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UPSA-M: Feasibility and initial validity of a mobile application of the UCSD Performance-Based Skills Assessment

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1. Introduction

Schizophrenia is a chronic and severe mental illness frequently resulting in real-world functioning deficits that persist into late life. Unemployment, reduced productivity, and residential dependence have made schizophrenia among the most serious and expensive chronic illnesses (Wu et al., 2005). Neuropsychological deficits have consistently been identified as the strongest predictor of real-world functioning (Green, 1996; Green et al., 2004; Harvey et al., 1998), and the impact neuropsychological deficits have on functional impairments persist beyond the role of symptom severity (Kurtz et al., 2008). Neuropsychological performance, however, accounts for only ~25% of the variance in real-world functioning (Fett et al., 2011), and several factors have been identified as mediators of the relationship between neuropsychological ability and real-world functioning (Bowie et al., 2008; Brekke et al., 2005; Keefe et al., 2006).

Functional capacity, defined as abilities that are essential to function independently in the community, is one known mediator between neuropsychological ability and real-world

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Conflict of Interest

None to declare.

Contributors

Raeanne Moore helped with the design and development of the UPSA-M, collected data, carried out the statistical analyses, and wrote the paper. Pariya Fazeli, Colin Depp, David Moore, Eric Granholm, and Dilip Jeste assisted with writing the paper. Thomas Patterson helped with the conceptual design of the UPSA-M, provided consultation on data collection, and assisted with writing the paper. Brent Mausbach helped with the conceptualization and design of the UPSA-M, supervised data collection and statistical analyses, and assisted with writing the paper. All authors contributed to and have approved the final manuscript.

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functioning (Bowie et al., 2008; Bowie et al., 2006; Ho et al., 2013). Appropriate assessment of functional capacity is a fundamental component of determining the real-world relevance of treatment response in clinical trials to improve cognitive impairment (Green et al., 2004; Green and Nuechterlein, 2004; Velligan et al., 2013). Traditionally measured with performance-based assessments, functional capacity assessments require consumers to role-play specific functional skills in a controlled environment. These assessments provide an objective index of current abilities and can help researchers and clinicians determine patients' abilities and the effectiveness of cognitive and vocational rehabilitation efforts. The UCSD Performance-Based Skills Assessment (UPSA; Patterson et al., 2001) is one such measure that is frequently used in both clinical and research environments to assess functional capacity among those aging with schizophrenia (Bowie et al., 2012; Kalache et al., 2014; Marx et al., 2014; Murthy et al., 2012; Patterson et al., 2006b) and is considered the best available functional capacity assessment (Green et al., 2011; Mausbach et al., 2009). Psychometric strengths of the UPSA have been demonstrated in several studies. For example, both the UPSA and the Brief UPSA (UPSA-B) have been found to be accurate predictors of residential independence among middle-aged and older adults with schizophrenia (Mausbach et al., 2011; Mausbach et al., 2008b). Additionally, Mausbach et al. (2007) found that the UPSA-B was a more substantial predictor of employment status than symptoms or cognitive performance. Strong positive correlations between neuropsychological test performance and the UPSA have been repeatedly observed (Bowie et al., 2010; Depp et al., 2009; Harvey et al., 2009; Holshausen et al., 2014; Keefe et al., 2006; Mausbach et al., 2007; McClure et al., 2007; Moore et al., 2013c; Twamley et al., 2002), and the UPSA has been found to mediate the relationship between neuropsychological ability and real-world functional outcomes (Bowie et al., 2008; Bowie et al., 2006).

Despite the many strengths of the UPSA and the UPSA-B, these tests require several props and examiner materials (e.g., administration manual) that can be burdensome and impractical in clinical settings. We previously developed and validated a computerized version of the UPSA (C-UPSA; Moore et al., 2013b) in a sample of middle-aged and older patients with schizophrenia and control participants, and found C-UPSA performance was correlated to performance on the original UPSA. Advantages of the C-UPSA over the traditional version of the test include: increased portability, ease of administration and scoring, including standardized audio files of instructions and test questions, decreased administration time, less examiner impact on participant performance, and recording of participants' verbal responses for the examiner to listen to at a later time and score. However, mobile applications (apps) via smartphones and tablet devices are increasingly being used in clinical and research settings, and most of the NIH's institutes and centers have made significant investments in use mobile technology to improve healthcare outcomes (Collins, 2011). Given that the C-UPSA is restricted to use on a personal computer or laptop, the goal of the present study was to develop and establish feasibility and initial validity of a mobile app version of the UPSA (UPSA-M) to further enhance portability and ease of administration and scoring of the UPSA test. Advantages of a mobile app version of the UPSA compared to the C-UPSA are that it includes all of the advantages of the C-UPSA, as well as 1) increased portability, which would be particularly beneficial in a

