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Neurocognitive and Functional Correlates of Mobile Phone Use in Middle-Aged and Older Patients with Schizophrenia

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Abstract

Objectives—Our objective was to examine the association of mobile phone use and ownership with psychopathology, cognitive functioning and functional outcome in 196 outpatients aged 40 and older who were diagnosed with schizophrenia.

Methods—Participants reported their past and current mobile phone use on a standardized self-report scale and they were administered tests of global cognition, functional capacity and informant-rated functional outcome.

Results—The great majority of subjects had used a mobile phone (78%) but few currently owned one (27%). After adjusting for age (mean age 51), any past mobile phone use was associated with less severe negative symptoms, and higher global cognitive performance, functional capacity, and functional outcome. A total of 60% of participants reported being comfortable with mobile phones, but comfort was not associated with any cognitive or functional outcomes.

Conclusions—Most older patients with schizophrenia have used mobile phones and lifetime mobile phone use is a positive indicator of cognitive and functional status.

Keywords

Psychosis; cognitive functioning; disability; technology; aging

INTRODUCTION

Approximately 91% of all Americans own a mobile phone (Duggan & Smith, 2013). The ability to use a telephone is considered one of the instrumental activities of daily living, and mobile phones are rapidly replacing land-line telephones as an “everyday technology” (Czaja et al., 2006). Furthermore, a number of interventions focusing on schizophrenia have used mobile phone to extend psychosocial interventions to the community, delivered through

either live communication with a provider, text messages, or smartphone applications, with intervention foci reminders or prompts to engage in self-management activities outside of the clinic setting (Depp et al., 2010; Palmier-Claus et al., 2013) or elements of evidence-based treatments such as cognitive behavioral therapy for SMI (Ben-Zeev et al., 2014; Granholm, Ben-Zeev, Link, Bradshaw, & Holden, 2012). Thus, mobile phone use can be viewed as an increasingly relevant indicator of functional status and as a potential conduit to intervention in schizophrenia. However, little is known about the status of mobile phone penetration in schizophrenia, or the illness and functional correlates of mobile phone use, particularly among middle-aged and older adults.

There are a number of reasons to suspect that mobile phone use in middle-aged and older people with schizophrenia would be diminished relative to population norms. Rate of adoption of mobile phones is negatively associated with age in the general population (Smith, 2014), and older age is positively associated with reports of problems learning to use mobile phones and diminished perceived utility (Czaja et al., 2006) although this digital divide is rapidly lessening over time (Smith, 2014). Among people with schizophrenia, fear or distrust of technology, cognitive difficulties, and social isolation each may additionally reduce use relative to unaffected people (Palmier-Claus et al., 2013). Financial limitations may also limit mobile phone access, although federal and state programs have increasingly made available free mobile phones to people with limited income (Lifeline Program, <http://www.fcc.gov/lifeline>).

In among the only studies that reported mobile telephone use in schizophrenia, Ben-Zeev et al. (Ben-Zeev, Davis, Kaiser, Krzsos, & Drake, 2013) surveyed patients at a large outpatient psychiatric rehabilitation facility and found that a surprisingly high proportion (63%) of people with schizophrenia owned a mobile phone. This proportion was lower than that in a comparative sample of patients with mood disorders. Among those with schizophrenia who used mobile phones, most reported daily use and about one third used texting and internet functions. Predictors of use of mobile phones included younger age, higher educational attainment, and greater personal income. Examination of other technology use indicates that about 1/3 of patients report computer ownership and internet access, which is far below the national average (Black, Serowik, Schensul, Bowen, & Rosen, 2013). These studies did not report rates in across age groups nor include data on clinical and functional correlates of mobile phone use. In pilot trials of mobile health interventions, the evidence for the association between symptoms, cognitive and functional capacity and uptake of mobile phones is mixed; In one study employing an intervention delivered through text messages, patients with more severe negative symptoms were more likely to drop out of the intervention due to poor adherence (Granholm et al., 2012), whereas, in a more recent study adherence was unrelated to cognition or symptoms (Ben-Zeev et al., 2014).

