

## PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (<http://bmjopen.bmj.com/site/about/resources/checklist.pdf>) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

### ARTICLE DETAILS

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| <b>TITLE (PROVISIONAL)</b> | Feedback on SMS reminders to encourage adherence among patients having antipsychotic medication: a cross-sectional survey nested within a randomised trial |
| <b>AUTHORS</b>             | Kannisto, Kati; Adams, Clive; Koivunen, Marita; Katajisto, Jouko; Välimäki, Maritta  |

### VERSION 1 - REVIEW

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| <b>REVIEWER</b>        | Aroldo Ayub Dargél<br>Perception and Memory Laboratory, Institut Pasteur. Paris, France |
| <b>REVIEW RETURNED</b> | 29-Jun-2015   |

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| <b>GENERAL COMMENTS</b> | <p>The study provide evidence to show SMS reminder as a useful tool to remind outpatients with psychotic symptoms about adherence to treatment as well as to keep their treatment follow-up. In addition, they demonstrated greater satisfaction of this population of psychotic patients in receiving tailored SMS during the period of the study. The topic is of clinical significance.</p> <p>Some comments and suggestions are described below:</p> <p><b>ABSTRACT:</b></p> <ul style="list-style-type: none"><li>• The sentence explaining the “Objectives” of the study sounds vague and should be re-structured.<br/>“To explore feedback....tailored SMS reminders... for medication adherence? in psychiatric outpatient care (or in psychotic patients/ patients using antipsychotics...?) and explore factors related to satisfaction (satisfaction of ...? Of using/receiving SMS..?)</li><li>• “Participants”: describe only the participants number would be better in this part. Consider deleting the “response rate 72%”.</li><li>• “Conclusion”: a quite vague...The authors should consider to re-write, being more concisely and objective.</li></ul> <p><b>STRENGTHS AND LIMITATIONS</b></p> <ul style="list-style-type: none"><li>• The authors should be more clear: exploring patients’feedback (which kind of patients? psychiatric patients in general, psychotic patients with diagnosis of ?...OR</li></ul> <p><b>INTRODUCTION:</b></p> |
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|  | <ul style="list-style-type: none"><li>• 1st paragraph: the authors refer to nonadherence for “people with psychosis” and “people with schizophrenia”. Would be better to be explicit “nonadherence of...? Medication? Maybe exemplify with nonadherence rates...</li><li>• Would be better to quote a more specific paper about “poor attendance rates [7]”. This study (reference, [7]) is a pilot trial with adolescents in psychotherapy and it’s not clear if those patients are psychotic.</li><li>• Quote reference for “people living with schizophrenia”[ ]</li><li>• 2nd paragraph: they refer to “severe mental disorders”. The authors could be more specific on what they would like to emphasize (all/most of all severe mental illness or those with psychosis, and then giving example such as...). Review the sentence beginning with “Text message is easy...”A quite repetitive “simple to use” and “potentially useful”.</li><li>• The aim of the study is quite different from that one described in the “Objectives section” in the abstract. It would be recommended that authors could align the same idea as well as write more objectively here. Also, the second sentence beginning with “For this exploration...” might be removed from this part of the text. Maybe the authors could adapt it in the Methods section.</li></ul> <p><b>METHODS</b></p> <ul style="list-style-type: none"><li>• Although the reader can infer from the text, the eligibility criteria (inclusion/exclusion criteria) might be written more clearly.</li><li>• It would be interesting if the authors could briefly describe the type of messages (frequency, content) they sent to the participants. The text messages followed a standard pattern regarding the content? Tailored messages for medication adherence / outpatient treatment follow-up...(e.g. supplementary table).</li><li>• The authors used a subset of data from another study (RCT Mobile.Net). Would be interesting if the authors could better describe this subpopulation of Psychotic patients. Psychiatric patients that presented Psychosis? Which were the most common psychiatric diagnosis (all patients had schizophrenia? Schizophrenia-like or other diagnosis?). Or this population was characterized as “psychotic” because people were discharged from the Psychiatric Unit taking antipsychotic (e.g. bipolar patients using antipsychotics..).</li><li>• Then would be interesting to perform some subgroups analyze for the primary outcome of people with schizophrenia compared with others who were taking antipsychotics.</li></ul> <p><b>RESULTS</b></p> <ul style="list-style-type: none"><li>• Please briefly describe the reasons for using the participant's age at first contact in psychiatric services and feedback</li><li>• The duration of illness should be compared among groups.</li><li>• Ongoing medication that could influence here should be mentioned; at least, the most frequently used antipsychotics on this</li></ul> |
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|  | <p>population.</p> <p><b>DISCUSSION</b></p> <ul style="list-style-type: none"> <li>• 2nd paragraph: Again, the authors mentioned “people living with psychosis” without being specific about what population they are referring (see comment in the Introduction section). In the next sentence the authors describe “low response rates”. It appears to be treatment response rates. Then, it would be interesting to review this. The authors may review this paragraph as a whole.</li> <li>• 3rd paragraph: at the end, the authors mentioned selection-bias regarding population gender. It would be interesting if the authors could develop more this section, describing, for example, the bias related with inclusion criteria (“only patients having a mobile phone”).</li> <li>• 5th paragraph: the authors might review this entire paragraph. There are a miscellaneous of ideas and they are poor developed. (from the idea of people living alone, people divorced to unemployed and self-neglect), ending with life-expectancy for schizophrenia. The authors might be more specific here, in which the idea they would like to ling with the use of mobile technology.</li> <li>• The authors could describe briefly about the cognitive abilities of this population and how this could influence to use/accept mobile technologies.</li> <li>• The authors might develop in more details about their findings regarding “geography”, show why this is important, trying to relate to other countries....</li> <li>• Finally, the authors need to do a final proofreading, for example repeated words and sentence structure (e.g. “ a small minority of this paranoid group thought thought that...”).</li> </ul> |
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| <b>REVIEWER</b>        | Dror Ben-Zeev<br>Dartmouth College<br>USA |
| <b>REVIEW RETURNED</b> | 23-Jul-2015                               |

