

BMJ Open Feedback on SMS reminders to encourage adherence among patients taking antipsychotic medication: a cross-sectional survey nested within a randomised trial

Kati Anneli Kannisto,^{1,2} Clive E Adams,³ Marita Koivunen,^{1,2} Jouko Katajisto,⁴ Maritta Välimäki^{1,5,6}

To cite: Kannisto KA, Adams CE, Koivunen M, *et al.* Feedback on SMS reminders to encourage adherence among patients taking antipsychotic medication: a cross-sectional survey nested within a randomised trial. *BMJ Open* 2015;**5**:e008574. doi:10.1136/bmjopen-2015-008574

► Prepublication history for this paper is available online. To view these files please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2015-008574>).

Received 22 April 2015
Revised 21 August 2015
Accepted 20 September 2015



CrossMark

For numbered affiliations see end of article.

Correspondence to
Kati Anneli Kannisto;
kaankan@utu.fi

ABSTRACT

Objectives: To explore feedback on tailored SMS reminders to encourage medication adherence and outpatient treatment among patients taking antipsychotic medication, and associations related to the feedback.

Design: A cross-sectional survey nested within a nationwide randomised clinical trial ("Mobile.Net" ISRCTN27704027).

Setting: Psychiatric outpatient care in Finland.

Participants: Between September 2012 and December 2013, 403 of 558 adults with antipsychotic medication responded after 12 months of SMS intervention.

Main outcome measure: Feedback was gathered with a structured questionnaire based on Technology Acceptance Model theory. Data were analysed by Pearson's χ^2 test, binary logistic regression and stepwise multiple regression analyses.

Results: Almost all participants (98%) found the SMS reminders easy to use and 87% felt that the SMS did not cause harm. About three-quarters (72%) were satisfied with the SMS received, and 61% found it useful. Divorced people were particularly prone to find SMS reminders useful ($\chi^2=13.17$, df=6, p=0.04), and people seeking employment were more often 'fully satisfied' with the SMS compared with other groups ($\chi^2=10.82$, df=4, p=0.029). People who were older at first contact with psychiatric services were more often 'fully satisfied' than younger groups (OR=1.02, 95% CI 1.01 to 1.04, p=0.007).

Conclusions: The feedback of patients taking antipsychotic medication on SMS services was generally positive. Overall, people were quite satisfied despite considerable variation in their sociodemographic 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 customised to the needs of the isolated or jobless. This is an area in which much careful evaluation is needed.

Strengths and limitations of this study

- To the best of our knowledge, this is the largest study exploring feedback on SMS reminders among patients taking antipsychotic medication.
- The questionnaire was based on the Technology Acceptance Model, which is a useful theoretical model to understand and explain technology users' behaviour and its implementation.
- More accurate validity testing is needed to ensure the validity and reliability of use of this questionnaire for this specific study population.

INTRODUCTION

Medication non-adherence is a common concern regarding people with mental health problems.^{1–5} Non-adherence to antipsychotic medication⁶ and poor attendance rates at mental health outpatient clinics⁷ have been found to be highly prevalent for these people,^{6, 7} especially those living with schizophrenia,⁸ which is the severest form of psychosis.⁹ About half do not adhere to antipsychotic medication, non-adherence rates varying between 47.5–55.8%,^{10, 11} and 20–36% miss scheduled clinical outpatient appointments.^{12, 13} Negative attitudes towards antipsychotic medication, stigma and concern regarding rehospitalisation are frequently cited as causes,¹⁴ and promotion of adherence has been advocated on health as well as economic grounds.^{6, 15}

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 at 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 patients' quality of life.¹⁷ Text messaging is easy to undertake and use,^{19 20} inexpensive²¹ and acceptable.^{20 22} However, whether patients taking 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, has been questioned.²⁵ In other healthcare conditions, daily SMS reminders did not work—they had no impact on adherence to oral contraceptive pills²⁶ and no effect on medication schedules for acne.²⁷

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-stigmatising and 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, and easy access to and confidence with mobile phone use.²⁰ Over 70% of psychiatric patients reported their instrument to be a smartphone,³⁰ enabling the use of smartphone 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 in using 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 phones.^{33 34} Therefore, this group of health service users cannot be ignored while conducting person-centred information and communication technology (ICT) research.³⁵

The feedback of people living with an illness can make an important contribution to healthcare improvement.³⁶ Increased emphasis on patient feedback reflects extensive investment in collection and use of peoples' experience to evaluate providers' performance in healthcare.³⁷ Although text messaging has shown promise 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 utilisation of mobile technology in daily life.³⁹ Structuring this feedback using the Technology Acceptance Model (TAM)^{40 41} produces a frameworks by which adoption and long-term utilisation in the treatment processes can be considered.⁴²

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

intervention group (n=569) received tailored SMS reminders for 12 months.⁴³

METHODS

Participants

To explore patients' feedback, we used a subset of data⁴⁴ collected for a multicentre randomised controlled two-armed trial ("Mobile.Net" ISRCTN: 27704027) conducted at 24 sites and in 45 psychiatric hospital wards in Finland.⁴³ Five hundred and sixty-nine people in the intervention group of the Mobile.Net trial were included in the survey. The inclusion criteria were as follows: age of 18–65 years, either sex, taking 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 non-acute treatment period or were treated in forensic psychiatric services.⁴³ During the trial, the 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/month, at the beginning of the week (Monday and Tuesday) and in the morning (06:00–12:00).⁴⁵

Data collection

The data concerning participants' feedback on SMS reminders were collected between September 2012 and December 2013. One day before the telephone call for a data collection, the researchers (ie, 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} To optimise participation, the researcher made contact a maximum of two times in the following days (from 10:00 to 16:00, not on weekends). In the initial call, participants were told the reason for the call and informed about the study,⁴⁸ and reminded that participation was voluntary and that participants could stop the interview whenever they wanted to do so. Those who were not reached by telephone received the questionnaire by post with written information about the study and a prepaid postal envelope.

