Certified Peer Specialists and Older Adults with Serious Mental Illness' Perspectives of the Impact of a Peer-Delivered and Technology-Supported Self-Management Intervention

Karen L. Fortuna, PhD, MSW[1,2], **Marianne Storm, PhD**[3,4], **John A. Naslund, PhD**[5], **Kelly A. Aschbrenner, PhD**[1,2], **Matthew C. Lohman, PhD, MPH**[6], **Philip I. Chow, PhD**[7], **Peter R. DiMilia, MPH**[4], and **Stephen J. Bartels, MD, MS**[1,2,4]

[1]Dartmouth Centers for Health and Aging, 46 Centerra Parkway, Suite 200 Lebanon, NH 03766

[2]CDC Health Promotion Research Center at Dartmouth, Lebanon, NH, United States.

[3]Faculty of Health Sciences, University of Stavanger, Stavanger, Norway

[4]The Dartmouth Institute, 1 Medical Center Drive, Lebanon, NH 03766

[5]Harvard Medical School, Department of Global Health and Social Medicine, 641 Huntington Avenue Boston, MA 02115

[6]University of South Carolina, Arnold School of Public Health, Department of Epidemiology and Biostatistics, 921 Assembly St, Columbia, SC 29208

[7]Center for Behavioral Health and Technology, Dept. of Psychiatry and Neurobehavioral Sciences, University of Virginia, 1300 Jefferson Park Ave, Charlottesville, VA 22903

Abstract

We explored certified peer specialists and older adults with serious mental illness perspectives of the impact of a peer-delivered medical and psychiatric self-management intervention, "PeerTECH". Transcripts from interviews with consumers with serious mental illness and a focus group with certified peer specialists who were engaged in PeerTECH were analyzed. Consumer participants (N=8) had a mean age of 68.8 years (SD=4.9) and included individuals diagnosed with major depressive disorder (5 people), schizophrenia spectrum disorders (2 people), and bipolar disorder (1 person). Certified peer specialists (N=3) were aged 55 years or older. Themes included: internal and external forces of accountability, confidence, internal and external locus of hope, human bonding, and peer support. This exploratory qualitative study found that human support from peers can potentially influence health behavioral change in a combined peer and technology-based medical and psychiatric illness self-management intervention.

Keywords

Serious mental illness; mHealth; peer support; illness self-management

---

Address for correspondence: Karen L. Fortuna, Dartmouth Centers for Health and Aging 46 Centerra Parkway, Suite 200 Lebanon, NH 03766, (603) 653-3435, Karen.L.Fortuna@Dartmouth.edu.

Older adults with serious mental illness or SMI (i.e., schizophrenia spectrum disorders, bipolar disorder, or persistent major depressive disorder) are a rapidly growing population with high rates of chronic illness that is associated with impaired functioning and early mortality (DE Hert et al., 2011). People with SMI and co-occurring health conditions are also among the most costly Medicaid and Medicare recipients (Bartels et al., 2003). Self-management skills such as medication management and stress reduction can help to improve physical and mental health outcomes (Whiteman et al., 2016). Improving outcomes for older adults with SMI will likely require innovative approaches to delivering self-management interventions that are readily accessible in the community.

Peer-delivered self-management interventions for people with SMI in the community enhanced with smartphone Apps are a promising method to support independent self-management activities in the community (Fortuna et al., 2018). Certified peer specialists are typically people who have experienced a mental illness, are in recovery, and can provide Medicaid reimbursable services (Solomon, 2004). With the increasing use of technology in mental health services, peer-delivered services can potentially be advanced to provide live or automated peer support or other peer services in any place, at any time.

Emerging evidence suggests that peer-delivered mobile health (mHealth) self-management interventions are potentially effective for older adults with SMI on a multitude of domains--- self-efficacy, illness self-management behaviors, hope, and empowerment (Fortuna et al., 2018). An in-depth understanding of the perspectives of certified peer specialists and consumers with mental illness involved is essential for developing targeted mHealth interventions.

To understand the impact of PeerTECH from the consumer perspective, we examined consumer and certified peer specialists' perspectives of the impact of a peer-delivered medical and psychiatric self-management intervention for older adults with serious mental illness. We explored the content of individual interviews with consumers with SMI and a focus group with certified peer specialists who were engaged in a 12-week in-person peer-delivered intervention augmented by a smartphone App. The PeerTECH intervention focuses on training older adults with SMI to self-manage both medical and psychiatric illnesses through psychoeducation, behavioral tailoring, coping skills training, and motivational interviewing. Findings related to the feasibility and effectiveness of this peer-delivered intervention augmented by a smartphone App has been previously reported (Fortuna et al., 2017a). This manuscript aims to explore certified peer specialists and older adults with serious mental illness perspectives of the impact of a peer-delivered medical and psychiatric self-management mHealth intervention.

