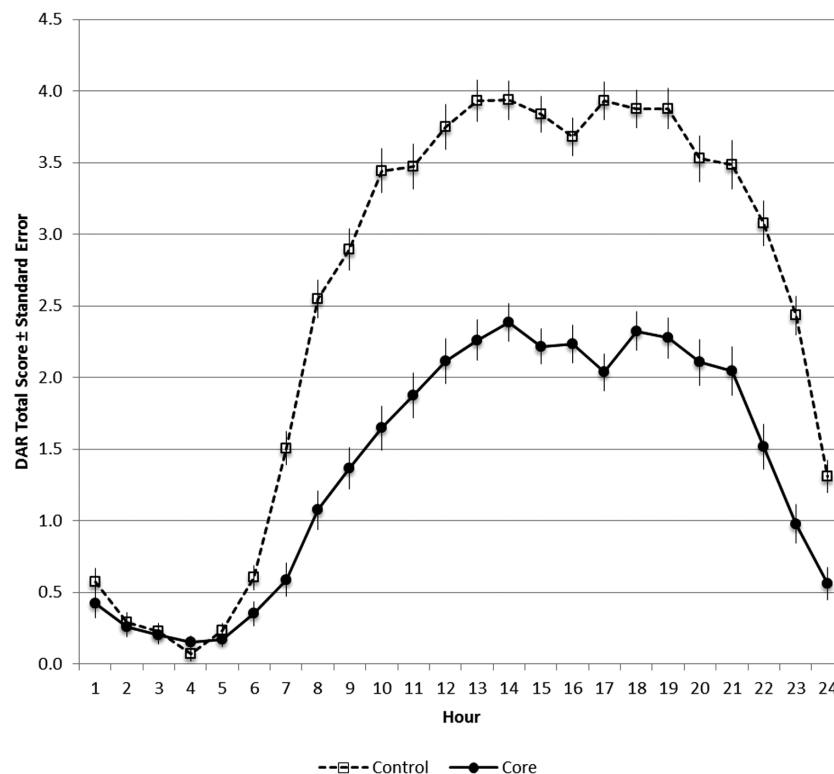


Fig. 1. Daily activity report (DAR) total score by hour for patients and controls.

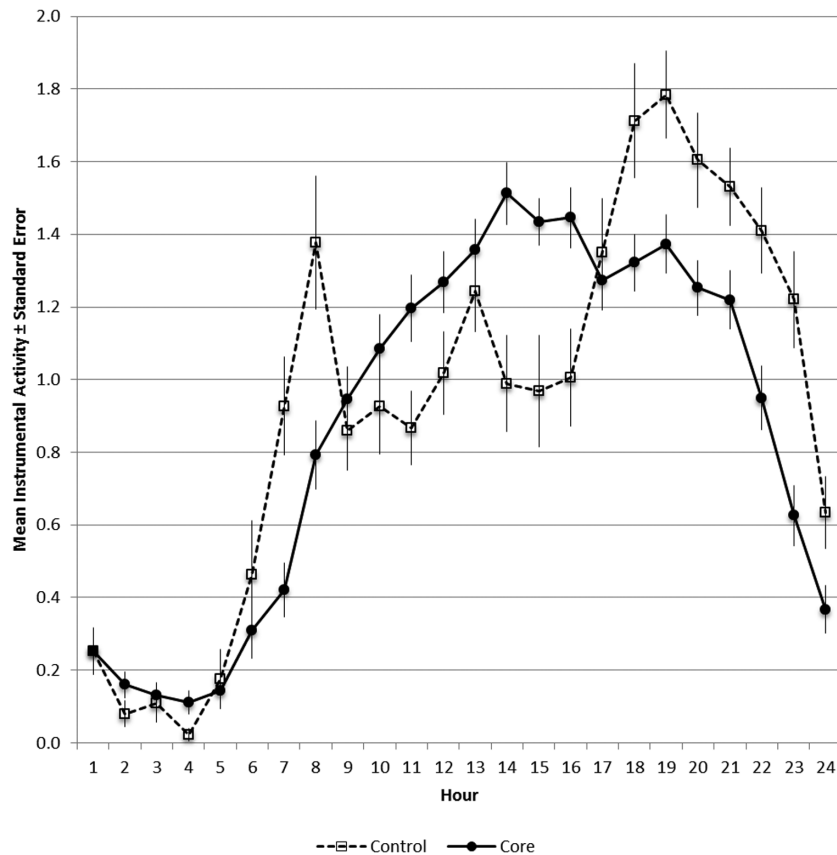


Fig. 2. Daily activity report (DAR) instrumental activities score by hour for patients and controls.

related at least at a trend level to all DAR domains, but functional measures are primarily related to vocational/school activities from the DAR. Multiple regression indicates that the instrumental score from the DAR contributes significantly to the SOFI total and UPSA-B. The amount of social activity engaged in by patients is correlated with the social item of the NSA and the PANSS negative symptom factor score. These analyses were not corrected for multiple comparisons.