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| <b>GENERAL COMMENTS</b> | <p>I found this submission to be clear, well-written, and thoughtful. The statistical approach is straightforward and appropriate for the questions asked. The findings will be of heuristic value to the field of mHealth as a whole because of its sample size and broader implications of patient-centered feedback derived from an especially challenging clinical population. It will have particular relevance to mHealth research involving people with serious mental illness. I have only a few comments for the authors consideration:</p> <p>1) Generalizability: How much of the patient feedback applies to SMS as a broad treatment strategy and how much of it pertains the the specific content/frequency of the text reminders used in this trial? Some thoughtful discussion of this issue in the discussion would enhance the readers ability to put findings in context.</p> <p>2) Why were these sociodemographic and clinical variables specifically chosen as predictors in the model? Was there a theoretical reason guiding this decision or was it completely</p> |
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|  | <p>convenience driven? I encourage the authors to shed some light on the selection rationale, demonstrating this was not a an exploratory "fishing expedition" as it would strengthen the paper.</p> <p>3) Table 4 data is minimal and should be reported in the text.</p> <p>4) Was there some clear separation between research staff (who made the data collection call) and clinical staff (who provided technical troubleshooting as part of the intervention)? If there wasn't, can the authors be sure the largely positive feedback is not linked with participants hesitancy to provide negative feedback to the same people who are administering their intervention?</p> <p>5) The Yes/No response format is very limited in its capacity to capture nuance, belief strength, etc. Some of the question items adopted for this study originally had continuous response options. The forced-choice binary response option should be discussed as a limitation.</p> <p>6) Some discussion /connection of these findings to recently published research reporting on acceptability and feasibility of successful bidirectional (interactive) SMS among people with psychosis seems particularly relevant to this paper (see: Ben-Zeev, D., Kaiser, S. M., Krzos, I. (2014). Remote "hovering" with individuals with psychotic disorders and substance abuse: Feasibility, patient engagement, and therapeutic alliance with a text-messaging mobile interventionist. Journal of Dual Diagnosis, 10 (4), 197-203.)</p> |
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| <b>REVIEWER</b>        | <p>John Torous<br/>Harvard Longwood Psychiatry Residency Training Program, Harvard Medical School, USA</p> <p>Brigham and Women's Hospital, Harvard Medical School, USA</p> |
| <b>REVIEW RETURNED</b> | 23-Jul-2015   |

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| <b>GENERAL COMMENTS</b> | <p>This is an interesting paper presenting results of users' subjective experiences regarding perceived satisfaction, usefulness, and ease of use of a SMS text-messaging program to encourage adherence in psychiatric outpatients. The number of subjects and duration of technology use in this study are impressive. The paper could be made stronger through a more comprehensive discussion of prior text messaging studies for patients with psychosis so readers understand the context of this study and how these results are similar to other studies in terms of say feasibility but unique in terms of subject number and duration. Finally clarification of how / if subjects perception of text messaging is based on, or related to, adherence to / use of text messaging is critical in understanding the meaning of this data. Overall, this is an impressive paper exploring an important area of service delivery for psychiatry.</p> <p>Introduction:</p> <p>The introduction will benefit from a discussion of the existing literature regarding the utility of text messaging interventions in psychotic spectrum patient populations. For example, citations 15-17 are ok, but there is a more relevant literature regarding this technology for patients with psychotic disorders.</p> |
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|  | <p>Please expand the discussion to current uses and general results of text messaging programs for psychiatric patients. Citation 27 is from 2012 and it would be interesting to report on more current data regarding patient's interest and use of technology in general.</p> <p>Please define 'long term' as used on the top of page 5. What is the longest study prior to this study?</p> <p>Consider a further literature review before stating that feedback from patients with psychosis is particularly scarce. A quick pubmed search shows several papers with interesting results suggesting feasibility and high rates of adherence.</p> <p>Methods:</p> <p>Please provide some further details on the Mobile.Net trial for readers who may not be able to immediately refer to the original study and paper.</p> <p>Please provide further details on who made the phone calls to subjects.</p> <p>It appears the satisfaction etc. data presented in this paper is independent of actual use of the text-messaging program? Can you provide some data if the opinions of these subjects reflect subjects who actually were adherent and used the text messaging vs. those that may have rarely actually used it. This seems critical in understanding the face-validity of this data.</p> <p>Results:</p> <p>Can you provide further details on who the 28% were that did not respond to the phone calls and thus did not provide data. This seems like important information in understanding who text messaging may work well for – and who not.</p> <p>Can results be presented by psychotic disease state as well? Were these all schizophrenia patients, schizoaffective, bipolar with psychotic features patients etc?</p> <p>Please check table 1. It reports that 87% felt that text messaging causes harm?</p> <p>Can you provide more details on the 13% who felt this caused harm?</p> <p>Discussion:</p> <p>Stating response rates from patients with psychosis are generally lower needs more support than citation 60 alone, which is from 2007. Please expand to discuss rates of response of patients with psychosis using digital platforms like texting. Rates of adherence may actually be rather good?</p> <p>Please discuss further if these results are related to adherence, i.e. does this data represent the opinions of patients who actually used the text messaging program – or instead were meant to and may</p> |
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|  | <p>actually not have used it very often at all.</p> <p>It would be interesting to at least mention smartphone interventions, esp in comparison to text messaging for patients with psychotic disorders. See PMID: 23563184.</p> <p>Again, when citing the literature, either clearly identify that citations like 63,64,65 are in very different patient populations and disease states or better yet – include citations related to text messaging in patients with psychotic disorders.</p> <p>Can you provide more information on the patients who recorded that the intervention caused harm. Harm is a very broad term.</p> <p>It seems that the results presented in this study do not support making conclusions about more interactive/game approaches for younger patients and texts for older. There were no questions asked about games/interactivity. This should be supported further or removed.</p> <p>Please expand the section on limitations of this study. It will be important to talk about the regional nature of this patient population, fact this is all subjective data (eg harm was not verified?), app use was not verified?, etc</p> <p>Please discuss these results in the context of the existing literature of text messaging interventions for patients with psychotic spectrum illnesses.</p> |
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### VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Reviewer Name Aroldo Ayub Dargél