hospital setting, 2) the option to administer the full UPSA or the UPSA-B and 3) touch screen capacity, which is more translatable to today's real-world functional activities (e.g., using the touch screen on an ATM). The population of people living with schizophrenia is aging, and middle-aged and older adults demonstrate greater aging-associated impairment to functioning. The President's New Freedom Commission on Mental Health (2003) has appealed for the development of effective treatments to "aid persons with severe mental illness to more adequately live, work, and participate in their communities". However, to test the efficacy of new treatments in this population, feasible and valid outcome measures, such as UPSA-M, are needed. Thus, the current study extends our previous work by investigating: 1) the feasibility of using the UPSA-M in middle-aged and older adults with schizophrenia and whether the UPSA-M could significantly differentiate the schizophrenia from age-matched control participants; 2) the relationship of the UPSA-M to the traditional UPSA and UPSA-B; 3) the clinical correlates of UPSA-M among participants with schizophrenia; and 4) the impact of tablet usage on UPSA-M performance.

2. Method

2.1. Sample

This study was approved by the University of California, San Diego (UCSD) Institutional Review Board. All participants volunteered and provided written, informed consent. Participants for this study consisted of 21 individuals diagnosed with schizophrenia or schizoaffective disorder and 13 demographically-matched healthy comparison participants (HC). Participants with schizophrenia were recruited from one of two randomized controlled trials (Skills Training and Empowerment Program [STEP] or Improving Recovery in Schizophrenia [IRIS]), both of which were examining the efficacy of psychosocial interventions to improve UPSA scores. We used post-treatment UPSA scores as baseline data and tested participants with the UPSA-M during a separate post-treatment visit. No participants were receiving the psychosocial treatment in the period between original UPSA and UPSA-M assessment visits. For this study, patients with schizophrenia were required to be at least 30 years of age, have a chart diagnosis of schizophrenia or schizoaffective disorder (verified by chart review, as diagnosed by the patient's psychiatrist), and be fluent in English. Participants were excluded for: dementia, suicidal ideation or intent, inability to complete the assessment battery, or if they were enrolled in another psychosocial intervention or pharmacotherapy study at time of intake. The UCSD-Brief Assessment of Capacity to Consent (UBACC; Jeste et al., 2007) was used to determine capacity to consent prior to intake. HC participants were recruited from longitudinal observational studies. Inclusion criteria for HC participants were 30 years of age or older and English fluency. Exclusion criteria included a psychiatric diagnosis (as assessed by the Mini International Neuropsychiatric Interview; Sheehan et al., 1998) or diagnosis of dementia. Every attempt was made to make HCs comparable to patients with schizophrenia on demographic variables, including age, gender, and race (Table 1).

2.2. Measures

2.2.1. UCSD Performance-Based Skills Assessment – Mobile App (UPSA-M)—

We developed a mobile application (app) of the full UPSA for use on iPads. We previously

developed a computerized version of the UPSA (C-UPSA; Moore et al., 2013b), in which we retained 4 of the 5 subtests from the full UPSA (planning recreational activities, finance, communication, and transportation). In our initial validation of the C-UPSA, we found it was highly related to the full paper and pencil UPSA ($r = 0.73, p < 0.001$); therefore, the same 4 subtests were retained for the UPSA-M. The relationship between the UPSA-B and the C-UPSA Brief was also highly correlated ($r = 0.71, p < 0.001$). Users have the option to administer the full UPSA or the UPSA-B (Finances and Communications subtests of full UPSA) on the UPSA-M. A tutorial is included in the UPSA-M for examiners to help familiarize patients with using the iPad, including zooming, scrolling, advancing the screen, writing on the device (including using fingers and a stylus), and selecting/deselecting items. We also wrote a user manual that contains explicit instructions for testers on how to walk participants through the tutorial before testing as well as test administration and scoring instructions. As with the traditional UPSA, raw scores are converted to standard scores with each subtest scaled scores ranging from 0 to 25 points (max total score=100 points).