When excluding scores for hours of sleep from the DAR, the general pattern of correlations and differences among controls and patients remained strikingly similar. We examined the relationship between hours of sleep and outcomes. Hours of sleep were correlated with PANSS negative symptoms ($r = .40$ $P < .003$), the NSA mean ($r = .35$ $P < .01$), the UPSA-B ($r = -.28$ $P < .05$), and the SOFI ($r = -.30$ $P < .04$) but not with the SOFAS ($r = .12$ $P > .40$). We believe that this suggests that hours of sleep should be included in the DAR scores. We also examined the ability of the DAR to predict symptoms and outcomes over and above hours of sleep using multiple regression entering hours of sleep first, followed by DAR scores for only waking hours. We found that the DAR added significantly to the prediction of the SOFI ($F(3, 45) = 3.76$ $P < .02$), SOFAS ($F(3,45) = 6.68$ $P < .0008$), NSA = 14 ($F(3,45) = 14.70$ $P < .0001$), NSA mean ($F(3,45) = 4.19$

$P < .02$), NSA social ($F(3,45) = 4.35$ $P < .0009$) and NSA motivation scores ($F(3,45) = 6.17$ $P = .002$).

Conclusions

The study provides preliminary support for the reliability and validity of the DAR and suggests that further refinement and investigation of such an instrument may be valuable. The 3 items represent fairly independent domains. A composite score may only be appropriate when examining the relationship of the DAR to measures such as negative symptoms which impact instrumental, social and vocational domains of functioning or with a scale such as the PSP in which all DAR domains are captured. Domain scores may be more appropriate when examining correlations among the DAR and IDLs, social or vocational outcomes separately.

The reliability of the DAR over 1 month was moderate indicating that daily activity is changeable. This may mean that a larger sample of patients would be needed to identify meaningful change in clinical trials, or that sources of variability would need to be identified and collected. Alternatively, the lower test-retest reliability could be viewed as a strength indicating that the DAR would be more sensitive to change.

Table 3. Convergent and Discriminant Validity of the DAR

	DAR Independent Living r ($B \pm SE$)	DAR Social Activity	DAR Work/School Activity	All components in Multiple Regression F , R^2 , t_{domain}	DAR TOT
SOFAS	.24***** (7.89 \pm 5.37)	.15 (1.59 \pm 4.47)	.54***** (37.93 \pm 8.89)	$F(3,46) = 7.64^{***}$, $R^2 = .33$, $t_{\text{INS}} = 1.47$, $t_{\text{SOC}} = 0.36$ $t_{\text{WORK}} = 4.27^{***}$.39*
SOFI total	.28* (17.18 \pm 8.2)	-.01 (-6.79 \pm 6.83)	.41** (42.77 \pm 13.58)	$F(3,46) = 5.07^{**}$, $R^2 = .25$, $t_{\text{INS}} = 2.09^*$, $t_{\text{SOC}} = -.99$, $t_{\text{WORK}} = 3.15^{**}$.27*****
NSA-16 mean score	-.26***** (-0.65 \pm 0.41)	-.17 (-0.16 \pm 0.34)	-.46*** (-2.31 \pm 0.68)	$F(3,46) = 5.58^{**}$, $R^2 = .27$, $t_{\text{INS}} = -1.60$, $t_{\text{SOC}} = -0.48$, $t_{\text{WORK}} = 3.41^{**}$	-.39**
NSA social domain	-.30* (-0.99 \pm 0.54)	-.24***** (-0.47 \pm 0.45)	-.43** (-2.74 \pm 0.90)	$F(3,46) = 5.66^{**}$, $R^2 = .27$, $t_{\text{INS}} = -1.81^{***}$, $t_{\text{SOC}} = -1.04$, $t_{\text{WORK}} = -3.04^{***}$	-.44**
NSA motivation domain	-.28* (-0.83 \pm 0.45)	-.13 (-0.06 \pm 0.38)	-.45** (-2.51 \pm 0.75)	$F(3,46) = 5.51^{**}$, $R^2 = .26$, $t_{\text{INS}} = -1.83^{***}$, $t_{\text{SOC}} = -0.16$, $t_{\text{WORK}} = -3.35^{**}$	-.37**
NSA item 14 activity item	-.22 (-0.53 \pm 0.35)	-.11 (0.04 \pm 0.29)	-.72*** (-4.05 \pm 0.58)	$F(3,46) = 17.94^{***}$, $R^2 = .54$, $t_{\text{INS}} = -1.51$, $t_{\text{SOC}} = 0.17$, $t_{\text{WORK}} = -6.98^{***}$	-.40**
PANSS negative	-.25***** (-0.66 \pm 0.52)	-.30* (-0.73 \pm 0.44)	-.31* (-1.74 \pm 0.87)	$F(3,46) = 3.76^*$, $R^2 = .20$, $t_{\text{INS}} = -1.26$, $t_{\text{SOC}} = -1.68^{***}$, $t_{\text{WORK}} = -2.00^{***}$	-.41**
PANSS positive Brief Cognitive Assessment	-.08 (-0.18 \pm 0.54) .17 (0.27 \pm 0.39)	-.07 (-0.06 \pm 0.45) .01 (-0.09 \pm 0.23)	-.27***** (-1.69 \pm 0.90) .26***** (0.81 \pm 0.44)	$F = 1.32$ $F = 1.60$	-.17 .17
UPSA-B	.33* (24.98 \pm 10.28)	-.01 (-7.79 \pm 8.56)	.33* (33.61 \pm 17.02)	$F = 3.89^*$, $R^2 = .18$, $t_{\text{INS}} = 2.43^*$, $t_{\text{SOC}} = -0.91$, $t_{\text{WORK}} = 1.97^{***}$.25*****