Institution and Country Perception and Memory Laboratory, Institut Pasteur. Paris, France

Please state any competing interests or state 'None declared': No conflicts of interest.

Please leave your comments for the authors below

The study provide evidence to show SMS reminder as a useful tool to remind outpatients with psychotic symptoms about adherence to treatment as well as to keep their treatment follow-up. In addition, they demonstrated greater satisfaction of this population of psychotic patients in receiving tailored SMS during the period of the study. The topic is of clinical significance.

We thank the reviewer for the valuable comments.

Some comments and suggestions are described below:

ABSTRACT:

1) • The sentence explaining the “Objectives” of the study sounds vague and should be re-structured. “To explore feedback....tailored SMS reminders... for medication adherence? in psychiatric outpatient care (or in psychotic patients/ patients using antipsychotics...?) and explore factors related to satisfaction (satisfaction of ...? Of using/receiving SMS..?)

We clarified the point raised and revised it as follows:

“To explore feedback on tailored SMS reminders to encourage medication adherence and outpatient treatment among patients having antipsychotic medication and associations related to the feedback.”

2) • “Participants”: describe only the participants number would be better in this part. Consider deleting the “response rate 72%”.

We removed the “(response rate 72%)”.

3) • “Conclusion”: a quite vague...The authors should consider to re-write, being more concisely and objective.

We clarified the point raised and revised it as follows:

“The feedback of patients having antipsychotic medication on SMS services was generally positive. Overall, people were quite satisfied despite considerable variation in their socio-demographic background and illness history. Our results endorse that the use of simple easy-to-use existing technology, such as mobile phones and SMS, is acceptable in psychiatric outpatient services. Moreover, people using psychiatric outpatient services are able to use this technology. This acceptable and accessible technology can be easily tailored to each patient’s needs and could be customized to the needs of the isolated or jobless. This is an area in which much careful evaluation is needed.”

#### STRENGTHS AND LIMITATIONS

4) • The authors should be more clear: exploring patients’feedback (which kind of patients? psychiatric patients in general, psychotic patients with diagnosis of ?...OR

We clarified the point raised and revised it as follows:

“To our knowledge, this is the largest study exploring feedback on SMS reminders among patients having antipsychotic medication.”

#### INTRODUCTION:

5) • 1st paragraph: the authors refer to nonadherence for “people with psychosis” and “people with schizophrenia”. Would be better to be explicit “nonadherence of...? Medication? Maybe exemplify with nonadherence rates...

We clarified the point raised and revised it as follows:

“Medication nonadherence is a common concern regarding people with mental health problems,[1-5]. Nonadherence to antipsychotic medication,[6] and poor attendance rates at mental health outpatient clinics,[7] have been found to be highly prevalent for these people,[6, 7], especially for people living with schizophrenia,[8], which is the severest form of psychosis,[9]. About half do not adhere to antipsychotic medication, nonadherence rates varying between 47.5–55.8%,[10, 11], and 20%–36% miss scheduled clinical outpatient appointments,[12, 13].”

6) • Would be better to quote a more specific paper about “poor attendance rates [7]”. This study (reference, [7]) is a pilot trial with adolescents in psychotherapy and it’s not clear if those patients are psychotic.

We changed the reference as follows: Cheng KD, Huang CJ, Tsang HY, Lin CH. Factors related to missed first appointments after discharge among patients with schizophrenia in Taiwan. J Formos Med Assoc 2014;113:436-41.

7) • Quote reference for “people living with schizophrenia”[ ]

We added the reference as follows: Balikci A, Erdem M, Zincir S, Bolu A, Zincir SB, Ercan S, Uzun O. Adherence with Outpatient Appointments and Medication: A Two-Year Prospective Study of Patients with Schizophrenia. *Bulletin of Clinical Psychopharmacology* 2013;23:57-64.

8) • 2nd paragraph: they refer to “severe mental disorders”. The authors could be more specific on what they would like to emphasize (all/most of all severe mental illness or those with psychosis, and then giving example such as...). Review the sentence beginning with “Text message is easy...” A quite repetitive “simple to use” and “potentially useful”.

We clarified the point raised and revised it as follows:

“Text messaging is easy to undertake and use,[19, 20], it is inexpensive,[21], and acceptable,[20, 22]. It has, however, been questioned whether patients having antipsychotic medication, such as people living with schizophrenia will interact with technology because of difficulties with cognitive abilities,[23, 24] or a lack of willingness to engage in mobile interventions,[25].”

9) • The aim of the study is quite different from that one described in the “Objectives section” in the abstract. It would be recommended that authors could align the same idea as well as write more objectively here. Also, the second sentence beginning with “”For this exploration...” might be removed from this part of the text. Maybe the authors could adapt it in the Methods section.