2.2.2. Criterion Measures—The criterion measures used to assess the construct validity of the UPSA-M included the full UPSA (Patterson et al., 2001), UPSA-Brief (UPSA-B; Mausbach et al., 2007), Repeatable Battery for the Assessment of Neuropsychological Status (RBANS; Randolph, 1998), and the Positive and Negative Syndromes Scale (PANSS; Kay, 1987). We have previously described these measures in detail (Ho et al., 2013; Moore et al., 2013a; Moore et al., 2013b). Briefly, the full UPSA consists of 5 subscales assessing functional skills in the domains of planning recreational activities, finance, communication, transportation, and household chores. The UPSA-B consists of the finance and communication subscales of the full UPSA. The RBANS total score, which consists of immediate and delayed memory, attention, visuospatial, and language indices, was used to assess overall neurocognitive status, whereas the PANSS assesses severity of psychotic symptoms. The positive and negative symptoms subscales of the PANSS were used in this study.

2.2.3. Computer Usage—We developed a Computer Usage Questionnaire in which participants were asked about their tablet device usage (e.g., *Have you ever used a tablet device before today?*), internet usage (*Do you ever use the internet? If so, how often?*), as well as difficulty with the iPad in the following domains (ranked from 1=Not at all [difficult] to 5=Very much [difficulty]): operating the device, understanding the questions, hearing the questions, and seeing items on the screen. This questionnaire also included an item on enjoyment with using the iPad, from 1=Not at all to 5=Very much.

2.3. Procedures

Patients with schizophrenia completed the criterion measures at their respective B&C facility or day treatment program at baseline and at 6-, 12- and 18-month follow-ups. We administered the UPSA-M and our computer usage questionnaire no less than 2 weeks and no more than 3 months after assessment with the original UPSA, PANSS, and RBANS. HC participants were administered the UPSA-B as part of their ongoing successful aging study, and the UPSA-M was administered within one or two months of UPSA-B completion.

Once participants completed the practice iPad operating tasks presented in the UPSA-M tutorial and appeared comfortable with the device, the UPSA-M was administered without examiner involvement. Participants listened and responded verbally or with a stylus to questions asked by the tablet. Headphones were provided if the participant has hearing difficulties or otherwise preferred to use headphones. As with other versions of the UPSA, participants have the option to repeat questions one time. All responses were stored on the device for examiners to score after testing is completed. Scoring of non-verbal responses were automatically completed using a standard algorithm, whereas digitally stored audio responses must be listened to by the examiner and scored according to UPSA scoring procedures.

2.4. Statistical Analyses

Data were inspected for normality and all data was normally distributed. Group differences were examined using t-tests for continuous and chi-squared tests for categorical variables, and correlational analyses between UPSA-M, UPSA-M Brief, clinical correlates, and other variables were performed. Next, a more clinically meaningful probabilistic index [$P(X > Y)$] (Acion et al., 2006) was calculated using the area under curve from Receiver Operating Characteristic analysis. In this study, $P(X > Y)$ represents the probability that a randomly selected schizophrenia patient will have a worse score on the UPSA-M than a HC. For example, a value of 0.73 indicates that when comparing a randomly selected schizophrenia patient against a randomly selected HC, 73% of the time the schizophrenia patient will have a worse UPSA-M score. For all analyses, alpha was set at 0.05, two-tailed.

3. Results

3.1. Group Differences in UPSA-M Performance

Demographics and clinical characteristics are presented in Table 1. Participants did not significantly differ on age, gender, or race/ethnicity. HC participants reported more prior tablet use, more past internet use, and greater current frequency of internet use than patients with schizophrenia. HC participants also reported less difficulty operating and seeing the iPad than the patients with schizophrenia; however, when comparing the means on these two items, patients with schizophrenia reported, on average, a *little bit of difficulty* operating the device and seeing items on the screen, whereas HC participants reported, on average, that the iPad was *not at all difficult* in regard to these factors. Detailed examiner notes indicated that patients with schizophrenia were less likely than HC participants to zoom in on the items during testing. No group differences were observed on understanding or hearing the questions on the iPad or preference for using the iPad compared to the traditional test (with both groups reporting greater preference for the iPad version). HC participants showed significantly greater scores than the patients with schizophrenia on the UPSA-M full version ($d=.097$), UPSA-M Brief ($d=1.34$), and Finances subtest ($d=1.66$) (Table 1). Because this sample of patients with schizophrenia had significantly lower education than the NCs, we repeated these analyses covarying for education. The comparison for the full version of the UPSA-M was not significant when education was covaried for ($F=3.44$, $p=0.08$, $d=1.35$), but the UPSA-M Brief comparison remained significant in this analysis ($F=8.63$, $p<0.01$, $d=3.15$).