Methods

Study Design

This study was approved by [blinded for review] Institutional Review Board. Detailed information on the study design and recruitment procedures has been published elsewhere (Fortuna et al., 2018). In brief, we examined the feasibility, acceptability, and preliminary effectiveness of a combined peer and technology-based medical and psychiatric illness self-

management intervention for older adults with SMI and chronic health conditions called "PeerTECH". PeerTECH was provided in-person by a certified peer specialist enhanced with a smartphone App over a 12-week intervention period (Fortuna et al., 2018). In our initial pre/post study, we found PeerTECH was feasible and acceptable among consumers and peers. PeerTECH was related to statistically significant improvements in psychiatric self-management (Fortuna et al., 2018). Additionally, improvements were found in self-efficacy for managing chronic health conditions, hope, quality of life, medical self-management skills, and empowerment (Fortuna et al., 2018).

PeerTECH Intervention

We adapted a clinician-administered evidence-based intervention, "Integrated Illness Management and Recovery" (Bartels et al., 2014) for in-person delivery by a certified peer specialist and a smartphone application ("PeerTECH"). In-person delivery was guided by eModules. Twelve different eModules were completed on a tablet collaboratively with a peer and consumer during one-hour, weekly, in-person sessions (see Table 1). eModules included videos and guided tasks designed to teach and reinforce psychoeducation and coping skills training for self-management of SMI and chronic health conditions.

The smartphone App component reinforced in-person peer sessions and provided support to participants in their everyday lives (Fortuna et al., 2018; Whiteman et al., 2017a). The smartphone App included daily, personalized self-management tasks such as "check your blood glucose" or "walk for 10 minutes today", peer led videos on self-management skill development, medication reminders, a pedometer, and a HIPAA-compliant chat feature. Peers provided peer support by text messaging through the App using the HIPAA-compliant chat feature. Peer support is a non-manualized form of social support that is provided by a person living with a mental health condition to others sharing a similar mental health condition to achieve individually identified goals (Solomon, 2004). Smartphones and data plans were provided free to consumer participants to use for the study duration, or participants were permitted to use their own smartphone.

Fidelity Assessment

The first author (principal investigator) and peer supervisor supervised intervention fidelity through (1) participant engagement with the PeerTECH smartphone App and (2) deliberation between the principal investigator and peer supervisor that occurred during weekly meetings or as needed. The principal investigator also observed at least one in-person eModule session over the duration of the intervention with each certified peer specialist. The principal investigator offered an evaluation of peers' delivery of PeerTECH to peer interventionists and the peer supervisor.

Consumer Participants Recruitment

Clinical staff at a home health agency reviewed caseloads and identified potential consumer participants that met inclusion criteria. During the consumer informed consent process, potential participants were provided information on the study, including notification that their participation was voluntary and that their confidentiality would be protected. After a discussion about the study, potential participants who agreed to participate completed a

written informed consent. Each participant was then scheduled to meet with a certified peer specialist in the consumer's home for one-hour every week for 12 weeks.

Semi-structured Interview—As stated above, the informed consent was completed prior to beginning the study. At the conclusion of the intervention, consumer participants completed a one-hour semi-structured interview with research staff at the consumers' home. The interview was audio-recorded and transcribed. Participants were provided a $20 gift card incentive for participating in the interview.

Peer Participants Recruitment

Three certified peer specialists were interviewed and hired to provide PeerTECH. One certified peer specialists with supervisory experience was hired to supervise peers delivering PeerTECH. Each peer completed the PeerTECH training to acquire the needed knowledge and skills to help facilitate the delivery of the PeerTECH intervention to consumer participants. PeerTECH training consisted of 20 hours of training on 4- consecutive days. Training was provided by the first author and included: information about the interaction between stress, physical health, and mental health; how to set actionable goals; delivering PeerTECH sessions using guided eModules on a tablet; using role-play and personal stories to teach self-management skills; and instruction on how to use the smartphone application. Two of the certified peer specialists were assigned a 2–3 person caseload and worked a total of 10 hours per week including providing direct care, text messaging, writing case notes, and supervision. Peers were provided with a tablet or used their personal tablet to deliver eModules. The third certified peer specialist was a peer supervisor and worked between 3–5 hours a week supervising peers and providing technical assistance. All peers received an hourly rate for their work in PeerTECH.

Focus Group—At the conclusion of the intervention, three peer participants completed a 1.5-hour focus group with research staff in a private office setting. Peers completed an informed consent process to participate in a focus group. During the informed consent, research staff provided peers an information sheet detailing the purpose of the focus group and they informed their participation was voluntary and confidential. Verbal informed consent was obtained from all peer participants. The focus group was audio-recorded and transcribed.