We revised the aim of the study as follows (please, see the 1st comment, too):

“The aim of this cross-sectional survey was to explore feedback on tailored SMS reminders to encourage medication adherence and outpatient treatment among patients having antipsychotic medication, and to explore the associations related to the feedback.”

We moved the second sentence to Methods section under the subtitle “Participants” and changed the sentence as follows: “To explore patients’ feedback we used a subset of data,[44] collected for a multicenter randomized controlled two-armed trial (“Mobile.Net” ISRCTN: 27704027) conducted in 24 sites and 45 psychiatric hospital wards in Finland,[43].”

## METHODS

10) • Although the reader can infer from the text, the eligibility criteria (inclusion/exclusion criteria) might be written more clearly.

We clarified the point raised and revised it as follows:

“The inclusion criteria were as follows: age of 18–65 years, either sex, having antipsychotic medication on discharge from a psychiatric hospital, having a mobile phone, and able to use the Finnish language. Written informed consent was guaranteed. Exclusion criteria were as follows: patients who had a planned nonacute treatment period or were treated in forensic psychiatric services,[43].”

11) • It would be interesting if the authors could briefly describe the type of messages (frequency, content) they sent to the participants. The text messages followed a standard pattern regarding the content? Tailored messages for medication adherence / outpatient treatment follow-up...(e.g. supplementary table).

We clarified the point raised and revised it as follows:

“Participants received tailored SMS reminders for 12 months,[43]. The most commonly selected messages from the three main topics (medication, treatment appointment and free time) were as follows: “Have you taken your medication - feel well”, “It is important to comply with your follow-up appointment, isn't it?” and “Get up, go out and exercise”. Participants preferred to receive messages 1–6 times per month, at the beginning of the week (Monday and Tuesday) and in the morning time (6am–12pm) (see more detailed Kauppi et al. 2015,[45]).”

12) • The authors used a subset of data from another study (RCT Mobile.Net). Would be interesting if the authors could better describe this subpopulation of Psychotic patients. Psychiatric patients that presented Psychosis? Which were the most common psychiatric diagnosis (all patients had schizophrenia? Schizophrenia-like or other diagnosis?). Or this population was characterized as “psychotic” because people were discharged from the Psychiatric Unit taking antipsychotic (e.g. bipolar patients using antipsychotics..).

We clarified the point raised and revised it as follows:

“The most common psychiatric diagnoses (ICD 10) were F20-F29: schizophrenia, schizotypal and delusional disorders (38%) and F30-F39: mood [affective] disorders (29%), other 33% were minor (more detailed description in Table 1).”

13) • Then would be interesting to perform some subgroups analyze for the primary outcome of people with schizophrenia compared with others who were taking antipsychotics.

We clarified the point raised, performed subgroup analyses and revised the text as follows:

“Further, there were no statistically significant differences ( $P>0.05$ ) when comparing participants' feedback on SMS reminders between participants with schizophrenia (F20-F29) and participants with other psychiatric diagnoses (other than F20-F29).”

## RESULTS

14) • Please briefly describe the reasons for using the participant's age at first contact in psychiatric services and feedback

To describe patients' illness history we have found that most of the patients' having antipsychotic medication do not remember how many times they have been in hospital or how long they have had the illness or been treated, but they do remember how old they were at their first contact in psychiatric services. Patients' medical records are also not always available.

15) • The duration of illness should be compared among groups.

Dear Reviewer Aroldo Ayub Dargél, we are kindly asking some clarification for this comment: what groups do you mean? We can calculate the duration of patients' illness and are more than willing to perform more statistical analyses to improve our study results.

16) • Ongoing medication that could influence here should be mentioned; at least, the most frequently used antipsychotics on this population.

We clarified the point raised and revised it as follows:

“Less than half of the participants (43%) had a neuroleptic medication, following neuroleptic and antidepressant medication together (36%), antidepressant medication (6%) and other psychiatric medication (5%). Medication information was missing for 10% of the participants.”

## DISCUSSION

17) • 2nd paragraph: Again, the authors mentioned “people living with psychosis” without being specific about what population they are referring (see comment in the Introduction section). In the next sentence the authors describe “low response rates”. It appears to be treatment response rates. Then, it would be interesting to review this. The authors may review this paragraph as a whole.

We clarified the point raised and revised the whole paragraph as follows:

“To our knowledge, this is the largest study exploring patients’ feedback on SMS reminders for people having antipsychotic medication. Our sampling secured participation from people who received SMS reminders for 12 months. This group consisted of people having antipsychotic medication, not only schizophrenia, and in this way improves generalisability to psychiatric outpatient care contexts. In studies concerning people with mental health problems low survey response rates have been a major methodological problem,[63]. Our survey response rate was 72%, which is quite satisfactory comparing to other studies where response rate may vary between 63% and 99%,[64-67].”

18) • 3rd paragraph: at the end, the authors mentioned selection-bias regarding population gender. It would be interesting if the authors could develop more this section, describing, for example, the bias related with inclusion criteria (“only patients having a mobile phone”).