Given that use of “everyday technologies” such as mobile phones are increasingly required for participation in daily life, and that mobile health interventions may mitigate some barriers to accessing care that are more prevalent among older adults, we investigated the patterns and functional correlates of mobile device use in a sample of middle-aged and older outpatients with schizophrenia. Since cognition, functional capacity, and symptoms are strongly lined to limitations in instrumental activities of daily living in schizophrenia (Bowie

et al., 2010), we hypothesized that mobile phone use would be negatively associated with cognitive function, functional capacity, and positive and negative symptoms. Specifically, we assessed: 1) the rate and intensity of prior mobile phone use in a sample of outpatients with schizophrenia, and 2) the association of mobile phone use with functional capacity, cognitive function, and psychopathologic symptom severity. We hypothesized that endorsement of mobile phone use and ownership would be associated with better performance on measures of functional capacity, global cognitive function, clinician-rated outcome, and lower severity of psychopathologic symptoms, after adjusting for relevant sociodemographic factors. We also explored whether there were differences between current, past, and never users of mobile phones as well as the association between comfort, purpose, frequency of use (among current mobile phone users) and demographic/outcome variables.

METHODS

Participants

The sample consisted of 208 middle-aged and older patients with schizophrenia or schizoaffective disorder who were enrolled in a randomized trial to examine efficacy of two skills-based interventions to improve functioning. The purpose of the parent study is to investigate mobile phones as a supplemental tool to encourage home practice participation in functional skills training, in order to compensate for the higher likelihood functional and cognitive deficits as well as transportation difficulties present in middle-aged and older patients with schizophrenia. Findings reported here derive from baseline data obtained prior to randomization collected between 2009 and 2011. A total of 12 patients did not complete the questionnaire on mobile phone use and so the sample used in the analyses consisted of 196 patients. To be eligible for the study, participants were required to be 40 years or older and have a DSM-IV chart diagnosis of schizophrenia or schizoaffective disorder. Given that schizophrenia is increasingly viewed as associated with accelerated aging (Jeste, Wolkowitz, & Palmer, 2011) and that functional deficits evident in middle-age may cross thresholds that result in need for community supports (e.g., residential care), middle-aged and older patients were the population of interest. Participants were excluded from the study if they had a DSM-IV diagnosis of dementia, expressed suicidal ideation or intent at the time of baseline assessment, could not complete the assessment battery, or were participating in any other psychosocial intervention or drug research at the time of enrollment. Written informed consent was obtained from participants prior to enrollment and the study was approved by the UC San Diego Human Subjects Protections Program.

Participants were recruited from a variety of community-based agencies in San Diego County, including residential facilities, day treatment centers, and psychosocial clubhouses. We categorized participants into level of independence using the following independence level determinations: 1) Head of household, independent - either lives alone, with a partner, with spouse and/or kids in own home, or in shared home with friends or relatives if equal partner in household and without outside supervision, 2) Head of household semi-independent - as above, but gets assistance (e.g., apartment supervised by treatment program), or could use assistance (e.g., somewhat unsanitary living conditions), 3) Not head

of household, but in general community - lives in home of parents, children, etc., or lives in group home, or 4) Other.

Medication information, obtained from a review of medical records, showed that 132 were currently taking antipsychotic medications (67%). Of the total sample, 59% were taking atypical antipsychotics and 24% were taking typical antipsychotics (some of the participants were prescribed both classes of antipsychotic). Dosing of medications was indicated by a mean chlorpromazine equivalent of 448.5 mg/day (SD = 511.8 mg/day), which we calculated using the formulae published by Andreasen and colleagues (2010).

Measures

Mobile Phone Use—Mobile phone use was assessed with an interviewer-administered self-report scale that was developed for this study. This questionnaire asked four questions (yes/no) about use and ownership of a mobile phone: 1) Have you ever owned a mobile phone? 2) Have you ever used a mobile phone? 3) Do you currently own a mobile phone? 4) Do you currently use a mobile phone? A single item then asked participants to rate their perceived level of comfort with mobile phones on a 4-point Likert-type scale from 0 = “not at all” to 4 = “very comfortable.” For those who reported being “not at all” comfortable, participants were asked an open-ended question about reasons for discomfort. Participants were then asked to rate the frequency with which they used a mobile device in the last week. Response options were 0 = “Never”, 1 = “1-2 days”, 2 = “3-4 days”, and 3 = “every day”). Participants were also asked whether or not they used a mobile phone to 1) converse with family or friends, 2) access information (e.g., contact businesses to inquire about hours of operation), or 3) interact with medical providers. We did not distinguish in this questionnaire between feature phones and smartphones.