After detailed data checking, the data of 11 participants (of 569) were excluded due to refusal after informed consent (n=5), not fulfilling inclusion criteria (n=3), randomisation error (n=1) and death (n=2). The total remaining was 558 people. Of 558 possible interviewees, 82 did not answer the call, 58 telephone numbers were unobtainable, for example, due to a switched off mobile phone ('the dialled number cannot be reached') and for 48 people, the telephone number was not in use during data collection. In two calls, a person other than the participant answered the telephone.

Finally, 368 people were reached by telephone but 8 refused to participate. The remaining 190 received a blank questionnaire by post. Forty-three people returned these filled. This resulted in a response rate of 72% (403 of a possible 558).

Outcome measures

Data were collected with a five-item structured questionnaire developed for the study. Questions were based on the existing literature regarding service users' experiences and the TAM,^{40 41} exploring patients' feedback of text message service. TAM can be used to link users' perceived usefulness and perceived ease of use about information technology to their acceptance of the technology.⁴¹ On the basis of our service-user consultation,⁴⁹ the questionnaire was kept short^{50 51} and simple,⁵² to allow it to be undertaken via telephone.⁴⁸ TAM has already been found to be useful in describing adoption of technology^{42 53 54} and explaining users' behaviour in information technology implementation.⁵⁵ Questions focused on:

1. Satisfaction regarding the SMS system (1 item);⁵⁶
2. Perceived usefulness (1 item)⁵⁷
3. Perceived ease of use (2 items);⁵⁸
4. Participants' intention to use the SMS system in the future (1 item).⁵⁹

Responses to questions were dichotomous (1=yes; 2=no). If answers were uncertain (eg, 'On other hand yes, on the other hand no' or 'yes at the beginning, no at the end') an additional option (3=either yes/or no) was used.

Statistical analysis

Descriptive statistics (frequency, percentage, mean, SD) were used to describe participants' characteristics. In addition, four geographical regions⁶⁰ were formed based on the location of the psychiatric hospital where people were recruited. To analyse where any evidence of selective dropout existed in the data (ie, difference between participants who could not be reached by phone), the demographic characteristics between respondents and non-respondents (ie, those who answered the survey questionnaire and those who did not), we used independent samples t test for continuous variables and χ^2 test for categorical variables. The following sociodemographic characteristics were included as predictors in logistic regression models: age, gender (male, female), marital status (single, married, divorced, widowed), vocational education (none, vocational training courses, primary vocational skill certificate, secondary vocational skill certificate, university degree), employment status (employed, retired, housework/self-employed, student, job seeker), geographical region (Helsinki-Uusimaa, West Finland, South Finland and North and East Finland) and age at first contact in psychiatric services.

Participants' feedback was calculated in two ways. First, answers to each individual item were analysed using descriptive statistics. Second, patients were categorised as

'fully satisfied' (100% positive answer to all 5 questions) and 'other' (not fully satisfied).

Differences between feedback between those who were fully satisfied compared with people who were not for demographic characteristics (gender, marital status, vocational education, employment status, diagnosis (International Classification of Diseases Tenth Revision, ICD-10⁶¹), geographical region) were analysed with χ^2 test. Dependences with age and age at first contact in psychiatric services were analysed using Spearman correlation coefficients. Binary logistic regression analysis followed to describe the relationship between demographic characteristics and a categorical dependent variable (fully vs not fully satisfied). Further, stepwise multiple regression analyses were conducted to explore whether satisfaction with the SMS could be predicted by demographic characteristics. A stepwise forward selection procedure was used to build the most parsimonious prediction model using SPSS V.21.⁶² Imputation was not used to manage missing values. p Value <0.05 was interpreted as a statistically significant difference. The Kuder-Richardson 20 (KR-20) coefficient for dichotomous variables was used to assess the internal consistency of the questionnaire indicating that the questionnaire was reliable (KR-20=0.68).

RESULTS

A total of 403 participants (179, 44% male), responded to the questionnaire. Mean age was 39.7 years (SD=12.8, range 18–65). About half (47%) were single (30% married, 20% divorced, 3% widowed) and almost one-third (28%) had no vocational education (11% had a university degree, 61% had a variety of vocational training courses) and 50% were retired. The most common psychiatric diagnoses (ICD-10⁶¹) were F20-F29: schizophrenia, schizotypal and delusional disorders (38%); and F30-F39: mood (affective) disorders (29%); the remaining 33% were minor (more detailed description in table 1). On the basis of the regional categorisation, about one-third of the participants lived in North and East Finland (37%), 29% in South Finland, 26% in Helsinki-Uusimaa and 9% were in West Finland. Participants' mean age at first contact within psychiatric services was 28.2 years (SD=12.1). Less than half of the participants (43%) took a neuroleptic medication, the remaining were using neuroleptic and antidepressant medication together (36%), antidepressant medication (6%) or other psychiatric medication (5%). Medication information was missing for 10% of the participants.

Participants who did not answer 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 were younger on their first contact with psychiatric services (p=0.003), when compared with participants who answered the survey questionnaire (n=403) (table 1).

Table 1 Comparison of demographic characteristic of the respondents (N=403) and non-respondents (N=155)

