Can Geriatric Psychiatry Patients Complete Symptoms Self-Reports Using Tablets? A Randomized Study

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ABSTRACT

Background

With our aging population and limited number of geriatric psychiatrists, innovations must be made in order to meet the growing demands for geriatric psychiatry services. Emerging technologies could greatly improve access to care and systematic data collection.

Methods

This randomized study compared completion rates and time to completion (primary outcomes) when using iPad technology vs. traditional paper forms to complete self-report psychiatric symptoms. Geriatric psychiatry outpatients (n = 72) and adult psychiatry inpatients (n = 50) were recruited to complete the Brief Symptom Inventory (BSI-53), the Activities of Daily Living (ADL), and Patient Health Questionnaire (PHQ-9) questionnaires.

Results

Geriatric psychiatry outpatients completed the iPad and paper questionnaires at similar rates (91.7% vs. 97.2%, Fisher's Exact $p = .61$). In two-way ANOVA, including patients aged ≥ 60 (n = 85), outpatient status ($F(1,81) = 4.48$, $p = .037$) and iPad format ($F (1,81) = 8.96$, $p = .04$) were associated with a shorter time to completion. The effect of questionnaire formats was especially prominent in the inpatient group on time to completion.

Conclusions

Older adults with mental illness demonstrate a similar ability to complete self-report questionnaires whether iPads or paper forms. iPad questionnaires may even require less time to complete in geriatric psychiatry inpatients. Patients also found iPad questionnaires to be easy to use and read. Tablets could potentially be used for psychiatric symptom assessment for clinical, research, and population health purposes.

Key words: iPad, tablet computers, late-life mental illness, symptom monitoring, technology

INTRODUCTION

Up to 70% of older adults with severe mental illness may not have access to mental health resources corresponding to their needs.[1] Tablet computer technologies could improve access to care and systematic data collection in late-life mental illness in a scalable fashion. Using tablet computers, clinical psychiatric self-report data could be made readily available to geriatric mental health clinicians. This may be particularly beneficial for older patients with mental illness, many of whom have limited mobility and/or live in remote regions.[2] The systematic collection of clinical information using tablet computers could also be used for clinical quality improvement initiatives and research.[3]

However, the use of tablet computer and related technologies to collect psychiatric self-report data has mainly been evaluated in adult populations[4] with little geriatric medicine and geriatric psychiatry data. Older adults, in comparison to their younger counterparts, may be less familiar with iPad technology. Assuming that geriatric patients do not tend to be as "tech savvy" as the rest of the adult population, results from feasibility studies focusing on adult populations cannot be generalized to the geriatric population. Small geriatric feasibility studies (mostly uncontrolled) have been conducted with healthy individuals,[5-7] chronically physically ill,[8] and cognitively impaired patients;[9,10] few studies included geriatric mental health samples.[11,12] All of these studies have

found that most older adults enjoy and are able to use computer tablets or other related devices (e.g., personal digital assistants [PDAs]) to answer symptom questionnaires.

There are several limitations to the existing literature. Previous studies in non-psychiatric older adult samples using randomized designs had examined PDAs,[5,6] not tablet computers, in comparison to paper-based questionnaires. PDAs are handheld devices, whereas tablets are larger in size. Both can include touchscreen display, and PDAs often have buttons used to navigate the interface. The larger screen, texts, and high sensitivity touchscreen of the tablet interface may render the collection of self-reports easier, as it makes the devices more "user friendly". A previous study suggested that tablet computers may be an alternative hardware to PDAs when collecting data from older non-psychiatric patients, as they found technical difficulties with PDAs affected data collection.[5]

The usability (completion rates and time to completion of questionnaires) and acceptability (ease of use) of tablet computers have never been compared to paper-based questionnaires in older adults with mental illness. This is particularly important in patients with severe late-life mental illness, who are often even less exposed to tablet computer and related technologies.[13] This study aimed to compare the usability and acceptability of tablet computers vs. traditional paper forms in completing self-report questionnaires in late-life mental illness.