Global Cognitive Functioning—Global cognitive functioning was assessed with the Repeatable Battery of the Assessment of Neuropsychological Status (RBANS) (Gold, Queern, Iannone, & Buchanan, 1999). This neuropsychological screening battery was administered by a trained research assistant and covers 12 subtests which are then used to calculate five index scores; Immediate Memory (via list learning and story memory tasks) (score range = 40-152), Visuospatial/Construction (via figure copy and line orientation tasks) (score range = 50-136), Language (specifically, picture naming and semantic fluency) (score range = 40-137), Attention (including digit span and coding) (score range = 40-154), and Delayed Memory (by tapping into list recognition, story recall, and figure recall) (score range = 40-137) (Randolph, Tierney, Mohr, & Chase, 1998). The index scores were then combined to create the RBANS Total Score (with higher scores corresponding to better performance), which was used in the current analyses.

Functional Capacity—Functional capacity was assessed with the University of California, San Diego Performance-Based Skills Assessment (UPSA) (Patterson, Goldman, McKibbin, Hughs, & Jeste, 2001). The UPSA was designed to evaluate the abilities of individuals to perform everyday tasks that are considered necessary for independent functioning in the community. The UPSA uses role-playing situations to evaluate skills in five areas: household chores (scores range from 0 to 4), communication (scores range from 0

to 9), finance (scores range from 0 to 6), transportation (scores range from 0 to 6) and planning recreational activities (scores range from 0 to 27). Subscale total scores are then calculated by transforming raw scores into a 0-10 point scale and multiplying by 2. This calculation yields subscale scores ranging from 0-20 and total scores ranging from 0 to 100 points, with higher scores reflecting better performance (Patterson et al., 2001).

Functional Outcome—Functional outcome was assessed with the Specific Levels of Functioning (SLOF) scale (Schneider & Struening, 1983). This instrument was designed to measure directly observable behavioral functioning and daily living skills of patients with SMI. It consists of 43 items grouped into 6 main areas: physical functioning; personal care skills; interpersonal relationships; social acceptability; activities of community living; & work skills. Each of these functional domains is rated on a 5-point Likert scale ranging from “not well at all” to “very well”. Scores on this measure range from 43- 215 with higher scores reflecting better functional outcomes. This measure has established reliability and internal consistency in schizophrenia (Schneider & Struening, 1983). SLOF forms were not filled out by the patients, but instead were filled out by a person familiar with the participants’ skills of everyday living, such as case managers, board and care staff, and family members. All individuals providing SLOF ratings were blind to other assessment data.

Positive and Negative Symptoms—Positive and negative symptoms were assessed with the Positive and Negative Syndrome Scale (PANSS) (Kay & Singh, 1989). The PANSS was administered by a trained research assistant that passed standardized levels of reliability. Symptom severity ratings range from 1 (absent) to 7 (extreme) and assess 30 different symptoms including positive (e.g., hallucinations and delusions), negative (e.g. poor rapport, blunted affect), and general psychopathological symptoms (e.g. anxiety, poor attention) symptoms. For our analyses, we only used scores from the positive and negative syndrome subscales (each with a range of 7 to 49). Previous studies have reported an inter-rater reliability of 0.83 and 0.85 for the positive and negative subscales and internal reliability coefficients of 0.73 and 0.83 (Cronbach’s alpha) (Kay & Singh, 1989).