| Demographic characteristics n (%) | Respondent n=403 | Non-respondent n=155 | p Value (χ^2 , df) |
|---|---------------------|-------------------------|--------------------------|
| Age, mean (SD) | 39.7 (12,8) | 35.4 (12,0) | <0.001 |
| Range | 18–65 | 18–64 | |
| Gender, n (%) | | | 0.014* (6.16, 1) |
| Male | 179 (44) | 87 (56) | |
| Female | 224 (56) | 68 (44) | |
| Marital status, n (%) | | | 0.039* (8.29, 3) |
| Single | 188 (47) | 85 (55) | |
| Married | 122 (30) | 28 (18) | |
| Divorced | 81 (20) | 36 (23) | |
| Widowed | 10 (3) | 4 (3) | |
| Vocational education, n (%) | | | 0.027* (10.96, 4) |
| None | 110 (27) | 63 (40) | |
| Vocational training courses | 59 (17) | 20 (13) | |
| Primary vocational skill certificate | 117 (29) | 41 (27) | |
| Secondary vocational skill certificate | 58 (14) | 20 (13) | |
| University degree | 43 (11) | 9 (6) | |
| Missing information | 6 (2) | 2 (1) | |
| Employment status, n (%) | | | 0.639 (2.54, 4) |
| Employed | 76 (19) | 29 (19) | |
| Retired | 196 (49) | 67 (43) | |
| Housework/self-employed | 11 (3) | 4 (3) | |
| Student | 40 (10) | 19 (12) | |
| Job seeker | 72 (18) | 35 (23) | |
| Missing information | 8 (2) | 1 (<1) | |
| Diagnosis (ICD-10), n (%) | | | 0.134 (13.1, 9) |
| F00-F09† | 1 (<1) | – | |
| F10-F19‡ | 13 (3) | 16 (10) | |
| F20-F29§ | 154 (38) | 56 (36) | |
| F30-F39¶ | 115 (29) | 40 (26) | |
| F40-F49** | 35 (9) | 11 (7) | |
| F50-F59†† | 1 (<1) | – | |
| F60-F69‡‡ | 48 (12) | 22 (14) | |
| F70-F79§§ | 3 (<1) | 1 (<1) | |
| F80-F89¶¶ | 2 (<1) | 1 (<1) | |
| F90-F98*** | 1 (<1) | – | |
| Diagnose missing | 30 (7) | 8 (5) | |
| Geographical categorisation (NUTS), n (%) | | | 0.252 (4.09, 3) |
| West Finland | 36 (9) | 16 (10) | |
| Helsinki-Uusimaa | 104 (26) | 44 (28) | |
| South Finland | 115 (28) | 52 (34) | |
| North and East Finland | 148 (37) | 43 (28) | |
| Age at first contact in psychiatric services, mean (SD) | 28.2 (12,1) | 25.2 (10,1) | 0.003 |
| Range | 3–64 | 3–52 | |

*Statistically significant ($p < 0.05$) by χ^2 test and t test.

†Organic, including symptomatic, mental disorders.

‡Mental and behavioural disorders due to psychoactive substance use.

§Schizophrenia, schizotypal and delusional disorders.

¶Mood (affective) disorders.

**Neurotic, stress-related and somatoform disorders.

††Behavioural syndromes associated with physiological disturbances and physical factors.

‡‡Disorders of adult personality and behaviour.

§§Mental retardation.

¶¶Disorders of psychological development.

***Behavioural and emotional disorders with onset usually occurring in childhood and adolescence.

ICD, International Classification of Diseases; NUTS, Nomenclature of Territorial Units for Statistics.

Almost all participants (98%) found the SMS reminders easy to use and 87% felt that SMS did not cause harm (table 2). About three-quarters (72%) were

satisfied with the SMS received, and 61% found it useful, although some were ambivalent. Overall, two-thirds of participants (64%) stated that they wished to continue

Table 2 Participants' feedback on SMS (n=403)

| Items | Yes (%) | No (%) | Ambivalent (%) |
|--|----------|----------|----------------|
| Satisfaction—'Have you been satisfied with the text messages?' | 274 (72) | 85 (22) | 24 (6) |
| Usefulness—'Were the text messages useful?' | 236 (61) | 121 (32) | 26 (7) |
| Easiness—'Were the text messages easy to use?' | 392 (98) | 8 (2) | — |
| Harm—'Did the text messages cause any harm to you?' | 51 (13) | 350 (87) | — |
| Future use—'Would you use this kind of text message system in the future?' | 247 (64) | 138 (36) | — |

using the SMS system in the future. Almost half of the 403 participants (46%) were fully satisfied with the SMS system (providing 100% positive feedback).

Of the total sample (N=558), 70% found the SMS reminders easy to use, and 63% felt that SMS did not cause any harm. Almost half of the participants (49%) were satisfied with the SMS received, and 42% found it useful. Slightly less than half of the participants (44%) were interested in using the SMS intervention in the future. One-third of the participants (33%) were fully satisfied with the SMS system.

Participants selected a mean number of 10 messages/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).

Of 403, a total of 51 (13%) participants were of the opinion that text messages caused 'harm', for example, the messages woke the participant in the morning, irritated them or disturbed their work. Those more often pointing out negative issues in the SMS were females (69%), aged about 40 years (mean 39.5; range 19–62), single (47%; 33% married, 16% divorced, 4% widowed) and retired (55%; 22% had no vocational education, 12% had a university degree, 66% had 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%); the remaining 39% were minor.

On the contrary, people who were divorced found SMS reminders useful more often than single (75% vs 60%), married (75% vs 54%) or widowed (75% vs 60%) participants, respectively ($\chi^2=13.17$, $df=6$, $p=0.04$). Women perceived the SMS reminders to be harmful more often than did men (16% vs 9%, $\chi^2=4.01$, $df=1$, $p=0.045$). Of all different background characteristics, job seekers were more often fully satisfied with the SMS when compared with other groups (table 3).

Participants recruited in hospitals located in Western Finland were most often fully satisfied with the SMS system compared to those recruited in other Finnish regions ($p=0.048$) (table 4).

Participants' age at first contact in psychiatric services predicted their satisfaction (OR=1.02, 95% CI 1.01 to 1.04, $p=0.007$). The older people were at the time of their first contact with psychiatric services, the more often they were fully satisfied with the SMS system. Geographical categorisation⁵⁸ approached conventional levels of statistical significance as a predictor ($p=0.07$).

DISCUSSION

This study explored patients' feedback on tailored SMS reminders in psychiatric outpatient care in Finland. Our study provides deep insight—and reassurance—for healthcare personnel and policymakers regarding the issues that should be taken into consideration when individually tailoring ICT methods to encourage treatment adherence for people with antipsychotic medication, in order to support self-management and improve psychiatric outpatient care.