We hypothesized that: 1) outpatients and inpatients with late-life mental illness would have similar rates of completion and time to completion in completing both tablet computer and paper-based questionnaires; 2) aging across the lifespan would not greatly affect patients' rate of completion and time to completion of tablet computer and paper-based questionnaires. An exploratory aim of this study was to determine whether tablet-based questionnaires would be easy to read and easy to use in the majority of patients.

METHODS

Study Population

We recruited 72 consecutive older adults from the geriatric psychiatry clinic (aged ≥ 65) and 50 adult and elderly patients from the inpatient psychiatric unit (aged ≥18; n = 13 aged ≥ 60) at the Jewish General Hospital (JGH). Geriatric psychiatry outpatients were recruited from a clinic following only patients 65 years old and over. Inpatients aged over 60 years old were included to broaden our representation of patients admitted to the ward, since only a limited number of patients over 65 were admitted in the psychiatric inpatient unit during our recruitment period. The JGH is an academic hospital in Montréal, Canada, providing universal outpatient and inpatient health coverage to 350,000 residents in the surrounding catchment area. Our recruitment period spanned between June and August 2015. Our exclusion criteria were: illiteracy and inability to communicate in English or French, moderate-to-severe dementia, and patients deemed

extremely unstable by their treating psychiatrists (e.g., some patients from the closed high-care division were recruited, but patients with high imminent potential for violence were excluded for safety reasons). All geriatric outpatients approached for recruitment agreed to participate (n = 72), while in the inpatient unit, 50 out of 68 patients approached (73.5%) joined the study.

Study Design

Patients were randomized into two groups: those who completed a set of well-validated, self-report psychiatric questionnaires on traditional paper forms; and those who used a tablet computer (an iPad). Simple randomization was employed using a random number generator (random.org). Two separate lists of random numbers (1 = iPad or 0 = paper) were generated: one for geriatric psychiatry outpatients and one for inpatients. The rationale for randomizing the outpatients and inpatients separately was that the groups were likely to have different *a priori* abilities to complete the self-report questionnaires. A research assistant (GM) and a psychiatry resident (CY) administered the self-report questionnaires, though patients independently completed all of the self-report questionnaires.

Three validated psychiatric self-report instruments were chosen: the Brief Symptom Inventory (BSI-53), the Patient Health Questionnaire (PHQ-9), as well as the Katz Index of Independence in Activities of Daily Living (Katz ADL) for the elderly patients (aged ≥ 65). The BSI-53 is a comprehensive symptom inventory containing 53 items examining a broad range of mental disorders such as anxiety, depression, psychosis, mania, and suicidality.[14] The PHQ-9 is a 9-item depression questionnaire screening tool.[15] Outpatients and inpatients aged ≥ 60 (n = 85) completed the 6-item ADL questionnaire, used clinically to assess for functional independence.[16] The iPad version was constructed using a survey software (http://www.quicktapsurvey.com/). We included an instruction page on screen and displayed one multiple choice question at a time in order to maximize the font sizes for easy reading. Before starting, patients were prompted to complete an example question (also present on the paper version) to assess their understanding of the process. Following the completion of this question, they were asked by the research assistant if they had any questions and were told to begin the questionnaires when they felt ready to do so. Participants navigated through the iPad questionnaires by tapping on the answer they selected. Participants were encouraged to ask questions if they did not understand some of the terms used in the questionnaires, when applicable. The number of questions asked and nature of the questions were documented for all participants. Patients were not given any additional time to familiarize themselves with the iPad. During the completion of the questionnaires, the patients were supervised by the research assistant to ensure that they read each question thoroughly. If difficulties were observed by the research

assistant, clarifications were provided, but the participants did not receive any physical help. A licensing agreement with Pearson Publishing was obtained to reproduce the BSI-53 on the iPad (PHQ-9 and ADL are freely available).