We clarified the point raised and revised it as follows:

“Our study has also limitations. First, we do not have data about how many people actually used the intervention. It is therefore possible that those 72% participants who answered to the survey questionnaire are active technology users and expressed their satisfaction with the SMS intervention offered. Comparison of the background characteristics also showed that our data is biased toward older participants, females, those who were married, and had vocational education. Second, the survey questionnaire was based on the Technology Acceptance Model (TAM),[40, 41], which is a useful theoretical model to understand and explain technology users’ behavior and its implementation. Validity testing is needed in the future to ensure the validity and reliability of use of this questionnaire for this specific study population and to compare the results with other studies. Third, the instrument was kept short,[50, 51] and simple,[52], to be carried out in telephone,[48]. On the other hand, the forced-choice binary yes/no response options may have limited to capture the nuance of patients’ feedback on SMS reminders. Fourth, one of our inclusion criteria was that the participants will own a mobile phone. About 97% of the Finnish citizens have mobile phones,[68] and therefore using SMS in health services seems to be a real opportunity in the future. However, to use the intervention globally, more information is needed about the use of mobile technology in other countries, such as in Africa where the mobile phone penetration is about 63%,[69]. This has to be taken into consideration when implementing SMS reminders into other contexts. Finally, more men tend to carry the diagnosis of psychosis and be treated with psychosis in Finland (53%, Finnish National Institute of Health and Welfare 2015,[70]). In our data, male participants seem to be underrepresented (44%). We also missed those who are single, have no vocational education, and job seekers who are often more ill than average and use health services less than others, even though they have particular need for those services,[71] or may have problems with treatment adherence in mental health services,[72]. Special effort should therefore put on those persons who are difficult to capture in mental health services.”

19) • 5th paragraph: the authors might review this entire paragraph. There are a miscellaneous of ideas and they are poor developed. (from the idea of people living alone, people divorced to unemployed and self-neglect), ending with life-expectancy for schizophrenia. The authors might be more specific here, in which the idea they would like to link with the use of mobile technology.

We clarified the point raised and revised it as follows:

“We found that people seeking jobs were more often fully satisfied with the SMS comparing with other groups. People with severe mental health disorders are 6 to 7 times more likely to be unemployed than people without mental health problems,[76]. The use of ICT (information and communication technology) has increased among people aged 55 or over,[77], and is essential for people seeking jobs,[78]. This may indicate that job seekers are active mobile phone and ICT users, and therefore satisfied with the SMS reminder system. Our study results are encouraging, because it can be truly important that an intervention to be used is acceptable to this group of people. All acceptable methods to encourage self-care and self-management in this group are most welcome,[79]. Overall, patients’ satisfaction with psychiatric services and care varies from satisfaction level little over 50%,[80], to “good” (scale from “very poor” to “very good”],[81]. As opposite to previous satisfaction studies, our study result with 72% of the participants indicating their satisfaction concerning the SMS reminders was considerably higher. Therefore, our study result is encouraging.”

20) • The authors could describe briefly about the cognitive abilities of this population and how this could influence to use/accept mobile technologies.

We clarified the point raised and revised it as follows:

“Our study did not confirm the suspicion that people with serious mental health illnesses are not capable of using technology-based SMS interventions,[24]. Cognitive inability is common with people with schizophrenia for example in domains of working memory, speed of processing and verbal learning [28], which may promote challenges in interacting with technology [24]. Ben-Zeev et al. [20] found that given opportunity and with the help of appropriate training many people with schizophrenia are able and willing to use mobile technologies successfully [25], learn quickly and remember how to use mobile interventions [20]. Therefore, mental illness itself is not a barrier for technology use to encourage patient self-management.”

21) • The authors might develop in more details about their findings regarding “geography”, show why this is important, trying to relate to other countries....

We removed the text concerning geographical variation from the discussion.

22) • Finally, the authors need to do a final proofreading, for example repeated words and sentence structure (e.g. “ a small minority of this paranoid group thought thought that...”).

We read the manuscript carefully and checked the spelling and grammatical issues.

Thank you for your valuable feedback and comments.

Reviewer: 2

Reviewer Name Dror Ben-Zeev

Institution and Country Dartmouth College

USA

Please state any competing interests or state ‘None declared’: None declared.

Please leave your comments for the authors below

I found this submission to be clear, well-written, and thoughtful. The statistical approach is straightforward and appropriate for the questions asked. The findings will be of heuristic value to the field of mHealth as a whole because of its sample size and broader implications of patient-centered feedback derived from an especially challenging clinical population. It will have particular relevance to mHealth research involving people with serious mental illness. I have only a few comments for the

authors consideration:

We thank the reviewer for the valuable comments.

1) Generalizability: How much of the patient feedback applies to SMS as a broad treatment strategy and how much of it pertains to the specific content/frequency of the text reminders used in this trial? Some thoughtful discussion of this issue in the discussion would enhance the readers' ability to put findings in context.

We clarified the point raised and revised it as follows:

"Overall, patients' satisfaction with psychiatric services and care varies from satisfaction level little over 50%,[80], to "good" (scale from "very poor" to "very good",[81]. As opposite to previous satisfaction studies, our study result with 72% of the participants indicating their satisfaction concerning the SMS reminders was considerably higher. Therefore, our study result is encouraging."

2) Why were these sociodemographic and clinical variables specifically chosen as predictors in the model? Was there a theoretical reason guiding this decision or was it completely convenience driven? I encourage the authors to shed some light on the selection rationale, demonstrating this was not an exploratory "fishing expedition" as it would strengthen the paper.

We chose all demographic variables as predictors, and did not exclude any of them.

3) Table 4 data is minimal and should be reported in the text.

Table 4 has been removed, and the results reported in the text.

4) Was there some clear separation between research staff (who made the data collection call) and clinical staff (who provided technical troubleshooting as part of the intervention)? If there wasn't, can the authors be sure the largely positive feedback is not linked with participants' hesitancy to provide negative feedback to the same people who are administering their intervention?

We clarified the point raised and revised it as follows:

"One day before the telephone call for a data collection, the researcher (i.e. members of the Mobile.Net research group, not including clinical staff) sent a text message to participants allowing them to prepare for the upcoming call,[46, 47]."

5) The Yes/No response format is very limited in its capacity to capture nuance, belief strength, etc. Some of the question items adopted for this study originally had continuous response options. The forced-choice binary response option should be discussed as a limitation.

