

**Table 1. Summary details of the twenty-six included studies**

Author	Date	Country of origin of 1st author	Aim/purpose	Study design	Participant population	Setting	e-health domain	Duration	Summary of main factors that influence digital health intervention implementation
Anttila <i>et al.</i>	2012	Finland	To evaluate the use of web-based patient education sessions in the psychiatric inpatient care.	Mixed methods evaluation study of DHI supported by staff	Mixed	Inpatient	Web-based programme	1-20 sessions (20-60mins each)	Unsuccessful sessions: lack of motivation from participant, poor mental state, poor IT skills, language problems. People with schizophrenia less successful sessions, people with vocational education had more successful sessions.
Bauer <i>et al.</i>	2017	USA	Follow-up analysis of the implementation and sustainability of a clinical video teleconference-based collaborative care model for individuals with bipolar disorder treated in the Department of Veterans Affairs to (a) characterize the extent of implementation and sustainability of the	Mixed methods implementation and sustainability study of DHI supported by staff	Bipolar disorder	Community	Telecare	6 months	Barriers: labour intensive scheduling, availability of telehealth space, equipment, and staff at certain sites. Facilitators: national level infrastructure to support implementation, ease of use and integration into ongoing workflow via e-health records.

			program after its establishment and (b) identify barriers and facilitators to implementation and sustainability.						
Baumel <i>et al.</i>	2016	USA	To describe the adaptation of an available online platform that provides volunteer (i.e., listener) based emotional support, to complement ongoing treatment for people with schizophrenia-spectrum disorders.	Mixed methods evaluation study of DHI supported by peers	Schizophrenia from disorder	Community	Online platform	1 session	Facilitators: Availability & accessibility of online platform at home and in times of crisis. Increasing support and socialisation.
Ben-Zeev <i>et al.</i>	2016	USA	To evaluate the viability of extended mHealth interventions for people with schizophrenia-spectrum disorders following hospital discharge. (1) Can individuals be engaged with a mobile phone intervention program during this high-risk period?, (2) Are age, gender, racial background, or hospitalization history associated with their engagement or	Observational study of unsupported DHI	Schizophrenia from disorder	Community	mHealth	6 months	Individuals with schizophrenia-spectrum disorders can actively engage with a clinically supported mobile phone intervention for up to 6 months following hospital discharge. Participants who were white or female or younger (age 18-29) were significantly more engaged. Individuals with more severe psychopathology were less engaged than those with less severe psychopathology.

			persistence in using a mobile phone intervention over time?, and (3) Does engagement differ by characteristics of the mHealth intervention itself (ie, pre-programmed vs on-demand functions)?						
Biagianni <i>et al.</i>	2016	USA	To investigate the feasibility of delivering 6 weeks of CLIMB- a mobile psychosocial intervention designed to enhance social functioning in people with Chronic Psychotic disorder and to explore the initial effects on outcomes.	Mixed methods open label pilot study of supported DHI	Chronic psychotic disorder	Community	mHealth	6 weeks	High retention and IPAD return rates. Participant feedback: positive experience, treated like a unique person rather than sick patient, enjoying the experience, improving in social interactions.
Bonefils <i>et al.</i>	2016	USA	To explore the implementation process of a computerized decision support centre to promote shared decision making.	Mixed methods implementation study of DHI supported by staff	Severe mental illness	Community	Peer-run Web Based Computer Program	18 months- at least one session	General barriers: workload of clinicians, complexity of program, difficulty integrating DHI into crisis-orientated service, staff IT skills. Context related barrier: construction on site, high staff turnover, lack of investment from key staff, adding a second service site (without additional peer specialist time), recruitment limitations.
Deegan <i>et al.</i>	2008	USA	To identify best practices for a computerised shared decision	Mixed methods implementation and	Psychosis or mood disorder	Community	Peer-run Web Based Computer Program	12 months- 1-10 sessions	Staff: Intervention focused consultations but felt scheduling to complete it was difficult. Participants reported that it assisted