Statistical Analysis—All calculations were carried out using SPSS version 21. After descriptive analyses, we compared participants who had never owned/used a mobile phone with those who had ever owned/used in terms of demographic variables (age, sex, education, etc.). We included as covariates in subsequent analyses any variable from these comparisons with a p-value of <0.05. We next contrasted mobile phone use and ownership groups across the following dependent variables of 1) cognitive function, 2) functional capacity, 3) functional outcome, and 4) positive and negative syndrome scale severity, adjusting for significant demographic covariates using the general linear model (GLM) procedure. We calculated Cohen’s d for each of these comparisons. We repeated these analyses to also compare current users/own with those who did not currently use/own a mobile phone. Finally, in exploratory analyses, we used univariate ANOVAs and Spearman correlations to associate reasons for use, frequency of mobile phone use, comfort with mobile phones, and past but not current mobile phone use and ownership with the dependent variables listed

above. Missing data was minimal (<2%) and so variables were not imputed. The alpha level of these analyses was set to $p < .05$.

RESULTS

Sample Characteristics

As seen in Table 1, the mean age of the study sample was 51.8 years (SD: 7.3, range 40 to 73 years), with participants being mostly male (62%) with an average of a high school level of education. Most (82%) were rated by interviewers as not heads of household but residing in the community. On average, the sample was experiencing a mild level of severity of positive and negative symptoms. The mean level of global cognitive functioning on the RBANS and functional capacity on the UPSA was in the impaired range in light of previously published cut scores on these instruments (Gold et al., 1999; Patterson et al., 2001). Thus, overall the sample was relatively psychiatrically stable but with substantial cognitive and functional deficits, consistent with a population of chronic middle-aged and older treated patients with schizophrenia.

Mobile Phone Use

As captured in Table 2, the great majority of patients had used a mobile phone (78.0%), although only a minority currently owned one (27.6%). Relatively few participants who were current users of a mobile phone used a mobile phone on a daily basis. The majority of participants (59.1%) reported feeling “comfortable” or “very comfortable” with mobile phone use. For the subset of participants who reported feeling not at all or only somewhat comfortable, open-ended responses were obtained. There were 21 unique statements among those who reported being less than “comfortable” using a mobile phone. Notably, only two of which included content that was suspected as consistent with psychosis (e.g., fear of sound waves). The remaining statements included concerns over unfamiliarity (“I never learned”), uncertainty about how to use (“It is too complicated to use”), and lack of perceived need due to restricted social contacts (“I don’t have anyone to call”). Among those who currently used a mobile phone, 93.9% reported using it to call family or friends in the past week, 51.5% used it to call for information, and 56.1% used it for medical reasons.

Demographic Correlates of Mobile Phone Use

Participants who had never used a mobile phone were significantly older (mean age = 54.8) than participants who had ever used a mobile phone (mean age = 50.8) ($t = 3.25$, $df = 194$, $p = 0.001$). However, participants who had never used or who had never owned a mobile phone did not differ with respect to other sociodemographic characteristics listed in Table 1. Current use of mobile phones was associated with residential status ($\chi^2(4) = 11.02$, $p = 0.026$), with current users of mobile phones being more likely to be independent heads of households (13.4% vs 5.4%) and semi-independent heads of household (11.9% vs 5.4%) than those not currently using mobile phones. Current ownership of a mobile phone was not associated with demographic characteristics. We did not find any association between year of entry to the study (2009-2011) and rate of ownership ($\chi^2(6) = 4.0$, $p = 0.664$) or use ($\chi^2(6) = 4.2$, $p = 0.645$).

Clinical Correlates of Mobile Phone Use and Ownership

As seen in Table 3, adjusting for age, participants who had ever used a mobile phone had significantly better cognitive functioning than those who had never used one. Also, participants who had ever used a mobile phone had significantly better functional capacity, less severe negative symptoms, and were rated by informants as having better functioning compared to participants who had never used a mobile phone. Positive symptom severity was not significantly associated with history of mobile phone use.

Interestingly, history of ownership of a mobile phone was less associated with other variables. When comparing participants who had ever owned a phone to those who had never owned, we found that participants who had ever owned a mobile phone scored significantly higher in functional capacity (UPSA Score). However, none of the other variables were significantly associated with history of ownership of a mobile phone.

Current use of a mobile phone adjusting for residential status (Table 4) was positively associated with cognition, functional capacity, and functional outcome, but was not associated with positive or negative symptom severity. Only the UPSA score was associated with current ownership of a mobile phone.