The area under the curve (AUC) for the UPSA-M indicated there was an estimated 80% probability ($AUC=0.80, p<0.01$) that a randomly selected HC would have a higher score on the UPSA-M than a randomly selected schizophrenia participant. The probability of a randomly chosen HC scoring higher on the UPSA-M Brief than a randomly selected schizophrenia participant was 87% ($AUC=0.87, p<0.001$). In comparison, the AUC for the paper-and-pencil UPSA-B was 0.89 ($p<0.001$), showing practically equivalent sensitivity to the UPSA-M Brief.

Among the schizophrenia group and controlling for time between assessments, the UPSA-M was related to the traditional UPSA ($r=0.61, p<0.01$), and UPSA-M Brief was related to UPSA-B ($r=0.73, p<0.01$). However, UPSA-M Brief and UPSA-B performance was not related among HC participants ($r=0.24, p=0.45$).

3.2. Clinical Correlates of UPSA-M Performance among Patients with Schizophrenia

We examined the relationships between neuropsychological status, symptom severity and UPSA-M performance among the schizophrenia group. As seen in Table 2, UPSA-M and RBANS scores were highly related, whereas UPSA-M Brief and RBANS approached significance. RBANS and the traditional UPSA and UPSA-B, which were administered on the same day, were highly related, as seen by correlations of $r=0.77$ ($p<0.001$; UPSA) and $r=0.68$ ($p<0.01$; UPSA-B). For the full and brief versions of the original UPSA and UPSA-M, no significant relationship was found with positive or negative symptoms of psychopathology.

3.3. UPSA-M and Tablet Usage among Patients with Schizophrenia

We were interested in determining whether UPSA-M performance was associated with tablet usage in the schizophrenia group (Table 2). Mean time to complete the full UPSA-M was 13 minutes ($SD=4$ minutes) for HC participants and 19 minutes ($SD=5$ minutes) for patients with schizophrenia. Estimated time to complete the UPSA-M-Brief is 7–10 minutes, although this was not directly measured. In addition, patient-reported enjoyment with using the iPad was related to better UPSA-M and UPSA-M Brief performance, whereas other computer usage variables (i.e., self-reported difficulty operating the device) were unrelated.

4. Discussion

Findings from this study demonstrate the feasibility of a mobile app version of the UCSD Performance-Based Skills Assessment (UPSA-M) for use in middle-aged and older adults with schizophrenia. Specifically, we found that the UPSA-M was able to differentiate patients with schizophrenia 80% of the time, and this classification ability increased to 87% with the UPSA-M Brief, demonstrating equivalent sensitivity to differentiate patients with schizophrenia as the paper-and-pencil UPSA-B despite overall lower performance on the UPSA-M and UPSA-M Brief. Patients with schizophrenia performing significantly worse than the HC group on the financial tasks, whereas significant group differences were not found on the other UPSA-M subtests. It may be that participants with schizophrenia have learned less about keeping their finances in order over their lifetime (a job that is often done by a case manager) than the HCs; however, as was previously mentioned the patients with

schizophrenia had recently completed a skills training intervention to help them improve these skills, so this subtest may be a more sensitive indicator of impairment in this population than the other subtests. Additionally, the UPSA-M was related to the traditional UPSA, despite only 3 of the 20 patients with schizophrenia having prior experience using a tablet device and none owning a tablet. Consistent with other studies, we found neuropsychological performance was related to functional capacity as measured by the UPSA-M. The iPad was designed to be user friendly, and with a brief (<5 minute) tutorial all participants were able to use the device independently without observed or self-reported problems. Given that patients with schizophrenia reported greater difficulty operating the device and seeing items on the screen, future studies would likely benefit from spending more time having participants engage in guided practice during the tutorial, especially with the zoom feature.

