

Assistive technology and schizophrenia

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Abstract

Purpose – Assistive technology (AT) has been highlighted as a tool that can support self-management for people living with schizophrenia. A gap in the literature exists regarding the views held by the stakeholders involved in the health care of an individual living with schizophrenia regarding the potential use of AT to enable the self-management of this condition. The purpose of this paper is to explore how individuals living with schizophrenia, their relatives and their mental health care professionals view AT as a tool to facilitate self-management.

Design/methodology/approach – This mixed methods research paper will discuss the findings of the second stage of a two-stage research study. The paper will discuss the findings of questionnaires that were disseminated to service users living with schizophrenia, their relatives and the health-care professionals of a community mental health service in the Greater Dublin area.

Findings – The results indicate that the introduction of AT for the self-management of schizophrenia would be accepted by key stakeholders.

Research limitations/implications – As AT continues to develop, it is clear from the findings presented in this paper that the main stakeholder groups involved in the care of an individual living with schizophrenia are amenable to the use of AT to facilitate the self-management of this condition. Further research is required to explore correct policing and management of its implementation.

Originality/value – This study is the first study of its kind within an Irish context to explore the use of assistive technology as a tool for self-management from the perspective of those experiencing schizophrenia, their relatives and the health-care professionals working alongside them.

Keywords Self-management, Recovery, Schizophrenia, Assistive technology

Paper type Research paper

Introduction

People living with schizophrenia can experience limitations to their functional ability within their day-to-day activities. Executive functioning skills can be impaired resulting in decreased motivation, ability to initiate and complete tasks and ability to plan and organise daily routines (Twamley *et al.*, 2008). Engagement in self-care activities such as cooking, taking medications and attending hospital appointments can be impaired (Kessler *et al.*, 2007). People living with schizophrenia can benefit from environmental support to enable



them to self-manage their condition (Kessler *et al.*, 2007; Zhou and Gu, 2014; O'Hanlon *et al.*, 2016).

Self-management as a means to empower

Self-management is an approach to the delivery of health care that was first established for the management of chronic physical conditions. It is a complex, approach that can empower the person living with a chronic physical condition to maintain their health and well-being outside of the physician's office as they create daily behaviours that overcome the challenges that they can experience (Lorig and Holman, 2003). Self-management strategies can empower an individual living with a mental health condition similar in a way to "Recovery" (Davidson, 2016; Sterling *et al.*, 2010). Engaging in self-management can be considered a step towards the ideologies that reflect a "Recovery" approach as individuals are facilitated to engage in behaviours that respect their individuality and promote their participation and engagement in health-related activities. Such self-management strategies have proved positive for people experiencing schizophrenia (Zhou and Gu, 2014).

Assistive technology to promote Self-Management

According to the World Health Organization (2001), "technology" is *any product, instrument, equipment or technology adapted or specially designed for improving the functioning of a disabled person* (p. 173). Assistive technology (AT) is a term used for items that can enable a person to counteract the difficulties they experience from living with certain conditions and enable them to navigate their world (Cook *et al.*, 2008; Anger, 2010; Gillespie *et al.*, 2012). AT can include items that enable a person to overcome forgetfulness or disorganisation, or which can act as a cue to prompt to attend to activities of daily living. AT can act as a supporting feature of the environment that that can enable a person to initiate, complete and engage in the health-care-related tasks of their choice (Cook *et al.*, 2008). If selected correctly, based upon the needs of the person, their environment and the task at hand, the use of the AT becomes a harmonising aspect of the person and their daily routine (Gibson *et al.*, 2012).

Technology can be harnessed by people who are living with cognitive impairment to overcome their limitations (Gillespie *et al.*, 2012). AT could act as a supporting factor for a person with schizophrenia to overcome their cognitive disabilities by alerting, reminding, organising or cuing individuals and enabling self-management strategies (Gillespie *et al.*, 2012; Ben-Zeev *et al.*, 2013; Ben-Zeev, 2012). The use of mobile phone, personal computers and similar technologies is high among people living with schizophrenia (Ben-Zeev *et al.*, 2013; Ben-Zeev *et al.*, 2012; Gay *et al.*, 2016; Firth and Torous, 2015). This is made possible by the abundance of sophisticated, yet affordable technology available on the market (Nayeem and Want, 2014; Burgess, 2012). Due to their easy to use features and accessibility, modern personal electronic devices such as Smartphone's can be fluid to a person's daily routine and enable a person to manage their routine (Nayeem and Want, 2014; Ben-Zeev, 2012). Text messaging has proven to be an effective tool to remind service users to attend appointments, adhere to their medication and remain in contact with their health-care professional (Kauppi *et al.*, 2015; Nolan *et al.*, 2011). Firth and Torous (2015) highlighted that "mHealth", or mobile health can be supportive for a person living with schizophrenia by detecting warning signs of relapse, monitoring trends in psychiatric symptoms and promoting self-management of mental health.