We clarified the point raised and revised it as follows:

"Third, the instrument was kept short,[50, 51] and simple,[52], to be carried out in telephone,[48]. On the other hand, the forced-choice binary yes/no response options may have limited to capture the nuance of patients' feedback on SMS reminders."

6) Some discussion /connection of these findings to recently published research reporting on acceptability and feasibility of successful bidirectional (interactive) SMS among people with psychosis

seems particularly relevant to this paper (see: Ben-Zeev, D., Kaiser, S. M., Krzos, I. (2014). Remote “hovering” with individuals with psychotic disorders and substance abuse: Feasibility, patient engagement, and therapeutic alliance with a text-messaging mobile interventionist. *Journal of Dual Diagnosis*, 10 (4), 197-203.)

We found this research report valuable and added it to our reference list, and cited it in the introduction and in the discussion.

Thank you for your valuable feedback and comments.

Reviewer: 3

Reviewer Name John Torous

Institution and Country Harvard Longwood Psychiatry Residency Training Program, Harvard Medical School, USA

Brigham and Women's Hospital, Harvard Medical School, USA

Please state any competing interests or state 'None declared': None

Please leave your comments for the authors below

This is an interesting paper presenting results of users' subjective experiences regarding perceived satisfaction, usefulness, and ease of use of a SMS text-messaging program to encourage adherence in psychiatric outpatients. The number of subjects and duration of technology use in this study are impressive. The paper could be made stronger through a more comprehensive discussion of prior text messaging studies for patients with psychosis so readers understand the context of this study and how these results are similar to other studies in terms of say feasibility but unique in terms of subject number and duration. Finally clarification of how / if subjects perception of text messaging is based on, or related to, adherence to / use of text messaging is critical in understanding the meaning of this data. Overall, this is an impressive paper exploring an important area of service delivery for psychiatry.

We thank the reviewer for the valuable comments.

We emphasized the similarities with previous studies and the uniqueness of our study as follows: “Our study results confirm previous studies concerning feasibility and acceptability of the use of SMS in psychiatric care, but are unique in terms of large study population (n=558) and long-term (study period 12 month) use of the intervention.”

Introduction:

1) The introduction will benefit from a discussion of the existing literature regarding the utility of text messaging interventions in psychotic spectrum patient populations. For example, citations 15-17 are ok, but there is a more relevant literature regarding this technology for patients with psychotic disorders.

We clarified the point raised, changed the references and revised as follows:

“Short message service (SMS) text messages as part of mHealth services,[15], have shown potential to improve adherence to antipsychotic medication,[16, 17] and attendance for mental health outpatient appointments,[13]. Use of SMS prompts may improve patients' self-management of

illness,[16, 18], social interactions, subjective attitude towards antipsychotic medication, and the quality of life,[17]. Text messaging is easy to undertake and use,[19, 20], it is inexpensive,[21], and acceptable,[20, 22]. It has, however, been questioned whether patients having antipsychotic medication, such as people living with schizophrenia will interact with technology because of difficulties with cognitive abilities,[23, 24] or a lack of willingness to engage in mobile interventions,[25]. In other health care conditions daily SMS reminders did not work – with no impact on adherence to oral contraceptive pills,[26], nor medication for acne,[27].”

2) Please expand the discussion to current uses and general results of text messaging programs for psychiatric patients. Citation 27 is from 2012 and it would be interesting to report on more current data regarding patient’s interest and use of technology in general.

We clarified the point raised and revised it as follows:

“Despite doubts, people with serious mental disorders such as schizophrenia are already being asked to use mobile phones as an aid to self-care. Phones are non-stigmatizing, familiar,[28], and have acceptable qualities,[19]. Ben-Zeev et al.,[20] found that people with serious mental health disorders perceived SMS reminders as helpful. No negative experiences were identified,[20]. Close to 100% of people with serious mental health problems reported owning or using a mobile phone,[29, 30], whereas 59% reported using the Internet,[29]. They also reported familiarity with SMS, easy access and confidence with mobile phone use,[20]. Over 70% of psychiatric patients reported their phone to be a smart phone,[30], enabling the use of smart phone interventions, such as applications for monitoring symptoms of mental health conditions in real time,[30-32] to be used in mental health services. Over 50% of psychiatric patients indicated their interest to use mobile phone applications,[30], whereas 73-87% were already using mobile phones daily with calls and text messaging being the two most common uses of the mobile phones,[33, 34]. Therefore, this group of health service users cannot be ignored while conducting person-centered information and communication technology (ICT) research,[35].”

3) Please define ‘long term’ as used on the top of page 5. What is the longest study prior to this study?

We clarified the point raised and revised it as follows: “long-term use (study periods 12 months or longer)”.

4) Consider a further literature review before stating that feedback from patients with psychosis is particularly scarce. A quick pubmed search shows several papers with interesting results suggesting feasibility and high rates of adherence.

We clarified the point raised and revised it as follows:

“Although text messaging has shown promises in health services,[13, 16, 17], and proved to be feasible and acceptable among patients with mental health problems,[19, 20], little research has been conducted to evaluate service users’ experiences and satisfaction regarding the long-term use (study periods 12 months or longer) of SMS,[38]. This feedback is needed if there is to be user-driven utilization of mobile technology in daily life,[39].”

Methods:

5) Please provide some further details on the Mobile.Net trial for readers who may not be able to immediately refer to the original study and paper.

We clarified the point raised and revised it as follows:

“To explore patients’ feedback we used a subset of data,[44] collected for a multicenter randomized controlled two-armed trial (“Mobile.Net” ISRCTN: 27704027) conducted in 24 sites and 45 psychiatric hospital wards in Finland,[43].”

6) Please provide further details on who made the phone calls to subjects.