			making in an outpatient psychiatric medication clinic.	sustainability study of DHI supported by staff					communication, gave a sense of accomplishment.
Deegan <i>et al.</i>	2010	USA	To describe Web-based application to Support Recovery and Shared Decision Making, the rationale for its use, early adopters, patterns of use and lessons learned.	Mixed methods implementation and sustainability study of DHI supported by staff	Severe mental illness	Community	Peer-run Web Based application	Over 3 years-unspecific number of sessions	Barriers: poor IT literacy of staff, lack of technology access, recession & budget cuts. Facilitators: peer support as DHI champions, care companies willing to absorb training and start-up costs.
Depp <i>et al.</i>	2014	USA	To evaluate the feasibility, acceptability and efficacy of an augmentative mobile ecological momentary intervention targeting self-management of mood symptoms.	Randomized single-blind controlled trial of unsupported DHI	Bipolar affective disorder	Community	mHealth	12 weeks	Adherence stable over time –minimal fatigue effect. No significant correlations between compliance with DHI and age or education. No association between PRISM adherence and baseline symptoms of mania or depression.
Graham <i>et al.</i>	1996	USA	A preliminary 6-month assessment of patient, provider, and community satisfaction with telepsychiatry project.	Observational study of supported DHI	Severe mental illness	Inpatient/Community	Telecare	6 months-unspecific number of sessions	Barriers: high start-up and network costs, professional scepticism regarding feasibility. Facilitator: allowed continuity of care.
Granholm <i>et al.</i>	2012	USA	Pilot trial of mobile intervention targeting medication adherence, socialization, and auditory hallucinations	Observational study of unsupported DHI	Schizophrenia or schizoaffective disorder	Community	mHealth	12 weeks	Non-completers had lower self-reported living skills, more severe negative symptoms, and lower estimated premorbid verbal IQ than completers. No differences in positive symptoms, depression, age, or education were found between groups.

Gyllenstein <i>et al.</i>	2017	Sweden	To study the effectiveness of computerised physical activity training in communal psychiatry for persons with severe mental illness. To identify factors promoting or impeding its use.	Mixed methods randomised cluster study of DHI supported by peers	Severe mental illness	Communal supported living	Computerised physical activity	10 months-3hours/week	Barriers: Lack of technological knowledge or negative attitude (staff and service users), lack of space to complete the activity. Facilitators: Motivated staff and friendly sporting rivalry between staff and service users.
Hesse <i>et al.</i>	2017	Germany	To assess the feasibility of virtual reality.	Randomized, controlled cross-over design of supported DHI	Schizophreniform disorder	Community	Virtual reality	2 sessions	Barriers: Physical side effects of virtual reality and disturbance of mental state.
Hidalgo-Mazzei <i>et al.</i>	2016	Spain	To evaluate the feasibility, acceptability and satisfaction of the smartphone application	Observational study of unsupported DHI	Bipolar affective disorder	Community	mHealth	12 weeks	Completers: higher total FAST (Functioning assessment short test) score and more years of smartphone usage. No difference between other sociodemographic or clinical variables.
John <i>et al.</i>	2017	Australia	The feasibility and benefits of implementing cognitive remediation interventions in everyday clinical practice among individuals living with schizophrenia.	Observational study of unsupported DHI	Schizophrenia or schizoaffective disorder	Inpatient	Computerised cognitive remediation	40 hours	Barriers: exacerbation of depression, technical problems, disruptive home environment, impersonal nature of communicating with a computer Facilitators: akin to speaking a doctor daily, improvement in symptoms.

Kasckow <i>et al.</i>	2016	USA	To test the feasibility of the telehealth monitoring intervention in this population.	Mixed method pilot trial of unsupported DHI	Schizophrenia or schizoaffective disorder and recent suicidal ideation	Community, recently discharged from inpatient services	Telehealth	3 months- at least monthly sessions	Barriers: technical problems, disruptive home environment, impersonal nature of DHI Facilitator: accessibility
Koivunen <i>et al.</i>	2008	Finland	To identify barriers and facilitators influencing the implementation of an interactive Internet-portal application for patient education in psychiatric hospitals.	Qualitative implementation study of supported DHI	Mixed	Inpatient	Web-based programme	1-20 sessions	Barriers classified: Organisational resources: environmental (lack of computers, room, internet), lack of staff resources, education and time, lack of finances and organisational strategy. Nurses characteristics: negative attitudes and IT capabilities. Patient related factors: poor mental state, negative attitude, lack of computer skills, short hospital stay. Portal related factor: difficult in use and inertness of content.
Korsbek <i>et al.</i>	2016	Denmark	To examine the use of a smartphone application as a modern decision aid to support shared decision making in mental health	Mixed methods pilot trial of supported DHI	Severe mental illness	Longer term rehab	mHealth	4 months	Barrier: lack of integration into existing IT system, complexity of intervention. Facilitator: staff champions more crucial than peer support.
Lobban	2017	UK	To test the feasibility and acceptability of a randomized controlled trial (RCT) to evaluate a Web-based enhanced relapse prevention intervention (ERPonline) and to report preliminary evidence of effectiveness.	A single-blind RCT with nested qualitative study of unsupported DHI	Bipolar affective disorder	Community	Web-based programme	48 weeks	Barrier: cost of innovation, lack of human support with online forum Facilitator: innovation source- that the intervention had been developed by other service users, alliance with the online team.