Technology can be most beneficial for a person living with schizophrenia if it is individually tailored and can increase self-reliance, social participation and promote sense of control over health care (Lenker *et al.*, 2013; O'Hanlon *et al.*, 2016). It could allow the person

to develop a self-management plan that will enable them to avoid social exclusion in a society that is becoming increasingly dependent on high end technology (Wykes *et al.*, 2015).

Attitudes relating to assistive technology use

Globally, service users appear to have an acceptance to the use of technology to assist with the self-management of enduring mental health conditions (Alvarez-Jimenez *et al.*, 2014; Ben-Zeev, 2012). In Ireland, there is currently no specific strategy to assist with the implementation of AT into the care plans of service users of mental health services (Cullen, 2018). It appears that introducing *e*Mental Health through the medium of AT to facilitate self-management would be in keeping with European initiatives and also promote service user choice and preferences in their care plan. Research pertaining to this topic however is focussed on controlled trial studies highlighting a gap in the research regarding the attitudes of the stakeholder groups involved including service users, family members and health-care professionals (Cullen, 2018).

Family members or close relatives are a cornerstone of a person's "Recovery" journey as they live with a serious mental health condition such as schizophrenia (Davidson, 2016). The relative can support a person and provide assistance with instrumental activities of daily living such as paying the person's bills, supporting them to attend doctor's appointments and getting the person items they may be in need of (Aldersey and Whitley, 2014). As the relative is such a prominent asset to the person's recovery process, it is imperative that we explore their attitudes in regards to the use of AT as a self-management tool.

It appears that health-care professionals have limited knowledge about potential AT that they could use to facilitate a person's ability to engage in self-management (Verdonck *et al.*, 2011). We know that attitudes can be enthusiastic within this population regarding AT use however health-care professionals maintain that they require more knowledge about AT to assist with incorporating it into service provision (de Joode *et al.*, 2012). It appears that the role of the occupational therapist could compliment assisting a service user to select AT due to the holistic approach of occupational therapy and the symbiotic use of AT as an intervention within this profession (Federici and Scherer, 2017; Cruz *et al.*, 2016). However, Verdonck *et al.* (2011) have found that occupational therapists appeared to have a lack of confidence in issuing AT to their clients.

For health-care professionals to work in a more recovery oriented manner, it is important that they understand the views related to AT use by all stakeholders. This knowledge could facilitate the appropriate selection, commissioning and support of assistive technology within practice (Cullen, 2018). This article will focus on the attitudes of the service user, relative and health-care professional stakeholders, to gain a general understanding of their current attitudes of AT as a self-management tool.

Method

The overall research project used a two stage exploratory sequential mixed method approach. The first stage used a qualitative approach using semi-structured interviews to gather data, and the second stage used a quantitative approach using questionnaires to gather data. A total of eight participants engaged with the first stage of the research including one service user, one relative and six health-care professionals. The interview transcripts were analysed using thematic analysis and the themes were used in the design of questionnaires. For purposes of this paper, the results from the second quantitative stage of the research will be discussed in depth.

The research tool – the questionnaire

The second stage of the study used a questionnaire to gather data. The design of the questionnaire was influenced by literature related to the topic and by the results of a thematic analysis of the data gathered in the first stage of data collection of the overall project [Figure 1](#).

Each of the three stakeholder groups received similar questionnaires with slight variances based on the needs of the groups. For example, asking a service user directly about their personal experience, asking a relative about their relative's experience with AT and asking a health-care professional questions about their experience implementing AT in a person's care plan.

Although the questionnaires for each stakeholder group were created separately, they held the same structure. The questionnaires first sought the demographic information of the participant's to develop a description of each stakeholder group. A definition of AT was then provided:

Assistive technology (AT) is a term used for items that can enable a person to counteract the difficulties they experience from living with certain conditions. For people living with schizophrenia, AT can include items that overcome forgetfulness or disorganisation, or act as prompts that can enable a person to do the things they want and need to do on a daily basis.

For the purposes of this research we will be considering AT such as computers, electronic devices, smartphone Applications and smartphones that could enable a person experiencing schizophrenia to do what they want and need to do (World Health Organization, 2001; Cook et al., 2008).

Participants were asked questions relating to their AT use and knowledge of AT and were then invited to complete an attitude scale about AT. The attitude scales were similarly structured; however, they held slight variances to allow for each groups perspective on the person's care plan.