We clarified the point raised and revised it as follows:

“One day before the telephone call for a data collection, the researcher (i.e. members of the Mobile.Net research group, not including clinical staff) sent a text message to participants allowing them to prepare for the upcoming call,[46, 47].”

7) It appears the satisfaction etc. data presented in this paper is independent of actual use of the text-messaging program? Can you provide some data if the opinions of these subjects reflect subjects who actually were adherent and used the text messaging vs. those that may have rarely actually used it. This seems critical in understanding the face-validity of this data.

We clarified the point raised and revised it as follows:

“Participants selected a mean number of 10 messages per month (range 2–25),[45]. There were no statistically significant differences ( $P>0.05$ ) related to the amount of selected text messages and participants’ feedback on SMS reminders. Further, there were no statistically significant differences ( $P>0.05$ ) when comparing participants’ feedback on SMS reminders between participants with schizophrenia (F20-F29) and participants with other psychiatric diagnoses (other than F20-F29).”

“Our study has also limitations. First, we do not have data about how many people actually used the intervention. It is therefore possible that those 72% participants who answered to the survey questionnaire are active technology users and expressed their satisfaction with the SMS intervention offered. Comparison of the background characteristics also showed that our data is biased toward older participants, females, those who were married, and had vocational education.”

Results:

8) Can you provide further details on who the 28% were that did not respond to the phone calls and thus did not provide data. This seems like important information in understanding who text messaging may work well for – and who not.

We clarified the point raised and revised it as follows:

“Participants who did not answer to the survey questionnaire ( $n = 155$ , 28%) were younger ( $P<0.001$ ), most often male ( $P=0.014$ ,  $\chi^2=6.16$ ,  $df=1$ ), had no vocational education ( $P=0.027$ ,  $\chi^2=10.96$ ,  $df=4$ ), and came younger to their first contact in psychiatric services ( $P=0.003$ ) when compared to participants, who answered to the survey questionnaire ( $n = 403$ ) (Table 1).”

9) Can results be presented by psychotic disease state as well? Were these all schizophrenia patients, schizoaffective, bipolar with psychotic features patients etc?

We clarified the point raised and revised it as follows:

“The most common psychiatric diagnoses (ICD 10) were F20-F29: schizophrenia, schizotypal and delusional disorders (38%) and F30-F39: mood [affective] disorders (29%), other 33% were minor (more detailed description in Table 1).”

10) Please check table 1. It reports that 87% felt that text messaging causes harm?

We corrected this as follows: 13% felt that text messaging caused harm.

11) Can you provide more details on the 13% who felt this caused harm?

We clarified the point raised and revised it as follows:

“Out of 403, a total amount of 51 (13%) participants were in opinion that text messages caused ‘harm’ e.g. the messages woke the participant in the morning, irritated them or disturbed their work. Those who pointed out more often negative issues in SMS were females (69%), aged about 40 years (mean 39,5; range 19 to 62), single (47%; 33% married, 16% divorced, 4% widowed) and retired (55%; 22% had no vocational education, 12% university degree, 66% a variety of vocational training courses). Further, in this group of 51 patients, the most common psychiatric diagnoses were F20-F29: schizophrenia, schizotypal and delusional disorders (35%) and F30-F39: mood [affective] disorders (26%), other 39% were minor.”

Discussion:

12) Stating response rates from patients with psychosis are generally lower needs more support than citation 60 alone, which is from 2007. Please expand to discuss rates of response of patients with psychosis using digital platforms like texting. Rates of adherence may actually be rather good?

We clarified the point raised and revised it as follows:

“In studies concerning people with mental health problems low survey response rates have been a major methodological problem,[63]. Our survey response rate was 72%, which is quite satisfactory comparing to other studies where response rate may vary between 63% and 99%,[64-67].“

13) Please discuss further if these results are related to adherence, i.e. does this data represent the opinions of patients who actually used the text messaging program – or instead were meant to and may actually not have used it very often at all.

We clarified the point raised and revised it as follows:

“In studies concerning people with mental health problems low survey response rates have been a major methodological problem,[63]. Our survey response rate was 72%, which is quite satisfactory comparing to other studies where response rate may vary between 63% and 99%,[64-67].“

Our study has also limitations. First, we do not have data about how many people actually used the intervention. It is therefore possible that those 72% participants who answered to the survey questionnaire are active technology users and expressed their satisfaction with the SMS intervention offered. Comparison of the background characteristics also showed that our data is biased toward older participants, females, those who were married, and had vocational education.”

“Participants selected a mean number of 10 messages per month (range 2–25),[45]. There were no statistically significant differences ( $P>0.05$ ) related to the amount of selected text messages and participants’ feedback on SMS reminders.”

14) It would be interesting to at least mention smartphone interventions, esp in comparison to text messaging for patients with psychotic disorders. See PMID:23563184.

We clarified the point raised and revised it as follows:

Page 4: “Over 70% of psychiatric patients reported their phone to be a smart phone,[30], enabling the use of smart phone interventions, such as applications for monitoring symptoms of mental health conditions in real time,[30-32] to be used in mental health services. Over 50% of psychiatric patients indicated their interest to use mobile phone applications,[30], whereas 73-87% were already using

mobile phones daily with calls and text messaging being the two most common uses of the mobile phones,[33, 34].”

Page 16: “A simple, one-way SMS reminder system – as used in our study - could be suitable for an aging population,[84], while younger groups may want to use a more interactive system,[85], such as games,[86] (e.g. serious games to tackle social anxiety and self-stigmatization with people with psychosis,[87]), or smart phone interventions (e.g. applications for monitoring symptoms of mental health conditions in real time,[30-32]). Over 80% (mainly male and younger participants) of participants with first-episode psychosis reported to use consoles,[88].”