To the best of our knowledge, this is the largest study exploring patients' feedback on SMS reminders for people taking antipsychotic medication. Our sampling secured participation from people who received SMS reminders for 12 months. This group consisted of a selection of people taking antipsychotic medication, not only patients with 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 when compared with other studies where response rate varied between 63% and 99%.^{64–67}

Our study also has 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 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 are biased towards older participants, females, those who were married and those who had vocational education. Second, the survey questionnaire was based on the TAM,^{40 41} which is a useful theoretical model to understand and explain technology users' behaviour and its implementation. Validity testing is needed in the future to ensure the validity and reliability of use of this

Table 3 Differences between participants in their satisfaction with SMS reminders (n=403)

| Demographic characteristics | Fully satisfied n/N (%) | Not fully satisfied n/N (%) | p Value (χ^2 , df) |
|--|----------------------------|--------------------------------|-----------------------------|
| Gender | | | 0.496 (0.46, 1) |
| Male | 86/179 (48) | 93/179 (52) | |
| Female | 100/224 (45) | 124/224 (55) | |
| Marital status | | | 0.262 (4.00, 3) |
| Single | 86/188 (40) | 102/188 (60) | |
| Married | 49/122 (40) | 73/122 (60) | |
| Divorced | 44/81 (54) | 37/81 (46) | |
| Widowed | 5/10 (50) | 5/10 (50) | |
| Vocational education | | | 0.062 (8.95, 4) |
| None | 49/110 (44) | 61/110 (56) | |
| Vocational training courses | 38/69 (55) | 31/69 (45) | |
| Primary vocational skill certificate | 60/117 (51) | 57/117 (49) | |
| Secondary vocational skill certificate | 18/58 (31) | 40/58 (69) | |
| University degree | 19/43 (44) | 24/43 (56) | |
| Employment status | | | 0.029* (10.82, 4) |
| Employed | 31/76 (41) | 45/76 (59) | |
| Retired | 93/196 (47) | 103/196 (53) | |
| Housework/self-employed | 2/11 (18) | 9/11 (82) | |
| Student | 13/40 (32) | 27/40 (68) | |
| Job seeker | 41/72 (57) | 31/72 (43) | |
| Diagnose (ICD-10) | | | 0.439 (8.98, 9) |
| F00-F09 | 0/1 (0) | 1/1 (0) | |
| F10-F19 | 6/13 (46) | 7/13 (54) | |
| F20-F29 | 73/154 (47) | 81/154 (53) | |
| F30-F39 | 63/115 (55) | 52/115 (45) | |
| F40-F49 | 14/35 (40) | 21/35 (60) | |
| F50-F59 | 0/1 (0) | 1/1 (100) | |
| F60-F69 | 17/48 (35) | 31/48 (65) | |
| F70-F79 | 1/3 (33) | 2/3 (67) | |
| F80-F89 | 1/2 (50) | 1/2 (50) | |
| F90-F98 | 0/1 (0) | 1/1 (100) | |
| Geographical categorisation (NUTS) | | | 0.121 (5.80, 3) |
| West Finland | 23/36 (64) | 13/36 (36) | |
| Helsinki-Uusimaa | 50/104 (48) | 54/104 (52) | |
| South Finland | 50/115 (43) | 65/115 (57) | |
| North and East Finland | 63/148 (43) | 85/148 (57) | |

*Statistically significant ($p < 0.05$) by χ^2 test.

ICD, International Classification of Diseases; NUTS, Nomenclature of Territorial Units for Statistics.

questionnaire for this specific study population, and to compare the results with other studies. Third, the questionnaire was kept short^{50 51} and simple,⁵² making it convenient to be carried out on the telephone.⁴⁸ However, the forced-choice binary yes/no response options may have limited capturing of the nuance of patients' feedback on SMS reminders. Fourth, one of our inclusion criteria was that participants own a mobile phone. About 97% of Finnish citizens have mobile phones,⁶⁸ 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 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 2015⁷⁰). In our data, male participants seem to be under-represented (44%). We also missed those who are single, have no vocational education, and job seekers who are often more ill than average and who 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 be made for those persons who are difficult to capture in mental health services.

Previous studies have shown that SMS are easy to use,^{19 20} do not cause any harm⁵⁷ and result in high levels of satisfaction.^{20 22 64} We concur with these findings. In our study, 98% of participants responded that SMS were easy to use, whereas some references have been made to doubts that patients with mental health

Table 4 Associations with participants' demographic characteristics and feedback (n=403)

| Demographic characteristics | OR (95% CI) | p Value |
|--|-------------------------|---------|
| Age | 1.01 (0.99 to 1.04) | 0.319 |
| Gender | | |
| Male | (as reference category) | |
| Female | 1.11 (0.71 to 1.72) | 0.657 |
| Marital status | | |
| Single | (as reference category) | 0.301 |
| Divorced | 0.60 (0.34 to 1.06) | 0.077 |
| Married | 0.95 (0.50 to 1.79) | 0.873 |
| Widowed | 0.74 (0.17 to 3.22) | 0.686 |
| Vocational education | | |
| None | (as reference category) | 0.126 |
| Vocational training courses | 1.11 (0.56 to 2.19) | 0.767 |
| Primary vocational skill certificate | 1.09 (0.61 to 1.95) | 0.778 |
| Secondary vocational skill certificate | 0.44 (0.21 to 0.93) | 0.033 |
| University degree | 1.00 (0.46 to 2.18) | 0.996 |
| Employment status | | |
| Employed | (as reference category) | 0.157 |
| Retired | 1.18 (0.64 to 2.18) | 0.605 |
| Housework/self-employed | 0.46 (0.09 to 2.43) | 0.36 |
| Student | 0.88 (0.36 to 2.15) | 0.775 |
| Job seeker | 1.97 (0.97 to 4.01) | 0.059 |
| Geographical categorisation (NUTS) | | |
| West Finland | (as reference category) | 0.048 |
| Helsinki-Uusimaa | 0.49 (0.21 to 1.16) | 0.105 |
| South Finland | 0.33 (0.14 to 0.76) | 0.01 |
| North and East Finland | 0.36 (0.16 to 0.83) | 0.016 |
| Age at first contact in psychiatric services | 1.02 (1.00 to 1.05) | 0.08 |

NUTS, Nomenclature of Territorial Units for Statistics.

problems will interact with technology because of difficulties with cognitive abilities.^{23 24} Our study findings are, instead, promising, showing that a SMS intended for people with mental health problems is a feasible and acceptable method of sending reminders. A small minority of this patient group thought that SMS caused harm, such as through irritation or disturbance. Only a few previous studies reported SMS causing similar harm.^{64 73} That the greater proportion of this group were women (16% vs 9%) is surprising, since women are known to use SMS more than men,⁷⁴ although women tend to prefer to use their mobile phones for making phone calls.⁷⁵

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 in people with schizophrenia, for example, in domains of working memory, speed of

processing and verbal learning,²⁸ which may present challenges in interacting with technology.²⁴ Ben-Zeev *et al*²⁰ found that, given the opportunity, and with the help of appropriate training, many people with schizophrenia are able and willing to use mobile technologies successfully,²⁵ learning quickly and remembering how to use mobile interventions.²⁰ Therefore, mental illness by itself is not a barrier for technology-use to encourage patient self-management.