Exploratory Analyses

Notably, current ownership of a mobile phone and subjective comfort using a mobile phone were not associated with cognitive functioning, functional capacity, functional outcome, or positive or negative symptom severity. Among participants who had ever used a mobile phone ($n=153$) we contrasted those who had and had not used mobile phones to 1) communicate with family and friends, 2) access information, and 3) interact with medical providers. We did not find any differences at the $p<0.05$ level on these three independent variables and performance on the UPSA, the SLOF Scale, or RBANS measure, nor the PANSS Positive and Negative Syndrome Scale. Among current users of mobile phones, we found a significant association between higher frequency of past-week use and UPSA scores ($\rho=0.290$, $df=79$, $p=0.012$). However, none of the other variables was significantly associated with past-week usage frequency. Finally, we examined whether there were differences among previous user or owners of mobile phones compared to never owners/users. Contrasting three groups, 1) never owned/used a mobile phone, 2) previously but not currently own/use a mobile phone or 3) currently own/use a mobile phone, we performed univariate ANOVAs and Chi-Square analyses. Current users had higher SLOF scores ($n=53$, $m=103.7$, $sd=14.8$), compared to never users ($n=39$, $m=90.2$, $sd=21.3$), but former users ($m=96.8$, $sd=18.2$) did not differentiate from either group. Former owners of mobile phones were younger ($n=26$, $m=48.3$, $sd=6.3$), than never owners ($n=101$, $m=52.7$, $sd=7.3$), with current owners ($n=45$, $m=51.8$, $sd=7.5$) not differentiated from other groups. There were no pairwise differences between former and current users/owners of mobile phones.

DISCUSSION

This study is among the first to describe the rate and illness correlates of mobile phone use in middle-aged and older adults with schizophrenia, and several potentially useful findings

emerged. This sample represents a group facing a double “digital divide” (Chen & Wellman, 2003) by virtue of older age and chronic mental illness, and yet 78% had previously used a mobile phone and 43% had owned one at some point in their lives. Further, the great majority reported comfort in using a mobile phone, and the subset that reported a lack of comfort with mobile phones generally attributed discomfort to unfamiliarity rather than active avoidance. Given the rate of exposure to mobile phones in this older sample with substantial cognitive and functional impairments, these findings support the feasibility of disseminating interventions by mobile phones in patients with schizophrenia. On the other hand, only 28% currently owned a mobile phone. Given that three quarters of middle-aged and older people with schizophrenia would need to be provided with a mobile phone in order to participate in mobile-phone based services, the potential reach of interventions for middle-aged and older schizophrenia may be diminished in the absence of subsidization.

In comparison to the limited prior data available on mobile phone ownership in serious mental illness, our sample reported about half of the rate of use (Ben-Zeev et al., 2013). This discrepancy was evident despite comparable metropolitan areas where cellular coverage would be expected to be similar (San Diego and Chicago). There are several potential reasons for the comparatively low rate of mobile phone ownership in this study. For one, this study excluded participants below the age of 40 and the sample was 6 years older on average than that reported in the Ben-Zeev study (2013). Secondly, these data were collected between 2009 and 2011 (cell phone ownership was 83% in a U.S. nationally representative sample circa 2011 (Smith, 2011)) and so more recent data likely would indicate higher penetrance of mobile phones in this group. These data were collected during a significant expansion of the Lifeline Program, which is sponsored by the Federal Communications Commission, which offers discounted (often no charge) mobile phones to low-income consumers (www.fcc.gov/lifeline). We note that 35% of respondents in the Ben Zeev et al. (2013) had reported paying for a mobile phone with a “government plan”. As such, the rate of mobile phone use reported here should be interpreted in light of the ongoing increase in mobile phone penetration and developments in government subsidization of mobile phones.