Data Analysis

Separate semi-structured interview guides were developed from a review of the literature, which identified potential barriers and facilitators to older adults with SMI using technology. Individual interviews data from eight consumer participants who completed the PeerTECH intervention and focus group data from peers were analyzed.

Informed by the "grounded theory" approach we analyzed focus group and interview data. The codebook included *a priori* researcher-driven codes developed by the first two authors, which were derived from participant interviews (Martin & Turner, 1986). To include multiple perspectives, the first and second author read transcripts and added additional codes and operational definitions (Martin & Turner, 1986). Codes were derived from the individual

interviews and the focus groups by carefully reviewing the transcribed text. Then, the first and second authors sorted the codes and grouped them into overarching themes. Using thematic analysis, the first two authors summarized themes identified in the data that were representative of the different codes (Braun & Clarke, 2016). Within-group consensus or disagreements were assessed. We triangulated certified peer specialists and consumer data to elucidate themes and to improve the accuracy of the qualitative results. Triangulation involves multiple data sources collected through different methods in an effort to improve the validity of the qualitative results (Patton, 1999). Member checking was employed with one consumer and two certified peer specialists to validate findings and resolve any potentially conflicting results (i.e., member checking is a qualitative method used to valid researchers findings with participants viewpoints).

Results

Study Sample

The sample included eight consumer participants and three certified peer specialists, one of which was a peer supervisor.

Consumer Participants—Consumer participants (N=8) had a mean age of 68.8 years (SD=4.9) and were predominately women (7 people), White (8 people), and married (6 people). The sample included a diagnostically heterogeneous group of people diagnosed with major depressive disorder (5 people), schizophrenia spectrum disorders (2 people), and bipolar disorder (1 person).

Certified Peer Specialists—Certified peer specialists (N=3) were aged 55 years or older, two peers were female, and two peers identified as White while one peer identified as African-American.

All peers completed the [blinded for review] certified peer specialist training (Kaufman et al., 2016).

We identified 46 final codes relating to five themes. Themes covered different constructs of certified peer specialists and older adults with serious mental illness perspectives of the impact of PeerTECH. The themes were: internal and external forces of accountability, confidence, internal and external locus of hope, human bonding, and peer support. See Table 2 for selected quotes.

Internal and External Locus of Hope—The first theme and most prevalent represented peer specialists' impact on consumer participants' level of hope. Hope was defined as the perceived ability to meet desired goals, and ability to motivate a person to achieve those goals. Hope included the subcategories of internal and external locus of hope. For example, hope could be based on an individual (internal locus) or on another person such as family member, a friend, or for the purposes of this study a peer (external locus).

Human Bonding—The second theme included bonding between peers and consumer participants. Human bonding is the formation of a personal relationship between people.

Bonding typically occurs between family members or close friends; however, bonding can also happen between people with similar lived experiences.

Peer Support—The third theme was peer support, which included the subcategories of self-determination (i.e., right to determine their own goals), shared experience (i.e., experiential learning/experiential teaching), and companionship (i.e., sense of belonging). Peers believed that text message exchanges facilitated the development of social ties between certified peer specialists and consumer participants, which in turn, promoted engagement in PeerTECH.

Internal and External Forces of Accountability—The fourth theme represented peer specialists' impact on consumer participants' engagement in the intervention and included internal and external forces to promote accountability. External accountability included a personal accountability to peers to make progress towards their personalized goals.

Confidence—The fifth theme represented consumer participants' confidence in completing goals and included the subcategories of confidence in others and self-confidence. Confidence in others included efforts by peers to empower consumers to achieve their goals.

Discussion

We identified five broad themes that describe the impact of a combined peer and technology-based medical and psychiatric illness self-management intervention. The five themes included: internal and external forces of accountability, confidence, internal and external locus of hope, human bonding, and peer support. This exploratory qualitative study found that human support from peers can potentially influence health behavioral change in a combined peer and technology-based medical and psychiatric illness self-management intervention. Interactions with peers through the smartphone App appears to have reinforced the above themes. Certified peer specialists' strategies align with accepted theories that guide peer-delivered services and health behavior change interventions. As certified peer specialists advance services delivery using mHealth these findings can help to inform the development of combined peer and technology-based interventions.

Peer support can be provided in any place and at any time with use of the smartphone App. Peer support is a non-manualized form of social support (Solomon, 2004). Adults with SMI who have greater social support experience high rates of recovery, fewer symptoms, increased use of medical services, and improved well-being (Calsyn & Winter, 2002; Lam & Rosenheck, 1999; McCorkle et al., 2008; Thomas et al., 2016a; 2016b). Social support naturally occurs between friends and family members. However, having SMI is associated with debilitating social functioning and minimal social ties (Cohen C & Sokolovsky, 1978; Wang et al., 2017). Further, older adults with SMI not only have greater impaired ability to independently self-manage, but also have lower levels of social support (Cohen & Sokolovsky, 1978; Wang et al., 2017). Unlike traditional peer services, peer-delivered mHealth interventions can offer real-time social support features such as text messaging (Fortuna et al., in press). Peer-delivered mHealth can reach highly vulnerable older adults

with SMI—including those in rural areas, those who are homebound, and/or older adults that are socially isolated.