Accessing the stakeholder groups

The questionnaires were disseminated within a community mental health facility. The researcher was not allowed direct access to the population. The questionnaires were advertised through poster advertisement in the service. The questionnaires with an attached participant information leaflet were left in staff canteens, within family support group facilities and in clinical waiting rooms for the stakeholder groups to access. A drop box was

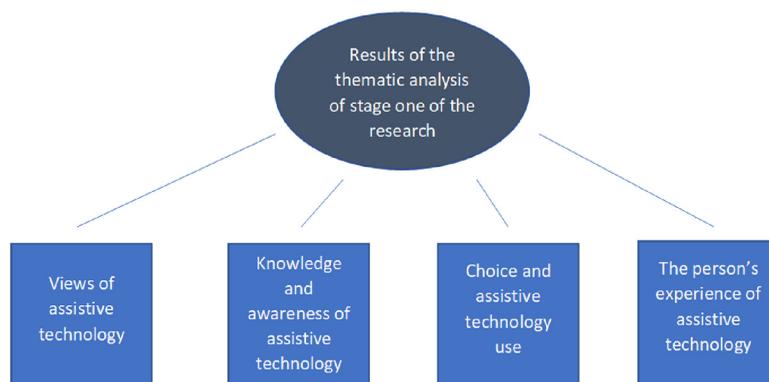


Figure 1.
Results of thematic
analysis

left in these areas for people to return the questionnaires. A total of 120 questionnaires were left in the specified prominent areas – 40 questionnaires for each stakeholder group. In total 40 questionnaires were returned. The returned questionnaires included 12 from the service user group, 7 from the relative group and 21 from the health-care professionals' group.

Results

The following section will discuss the results that were yielded from the questionnaires.

Demographic results

Demographic information of all three stakeholder groups is depicted in [Table I](#). The mean age of the service user and relative groups appear to be high in comparison to the health-care professional group which could infer that the results are coming from two distinct generations and that their relationships with technology could differ.

From the service user group, the questionnaires showed that the majority were attending the service involved in the study for greater than ten years. The demographic results from the service user group also showed that 91.7 per cent of this group had completed the leaving certificate or had completed the leaving certificate and had also engaged in further education. The results from the relative group highlight that for this group, that the majority of the participants had a relative who was attending services for greater than 10 years. From the health-care professional group two doctors, six mental health nurses, two occupational therapists, two psychologists, two social workers and seven social care workers participated in the research representing a variety of professions that are involved in all aspects of a person's care plan development with the majority of them having worked in mental health services for less than years.

Current level of knowledge and use of assistive technology

From the service user group, 58.33 per cent reported that they had used AT before. The majority of the relative group (85.71 per cent) maintained that their relative did not use AT. Of the health-care professional group, 57.14 per cent said they had direct experience of issuing AT to service users. Further on from these results, [Table II](#) highlights that all stakeholder groups have a desire to increase their knowledge about AT.

Table I.
Demographic information of participants

	Service users (N = 12)	Relatives (N = 7)	Health-care professionals (N = 21)
Mean age	51.83 years	67.71 years	35.67 years
Gender	Male: 67% Female: 33%	Male: 14% Female: 86%	Male: 42% Female: 52% Did Not Specify: 5%

Table II.
Responses from the three groups- would you like to learn more about assistive technology?

	Yes	No
Service user (N = 12)	83.33%	16.67%
Relatives (N = 7)	85.71%	14.29%
Health-care professionals (N = 21)	90.46%	9.52%

Views outlined from the attitude tables

In Tables III, IV and V, the following abbreviations represent the different responses to the statements offered; SA = Strongly Agree, A = Agree, N = Neither Agree or Disagree, D = Disagree, SD = Strongly Disagree and Did Not Respond = the number of people who did not respond to the question.

Services users agreed that AT could offer them more choice, control and independence in managing their health-care needs. They agreed that it could assist them with organisation skills and overcoming forgetfulness and the majority agreed that it would be something they would like to trial. They also maintained that it would be suitable for them.

Relatives agreed that AT could offer their relative who is living with schizophrenia more choice and control in the health care. The relative group appear to agree that AT could help foster a sense of independence for their relative and that the use of AT enable their relative to organise themselves and overcome forgetfulness. This group appear to disagree with the statement that their relative's use of AT would make them anxious.

The health-care professional group appear to agree with statements that consider AT as a means to give the service user more choice, control and independence in their health care. This group also agrees that AT could be a tool within the service user's wellness, action, recovery plan. The health-care professionals agree that AT could enable the service users to organise themselves and to enable them to remember aspects of their health care that they could forget. Statements relating to the need for more discussion on multi-disciplinary teams about AT and the creation of more educational opportunities for health-care professionals to learn about AT appear to have gained agreement from the health-care professional group.