There was substantial variation in the correlates of mobile phone use that depended on how mobile phone experience was queried. Specifically, history of any past use (vs. past or current ownership) was most associated with cognitive and functional impairment. The subset (22%) of patients who had never *used* a mobile phone were significantly older and had more severe cognitive deficits, worse functional capacity and outcome, and greater severity of negative symptoms even after adjusting for age differences. A total of 30% of these subjects reported feeling “not at all” comfortable with using a mobile phone. In contrast, past or current *ownership* of mobile devices was less related to cognitive, functional, and psychopathologic symptoms. Thus, mobile-phone based interventions or services that target functional deficits in middle-aged and older adults with schizophrenia may be presented with a conundrum that the most impaired patients are also the least likely to have been exposed to or comfortable with mobile phones in the past. Thus, it may be best to clarify whether potential participants had ever used (vs. owned) mobile phones in order to identify participants who may need additional focused training, support, and supervision in using mobile devices. Moreover self-assessed comfort with mobile phone use was unrelated

to cognitive or functional performance parallels that of related research that has pointed out the limited correspondence between self-reported and objective or informant ratings of functioning (Bowie et al., 2007). A pragmatic implication of these findings may be that training in and direct observation of use of mobile phones may be necessary to confirm competence prior to deployment of mobile health interventions. Moreover, problems with using mobile devices are likely dependent on the user interface, yet it is notable that at least in one study patients with schizophrenia can be effectively trained to operate smartphone and that cognitive problems and symptoms were unrelated to uptake of an intervention (Ben-Zeev et al., 2014).

There are several limitations of this study. The mobile phone questionnaire developed for this study relied on self-report and actual current or past mobile phone use was not externally verified, nor did we distinguish between feature phone use and smartphones. The sample was restricted to outpatients older than age 40 who were largely psychiatrically stable, and so the results might not generalize to younger, more psychiatrically unstable, or inpatient populations, nor to the subpopulation of patients with schizophrenia older than age 65 who represented a small proportion of the sample. The sample population was derived from one geographic area, a large metropolitan area with broad wireless coverage, and so our results may not apply to different regions. Because this study used data from a clinical trial (at baseline, pre-randomization) that involved the randomization to use of mobile phones, participants with greater fear of and/or suspicion about mobile devices may have self-selected themselves out of study participation. Our study was cross-sectional and so we cannot comment on the long-term impact, if any, of mobile phone use on social function and other functional domains. Finally, given the rapid rate of increase in penetration of mobile phones and the influence of cohort effects, we would expect that these estimates of mobile phone use in patients with schizophrenia will increase over the next several years.

The clinical implications of our findings are that mobile phone use may be increasingly considered an instrumental activity of daily living across the lifespan, even among middle-aged and older adults with schizophrenia. Instructional approaches to use of mobile phones may be offered to bridge the digital divide and may aid in reducing social isolation in schizophrenia, which has been associated with poor prognosis in schizophrenia (Schomerus et al., 2007). For future intervention approaches that employ mobile phones in schizophrenia, the majority of older patients are not naïve to mobile phones, but many lack current ownership of mobile phones, which may limit sustainability of interventions. If mobile health interventions in schizophrenia continue to develop evidence of effectiveness, it may be that subsidization of mobile phones could facilitate access to mental health care for this vulnerable group. Further research should investigate the optimal means of training individuals in mobile phone use, as well as the long-term impact of mobile phone use on functional outcomes such as social integration.

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Table 1

Demographic and clinical characteristics (n=196)

Variable	Mean (SD) or %	Range
Age (years)	51.8 (7.3)	40-73
Age of onset (years)	23.7 (11.7)	1-60
Education (years)	12.2 (2.3)	3-22
Sex (% Women)	37.8	--
Marital Status (%)		
Married	6.1	--
Divorced	29.6	
Widowed	3.6	
Never Married	60.7	
Race (%)		
Caucasian	53.1	
African-American	19.9	
Hispanic	15.8	
Native American	4.1	
Other	7.2	
Living Situation (%) ^d	8.2	--
Head of household, independent		
Head of household, semi-independent	7.7	
Not head of household, but in community	82.1 2.0	
Other		
RBANS Total	63.2 (12.7)	41-106
UPSA-B	53.5 (20.6)	0-100
SLOF Higher Functioning Scale	97.8 (18.2)	38-120
PANSS		
Negative	15.8 (5.2)	7-33
Positive	15.3 (6.0)	7-36