Matthews <i>et al.</i>	2016	USA	To determine the effectiveness and acceptance of Smartphone-Based Measure of Social Rhythms for Bipolar Disorder	Mixed method pilot trial of unsupported DHI	Bipolar affective disorder	Community	mHealth	4 weeks	Facilitators: convenience of using smartphone app, reduction in time for feedback, receiving visual feedback.
Mistler <i>et al.</i>	2017	USA	To determine the feasibility of utilising a mindfulness mobile phone app by acutely ill psychiatric inpatients with schizophrenia, schizoaffective disorder, and bipolar disorder. It also sought to determine how patients felt about using the mindfulness app.	Mixed method observational study of unsupported DHI	Schizophrenia, schizoaffective disorder, and bipolar disorder	Inpatient	mHealth	1 week	Facilitators: relief from boredom, therapeutic intervention, app usable and streamline, making app more personalised- e.g.- woman speaker, choose certain categories, enjoying intervention not medication based or involving face-face interaction Barriers: lack of space and privacy in inpatient unit, advertising, concerns about cybersecurity, lack of Wi-Fi,
Nicholas <i>et al.</i>	2010	Australia	To identify participant, program, and setting factors related to nonadherence in an online psycho-education program and to fill a gap in the literature by undertaking in-depth qualitative interviews with a cross section of non-completers to understand their reasons for discontinuation.	Mixed method randomised control trial of supported DHI	Bipolar affective disorder	Community	Web-based programme	8 weeks	Predictors of attrition: male gender and younger age. Women and those over 30 completed more workbook. Barriers: mental state, lack of motivation, not wanting to think about the illness/not accepting diagnosis, too simplistic, having to disclose too much personal information. Facilitators: peer support.

Nieves <i>et al.</i>	2009	USA	To assess the acceptability of videophone usage to patients, and the strengths and weaknesses of this treatment approach.	Observational study of supported DHI	Severe mental illness	Community	Telehealth	At least one year	Over 1 year: Estimated savings in nurse time amounted to \$4000, the cumulative patient travel time saved was over 130 hours. Staff: satisfaction at decrease in travel time, usefulness for telecare for service users with incentive to stay at home.
Poole <i>et al.</i>	2012	UK	A qualitative analysis of feasibility, acceptability and impact of Internet-based psychoeducation for bipolar disorder	Qualitative observation study of unsupported DHI	Bipolar disorder	Community	Web-based program	8 sessions	Key themes: accessibility and flexibility, effect of illness on engagement with programme, clarity and quality of content, preference for alternatives to computer-based format.
Roberts <i>et al.</i>	2017	USA	To assess the feasibility and potential efficacy of mHealth app for social cognitive bias.	Mixed methods pilot trial of unsupported DHI	Schizophreniform disorders	Community	mHealth	24 sessions	Barriers: app complexity, app dysfunction Facilitators: research staff fixing problems, service users' motivation and enjoyment.
Thomas <i>et al.</i>	2016	Australia	To develop and pilot a novel recovery-based digitally supported intervention for people with a psychotic illness.	Mixed methods pilot trial of supported DHI	Schizophreniform disorders	Community	Web-based programme	8 sessions	Facilitator: having a facilitator to be accountable to, the IT being a means of communication, IT making the process more engaging, interesting and in-depth.