Discussion

From the findings highlighted in this paper, attitudes from three stakeholder groups involved in the "Recovery" journey of a person living with schizophrenia regarding the use of AT have been highlighted. It appears that service users, relatives and health-care professionals are amenable to the use of AT as a tool to support self-management for a person living with schizophrenia. The three groups answered in a favourable manner to the introduction of AT to assist the self-management of schizophrenia. That is, there is an accepting environment to which AT could be introduced to within the mental health-care practice in this population.

	SA	A(%)	N	D	SD(%)	Did not respond(%)
I think that assistive technology would offer me more choice in my health care	8.3%	58.3	16.7%	–	8.3	8.3
I think that assistive technology would offer me more control in managing my health care	–	66.7	16.7%	–	8.3	8.3
I think that assistive technology would enable me to become more independent in managing my health care	8.3%	58.3	16.7%	–	8.3	8.3
I think that assistive technology would enable me to organise myself	25%	33.3	16.7%	8.3%	8.3	8.3
I think that assistive technology would enable me to remember things that I often forget	33.3%	33.3	16.7%	–	8.3	8.3
I would like to trial more assistive technology	16.7%	58.3	–	8.3%	8.3	8.3
I think that assistive technology would NOT be suitable for me	–	8.3	16.7%	41.7%	25	8.3

Table III.
Service user views of
ASSISTIVE
Technology (N = 12)

Service users

The service user group appears to hold an attitude that is welcoming to the trialling of more AT in their health-care plan. The results demonstrated that 83.33 per cent of the service user participants replied “Yes” to the questions “*Would you like to learn more about assistive technology?*”. Service users also appear to hold an attitude that identifies AT as a tool that can add a sense of independence, choice in and control over their ability to manage their health care as displayed in [Table III](#). Such attitudes suggest that this group view AT as promoting the ethos of the “Recovery” movement ([Davidson, 2016](#); [Shah et al., 2016](#)). This potentially highlights that AT can facilitate self-management in a manner that promotes “Recovery” and involve service users in their health-care plan ([Davidson, 2016](#)).

It is promising that this study population is welcoming of AT. These views are also reflected in international studies and are in line with EU led developments ([Gay et al., 2016](#); [Cullen, 2018](#)). As there is such a welcoming environment of the use of AT, it could be a tool to be considered within mental health-care practice within the Irish context. This is a concerning point within Irish mental health care as there are currently no defined pathways for AT provision for this population ([Cullen, 2018](#)).

Relatives

It appears that the relative stakeholder group could hold a positive view of AT however, the results were not strongly polarised in favour or against. The role of the relative is crucial, as they are considered to be key facilitators of the recovery process ([Davidson, 2016](#); [Shah et al., 2016](#)) and could be assisting their relative in their daily self-management care plan. As highlighted in [Table IV](#). There appears to be positive views regarding the ability of AT to support “Recovery” for the person living with schizophrenia. It is not clear from this study just how knowledgeable the relatives are in AT however a majority of 85.71 per cent reported that they would like to learn more about AT suggesting that they are open to education around this tool. Through providing education to relatives regarding AT, the family could perhaps become more involved in their relative’s mental health care and develop familiarity in how to best support their relative in selecting appropriate AT. According to [Cohen et al. \(2013\)](#) the education of the family in mental health care could

Table IV.
Relative views of
assistive technology
(N = 7)

	SA	A(%)	N(%)	D(%)	SD	Did not respond
I think that assistive technology would offer my relative more choice in their health care	14.3%	42.9	14.3	14.3	–	14.3%
I think that assistive technology would offer my relative more control in managing their health care	14.3%	42.9	14.3	14.3	–	14.3%
I think that assistive technology would enable my relative to become more independent in managing their health care	14.3%	42.9	14.3	14.3	–	14.3%
I think that assistive technology would become a part of my relative’s Wellness, Recovery Action Plan	–	42.9	28.6	14.3	–	14.3%
I think that assistive technology would enable my relative to organise themselves	14.3%	42.9	14.3	14.3	–	14.3%
I think that assistive technology would enable my relative to remember things that they often forget	14.3%	42.9	14.3	14.3	–	14.3%
If my relative used assistive technology to manage their health, I would become more anxious	–	14.3	14.3	57.1	–	14.3%
If my relative used assistive technology, it would offer me more peace of mind	–	42.9	28.6	28.6	–	–

provide benefits to both the service user and the relatives alike. It is imperative that the relative is enabled to assist their family member who is living with schizophrenia to make informed decisions about their AT choice and support them when they are using it in their daily routine (Davidson, 2016).