We found that people seeking jobs were more often fully satisfied with the SMS, when compared with other groups. People with severe mental health disorders are 6–7 times more likely to be unemployed than people without mental health problems.⁷⁶ The use of ICT has increased among people aged 55 years 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 is truly important that an intervention such as that used in this study 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, patient satisfaction with psychiatric services and care varies from a satisfaction level a little over 50%,⁸⁰ to 'good' (scale from 'very poor' to 'very good').⁸¹ As opposed 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.

Contrary to previous studies, where young people are referred to as 'digital natives' using ICTs in their daily lives,^{82 83} in our data, participants whose first contact with psychiatric services was when they were older were most often fully satisfied with SMS reminders. A simple, one-way SMS reminder system—as used in our study—could be suitable for an ageing population,⁸⁴ while younger groups may want to use a more interactive system,⁸⁵ such as games⁸⁶ (eg, serious games to tackle social anxiety and self-stigmatisation in people with psychosis⁸⁷), or smartphone interventions (eg, applications for monitoring symptoms of mental health conditions in real time^{30–32}). Over 80% (mainly male and those younger) of participants with first-episode psychosis reported that they used consoles.⁸⁸ However, we are reluctant to take this as an absolute. Health games or other internet interventions have problems with engagement.^{89 90} People under 44 years of age use mobile telephones for texting more than for making calls,⁹¹ while older adults report a wide variety of uses of technology, including use of mobile telephones.⁸⁴

CONCLUSIONS AND IMPLICATIONS

The generally positive feedback and satisfaction with SMS reminders may indicate possibilities for use of tailored mHealth interventions in psychiatric outpatient care. We think it is important to listen to feedback and

that this may affect the acceptance of technology in routine care. Our study results confirm previous studies concerning feasibility and acceptability of the use of SMS in psychiatric care, but are unique in terms of having a large study population (n=558) and long-term (study period 12 month) use of the intervention.

Our results largely endorse that emphasising the use of simple, already existing technology, such as mobile phones and SMS,⁹² may be an acceptable method in psychiatric outpatient services. This is in line with our previously published literature review, which showed a wide use of SMS reminders in different healthcare services.⁹³ The Mobile.Net randomised trial will evaluate the effects of one particular SMS system, but this feedback study does suggest that this media may have much to offer in supporting people in an acceptable way, inexpensively and over great distances.

There is, however, a risk that healthcare providers might use SMS as a way of shifting their responsibility to the patient, which may promote insufficient follow-up.⁹⁴ This could be a harmful consequence. Insufficient follow-up can result in non-attendance in vulnerable groups who are particularly unwell, socially impaired⁹⁵ and at risk of hospitalisation.⁹⁶ We need to understand the possible risks of implementation of SMS interventions³⁸ while emphasising the importance of service users' participation and feedback.³⁷

Author affiliations

¹Department of Nursing Science, University of Turku, Turku, Finland

²Satakunta Hospital District Pori, Finland

³Division of Psychiatry, Institute of Mental Health, University of Nottingham, Nottingham, UK

⁴Department of Mathematics and Statistics, University of Turku, Turku, Finland

⁵Turku University Hospital, Turku, Finland

⁶Hong Kong Polytechnic University, Hong Kong

Acknowledgements The authors would like to thank the patients, staff in participating research organisations and research assistants who kindly agreed to participate in this study, without whom the study would not have been possible. They also thank Kaisa Kauppi, Tella Lantta, Laura Yli-Seppälä and Sanna Suni for their invaluable help with data collection and data entry. They also thank the Mobile.Net Safety Committee Group for their input and support throughout this study.

Contributors KAK carried out the literature review and data collection, wrote the statistical analysis plan, conducted the descriptive data analyses, and drafted and revised the paper. CEA and MK drafted and revised the paper. JK conducted statistical analyses, assisted in interpreting the analysis, and drafted and revised the paper. MV designed and granted the study, wrote the study protocol and statistical analysis plan, provided scientific supervision, oversaw the conduct of the study, and drafted and revised the manuscript. All the authors contributed to and have approved the final manuscript.

Funding This work was supported by The Academy of Finland (132581), Turku University Hospital (EVO 13893), Satakunta Hospital District (EVO 12/2010, 81096), Foundations' Professor Pool, Finnish Cultural Foundation and the University of Turku.

Competing interests KAK reports grants from Satakunta Hospital District during the conduct of the study; CEA has nothing to disclose; JK has nothing to disclose; MK has nothing to disclose; MV reports grants from The Academy of Finland, Turku University Hospital, Satakunta Hospital District, Foundations' Professor Pool, Finnish Cultural Foundation and non-financial

support from University of Turku, during the conduct of the study. All the authors have completed the ICMJE uniform disclosure form at http://www.icmje.org/coi_disclosure.pdf and declare: this work was supported by The Academy of Finland (132581), Turku University Hospital (EVO 13893), Satakunta Hospital District (EVO 12/2010, 81096), Foundations' Professor Pool, Finnish Cultural Foundation and the University of Turku.