**Table 2: Summary of quantitative factors affecting implementation of digital health interventions for people with psychosis or bipolar disorder**

Study	Illness	Intervention	Experimental group (n)	Control group (n)	Outcome P value (Confidence Interval)
Antilla	Mixed population	Online patient education	93 patients completed by 83 nurses	Nil	<p>Lower global assessment of function- took more days to complete education session (spearman's correlation -0.25, <math>p &lt; 0.05</math>), more serious mental symptoms took more days to complete education session (spearman's correlation -0.25, <math>p &lt; 0.05</math>).</p> <p>Length of sessions was shorter for service users who had no vocational education compared to those with vocational education (<math>p = 0.032</math>).</p> <p>Service users having a vocational education also had more successful education sessions than patients without vocational education (<math>p = 0.015</math>). Patients attending all six sessions had more often more nurses involved in the sessions (<math>p = 0.049</math>). The group of patients with schizophrenia had fewer successful education sessions than those with other mental health diagnoses (<math>p = 0.009</math>).</p> <p>Service users' age, gender, self-reported IT skills, number of previous hospitalisation, age at onset- were not associated length of sessions in minutes, days and total number of sessions per person.</p>
Bauer	Bipolar disorder	Telecare	400	Nil	Life Goals completers did not differ from non-completers on a wide variety of demographic and clinical characteristics (no statistical information reported).

Ben-Zeev <i>et al.</i>	Schizophreniform	mHealth	342	Nil	<p>In the Cox proportional hazard portion of the joint models, there was a significant association between level of engagement and likelihood of discontinuing use, with higher levels of engagement associated with lower risk of discontinuation.</p> <p>Greater number of psychiatric hospitalizations was also significantly associated with likelihood of discontinuing use, with a discontinuation hazard ratio of 1.4 (95% CI 1.1-1.8; P=.004) for 7+ hospitalizations compared to fewer hospitalisations. The level of engagement with the mobile phone intervention declined over time.</p> <p>Gender, race, age, and number of psychiatric hospitalizations were all found to be significantly associated with engagement outcomes. Females were significantly more engaged as measured by Days of mHealth Use, Days Responding to Prompts, and Daily On-Demand Use.</p> <p>White participants were the most engaged. They had significantly more Days of mHealth Use (0.69 more per week), Days Responding to Prompts (0.72 more per week), and Days of On-Demand Use (0.17 more per week) than African-American participants. White participants had significantly more Days Responding to Prompts (0.74 more per week) and Days of On-Demand Use (0.33 more per week) but less Daily On-Demand Use (1.32 less uses per day) than Hispanic participants.</p> <p>Participants were categorized into three age groups: 18-29, 30-45, and 46-60. Participants aged 30-45 were significantly more engaged than younger participants (18-29 years) when considering Days of On-Demand Use (0.42 days more weekly) and Daily On-Demand Use (0.16 uses more per day). Older participants (46-60) were significantly more engaged in Days of On-Demand Use (0.48 days more weekly) and Daily On-Demand Use (1.78 uses more per day) when compared to those 18-29. However, they were significantly less engaged in Days Responding to Prompts (0.41 days fewer).</p>
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Participants with 7 or more psychiatric hospitalizations were significantly less engaged than those with fewer hospitalizations when considering Days of mHealth Use (0.2 days fewer per week), but no difference was seen in Days Responding to Prompts, Days of On-Demand Use, or Daily On-Demand Use.

Depp <i>et al.</i>	Bipolar affective disorder	mHealth	41	41	The association between the number of days on study and compliance with DHI was not significant ( $r=-0.122, p=0.448$ ), indicating that adherence was stable over time (i.e., minimal fatigue effects). There were also no significant correlations between DHI compliance and age ( $r=.174, p=0.278$ ) or education ( $r=-0.101, p=0.528$ ). Similarly, there were no significant associations between DHI adherence and baseline Montgomery-Åsberg Depression Rating Scale Score ( $r=0.058, p=0.717$ ), Young Mania Rating Scale Score ( $r=-0.121, p=0.451$ ), or self-rated Illness Intrusiveness Scale score ( $r=0.076, p=0.636$ )
Granholm <i>et al.</i>	Schizophreniform	mHealth	55	Nil	Non-completers had lower self-reported living skills, more severe negative symptoms ( $p=0.13$ ), and lower estimated premorbid verbal IQ ( $p=0.046$ ) than completers. No differences in positive symptoms, depression, age, or education were found between groups.
Hidalgo-Mazzei <i>et al.</i>	Bipolar Affective disorder	mHealth	51	Nil	There were no significant differences in terms of age between completers and non-completers (i.e. drop-outs). Completers: higher total FAST (Functioning assessment short test ( $b=1.12, p=0.02$ ) score and more years of smartphone usage ( $b=2.02, p=0.04$ ). No difference between other sociodemographic or clinical variables.
Nicholas	Bipolar Affective disorder	Web-based programme	123-programme only 126-programme + support	121	Adherence was significantly higher in the supported intervention (98/121, 81.0%) compared with the unsupported (80/120, 66.7%) intervention ( $\chi^2_{1,241} = 6.4, P = .01$ ).  Significant predictors of attrition were male gender ( $p=0.001$ ), young age ( $p=0.004$ ). Males were estimated to complete an average of 0.98 fewer workbooks than females, holding all other variables constant. Participants