Health-care professionals

The health-care professional group appears to hold positive views regarding AT (Table V). The health-care professionals provide service users with information to enable them to make informed decisions in regards to their health care. To enable this dynamic, it would be important that health-care professionals remain knowledgeable about the variety of AT devices that could benefit a person living with schizophrenia and promote self-management for this group. This group appear to be amenable to learning about AT which suggests that they would like to know more about this topic. The health-care professionals appear to agree with statements that link AT with the ethos of “Recovery” by highlighting that AT can afford service users more choice and control over their mental health care.

The role of the occupational therapist in AT provision

AT is a dominant intervention that an occupational therapist can provide in all practice areas of the profession (Federici and Scherer, 2017; Cruz *et al.*, 2016). From an occupational therapy assessment it could be identified as a beneficial tool for an individual to use (Federici and Scherer, 2017). There appears to be more recent development in the use of advanced electronic AT as an intervention tool as the technological environment in which we navigate grows exponentially (Dicianno *et al.*, 2015; Verdonck and Maye, 2016). To continue to provide socially appropriate interventions, the occupational therapist must remain educated in what AT is available on the market. This could allow them to facilitate a service user living with schizophrenia to make an informed decision about its use in their care plan (Verdonck and Maye, 2016; HSE Mental Health Services, 2017a). Future research could

	SA(%)	A(%)	N	D	SD	Did not respond
I think that assistive technology would offer the service user more choice in their health care	28.6	61.9	9.5%	-	-	-
I think that assistive technology would offer the service user more control in managing their health care	33.3	66.7	-	-	-	-
I think that assistive technology would enable the service user to become more independent in managing their condition	33.3	61.9	4.8%	-	-	-
I think that assistive technology would become a part of a person’s Wellness, Recovery, Action Plan	23.8	71.4	4.8%	-	-	-
I think that assistive technology would enable service users to organise themselves	33.3	52.4	14.3%	-	-	-
I think that assistive technology would enable service users to remember things that they often forget	28.6	71.4	-	-	-	-
There needs to be more discussion about assistive technology within multi-disciplinary teams	33.3	52.4	9.5%	4.8%	-	-
Opportunities for mental health-care professionals to learn about assistive technology should be created	42.9	57.1	-	-	-	-

Table V.
Health-care
professional views of
assistive technology
(N = 21)

specifically explore how confident occupational therapists are in their knowledge of AT devices available on the market for this purpose and if they have had experience with assisting a person to incorporate AT into their daily routine. Case study examples of AT use with this population would be a welcomed addition to the mostly quantitative research relating to this topic (Cullen, 2018). Occupational therapy case study examples could further highlight the unique role that occupational therapy could offer to this intervention tool.

Future considerations to facilitate the progression of AT

Although the findings from this research prove positive for AT, certain key considerations must be addressed before AT progresses. People living with schizophrenia are more likely to be unemployed and in receipt of social welfare when compared to individuals who are not living with this condition (Brown, 2011). AT can be expensive to buy and maintain. This could be problematic for individuals who are not financially secure. Services would have to explore how they can ensure that they can equitably provide modern mental health care that is in alignment with our current technological environment. There will be a need for appropriate pathways and procedures to ensure AT is available to people who could benefit from it (Ruzek and Yeager, 2017).

The findings reported in this paper do not address how AT will be incorporated into mental health-care services. As AT has been highlighted in this study as a potential facilitator of “Recovery” related services it would be important to introduce it to services in models that support “Recovery”. There is a potential role for health-care professionals to explore facilitating the introduction of AT into an individual’s mental health-care routine through a model of peer education and support (HSE Mental Health Services, 2017a; HSE Mental Health Services, 2017b; Shah *et al.*, 2016). Peer education allows for service users to be involved in educating their peers about their lived experience of a mental health condition (Naslund *et al.*, 2016). Through this model, service users are connected to their peers and could be facilitated by their peers to make choices about AT based on the experience of others. Further research could explore how AT could be implemented into services through a similar model. It is vital that this is done in a manner that captures the voices of the service users and respects their needs to avoid non-use of the AT device (Druss and Dimitropoulos, 2013; Cruz *et al.*, 2016).

Limitations to the research

Despite many efforts to advertise the study to promote engagement, there was limited uptake. For ethical reasons access to participants was not permitted and this prevented individualised supports to be put in place to assist people with filling out the questionnaires (i.e. if they had literacy problems). Alongside this limitation, engagement in research by people who are experiencing a serious mental health condition such as schizophrenia can be poor (Brown, 2011), thus limiting a large representation of the views of this population regarding the topic.