SD = standard deviation; SLOF = Specific Level of Functioning; UPSA-B = UCSD Performance Based Skills Assessment Brief; PANSS = Positive and Negative Syndrome Scale

Table 2

Mobile Phone Use Questionnaire Responses (n=196)

Variable	% of Sample
Ever Used a Mobile Phone	78.1
Ever Owned a Mobile Phone	42.9
Currently Use a Mobile Phone	34.2
Currently Own a Mobile Phone	27.6
How Often Used in Past Week (Among Current Users)	
Never	54.4
1-2 Days	10.1
3-4 Days	12.7
Every Day	22.8
How Comfortable Using a Mobile Phone	
Not at All Comfortable	10.9
Somewhat Comfortable	30.1
Comfortable	34.7
Very Comfortable	24.4
If currently Use Mobile Phone, used it in the past week for:	
Calling Family or Friends	93.9
Obtaining Information	51.5
Medical Purposes	56.1

Table 3

Mean Scores by Lifetime Mobile Phone Ownership or Use

Variable	Never Owned (n = 84)	Ever Owned (n = 112)	F-score (df) p-value	Cohen's d	Never Used (n = 43)	Ever Used (n = 153)	F-score (df) p-value ^I	Cohen's d
RBANS	61.9 (11.8)	65.1 (13.6)	3.7 (1,167) 0.054	0.25	56.4 (9.7)	65.3 (12.8)	21.8 (1,167) <0.001	0.78
UPSA Total	61.9 (18.4)	70.0 (14.9)	7.7 (1,178) 0.006	0.48	53.3 (21.8)	68.9 (14.1)	25.0 (1,169) <0.001	0.85
SLOF	97.0 (17.8)	101.2 (17.3)	1.6 (1,168) 0.204	0.24	91.7 (21.2)	100.9 (15.9)	6.4 (1,146) 0.012	0.49
PANSS Positive	15.3 (5.8)	15.1 (6.3)	0.1 (1,193) 0.817	0.03	15.7 (6.2)	15.1 (6.0)	0.3 (1,169) 0.569	0.10
PANSS Negative	16.2 (5.5)	15.5 (5.3)	0.7 (1,193) 0.399	0.13	15.4 (5.2)	17.5 (5.6)	5.6 (1,169) 0.019	0.39

^I Univariate models with Age entered as a covariate; RBANS: Repeatable Battery for the Assessment of Neuropsychological Status; UPSA: UCSD Performance Based Skills Assessment; SLOF: Specific Level of Function Scale – Informant Version; PANSS: Positive and Negative Syndrome Scale

Table 4

Mean Scores by Current Mobile Phone Ownership or Use

Variable	Currently Does Not Own (n = 142)	Currently Owns (n = 54)	F-score (df) p-value	Cohen's d	Currently Does Not Use (n = 129)	Currently Uses (n = 67)	F-score (df) p-value ^I	Cohen's d
RBANS	61.4 (11.9)	65.6 (14.7)	2.1 (1,167) 0.148	0.31	61.7 (11.7)	66.1 (14.1)	4.6 (1,167) 0.034	0.34
UPSA Total	51.1 (21.1)	60.6 (17.4)	8.7 (1,189) 0.004	0.49	50.2 (21.4)	60.1 (17.4)	9.5 (1,189) 0.003	0.51
SLOF	95.8 (18.8)	102.3 (16.8)	1.0 (1,168) 0.317	0.36	94.6 (19.4)	103.7 (14.8)	7.9 (1,168) 0.005	0.53
PANSS Positive	15.0 (5.9)	15.9 (6.4)	1.1 (1,193) 0.287	0.15	15.5 (6.1)	14.9 (6.0)	0.8 (1,193) 0.589	0.10
PANSS Negative	15.9 (5.1)	15.6 (5.4)	0.1 (1,193) 0.837	0.06	16.0 (5.1)	15.4 (5.4)	0.5 (1,193) 0.476	0.11

^I Univariate models with Residential Status entered as a covariate; RBANS: Repeatable Battery for the Assessment of Neuropsychological Status; UPSA: UCSD Performance Based Skills Assessment; SLOF: Specific Level of Function Scale – Informant Version; PANSS: Positive and Negative Syndrome Scale