Ethics approval Approval for the study (Mobile.Net) was obtained from the Ethics Committee of the Hospital District of Southwest Finland on 16 December 2010 (ref; ETMK 109/180/2010). Permission to conduct the study was guaranteed by each hospital organisation.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement This cross-sectional survey is a part of a randomised clinical trial ("Mobile.Net" ISRCTN: 27704027). This is an Open Access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix and adapt this work, build on this work non-commercially and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

Open Access This is an Open Access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

REFERENCES

1. Velligan DJ, Weiden PJ, Sajatovic M, *et al*. The expert consensus guideline series: adherence problems in patients with serious and persistent mental illness. *J Clin Psychiatry* 2009;70:1–46.
2. Leucht S, Tardy M, Komossa K, *et al*. Maintenance treatment with antipsychotic drugs for schizophrenia. *Cochrane Database Syst Rev* 2012;(5):CD008016.
3. Offord S, Lin J, Mirski D, *et al*. Impact of early nonadherence to oral antipsychotics on clinical and economic outcomes among patients with schizophrenia. *Adv Ther* 2013;30:286–97.
4. National Institute for Health and Care Excellence (NICE). Psychosis and schizophrenia in adults: treatment and management. 2014. <http://www.nice.org.uk/guidance/CG178> (accessed 7 Aug 2015).
5. Shuler KM. Approaches to improve adherence to pharmacotherapy in patients with schizophrenia. *Patient Prefer Adherence* 2014;8:701–14.
6. Kane JM, Kishimoto T, Correll CU. Non-adherence to medication in patients with psychotic disorders: epidemiology, contributing factors and management strategies. *World Psychiatry* 2013;12:216–26.
7. Cheng KD, Huang CJ, Tsang HY, *et al*. Factors related to missed first appointments after discharge among patients with schizophrenia in Taiwan. *J Formos Med Assoc* 2014;113:436–41.
8. Balıkcı A, Erdem M, Zincir S, *et al*. Adherence with outpatient appointments and medication: a two-year prospective study of patients with schizophrenia. *Bull Clin Psychopharmacol* 2013;23:57–64.
9. Alvarez-Jiménez M, Parker AG, Hetrick SE, *et al*. Pre-venting the second episode: a systematic review and meta-analysis of psychosocial and pharmacological trials in first-episode psychosis. *Schizophrenia Bull* 2011;37:619–30.
10. Byerly MJ, Nakonezny PA, Rush AJ. The brief adherence rating scale (BARS) validated against electronic monitoring in assessing the antipsychotic medication adherence of outpatients with schizophrenia and schizoaffective disorder. *Schizophrenia Res* 2008;100:60–9.
11. Vassileva I, Milanova V, Asan T. Predictors of medication non-adherence in bulgarian outpatients with schizophrenia. *Community Ment Health J* 2014;50:854–61.
12. Mitchell AJ, Selmets T. Why don't patients attend their appointments? Maintaining engagement with psychiatric services. *Adv Psychiatr Treat* 2007;13:423–34.
13. Sims H, Sanghara H, Hayes D, *et al*. Text message reminders of appointments: a pilot intervention at four community mental health clinics in London. *Psychiatr Serv* 2012;63:161–8.