Both the service user and relative group had a high mean age. It appears that in a general population, persons of a younger age are more inclined to use technology in their day to day lives (O’Hanlon *et al.*, 2016). The results of this project do not appear to reflect the views of such a younger population. Future research could solely explore the attitudes of a younger cohort and further explore what AT they are organically using, and benefitting from, without the direction of health-care professionals, to manage living with schizophrenia.

Conclusion

This paper has highlighted attitudes held by three stakeholder groups involved in the health care of an individual living with schizophrenia regarding the use of AT to facilitate self-management. It appears that there is an interest from service users, relatives and health-care professionals to incorporate the use of AT into the self-management routines of people living with schizophrenia. This highlights that there is a positive environment for AT to develop within mental health-care services as it continues to progress. AT was viewed by the participants as a tool that can facilitate “Recovery” by promoting choice in, and control over, an individually tailored tool that promotes self-management. However, it appears that services could benefit from more service user and health-care professional education in AT. It would reflect best practice in “Recovery” to enable service users to discuss their experiences of using AT as a self-management tool with their peers and learn from each other (HSE Mental Health Services, 2017a; Shah *et al.*, 2016). By supporting and educating people living with this condition to use AT, we will allow them remain included within a society that is becoming increasingly more infused with technology.

References

- Aldersey, H.M. and Whitley, R. (2014), “Family influence in recovery from severe mental illness”, *Community Mental Health Journal*, Vol. 51 No. 4, pp. 467-476, available at: <https://doi:10.1007/s10597-014-9783-y>
- Alvarez-Jimenez, M., Alcazar-Corcoles, M.A., Gonzalez-Blanch, C.G., Bendall, S., McGorry, P.D. and Gleeson, J.F. (2014), “Online, social media and mobile technologies for psychosis treatment: a systematic review on novel user-led interventions”, *Schizophrenia Research*, Vol. 156 No. 1, pp. 96-106, available at: <https://doi:10.1016/j.schres.2014.03.02>
- Aunger, R. (2010), “Types of technology”, *Technological Forecasting and Social Change*, Vol. 77 No. 5, pp. 762-782, available at: <https://doi:10.1016/j.techfore.2010.01.008>
- Ben-Zeev, D. (2012), “Mobile technologies in the study, assessment, and treatment of schizophrenia”, *Schizophrenia Bulletin*, Vol. 38 No. 3, available at: <https://doi:10.1093/schbul/sbr179>
- Ben-Zeev, D., Davis, K.E., Kaiser, S., Krzsos, I. and Drake, R.E. (2012), “Mobile technologies among people with serious mental illness: Opportunities for future services”, *Administration and Policy in Mental Health and Mental Health Services Research*, Vol. 40 No. 4, pp. 340-343, available at: <https://doi:10.1007/s10488-012-0424-x>
- Ben-Zeev, D., Kaiser, S.M., Brenner, C.J., Begale, M., Duffecy, J. and Mohr, D.C. (2013), “Development and usability testing of FOCUS: a smartphone system for self-management of schizophrenia”, *Psychiatric Rehabilitation Journal*, Vol. 36 No. 4, pp. 289-296, available at: <https://doi:10.1037/prj0000019>
- Brown, C. (2011), “Schizophrenia”, in Brown C. and Stoffel V.C. (Eds) *Occupational Therapy in Mental Health: A Vision for Participation*, F. A. Davis Company, Philadelphia, pp. 179- 191.
- Burgess, J. (2012), “The iPhone moment, the apple Brand and the creative consumer. From hackability and usability to cultural generativity”, in Hjorth L., Burgess J. and Richardson I. (Eds), *Studying Mobile Media: Cultural Technologies, Mobile Communication and the iPhone*, Routledge, New York, NY, pp. 28 -42.
- Cohen, A.N., Drapalski, A.L., Glynn, S.M., Medoff, D., Fang, L.J. and Dixon, L.B. (2013), “Preferences for family involvement in care among consumers with serious mental illness”, *Psychiatric Services*, Vol. 64 No. 3, pp. 257-263, available at: <https://doi:10.1176/appi.ps.201200176>