Patients' clinical and demographic characteristics (age, gender, diagnosis, and psychiatric/medical history) were ascertained at the time of the study through chart review. Ethics approval had been obtained from JGH and all participants gave written consent. This study did not require registration because it was not clinical trial and did not examine the iPad's direct effect on health outcomes. (https://clinicaltrials.gov).

Outcomes

The main usability outcomes were 1) the per cent of patients who completed the questionnaires, and 2) the total length of time (minutes) required to complete the BSI-53 and PHQ-9 questionnaires. To measure time to completion, two of the authors (GM and CY) used a stopwatch and instructed patients to 'go' before each individual questionnaire.

Secondary outcomes included: time to complete the ADL questionnaire (adult inpatients aged < 60 had not been asked to complete this, ADL had not been included in the primary outcome measure), as well as the following acceptability questions: 1) Was it difficult to read the items on the questionnaires? 2) Was it difficult to complete the questionnaires? and 3) Would you use iPad-based symptom questionnaires to communicate with your psychiatrist if it were put into routine clinical practice?

Conceptual Framework of this Study

We wished to compare questionnaire completion (usability) and ease-of-use (acceptability) outcomes in geriatric psychiatry patients randomly allocated to tablet vs. paper questionnaires. The main analyses would be performed on the subset of outpatients and inpatients aged ≥ 60 (n = 85, n = 72 outpatients, n = 13 inpatients). The effects of age on iPad vs. paper questionnaire completion would be assessed: 1) in this geriatric subset, and 2) in a broader sample of younger adult and geriatric psychiatric inpatients (aged ≥ 18) (n = 50, n = 37 aged 18–59, n = 13 aged ≥ 60). Analyses include the examination of the effects of inpatient/outpatient status, since severity of mental illness has been associated with less familiarity with technology.[17]

Statistical Analysis

Baseline demographic and clinical characteristics were compared between iPad and paper groups using chi-squared and t-tests, as appropriate, to assess for adequate randomization in the geriatric psychiatry outpatient (n = 72) and geriatric/younger adult inpatient samples (n = 50).

The patients aged ≥ 60 from both groups (n = 13 inpatient, n = 72 outpatient) were then compared for main questionnaire completion outcomes and secondary acceptability outcomes

using chi-squared and t-tests, as appropriate. Two-way analysis of variance (ANOVA) was used amongst patients aged ≥ 60 (n = 85) to examine the effects of iPad/paper and the inpatient/outpatient status, and their interaction on the total time to completion of the PHQ-9 and BSI-53. The relationship between age and time to completion was examined using Pearson's correlation: 1) in the entire geriatric sample (n = 85), and 2) in the mixed younger adult and geriatric inpatient sample (aged ≥ 18) (n = 50, n = 37 aged 18–59, n = 13 aged ≥ 60). If iPad and paper groups differed significantly with regard to baseline characteristics despite randomization, multiple linear regression would have been performed.

RESULTS

Baseline demographic and clinical characteristics of each iPad and paper group are presented in Table 1. iPad and paper groups did not differ, suggesting adequate randomization within the outpatient and inpatient samples, respectively.

Self-Report Symptom Questionnaire Completion Rate

Geriatric psychiatry outpatients (n = 72) were able to complete the iPad and paper questionnaires at similar rates (91.7% (33/36) vs. 97.2% (35/36), Fisher's Exact p = .61) (Table 2). In the iPad group, two patients were not able to complete their questionnaires due to logistical reasons (e.g., their transportation home had arrived), while 1 had to stop midway due to a hypoglycemic episode. In the paper group, the 1 non-completer stopped the survey after realizing that the BSI-53 had 53 items. In the inpatient group, of the 13 geriatric patients, 6 were randomly assigned to the iPad group (46.15%). In the outpatient group, 36 participants out of 72 were assigned to the iPad group (50%).

We observed a 100% completion rate for both iPad and paper groups in geriatric (n = 13) and adult (n = 37) inpatients.