14. Haddad PM, Brain C, Scott J. Nonadherence with antipsychotic medication in schizophrenia: challenges and management strategies. *Patient Relat Outcome Meas* 2014;5:43–62.
15. World Health Organization (WHO). mHealth. New horizons for health through mobile technologies. 2011. http://www.who.int/goe/publications/goe_mhealth_web.pdf (accessed 8 Mar 2015).
16. Granholm E, Ben-Zeev D, Link PC, et al. Mobile Assessment and Treatment for Schizophrenia (MATS): a pilot trial of an interactive text-messaging intervention for medication adherence, socialization, and auditory hallucinations. *Schizophr Bull* 2012;38:414–25.
17. Montes JM, Medina E, Gomez-Beneyto M, et al. A short message service (SMS)-based strategy for enhancing adherence to antipsychotic medication in schizophrenia. *Psychiatry Res* 2012;200:89–95.
18. Ben-Zeev D, Brenner CJ, Begale M, et al. Feasibility, acceptability, and preliminary efficacy of a smartphone intervention for schizophrenia. *Schizophrenia Bull* 2014;40:1244–53.
19. 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.
20. 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.
21. Lombard C, Deeks A, Jolley D, et al. A low intensity, community based lifestyle programme to prevent weight gain in women with young children: cluster randomised controlled trial. *BMJ* 2010;341:c3215.
22. Bogart K, Wong SK, Lewis C, et al. 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* 2014;14:15.
23. Ennis L, Rose D, Denis M, et al. Can't surf, won't surf: the digital divide in mental health. *J Ment Health* 2012;21:395–403.
24. Harvey PD, Se Keefe R. Technology, society, and mental illness: challenges and opportunities for assessment and treatment. *Innov Clin Neurosci* 2012;9:47–50.
25. Ben-Zeev D. Mobile technologies in the study, assessment, and treatment of schizophrenia. *Schizophr Bull* 2012;38:384–5.
26. Hou MY, Hurwitz S, Kavanagh E, et al. Using daily text-message reminders to improve adherence with oral contraceptives: a randomized controlled trial. *Obstet Gynecol* 2010;116:633–40.
27. Boker A, Feetham HJ, Armstrong A, et al. Do automated text messages increase adherence to acne therapy? Results of a randomized, controlled trial. *J Am Acad Dermatol* 2012;67:1136–42.
28. Pijnenborg GH, Withaar FK, Brouwer WH, et al. The efficacy of SMS text messages to compensate for the effects of cognitive impairments in schizophrenia. *Br J Clin Psychol* 2010;49:259–74.
29. Carras MC, Mojtabai R, Furr-Holden CD, et al. Use of mobile phones, computers and internet among clients of an inner-city community psychiatric clinic. *J Psychiatr Pract* 2014;20:94–103.
30. Torous J, Friedman R, Keshavan M. Smartphone ownership and interest in mobile applications to monitor symptoms of mental health conditions. *JMIR Mhealth Uhealth* 2014;2:e2.
31. Whittaker R. Issues in mHealth: findings from key informant interviews. *J Med Internet Res* 2012;14:e129.
32. Ainsworth J, Palmier-Claus JE, Machin M, et al. A comparison of two delivery modalities of a mobile phone-based assessment for serious mental illness: native smartphone application vs text-messaging only implementations. *J Med Internet Res* 2013;15:e60.
33. Proudfoot J, Parker G, Hadzi Pavlovic D, et al. Community attitudes to the appropriation of mobile phones for monitoring and managing depression, anxiety, and stress. *J Med Internet Res* 2010;12:e64.
34. Miller BJ, Stewart A, Schrimsher J, et al. How connected are people with schizophrenia? Cell phone, computer, email, and social media use. *Psychiatry Res* 2015;225:458–63.
35. Pelletier JF, Rowe M, Francois N, et al. No personalization without participation: on the active contribution of psychiatric patients to the development of a mobile application for mental health. *BMC Med Inform Decis Mak* 2013;13:78.
36. Health Research Institute. *Scoring healthcare: navigating customer experience ratings*. PricewaterhouseCoopers, 2013. <http://www.pwc.com/us/en/health-industries/publications/scoring-patient-healthcare-experience.jhtml> (accessed 8 Feb 2015).
37. Roberts MJ, Campbell JL, Abel GA, et al. Understanding high and low patient experience scores in primary care: analysis of patients' survey data for general practices and individual doctors. *BMJ* 2014;349:g6034.
38. de Jongh T, Gurol-Urganci I, Vodopivec-Jamsek V, et al. Mobile phone messaging for facilitating self-management of long-term illnesses. *Cochrane Database Syst Rev* 2012;(12):CD007459.
39. Department of Health. Personalised health and care 2020: a framework for action. 2014. <https://www.gov.uk/government/publications/personalised-health-and-care-2020/using-data-and-technology-to-transform-outcomes-for-patients-and-citizens> (accessed 8 Feb 2015).
40. Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Q* 1989;13:319–40.
41. Davis FD, Bagozzi RP, Warshaw PR. User acceptance of computer technology: a comparison of two theoretical models. *Manag Sci* 1989;35:982–1003.
42. Holden RJ, Karsh BT. The technology acceptance model: its past and its future in health care. *J Biomed Inform* 2010;43:159–72.
43. Välimäki M, Hätönen H, Adams CE. Mobile.net: Mobile Telephone Text Messages to Encourage Adherence to Medication and to Follow up With People With Psychosis: Methods and Protocol for a Multicenter Randomized Controlled Two-Armed Trial. *JMIR Res Protoc* 2012;1:e8.
44. Cho J, Park D, Lee HE. Cognitive factors of using health apps: systematic analysis of relationships among health consciousness, health information orientation, eHealth literacy, and health app use efficacy. *J Med Internet Res* 2014;16:e125.
45. Kauppi K, Kannisto KA, Hätönen H, et al. Mobile phone text message reminders: measuring preferences of people with antipsychotic medication. *Schizophr Res* 2015;168:514–22.
46. Burke LA, Miller MK. Phone interviewing as a means of data collection: lessons learned and practical recommendations. *Forum Qual Soc Res* 2001;2:7. <http://www.qualitative-research.net/index.php/fqs/article/view/959/2094> (accessed 8 Feb 2015).
47. Woodall A, Howard L, Morgan C. Barriers to participation in mental health research: findings from the genetics and psychosis (GAP) study. *Int Rev Psychiatry* 2011;23:31–40.
48. Elsom S, Sands N, Roper C, et al. Telephone survey of service-user experiences of a telephone-based mental health triage service. *Int J Ment Health Nurs* 2013;22:437–43.
49. Happell B, Roper C. Consumer participation in mental health research: articulating a model to guide practice. *Australas Psychiatry* 2007;15:237–41.
50. Brueton VC, Tierney J, Stenning S, et al. Strategies to improve retention in randomised trials. *BMJ Open* 2014;4:e003821.
51. Land L, Ross JD. Barriers to questionnaire completion: understanding the AIDS/HIV patient's perspective. *Nurse Res* 2014;21:20–3.
52. Waltz C, Strickland O, Lenz E. *Measurement in nursing research*. 4th edn. New York: Springer Publishing Company, LLC, 2010:23–52.
53. Aggelidis VP, Chatzoglou PD. Using a modified technology acceptance model in hospitals. *Int J Med Inform* 2009;78:115–26.
54. Kim NE, Han SS, Yoo KH, et al. The impact of user's perceived ability on online health information acceptance. *Telemed J E Health* 2012;18:703–8.
55. Legris P, Ingham J, Collette P. Why do people use information technology? A critical review of the technology acceptance model. *Information & Management* 2003;40:191–204.
56. Dowshen N, Kuhns LM, Johnson A, et al. Improving adherence to antiretroviral therapy for youth living with HIV/AIDS: a pilot study using personalized, interactive, daily text message reminders. *J Med Internet Res* 2012;14:e51.
57. Branson CE, Clemmey P, Mukherjee P. Text message reminders to improve outpatient therapy attendance among adolescents: a pilot study. *Psychol Serv* 2013;10:298–303.
58. Dick JJ, Nundy S, Solomon MC, et al. Feasibility and usability of a text message-based program for diabetes self-management in an urban African-American population. *J Diabetes Sci Technol* 2011;5:1246–54.
59. Ben-Zeev D, Kaiser SM, Brenner CJ, et al. Development and usability testing of FOCUS: a smartphone system for self-management of schizophrenia. *Psychiatr Rehabil J* 2013;36:289–96.
60. European Commission. Glossary: Nomenclature of territorial units for statistics (NUTS). 2014. http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Nomenclature_of_territorial_units_for_statistics_%28NUTS%29 (accessed 18 Jan 2015).
61. WHO. The ICD-10 Classification of Mental and Behavioural Disorders. 1993. <http://www.who.int/classifications/icd/en/GRNBOOK.pdf> (accessed 14 Aug 2015).
62. SPSS IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.
63. Perälä J, Suvisaari J, Saarni SI, et al. Lifetime prevalence of psychotic and bipolar I disorders in a general population. *Arch Gen Psychiatry* 2007;64:19–28.
64. Agyapong VI, Milnes J, McLoughlin DM, et al. Perception of patients with alcohol use disorder and comorbid depression about the