In a systematic review of functional capacity instruments, convergent validity of the paper-and-pencil UPSA and UPSA-B was found to be strong across studies, with schizophrenia patients consistently scoring worse on the UPSA than participants without schizophrenia. (Mausbach et al., 2009). A strong relationship with performance on the UPSA or UPSA-B and neurocognitive tests has already been demonstrated across studies, and results of several clinical trials (e.g., Granholm et al., 2005; Patterson et al., 2005; Patterson et al., 2006a) have demonstrated that both versions of the test are sensitive to change. Findings from this preliminary study are encouraging and suggest that the UPSA-M may possess similar psychometric properties as the original paper-and-pencil versions of the test.

The control group did not perform as expected on the UPSA-M. Our control sample and were recruited from the community and age- and gender-matched to the participants with schizophrenia. However, the control participants were not formally assessed for serious mental illness, but simply asked whether they had a diagnosis of a serious mental illness (such as schizophrenia). Therefore, it is difficult to determine whether results from our control sample are generalizable. There was a lack of correlation between UPSA-B and UPSA-M Brief in our control group, which is likely due to the restricted range of performance on both versions of the test in this sample.

There are limitations to our study. The sample size was relatively small which may reduce power and limit generalizability; however, we had adequate power to detect group differences. While our pilot study addressed the feasibility and some preliminary validity data of the UPSA-M and UPSA-M Brief, the small sample size limits us from an in-depth exploration of the validity of the UPSA-M. In addition, the relationship to real-world outcomes (i.e., employment status) and sensitivity to change were not measured in this study. A larger randomized controlled trial focused on the sensitivity and specificity of the UPSA-M for identifying functional milestones (e.g., work outcomes) is needed. Another viable option to establish the true validity of the UPSA-M is to pool the results of several studies using the UPSA-M in different situations (e.g., post-hospitalization) and with different patient populations (e.g., bipolar disorder) (Deeks, 2001; Fan et al., 2006). Additionally, our schizophrenia sample was relatively older and iPad naïve, and it is likely our results will generalize to other patient populations with psychopathology and/or cognitive impairment. Participants were recruited from ongoing longitudinal research

studies, and thus were a sample of convenience. Participants in this study may not reflect the greater schizophrenia and HC populations at large. Nonetheless, these samples were similar on key demographic variables, and we feel confident that group differences observed in this study are not an artifact of sampling bias. Additionally, patients with schizophrenia had recently completed a randomized controlled trial specifically focused on improving daily functioning, and therefore their original UPSA and UPSA-M scores may be higher than those in the general schizophrenia population. Indeed, mean UPSA scores for schizophrenia patients enrolled in the original UPSA validation study (Patterson et al., 2001) were over 15 points lower than mean UPSA-M scores in our sample. Our schizophrenia sample was experiencing a low level of severity of positive and negative symptoms, which may partially explain the non-significant relationship with the traditional UPSA and UPSA-M and negative symptoms. Therefore, the group differences may have been more pronounced if we had used a random community sample of patients with schizophrenia. The lack of relationship between UPSA-B and UPSA-M Brief in the HC sample was likely due to ceiling effects. Future studies are needed to examine the psychometric properties of the UPSA-M in larger and more diverse samples of patients with schizophrenia as well as other patient populations with cognitive impairment. Future research on the UPSA-Ms reliability and validity would benefit from counterbalancing the order of the tests, which was a limitation to this study. The original UPSA has been translated into several other languages and used in patients with bipolar disorder, HIV-associated neurocognitive impairment, methamphetamine dependence, and mild cognitive impairment; our goal is that the UPSA-M, with validity testing, will be deemed appropriate for use in these various samples as well.

In summary, this pilot study represents an important first step in the validation of the UPSA-M. Namely, this study provides proof of concept with support for the feasibility and clinical utility of the UPSA-M in assessment of functional capacity among adults aging with schizophrenia, and these preliminary data suggest other researchers can feel comfortable including this app in their research studies. We previously demonstrated the usefulness of the original UPSA (Mausbach et al., 2008a; Patterson et al., 2001), UPSA-Brief (Mausbach et al., 2007; Mausbach et al., 2011; Mausbach et al., 2010), and a computerized version of the UPSA (Moore et al., 2013b). Once further validity studies have been performed, the UPSA-M may emerge as a useful clinical and research tool, such as a decision aid tool to help clinicians determine which programs or services a patient may qualify for, which increased portability and ease of administration than alternative versions of the test.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Descriptive Statistics for Demographic Variables and Test Scores for Comparison and Schizophrenia Groups.