Questions and Interruptions

In the inpatient unit, 14 patients asked questions during the assessment, 6 of those were assigned the iPad and 3 of 6 (50%) were aged over 60 years old. Their questions were documented and none were related to the use of the interface but rather pertained to the technical terms used in the BSI-53 and the perceived ambiguity of some choices. Time to completion included the time to provide the brief clarifications. In the outpatient group, 39 patients asked questions during the completion of the questionnaires. Twenty-two of 39 participants (56.41%) had been assigned the iPad to complete the self-reports. The questions and comments were recorded and none pertained to the used of the tablet but rather to the meaning of some technical terms and hesitations between two answer choices. All of the patients in the outpatient group were aged 65 years old and over.

TABLE 1.
Clinical and demographic characteristics of the entire sample (n = 122)

	Outpatients (age ≥ 65) (n = 72)			Inpatients (age ≥ 18) (n = 50; n = 13 aged ≥ 60)		
	iPad (N = 36)	Paper (N = 36)	Statistics	iPad (N = 24)	Paper (N = 26)	Statistics
Mean Age (Yrs)	75.36±6.74	75.47±3.31	$t(70)=0.072, p=.94$	43.38±18.69	48.19±17.55	$t(48)=0.94, p=.35$
Age Range (Yrs)	67–91	65–87	N/A	18–83	21–81	N/A
Female	25 (69.4%)	25 (69.4%)	$X^2(1)=0.00, p=1.00$	12 (50.0%)	19 (73.1%)	$X^2(1)=2.8, p=.09$
Depression	20 (55.6%)	17 (45.9%)	$X^2(1)=0.35, p=.56$	5 (20.8%)	6 (23.1%)	$X^2(1)=0.37, p=.85$
Bipolar Disorder	6 (16.7%)	5 (14.3%)	$X^2(1)=0.08, p=.78$	6 (25..0%)	6 (23.1%)	$X^2(1)=0.025, p=.87$
Anxiety Disorders	5 (13.9%)	5 (13.9%)	$X^2(1)=0.002, p=.96$	2 (8.3%)	3 (11.5%)	$X^2(1)=0.14, p=.71$
Psychotic Disorders	6 (16.7%)	9 (25.7%)	$X^2(1)=0.87, p=.35$	11 (45.8%)	14 (53.8%)	$X^2(1)=0.32, p=.57$
Mild Dementia	2 (2.8%)	2 (2.8%	$X^2(1)=0.00, p=1.00$	0 (0%)	0 (0%)	$X^2(1)=0.00, p=1.00$
History of Substance Abuse Disorders	8 (22.2%)	5 (13.9%)	$X^2(1)=0.85, p=.36$	7 (29.2%%)	6 (23.1%)	$X^2(1)=0.24, p=.62$
Previous Admissions	18 (50.0%)	17 (47.2%)	$X^2=0.056(1), p=.81$	12 (52.0%)	13 (48.0%)	$X^2=0.32(1), p=.39$

Time to Complete Self-Report Symptom Questionnaires

The time required to complete questionnaires in outpatients and inpatients aged ≥ 60 (n = 85) was comparable between iPad and paper groups, perhaps slightly favoring the iPad groups (Table 2). The ADL questionnaire took less time to complete on the iPad in geriatric outpatients (0.7 vs. 1.1 minutes, t (66) =3.21, p = .002) (n = 72). For geriatric inpatients (n = 13), average time to complete both the BSI-53 and PHQ-9 was shorter when using the iPad as opposed to the traditional paper forms (9.2 vs. 17.0 minutes, t (11) = 2.0, p = .068). Older adults did not have more severe and disabling psychiatric symptomatology and this was not related to the time to completion.