- Cook, A.M., Polgar, J.M. and Hussey, S.M. (2008), "Introduction and overview", in Cook, A.M., Polgar J. M. and S.M. Hussey (Eds), *Cook and Hussey's Assistive Technologies: Principles and Practice (3rd ed)*, Mosby Elsevier, MO, pp. 3-33.
- Cruz, D., Emmel, M.L.G., Manzini, M.G. and Braga Mendes, P.V. (2016), "Assistive technology accessibility and abandonment: challenges for occupational therapists", *The Open Journal of Occupational Therapy*, Vol. 4 No. 1, p. 10, available at: <https://doi:10.15453/2168-6408.1166>
- Cullen, K. (2018), "eMental health: State of the art opportunities for Ireland", available at: www.mentalhealthreform.ie/wp-content/uploads/2018/05/eMental-health-review_report_final_may10_NEWcover.2.pdf (accessed 3 March 2019).
- Davidson, L. (2016), "The recovery movement: Implications for mental health care and enabling people to participate fully in life", *Health Affairs*, Vol. 35 No. 6, pp. 1091-1097, available at <https://doi:10.1377/hlthaff.2016.0153>.
- de Joode, E.A., van Boxtel, M.P.J., Verhey, F.R. and van Heugten, C.M. (2012), "Use of assistive technology in cognitive rehabilitation: exploratory studies of the opinions and expectations of healthcare professionals and potential users", *Brain Injury*, Vol. 26 No. 10, pp. 1257-1266, available at: <https://doi:10.3109/02699052.2012.667590>
- Dicianno, B.E., Parmanto, B., Fairman, A.D., Crytzer, T.M., Yu, D.X., Pramana, G., Coughenour, D. and Petrazzi, A.A. (2015), "Perspectives on the evolution of mobile (mHealth) technologies and application to rehabilitation", *Physical Therapy*, Vol. 95 No. 3, pp. 397-405, available at: <https://doi:10.2522/ptj.20130534>
- Druss, B.G. and Dimitropoulos, L. (2013), "Advancing the adoption, integration and testing of technological advancements within existing care system", *General Hospital Psychiatry*, Vol. 35 No. 4, pp. 345-348, available at: <https://doi:10.1016/j.genhosppsych.2013.03.012>
- Federici, S. and Scherer, M. (2017), *Assistive Technology Assessment Handbook*, CRC Press, FL.
- Firth, J. and Torous, J. (2015), "Smartphone apps for schizophrenia: a systematic review", *JMIR mHealth and uHealth*, Vol. 3 No. 4, pp. 102-107, available at: <https://doi:10.2196/mhealth.4930>
- Gay, K., Torous, J., Joseph, A., Pandya, A. and Duckworth, K. (2016), "Digital technology use among individuals with schizophrenia: Results of an online survey", *JMIR Mental Health*, Vol. 3 No. 2, p. e15, available at: <https://doi:10.2196/mental.5379>
- Gibson, B.E., Carnevale, F.A. and King, G. (2012), "Is my way: reimagining disability, independence and interconnectedness of persons and assistive technologies", *Disability and Rehabilitation*, Vol. 34 No. 22, pp. 1894-1899, available at: <https://doi.org/10.3109/09638288.2012.670040>
- Gillespie, A., Best, C. and O'Neill, B. (2012), "Cognitive function and assistive technology for cognition: a systematic review", *Journal of the International Neuropsychological Society*, Vol. 18 No. 1, pp. 1-19, available at: <https://doi:10.1017/S1355617711001548>
- HSE Mental Health Services (2017a), "A national framework for recovery in mental health, HSE mental health services", Dublin, available at: www.hse.ie/eng/services/list/4/mental-health-services/advancingrecoveryireland/national-framework-for-recovery-in-mental-health/recovery-framework.pdf (accessed 14 April 2019).
- HSE Mental Health Services (2017b), "Best practice guidance for mental health services, mental health services", Dublin, available at: www.hse.ie/eng/services/list/4/mental-health-services/mental-health-guidance/best-practice-guidance/documents/best-practice-guidance-for-mental-health-services.pdf (accessed 14 April 2019).
- Kauppi, K., Kannisto, K.A., Hätönen, H., Anttila, M., Löyttyniemi, E., Adams, C.E. and Välimäki, M. (2015), "Mobile phone text message reminders: measuring preferences of people with antipsychotic medication", *Schizophrenia Research*, Vol. 31 No. 168, pp. 514-522, available at: <https://doi:10.1016/j.schres.2015.07.044>