	Possible Score Range	Comparison Group (n=13)	Schizophrenia Patients (n=20)	t or Chi ²	df	p
Demographics						
Age (years), M (SD)	--	47.2(6.7) Range: 37–57	50.5(8.4) Range: 32–64	1.19	31	0.24
Female Gender, n (%)	--	54% (n=7)	45% (n=9)	0.25	1	0.62
Education (years), M (SD)	--	15.9(2.0)	12.5(1.9)	-4.77	29	<0.01
Ethnicity (% White)	--	54% (n=7)	45% (n=9)	0.25	1	0.62
Living Situation (% Board and Care)	--	0% (n=0)	90% (n=18)	--	--	--
Neurocognitive, Symptom and Functional Skills Measures						
RBANS Total Score, M (SD)	40–160	--	69.42(13.95)	--	--	--
PANSS Positive, M (SD)	7–49	--	12.45 (5.08)	--	--	--
PANSS Negative, M (SD)	7–49	--	14.70 (4.77)	--	--	--
UPSA Total Score, M (SD) ^a	0–100	--	74.74(11.91)	--	--	--
UPSA Brief (UPSA-B) Total Score, M (SD)	0–100	87.33(7.95)	65.35(16.37)	-4.49	31	<0.01
UPSA-M Total Score, M (SD)	0–100	80.21(7.74)	67.05(15.15)	-2.67	27	0.01
UPSA-M Brief Score, M (SD)	0–100	76.22(8.07)	56.91(17.65)	-3.68	30	<0.01
UPSA-M Planning Recreational Activities, M (SD)	0–25	20.80(2.77)	18.10(4.79)	-1.83	31	0.08
UPSA-M Finances, M (SD)	0–25	20.80(2.60)	13.40(5.46)	-4.54	30	<0.01
UPSA-M Communication, M (SD)	0–25	17.31(2.81)	14.58(4.93)	-1.81	31	0.08
UPSA-M Transportation, M (SD)	0–25	21.97(3.28)	19.96(5.66)	-1.08	28	0.29

	Possible Score Range	Comparison Group (n=13)	Schizophrenia Patients (n=20)	t or Chi ²	df	p
Average Time to Complete UPSA-M (minutes), M (SD)	--	13.1(3.5)	19.1(5.3)	3.37	30	<0.01
Tablet Usage						
Prior Tablet Device Use (% yes)	--	76.9%	14.3%	13.34	1	<0.01
Ever Use Internet (% yes)	--	100%	33.3%	14.73	1	<0.01
Frequency of Internet Use (among participants who use the internet)						
Rarely		0%	0%	6.40	18	<0.01
Daily		100%	4.8%			
Weekly		0%	23.8%			
Monthly		0%	4.8%			
Difficulty Operating Device ^b , M (SD)	1-5	1.15(0.38)	1.95(1.19)	2.33	31	0.03
Difficulty Understanding Questions ^b , M (SD)	1-5	1.15(0.38)	1.52(0.93)	1.36	32	0.18
Difficulty Hearing Questions ^b , M (SD)	1-5	1.00(0.00)	1.24(0.44)	1.96	32	0.06
Difficulty Seeing Items on Screen ^b , M (SD)	1-5	1.31(0.63)	2.14(1.20)	2.32	32	0.03
Preferred UPSA-M over UPSA ^c , M (SD)	1-5	4.36(0.65)	4.14(0.91)	-0.83	32	0.41

Note. RBANS=Repeatable Battery for the Assessment of Neuropsychological Status; UPSA=UCSD Performance-Based Skills Assessment; UPSA-M=UCSD Performance-Based Skills Assessment-Mobile Version;

^a Control participants did not complete the full original UPSA;

^b Higher value indicates greater difficulty;

^c Higher value indicates greater enjoyment/preference of iPad/ UPSA-M.

Table 2

Correlations among UPSA-M and UPSA-M Brief Scores, Clinical Correlates, and Tablet Usage in Patients with Schizophrenia

	UPSA-M Total	UPSA-M Brief
RBANS Total Score	0.77**	0.44
PANSS Positive	0.23	0.35
PANSS Negative	−0.24	−0.20
Completion Time	−0.24	−0.29
Difficulty Operating Device	−0.04	0.04
Difficulty Understanding Questions on Device	−0.20	−0.14
Difficulty Hearing Device	−0.09	−0.04
Difficulty Seeing Items on the Screen	−0.30	−0.50*

Note.

*
 $p < 0.05$;

**
 $p < 0.01$