Interaction Between Inpatient/Outpatient Status and iPpad/Paper Version on Time to Completion in all the Patients Aged ≥ 60

In two-way ANOVA, an interaction effect was significant, finding that iPads were associated with less time to completion in the inpatient setting (iPad 9.2 minutes vs. paper 17.0 minutes, F (1,81) = 4.98, p = .028), whereas this was not as marked in outpatients (9.3 minutes vs. 10.5 minutes) (Figure 1). Outpatient status (outpatient 9.9 minutes vs. inpatient 13.1 minutes, F (1,81) = 4.48, p = .037) and iPad use (iPad 9.3 minutes vs. paper 13.8 minutes, F (1,81) = 8.96, p = .04) had main effects on total time to completion of the PHQ-9 and BSI-53.

Association Between Age and Time To Completion

Amongst patients aged ≥ 60 (n = 85), there was no relationship between time to completion (r = 0.11, p = .29). In the mixed

younger adult and geriatric inpatient sample (n = 50, n = 37 aged 18–59, n = 13 aged ≥ 60), age was correlated with longer time to complete the BSI-53 and PHQ-9 (r = 0.49, p < .001). Inpatients aged ≥ 60 had significantly longer completion times than younger inpatients (13.4 vs. 7.5 minutes, t (48) = 3.3, p = .002), with this effect being more prominent in paper groups (17.0 vs. 8.3 minutes) compared to iPad groups (9.2 vs. 6.8 minutes), (two-way ANOVA age and iPad/paper interaction term: F (1,46) = 3.75, p = .05).

Acceptability Outcomes

Overall patients found the iPad easy to use, with questions that were easy to read (Table 2). The geriatric inpatients found the paper version more difficult to read (71.4% vs. 0% had reading difficulty, Fisher's Exact p = .02). The majority of geriatric psychiatry patients said they would use iPad-based symptom questionnaires to communicate with their psychiatrist if it were put into routine clinical practice (e.g., for symptom monitoring). Within the outpatient group 5/72 mentioned they would not be favourable to the implementation of such technology in clinical practice for the following reasons: the questionnaires were too long (n = 2); were not relevant to them (n = 1); did not think it would be necessary (n = 2). In the inpatient group, 3/52 patients reported that they would not be interested in seeing the implementation of such technology become routine because it was not "for them" (n = 3). Spontaneous comments, such as 'the iPad version is more practical than the paper version', 'it was easy to read and answer', 'the touchscreen was enjoyable', and 'doctors should be more involved using this kind of technology, it should be put into practice and is very innovative', were

TABLE 2.
Questionnaires in geriatric psychiatry outpatients and inpatients aged > 60 (n = 85)

	Outpatients (n = 72)			Inpatients (n = 13)		
	iPad (N = 36)	Paper (N = 36)	Statistics	iPad (N = 6)	Paper (N = 7)	Statistics
Completion Rate	91.7% (n=33)	97.2% (n=35)	Fisher's Exact p=.61	100% (n=6)	100% (n=7)	χ^2=0, p=1.0
Time for the completion of the BSI-53 (min)	7.49±3.71	8.26±3.64	t(70)=0.89, p=.37	7.42±4.00	13.6±6.99	t(11)=1.97, p=.077
Time for the completion of the PHQ-9 (min)	2.02±1.32	2.29±1.03	t(66)=0.93, p=.36	1.75±1.29	3.47±1.83	t(11)=1.91, p=.083
Time for the completion of the ADL (min)	0.70±0.40	1.08±0.57	t(66)=3.21, p=.002	0.82±0.51	1.78±1.27	t(8)=1.57, p=.16
Total time for completion of the PHQ-9 and BSI-53 questionnaires (min)	9.34±4.69	10.5±4.37	t(70)=1.07, p=.29	9.17±5.12	17.0±8.50	t(11)=2.05, p=.068
Was it difficult to read the items on the self-report questionnaires?	5.6% (n=2)	17.1% (n=6)	Fisher's Exact p=.15	0% (n=0)	71.4% (n=5)	Fisher's Exact p=.02
Was it difficult to complete the questionnaire?	8.3% (n=3)	5.7% (n=2)	Fisher's Exact p=1.0	0% (n=0)	28.6% (n=2)	Fisher's Exact p=.46
Would you use the iPad-based symptom questionnaires to communicate with your psychiatrist program if it were to be put into routine clinical practice in the future?	94.4% (n=34)	91.4% (n=32)	Fisher's Exact p=.67	100% (n=6)	71.4% (n=5)	Fisher's Exact p=.46

common. Several patients also suggested including a text box for personal messages to psychiatrist/clinicians.