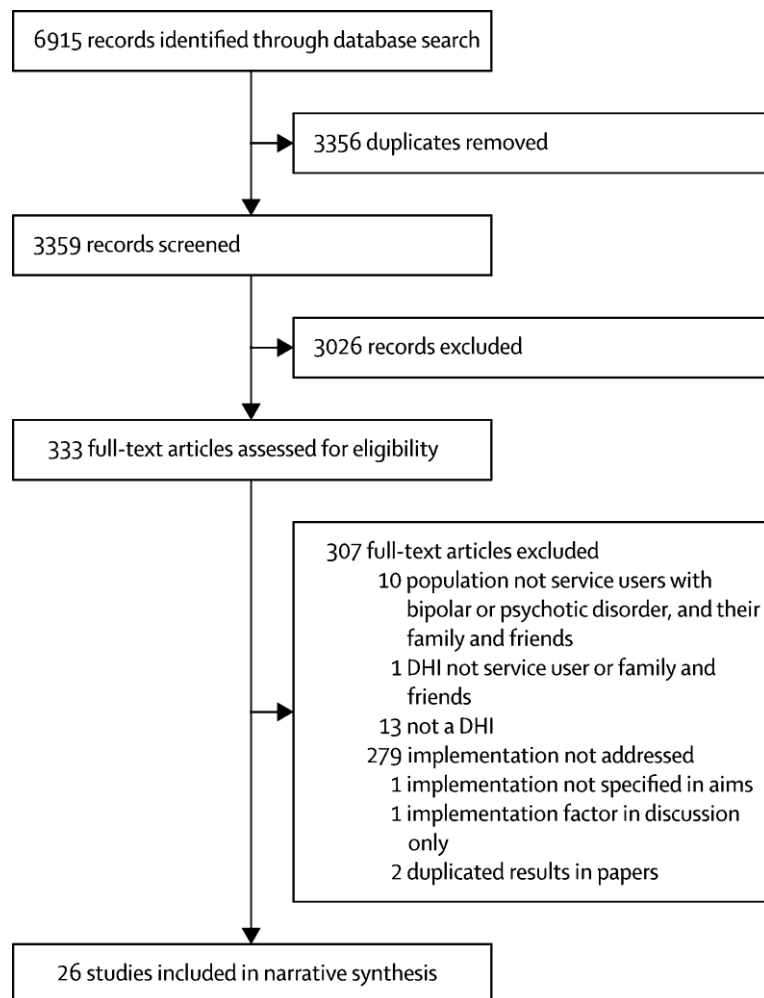
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over 30 years of age were estimated to complete an average of 1.04 more workbooks than those under 30 years of age.

Level of symptomatology, highest level of educational attainment, and baseline depression and anxiety scores did not significantly contribute to the overall model. The total variance explained by the model was 14.6% ( $F_{7,330} = 8.08, P < .001$ ).

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**Figure: Study selection**



Panel.

### **Search strategy and screening**

Seven bibliographical database searches (MEDLINE, EMBASE, PsycINFO, CINAHL, Web of Science, The Cochrane Library and OpenGrey) were conducted for articles published from 1995 (when digital health research started to be published) to 20th October 2017. There was no limitation on language. Forwards and backwards citation searching (citation chaining) until 20th October 2017 was also completed to ensure all relevant papers were included. Study authors were also contacted to identify any additional studies.