- usefulness of supportive text messages. *Technol Health Care* 2013;1:31–9.
65. Kessler RC, Birnbaum H, Demler O, *et al.* The prevalence and correlates of nonaffective psychosis in the National Comorbidity Survey Replication (NCS-R). *Biol Psychiatry* 2005;58:668–76.
 66. Keding A, Böhnke JR, Croudace TJ, *et al.* Validity of single item responses to short message service texts to monitor depression: an mHealth sub-study of the UK ACUDep trial. *BMC Med Res Methodol* 2015;15:56.
 67. Richmond SJ, Keding A, Hover M, *et al.* Feasibility, acceptability and validity of SMS text messaging for measuring change in depression during a randomised controlled trial. *BMC Psychiatry* 2015;15:22.
 68. Eurostat. Use of mobile phone. 2014d. http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=isoc_cias_mph&lang=en (accessed 15 Mar 2015).
 69. ITU. ICT Facts and Figures. The world in 2013. 2013. <http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2013-e.pdf> (accessed 1 Aug 2015).
 70. Finnish National Institute of Health and Welfare. Psychiatric specialist medical care 2013. 2015. <http://urn.fi/URN:NBN:fi-fe201402274339> (accessed 18 Jan 2015).
 71. Finnish National Institute of Health and Welfare. Health and welfare inequalities. 2015. <https://www.thl.fi/en/web/health-and-welfare-inequalities> (accessed 18 Aug 2015).
 72. Sajatovic M, Levin J, Fuentes-Casiano E, *et al.* Illness experience and reasons for nonadherence among individuals with bipolar disorder who are poorly adherent with medication. *Compr Psychiatry* 2011;52:280–7.
 73. Vervloet M, van Dijk L, Santen-Reestman J, *et al.* SMS reminders improve adherence to oral medication in type 2 diabetes patients who are real time electronically monitored. *Int J Med Inform* 2012;81:594–604.
 74. Cellular News. Women Spend More Time on the Phone and Send More Text Messages Than Men—Survey. 2011. <http://www.cellular-news.com/story/Reports/48190.php> (accessed 18 Mar 2015).
 75. Bulik BS. Always on women. A survey of how women are using technology today. 2011. <http://adage.com/images/bin/pdf/1114WP.pdf> (accessed 18 Mar 2015).
 76. OECD. Making Mental Health Count. 2014. <http://www.oecd.org/els/health-systems/Focus-on-Health-Making-Mental-Health-Count.pdf> (accessed 18 Jan 2015).
 77. Official Statistics of Finland. Väestön tieto- ja viestintätekniikan käyttö 2014. 2014. http://www.stat.fi/til/sutivi/2014/sutivi_2014_2014-11-06.fi.pdf (accessed 16 Aug 2015).
 78. Itublog. Innovative ICT Solutions for Youth Employment. <https://itu4u.wordpress.com/2014/05/15/innovative-ict-solutions-for-youth-employment/> (accessed 15 Aug 2015).
 79. Laursen TM. Life expectancy among persons with schizophrenia or bipolar affective disorder. *Schizophr Res* 2011;131:101–4.
 80. Holikatti PC, Kar N, Mishra A, *et al.* A study on patient satisfaction with psychiatric services. *Indian J Psychiatry* 2012;54:327–32.
 81. Kuosmanen L, Hätönen H, Jyrkinen AR, *et al.* Patient satisfaction with psychiatric inpatient care. *J Adv Nurs* 2006;55:655–63.
 82. ITU (International Telecommunications Union). Measuring the information society 2013. 2013. http://www.itu.int/en/ITU-D/Statistics/Documents/publications/mis2013/MIS2013_without_Annex_4.pdf (accessed 25 Mar 2015).
 83. Pew Research Center. Social Networking Fact Sheet. 2014. <http://www.pewinternet.org/fact-sheets/social-networking-fact-sheet/> (accessed 25 Mar 2015).
 84. Mitzner TL, Boron JB, Fausset CB, *et al.* Older adults talk technology: technology usage and attitudes. *Comput Human Behav* 2010;26:1710–21.
 85. Baranowski T, Buday R, Thompson DI, *et al.* Playing for real: video games and stories for health-related behavior change. *Am J Prev Med* 2008;34:74–82.
 86. LeBlanc AG, Chaput JP, McFarlane A, *et al.* Active video games and health indicators in children and youth: a systematic review. *PLoS ONE* 2013;8:e65351.
 87. van der Krieke L, Boonstra N, Malda A. Bias blaster: a game to beat interpretation bias in psychosis. *Psychiatr Serv* 2014;65:961.
 88. Abdel-Baki A, Lal S, D-Charron O, *et al.* Understanding access and use of technology among youth with first-episode psychosis to inform the development of technology-enabled therapeutic interventions. *Early Interv Psychiatry* 2015. doi:10.1111/eip.12250 [Epub ahead of print 22 May 2015]
 89. Peels DA, Bolman C, Golsteijn RH, *et al.* Differences in reach and attrition between Web-based and print-delivered tailored interventions among adults over 50 years of age: clustered randomized trial. *J Med Internet Res* 2012;14:e179.
 90. Al-Asadi AM, Klein B, Meyer D. Posttreatment attrition and its predictors, attrition bias, and treatment efficacy of the anxiety online programs. *J Med Internet Res* 2014;16:e232.
 91. Nielsen Mobile. In U.S., SMS Text Messaging Tops Mobile Phone Calling. 2008. <http://www.nielsen.com/us/en/insights/news/2008/in-us-text-messaging-tops-mobile-phone-calling.html> 12022015 (accessed 18 Jan 2015).
 92. Klasnja P, Consolvo S, McDonald DW, *et al.* Using mobile & personal sensing technologies to support health behavior change in everyday life: lessons learned. *AMIA Annu Symp Proc* 2009;14:338–42.
 93. Kannisto KA, Koivunen MH, Välimäki MA. Use of mobile phone text message reminders in health care services: a narrative literature review. *J Med Internet Res* 2014;16:e222.
 94. Vodopivec-Jamsek V, de Jongh T, Gurol-Urganci I, *et al.* Mobile phone messaging for preventive health care. *Cochrane Database Syst Rev* 2012;(12):CD007457.
 95. Killaspy H, Banerjee S, King M, *et al.* Prospective controlled study of psychiatric out-patient non-attendance. Characteristics and outcome. *Br J Psychiatry* 2000;176:160–5.
 96. Nelson EA, Maruish ME, Axler JL. Effects of discharge planning and compliance with outpatient appointments on readmission rates. *Psychiatr Serv* 2000;51:885–9.