DISCUSSION

To the best of our knowledge, this is the first study comparing geriatric psychiatry patients' ability and acceptability to complete symptom self-report questionnaires using tablet computers vs. traditional paper questionnaires. More than 92% of geriatric patients were able to complete the questionnaires on iPads, which did not differ from paper questionnaire completion rates. Time to completion for both tablet- and paper-based questionnaires was comparable in the geriatric psychiatry patients.

Older inpatients who have more severe and disabling psychiatric symptomatology than their outpatient counterparts completed the tablet-based questionnaires substantially faster than paper-based ones (10.5 minutes vs. 17.0 minutes). It is possible that, although many older adults are unfamiliar with iPads, the large font and intuitive design of tablet computers[18] overcame the issues of attention, visual acuity, and motor
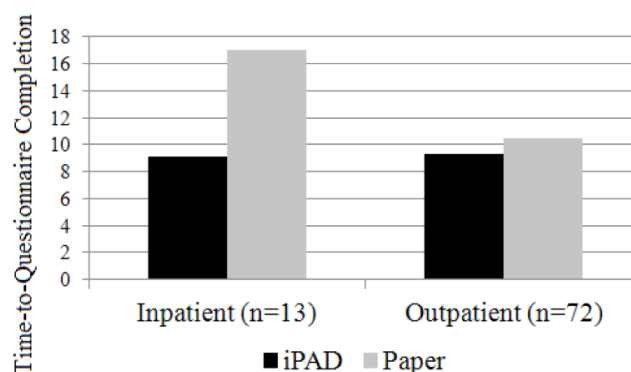

FIGURE 1. Total time to complete both BSI-53 and PHQ-9 questionnaires in geriatric psychiatry outpatients and inpatients aged > 60 (n = 85)

symptoms in severe late-life mental illness.[19] This supports the potential use of tablet computers as a communication tool between mental health professionals and elderly patients in the community to provide early signs of deterioration in their psychiatric condition. Future research could examine the use

of 'Red Flags', a set of self-reported symptoms indicating a high risk of psychiatric relapse, which could be tracked through tablet computers and allow clinicians to intervene and prevent acute psychiatric hospitalizations.

It also appears that aging does not affect mentally ill patients' capacity to answer tablet-based questionnaires, at least relative to their ability to complete paper questionnaires. Above age 60, further increases in age were not associated with time-to-complete questionnaires. Although inpatients aged > 60 completed questionnaires slower than their younger counterparts, these differences are far more pronounced with paper versions (17.0 vs. 8.3 minutes) compared to iPad versions (9.2 vs. 6.8 minutes). Previous research has shown age to be correlated with less computer proficiency in the general population,[20] but this was not observed in our study, likely because of the relatively low previous information technology skills needed to use tablet computers. Computer proficiency was assessed in our study by documenting all the questions related to the use of the iPad during the completion of the task, as well as the time to completion, one of our primary outcomes. Further, all the participants were closely supervised by the authors (GM & CY) to detect any signs of difficulty experienced during the completion of the questionnaires. Participants were also asked at the end of the study if they found the completion of the questionnaires difficult. A recent study found that almost 50% of patients with early stage dementia consider tablet computer use moderately or extremely intuitive,[18] which support tablet computers' ease of use.