The search strategy centred on the following three concepts: digital health interventions, psychosis or bipolar disorder, and implementation. A combination of medical subject headings (exploded where appropriate) and free-text words were included. Medical subject headings (MESH) referring to psychosis and bipolar disorder on a Medline search included:

Schizophrenia

Psychotic Disorders

Bipolar Disorder

MESH referring to DHIs on a Medline search included:

Telemedicine

Cell Phones

Mobile Applications

Computer-Communication-Networks

User-Computer Interface

Medical-Informatics-Applications

Decision-Making-Computer-Assisted

Therapy-Computer-Assisted

Videoconferencing

Virtual Reality Exposure Therapy

There were no available MESH terms that are sensitive or specific for implementation, therefore the following free-text word searches were used to search for this concept: real world or challenge\* or Embedding or Implemen\* Barrier\* or Routine or Obstacle\* or (patient\* adj5 (engage\* or acceptab\*))

Two authors (GA and TM) were involved at each stage of the review. All titles and abstracts were screened independently using Endnote. Three full texts papers not in English were translated by academics whose first language was that of the paper. Both researchers assessed the full texts of the potentially eligible papers.

Panel.

**Recommendations for implementation of digital health interventions in mental health setting for people with psychosis or bipolar disorder. Take into careful consideration:**

The complexity and adaptability of the intervention

The compatibility of the intervention with existing electronic systems and work practices

That sufficient financial support is in place for the up-front and ongoing delivery costs of the intervention

The individual IT skills of the staff and service users with personalised or group support provided where necessary

That human facilitation even remotely such as online support or telephone calls can support implementation

That service users, staff and implementation champions co-facilitate the process of developing and implementing the interventions

The adequate provision of training and education to service users and staff to promote engagement

That implementation of the intervention will require on-going monitoring, evaluation and adaptation

## **Appendix 1**

### **Definitions in Digital Healthcare**

#### *E-health*

E-health, the transfer of health-related resources and healthcare by electronic means<sup>1</sup>.

#### *mHealth*

Medical and public health practice supported by mobile devices, such as mobile phones, patient-monitoring devices, personal digital assistants and other wireless devices.<sup>2</sup>

#### *E-mental health*

The use of ICT to support and improve mental health, including the use of online resources, social media and smartphone applications. Two types of e-mental health are commonly referred to: web interventions and mobile applications.<sup>3</sup>

#### *Telemental health*

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<sup>1</sup> World Health Organisation. eHealth at WHO 2018 [Available from: <http://www.who.int/ehealth/about/en/>. (<http://www.who.int/trade/glossary/story021/en/>)].

<sup>2</sup> World Health Organization. mHealth New Horizons for Health through Mobile Technologies. Global Observatory for eHealth Series – Volume 3. WHO, 2013. [Available from: [http://www.who.int/goe/publications/goe\\_mhealth\\_web.pdf](http://www.who.int/goe/publications/goe_mhealth_web.pdf)].

<sup>3</sup> Hollis C, Morriss R, Martin J, Amani S, Cotton R, Denis M, et al. Technological innovations in mental healthcare: harnessing the digital revolution. Br J Psychiatry. 2015;206(4):263-5.



A subset of telehealth that uses video-conferencing technology to provide mental health services such as clinical assessment and management but from a distance. It includes telepsychology, telepsychiatry, telemental health nursing and telebehavioural health.<sup>4</sup>

### *Digital health interventions (DHI)*

Digital health interventions (DHI) are programs that provide information and support for physical and/or mental health problems via a digital platform (for example a website, a computer, or an app). The support provided can be emotional, decisional, and/or behavioral.<sup>5</sup>

### *Implementation Science*

Implementation research is the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and, hence, to improve the quality and effectiveness of health services and care.<sup>6</sup>

### *Engagement with digital health interventions*

Engagement is defined in the Consolidated Framework for Implementation Research as individuals served by the organization that participate in the innovation. It includes statements related to engagement strategies and outcomes, e.g., how innovation participants became engaged with the

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<sup>4</sup> Hollis C, Morriss R, Martin J, Amani S, Cotton R, Denis M, et al. Technological innovations in mental healthcare: harnessing the digital revolution. *Br J Psychiatry*. 2015;206(4):263-5.

<sup>5</sup> Murray E, Hekler EB, Andersson G, Collins LM, Doherty A, Hollis C, et al. Evaluating Digital Health Interventions: Key Questions and Approaches. *Am J Prev Med*. 2016;51(5):843-51.