- Kessler, R.K., Gionvannetti, T. and MacCullen, L.R. (2007), "Everyday action in schizophrenia: performance patterns and underlying cognitive mechanisms", *Neuropsychology*, Vol. 21 No. 4, pp. 439-447, available at: <https://doi.org/10.1037/0894-4105.21.4.439>
- Lenker, J.A., Harris, F., Taugher, M. and Smith, R.O. (2013), "Consumer perspectives on assistive technology outcomes", *Disability and Rehabilitation: Assistive Technology*, Vol. 8 No. 5, pp. 373-380, available at: <https://doi.org/10.3109/17483107.2012.749429>
- Lorig, K.R. and Holman, H.R. (2003), "Self-management education: history, definition, outcomes, and mechanisms", *Annals of Behavioral Medicine*, Vol. 26 No. 1, pp. 1-7, available at: https://doi.org/10.1207/S15324796ABM2601_01
- Naslund, J., Aschbrenner, K., Marsch, L. and Bartels, S. (2016), "The future of mental health care: peer-to-peer support and social media", *Epidemiology and Psychiatric Sciences*, Vol. 25 No. 2, pp. 113-122, available at: <https://doi.org/10.1017/S2045796015001067>
- Nayeem, I. and Want, R. (2014), "Smartphones: past, present, and future", *IEEE Pervasive Computing*, Vol. 1 No. 4, pp. 89-92, available at: <https://doi.org/10.1109/MPRV.2014.74>
- Nolan, C., Quinn, S. and MacCobb, S. (2011), "Use of text messaging in a mental health service for university student", *Occupational Therapy in Mental Health*, Vol. 27 No. 2, pp. 103-125, available at: <https://doi.org/10.1080/0164212X.2011.565702>
- O'Hanlon, P., Aref-Adib, G., Fonseca, A., Lloyd-Evans, B., Osborn, D. and Johnson, S. (2016), "Tomorrow's world: current developments in the therapeutic use of technology for psychosis", *BJPsych Advances*, Vol. 22 No. 5, pp. 301-310, available at: <https://doi.org/10.1192/apt.bp.115.014654>
- Ruzek, J.I. and Yeager, C.M. (2017), "Internet and mobile technologies: addressing the mental health of trauma survivors in less resourced communities", *Global Mental Health (Cambridge, England)*, Vol. 4 No. 16, doi: [10.1017/gmh.2017.11](https://doi.org/10.1017/gmh.2017.11).
- Shah, S.A., Nolan, M., Ryan, M., Williams, J. and Fannon, D. (2016), "Delivering recovery focused mental health care in Ireland: implications for services and practice development", *Irish Journal of Psychological Medicine*, Vol. 33 No. 2, pp. 121-128, available at: <https://doi.org/10.1017/ipm.2014.75>
- Sterling, E.W., von Esenwein, S.A., Tucker, S., Fricks, L. and Druss, B.G. (2010), "Integrating wellness, recovery, and self-management for mental health consumers", *Community Mental Health Journal*, Vol. 46 No. 2, pp. 130-138, available at: <https://doi.org/10.1007/s10597-009-9276-6>
- Twamley, E.W., Savla, G.N., Zurhellen, C.H., Heaton, R.K. and Jeste, D.V. (2008), "Development and pilot testing of a novel compensatory cognitive training intervention for people with psychosis", *American Journal of Psychiatric Rehabilitation*, Vol. 11 No. 2, pp. 144-163, available at: <https://doi.org/10.1080/15487760801963678>
- Verdonck, M. and Maye, F. (2016), "Enhancing occupational performance in the virtual context using smart technology", *British Journal of Occupational Therapy*, Vol. 79 No. 6, pp. 385-390, available at: <https://doi.org/10.1177/0308022615591172>
- Verdonck, M., McCormack, C. and Chard, G. (2011), "Irish occupational therapists' views of electronic assistive technology", *British Journal of Occupational Therapy*, Vol. 74 No. 4, pp. 185-190, available at: <https://doi.org/10.4276/030802211X13021048723291>
- World Health Organization (2001), *International Classification of Functioning Disability and Health*, World Health Organization, Geneva.
- Wykes, T., Haro, J.M., Belli, S.R., Obradors-Tarragó, C., Arango, C., Ayuso-Mateos, J.L. and Elfeddali, I. (2015), "Mental health research priorities for Europe", *The Lancet Psychiatry*, Vol. 2 No. 11, pp. 1036-1042, available at: [https://doi.org/10.1016/S2215-0366\(15\)00332-6](https://doi.org/10.1016/S2215-0366(15)00332-6)

Zhou, B. and Gu, Y. (2014), "Effect of self-management training on adherence to medications among community residents with chronic schizophrenia: a single blind randomized controlled trial in shanghai", *China, Shanghai Archives of Psychiatry*, Vol. 26 No. 6, pp. 332-338, available at: <https://doi:10.11919/j.issn.1002-0829.214076>

Further reading

McKibbin, C.L., Brekke, J.S., Sires, D., Jeste, D.V. and Patterson, T.L. (2004), "Direct assessment of functional abilities: relevance to persons with schizophrenia", *Schizophrenia Research*, Vol. 72 No. 1, pp. 53-67, available at: <https://doi:10.1016/j.schres.2004.09.011>

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