Note: SOFAS, Social and Occupational Functioning Scale. Table entries are unadjusted Pearson correlations and unstandardized multiple regression coefficients \pm standard errors. The fourth column summarizes the simultaneous multiple regression analysis. The final column is the Pearson correlation of the DAR total score with the functional measures.

* $P < .05$; ** $P < .01$; *** $P < .001$; **** $P < .0001$; ***** $P < .10$.

The DAR total score and scores for social and work/school activities discriminated patient participants from controls. Instrumental skills for controls and patients did not differ. Results pictured in figure 2 suggest that in a typical day, controls performed instrumental living tasks before work, during lunch, and after work, but did the same amount of these tasks as did patients during the entire day. Being at work generally excludes the possibility of engaging in nonwork related instrumental living skills. This pattern of activity clearly differentiating patients and controls is further support for the validity of the DAR.

The DAR total score was significantly correlated with negative symptoms and not positive symptoms, and was correlated with global social and occupational functioning demonstrating both convergent and discriminant validity. Results suggest that the DAR captures motivation, initiation and doing which may be important initial targets in studies of compounds designed to improve negative symptoms. Significant correlations between the DAR and the SOFAS/SOFI were moderate, but results suggest that, in general, measures of negative symptoms and functional outcome are primarily related to number of hours engaged in school and work. This may suggest that the negative symptom and functional outcome measures are primarily tapping the same work-related construct.³⁰ Work is highly stable in short-term trials and likely is less amenable to change. DAR instrumental activity predicted the majority of the variance in UPSA-B scores. The DAR was only weakly correlated with cognition perhaps because it does not capture the quality of performance of these activities.

Results also demonstrated the low level of activity engaged in by patients with schizophrenia treated in community mental health. Much of the day is taken up with very basic tasks and by nonproductive activities such as watching television. Individuals rarely worked or went to school and were significantly isolated from others. This is the first study attempting to quantify daily activity in this population with an immediate behavioral sampling approach attempting to determine all activities every 24 hours for 1 week. While ecological momentary assessment systems sample behavior by asking patients to respond to a text message regarding activities they are engaging in at various times during the day, this methodology is likely missing important but infrequent behaviors performed by those with serious mental illness.³¹ Even with the labor intensive data collection method in the current study, the majority of calls for both patients and controls were completed and there was no difference between groups in terms of number of completed calls, suggesting that contact 3 times daily is feasible.

Results must be interpreted with respect to methodological limitations including relatively small sample size, chronicity of the sample (most individuals having been ill >10 y), and the limited cognitive battery. The lack of

inclusion of another measure of daily activity other than the NSA daily activity item with which to compare the DAR is a limitation. Moreover, measures of symptoms and functioning were obtained only at baseline.

Despite these limitations, results suggest that patients can successfully report on their behaviors and that these reports are correlated with in office assessments by blinded raters. The DAR may be assessing a unique type of data not captured by existing instruments. The DAR may be feasible to employ using smart phone technology as a patient reported outcome in future studies.

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