<sup>6</sup> Eccles M, Mittman B. Welcome to Implementation Science. *Implementation Science*. 2006;1(1).

innovation<sup>7</sup>. Engagement with DHIs has also been conceptualised in terms of both experience and behaviour. It is defined as a multidimensional construct which can be measured through self-report questionnaires, verbal reports, automatic recording of DHI use or recording of psychophysical manifestations.<sup>8</sup>

## Appendix 2

### MEDLINE SEARCH STRATEGY

1. exp Schizophrenia/
2. schizophreni\*.mp.
3. Psychotic Disorders/
4. (delusional disorder\* or “hebephrenic\*” or “psychosis or psychoses or psychotic\*”).ti,ab.
5. ((chronic\* or serious or persistent or severe\*) adj2 (mental\* or psychological\* or mental health) adj2 (disorder\* or ill\* or condition\*)).mp.
6. Bipolar Disorder/
7. (bipolar or manic or mania).mp.
8. or/1-7
9. exp Telemedicine/
10. (telehealth or tele-health or telemedicine or tele-medicine or telerehabilitation or tele-rehabilitation or tele consultation or tele-consultation or telemental).mp.
11. (m-health or mhealth or e-health or ehealth or digital health or electronic health).mp.
12. (m-mental or e-mental or emental or digital mental or electronic mental).mp.
13. ((mobile or remote or virtual) adj3 (health\* or rehabilitation or consultation or intervention\* or program\*)).mp.

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<sup>7</sup> Consolidated Framework for Implementation Research. Engaging- Consolidated Framework for Implementation Research, [Available from: <http://cfirguide.org/wiki/index.php?title=Engaging>.]

<sup>8</sup> Perski O, Blandford A, West R, Michie S. Conceptualising engagement with digital behaviour change interventions: a systematic review using principles from critical interpretive synthesis. *Translational Behavioral Medicine*. 2016;7(2):254-267.

14. (smartphone\* or smart-phone\* or cellphone\* or cell-phone\* or computer tablet\* or mobile device\* or android\* or iPhone\* or i-phone\* or IPad\* or I-Pad or digital device\*).mp.
15. exp Cell Phones/
16. (cell\* phone or mobile phone\* or text messag\*).mp.
17. short messag\* service\*.mp.
18. Mobile Applications/
19. exp Computer Communication Networks/
20. (worldwide web or website\*).mp.
21. exp User-Computer Interface/
22. exp therapy, computer-assisted/
23. Medical Informatics Applications/
24. Decision Making, Computer-Assisted/
25. exp Videoconferencing/
26. (Videoconferenc\* or video-conferenc\* or Skype or Facetime or Face-time).mp.
27. (((online or computer\*) adj5 (intervention\* or program\* or deliver\* or education\* or psycho\* or training or therap\* or cbt or rehabilitation)) or computer-based).mp.
28. ((digital\* adj5 (intervention\* or program\* or deliver\* or education\* or psycho\* or training or therap\* or cbt or rehabilitation)) or digitally-based).mp.
29. ((internet adj5 (intervention\* or program\* or deliver\* or education\* or psycho\* or training or therap\* or cbt or rehabilitation)) or internet-based).mp.
30. ((web adj5 (intervention\* or program\* or deliver\* or education\* or psycho\* or training or therap\* or cbt or rehabilitation)) or web-based).mp.
31. computer-assisted therap\*.mp.
32. Virtual Reality Exposure Therapy/
33. (virtual reality or virtual environment\* or serious game\* or serious gaming or augmented reality\*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
34. or/9-33
35. 8 and 34
36. exp "Patient Acceptance of Health Care"/

37. exp "Delivery of Health Care"/

38. Feasibility Studies/

39. (feasib\* or effectiveness or real world or challenge\* or Embedding or Implemen\* or Material practice or Routin\* or normali\* or Adoption or Quality improvement or Disseminat\* or Best practice or Integrate or Fail\* or Advantage\* or Success\* or Problem\* or Barrier\* or Routine or Obstacle\* or Satisfaction or Experience\* or Issue\* or Adopt\* or Benefit\* or Promot\* or accomplish\* or facilitat\* or practicab\* or utili\*).mp.

40. (patient\* adj5 (engage\* or acceptab\*)).mp.