15) Again, when citing the literature, either clearly identify that citations like 63,64,65 are in very different patient populations and disease states or better yet – include citations related to text messaging in patients with psychotic disorders.

We clarified the point raised and changed the references as follows:

Palmier-Claus JE, Rogers A, Ainsworth J, et al. Integrating mobile-phone based assessment for psychosis into people's everyday lives and clinical care: a qualitative study. *BMC Psychiatry* 2013;13:34.

Ben-Zeev D, Kaiser SM, Krzos I. Remote "hovering" with individuals with psychotic disorders and substance use: feasibility, engagement, and therapeutic alliance with a text-messaging mobile interventionist. *J Dual Diagn* 2014;10:197-203.

Bogart K, Wong SK, Lewis C, Akenzua A, Hayes D, Prountzos A, Okocha CI & Kravariti E. 2014. Mobile phone text message reminders of antipsychotic medication: is it time and who should receive them? A cross-sectional trust-wide survey of psychiatric inpatients. *BMC Psychiatry* 14:15.

Agyapong VI, Milnes J, McLoughlin DM & Farren CK. 2013. Perception of patients with alcohol use disorder and comorbid depression about the usefulness of supportive text messages. *Technological Health Care* 21 (1), 31–39.

15) Can you provide more information on the patients who recorded that the intervention caused harm. Harm is a very broad term.

We clarified the point raised and revised it as follows:

“Out of 403, a total amount of 51 (13%) participants were in opinion that text messages caused ‘harm’ e.g. the messages woke the participant in the morning, irritated them or disturbed their work. Those who pointed out more often negative issues in SMS were females (69%), aged about 40 years (mean 39,5; range 19 to 62), single (47%; 33% married, 16% divorced, 4% widowed) and retired (55%; 22% had no vocational education, 12% university degree, 66% a variety of vocational training courses). Further, in this group of 51 patients, the most common psychiatric diagnoses were F20-F29: schizophrenia, schizotypal and delusional disorders (35%) and F30-F39: mood [affective] disorders (26%), other 39% were minor.”

16) It seems that the results presented in this study do not support making conclusions about more interactive/game approaches for younger patients and texts for older. There were no questions asked about games/interactivity. This should be supported further or removed.

We clarified the point raised and revised it as follows:

“A simple, one-way SMS reminder system – as used in our study - could be suitable for an aging

population,[84], while younger groups may want to use a more interactive system,[85], such as games,[86] (e.g. serious games to tackle social anxiety and self-stigmatization with people with psychosis,[87]), or smart phone interventions (e.g. applications for monitoring symptoms of mental health conditions in real time,[30-32]). Over 80% (mainly male and younger participants) of participants with first-episode psychosis reported to use consoles,[88].”

17) Please expand the section on limitations of this study. It will be important to talk about the regional nature of this patient population, fact this is all subjective data (eg harm was not verified?), app use was not verified?, etc

We clarified the point raised and revised it as follows:

“Our study has also limitations. First, we do not have data about how many people actually used the intervention. It is therefore possible that those 72% participants who answered to the survey questionnaire are active technology users and expressed their satisfaction with the SMS intervention offered. Comparison of the background characteristics also showed that our data is biased toward older participants, females, those who were married, and had vocational education. Second, the survey questionnaire was based on the Technology Acceptance Model (TAM),[40, 41], which is a useful theoretical model to understand and explain technology users’ behavior and its implementation. Validity testing is needed in the future to ensure the validity and reliability of use of this questionnaire for this specific study population and to compare the results with other studies. Third, the instrument was kept short,[50, 51] and simple,[52], to be carried out in telephone,[48]. On the other hand, the forced-choice binary yes/no response options may have limited to capture the nuance of patients’ feedback on SMS reminders. Fourth, one of our inclusion criteria was that the participants will own a mobile phone. About 97% of the Finnish citizens have mobile phones,[68] and therefore using SMS in health services seems to be a real opportunity in the future. However, to use the intervention globally, more information is needed about the use of mobile technology in other countries, such as in Africa where the mobile phone penetration is about 63%,[69]. This has to be taken into consideration when implementing SMS reminders into other contexts. Finally, more men tend to carry the diagnosis of psychosis and be treated with psychosis in Finland (53%, Finnish National Institute of Health and Welfare 2015,[70]). In our data, male participants seem to be underrepresented (44%). We also missed those who are single, have no vocational education, and job seekers who are often more ill than average and use health services less than others, even though they have particular need for those services,[71] or may have problems with treatment adherence in mental health services,[72]. Special effort should therefore put on those persons who are difficult to capture in mental health services.”

18) Please discuss these results in the context of the existing literature of text messaging interventions for patients with psychotic spectrum illnesses.

We clarified the point raised and included citations related to text messaging in patients with psychotic disorders in the discussion part.

Thank you for your valuable feedback and comments.

## VERSION 2 – REVIEW

|                        |                                    |
|------------------------|------------------------------------|
| <b>REVIEWER</b>        | Dror Ben-Zeev<br>Dartmouth College |
| <b>REVIEW RETURNED</b> | 31-Aug-2015                        |

|                         |  |
|-------------------------|--|
| <b>GENERAL COMMENTS</b> | The reviewer completed the checklist but made no further comments. |
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|                        |  |
|------------------------|--|
| <b>REVIEWER</b>        | John Torous<br>Harvard Longwood Psychiatry Residency Training Program, Harvard<br>Medical School, Boston, MA |
| <b>REVIEW RETURNED</b> | 25-Aug-2015  |

|                         |  |
|-------------------------|--|
| <b>GENERAL COMMENTS</b> | The reviewer completed the checklist but made no further comments. |
|-------------------------|--|