This may help explain why geriatric psychiatry patients were positive about their experience with the tablet computer. The majority of patients found the questionnaires on the iPad both easy to use and easy to read (and perhaps easier to read compared to paper questionnaires in geriatric psychiatry inpatients). This is in accordance with previous studies done in adult schizophrenia patients,[21] adult and older medically-ill patients,[8,22] and the general elderly population,[23] as well as a recent review exploring mobile health technology in late-life mental illness. The review found these type of technologies to be feasible for patients and reliable for mental health domains assessment within the geriatric population.[24] Despite the fact that 76% of community-dwelling older adults rated their technology skills as poor or average in a recent survey,[13] geriatric patients in our study expressed being interested in using iPad-based symptom self-report questionnaires once they were routinely available in future clinical practice.

The use of iPads to collect self-report symptom questionnaires in older adults with mental illness appears feasible, with a number of potential applications in clinical, population health, and research settings. Clinically, patients could answer iPad symptom self-reports on a regular basis in 'electronic health diaries', sharing their progress with mental health professionals, as has previously been used in adult patients with psychiatric disorders[3] and physical illnesses.[25,26] The majority of patients in our study appear to be open to this approach. One population that may be of particular interest is geriatric psychiatry patients in long-term care, who have up to 3 times the rate of acute psychiatric health service utilization. [27] Clinical data generated this way could be used for program evaluation or, on a larger scale, used for illness surveillance across a catchment area and to evaluate population-health interventions (e.g., a combination of 'Red Flag' symptoms could trigger a mental health visit by telephone or Skype to prevent acute health service use). Research initiatives could then make use of these large systematically collected repositories of data using platforms such as REDCap (http://project-redcap.org/). In this era of 'Big Data', large-scale clinical data gathered using iPads could be paired with neuroimaging and other biomarkers, to enable new insights into the etiology and treatment of late-life mental illness.

Limitations

Our study has a few limitations. We hypothesized that the iPad and paper-and-pencil groups would not be significantly different with regard to time-to-completion and completion rates. We did not find a statistical difference between groups, but this could be further assessed in larger studies with non-inferiority/equivalence statistical designs. We cannot comment on the use of tablet computers in older adults with moderate to severe dementia, as these were excluded from the study. It is worth mentioning that four patients had mild dementia (2 iPad, 2 paper questionnaires); all of them were able to complete the questionnaires and none of them reported any difficulties. Another limitation of our study lies in the lack of objectively scaled mental state assessments of our patients. A test–retest reliability was also not evaluated. These two factors may or may not have affected the reliability of the subjective score. Blinding of the assessors to iPad vs. paper allocation status was not feasible. Timing the completion reliably requires the assessor to observe the patient completing the questionnaire. This also permitted the assessor to determine if the patient was attentive to the questions or not. In the latter case, data were discarded, as its validity could not be ensured. However, we trust our colleagues' scientific integrity and do not believe this has affected the results. Younger and middle-aged psychiatric outpatient were not included in this study, which is a limitation as having a broad age range (similar to the inpatient recruitment) aimed to determine the effect of age on the primary outcomes. We did not assess patients' previous experience with iPads or other computerized devices. We did not collect data on all possible factors which could have theoretically affected time-to-questionnaire completion, such as extrapyramidal symptoms. We did not find a statistical difference between groups, but this could be further assessed in larger studies with non-inferiority/equivalence statistical designs.

CONCLUSIONS

We found that iPad tablet computer symptom self-report questionnaires had similar rates of completion and took

a similar amount of time to complete by older adults with mental illness, compared to paper versions. iPad questionnaires may even require less time to complete in geriatric psychiatry inpatients as they were also easy to read and easy to use. Tablet computers could potentially be used widely in both outpatient and acute inpatient settings for psychiatric symptom assessment in late-life mental illness for clinical, population health, and research purposes. Further research should evaluate whether tablet computers could be used to systematically track symptoms and improve health outcomes in late-life mental illness.

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CONFLICT OF INTEREST DISCLOSURES

The authors declare that no conflicts of interest exist.

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