41. or/36-40

42. 35 and 41

### Appendix 3

#### Summary of CFIR findings of factors important for the implementation of digital health interventions

CFIR construct	CFIR component	CFIR sub-component	Sources
Innovation characteristics	Innovation source		[Lobban]
	Evidence strength and quality		No data
	Relative advantage		[Anttila, Bauer, Baumel, Biagianti, Bonfils, Graham, Gyllensten, Hesse, Kaskow, Lobban,

CFIR construct	CFIR component	CFIR sub-component	Sources
			Matthews, Mistler, Nicholas, Nieves, Poole, Thomas ]
	Adaptability		[Bonfils, Koivunen, Mistler, Nicholas , Nieves, Poole]
	Trialability		No data
	Complexity		[Anttila, Bauer, Ben-Zeev, Baumel, Deegan (2010, Bonfils, Gyllensten, John, Kaskow, Koivunen, Kosebeck, Mistler, Nicholas, Poole ]
	Design quality and packaging		[Anttila,Bonfils, Nicholas, Poole, Thomas]
	Cost		[Anttila, Bauer, Deegan (2010),Graham, Koivunen, Lobban]
Outer setting	Patient needs and resources		[Bauer, Deegan (2010), Bonfils, Graham, Lobban, Koivunen, , Nieves]
	Cosmopolitanism		No data
	Peer pressure		No data
	External policy and incentives		[Bauer, Deegan (2010), Graham]
Inner setting	Structural characteristics		[Bauer, Bonfils]
	Networks and communications		No data

CFIR construct	CFIR component	CFIR sub-component	Sources
	Culture		No data
	Implementation climate		
		Tension for change	No data
		Compatibility	[Bauer, Deegan, Bonfils, Koivunen]
		Relative priority	Deegan (2010), Bonfils, Koivunen
		Organisational incentives and rewards	No data
		Goals and feedback	No data
		Learning climate	Bonfils
		Readiness for implementation	[Bauer, Bonfils, Koivunen]
		Leadership engagement	No data
		Available resources	[Bauer, Deegan, Bonfils, Gyllensten, Koivunen, Kosebek, Lobban, Mistler, Poole]
		Access to knowledge and information	[Bonfils, Gyllensten, Koivunen, Thomas]

CFIR construct	CFIR component	CFIR sub-component	Sources
Characteristics of individuals	Knowledge and beliefs about the intervention		[Anttila, Ben-Zeev, Baumel, Biaganti, Deegan (2008), Deegan (2010), Bonfils, Graham, Gyllensten, John, Kaskow, Koivunen, Korsbek, Lobban, Matthews, Mistler, Nicholas, Nieves, Poole]
	Self-efficacy		[Anttila, Biaganti, Deegan (2008), Bonfils, Gyllensten, John]
	Individual stage of change		[Anttila, Biaganti, Kaskow]
	Individual identification with organisation		No data
	Other personal attributes		[Anttila, Ben-Zeev, Baumel, Deegan (2008), Deegan (2010), Granholm, Hesse, Hidalgo-Mazzei, Kaskow, Koivunen, Nicholas, Poole, Thomas, Depp]
Process	Planning		[Anttila, Bonfils]
	Engaging		[Anttila, Bauer, Ben-Zeev, Baumel, Biaganti, Deegan (2008), Deegan (2010), Bonfils, Graham, Granholm, [Hesse, John, Kaskow, Koivunen, Lobban, Matthews, Mistler, Nicholas, Thomas, Depp]
		Opinion leaders	[Bonfils]
		Formally appointed internal implementation leaders	No data

CFIR construct	CFIR component	CFIR sub-component	Sources
		Champions	[Bauer, Deegan (2008), Deegan (2010), Bonfils, Gyllensten]
		External change agents	No data
		Key stakeholders (Healthcare professional)	[Anttila, Bauer, Deegan (2008), Deegan (2010), Bonfils, Graham, Gyllensten, Koivunen, Korsebek, Lobban, Nieves, Thomas, Poole]
		Innovation participants (patients)	[Anttila, Bauer, Ben-Zeev, Baumel, Deegan (2008), Granholm, Hesse, Hidalgo-Mazzei, John, Kaskow, Koivunen, Korsebek, Lobban, Matthews, Mister, Nicholas, Thomas, Depp]
	Executing		[Bauer, Bonfils, Granholm, Koivunen]
	Reflecting and evaluating		[Bonfils, Koivunen]