Peer support through in-person visits and use of the smartphone App appeared to reduce feelings of loneliness and social isolation. A significantly higher proportion of people with SMI experience social isolation compared to the general population (Adams et al., 2004; Badcock et al., 2015). Although not a diagnostic criterion of major depressive disorder, loneliness is a major predictor of depression in older adults (Adams et al., 2004; Cacioppo et al., 2006). Relative to younger people, older adults tend to prefer closer relationships with a fewer number of people. Because close social relationships increase meaning in life and serve as a key outlet for emotional support, older adults that are socially isolated are at significantly increased risk of mental and physical health issues (Shankar et al., 2011). Loneliness is a modifiable risk factor. As such, "loneliness" is a potential intervention target for peer-delivered interventions that may naturally reduce social isolation.

Consumers reported that the combination of peers and the smartphone App fostered feelings of confidence. Self-efficacy or health confidence is the degree to which someone believes they are capable of succeeding or accomplishing tasks (Bandura, 1998a; 1998b). Consumer participants felt empowered by peers to achieve their goals, which appears to have increased their confidence to change health behaviors. Promising evidence suggests that peer-delivered integrated illness management led to improvements in self-efficacy for managing chronic diseases (Fortuna et al., 2018). The adoption of self-efficacy into illness self-management interventions is established as an important mediator in the causal pathway from intervention exposure to changing health behaviors and clinical outcomes (Bandura, 1998a; 1998b). The combined peer and technology approach potentially allows for practice outside of the clinical environment through both in-person discussions with peers and through the smartphone App to master self-management skills.

Consumers engaged in using technology to support self-management reported that peers increased their hope in their recovery. Hope was defined as the perceived ability to meet desired goals and ability to motivate oneself to achieve those goals. In a population of people who are chronically ill, being hopeful enhanced the likelihood of recovery (Smith et al., 2016). Hope is a natural component of peer services delivery (Salzer & associates, 2002). Prior research has suggested that higher levels of hope positively impacts multiple domains including depressive symptoms, anxiety, distress, coping, wellbeing, health expenditures and immune response (Schrank et al., 2008). While the goals of peer support services are not the same as clinical services (Harp & Zinman, 1994), future peer-delivered mHealth intervention studies should examine non-traditional outcomes such as "hope" independently and explore interaction with distal outcomes such as improved mental and physical health or functioning.

Peers and consumer participants reported a close bond through personal relationships. While the bond between certified peer specialists and consumers has traditionally happened in-person, mHealth was used to facilitate bonding. The importance of human bonding is supported by studies demonstrating that therapeutic alliance, marked by the amount of trust between a therapist (in this case, a peer) and a consumer, is among the most robust

predictors of consumer health outcomes (Martin, 2000). Several emerging mHealth interventions for people with SMI include professional providers such as nurses, psychologists, and social workers in sending encouraging text messages and telephone reminders (Aschbrenner, Naslund, Gill, Bartels, & Ben-Zeev, 2016; Beebe et al., 2014; Maiga, 2011; Montes et al., 2012). Research has found that peers performed as well as professionals in intervention services delivery, and they produced comparable outcomes (Davidson et al., 2012). However, differences between peers compared to professional providers in delivering mHealth interventions are not known and may be nessecary to understand further in order to advance peer mHealth services delivery.

Personal accountability to certified peer specialists may promote engagement in technology-based interventions. The delivery of mHealth interventions is often challenged by low engagement and premature discontinuation among people with SMI (Berrouiguet et al., 2016; Eysenbach, 2005). Multiple factors impact engagement, including smartphone design features (Whiteman et al., 2017a; 2017b) and consumer factors such as willingness to use technology (Price et al., 2014), suspicion of smartphones (Depp et al., 2016), concerns related to privacy, confidentiality, and security (Olff, 2015), or familiarity with smartphones (Ben-Zeev et al., 2015). Consistent with literature on developing accountability in technology-based interventions (Mohr et al., 2011), certified peer specialists fostered consumers' accountability through expectations (i.e., setting long-term and short-term goals), performance monitoring via the smartphone App, bonding, legitimacy (i.e., shared lived experience), and social presence (i.e., in-person meetings in addition to augmented self-management training through the smartphone App).

Certified peer specialists' strategies align with accepted theories that guide peer-delivered services and health behavior change. The role of certified peer specialists in promoting behavior change has been explained by psychosocial processes grounded in theoretical frameworks (Salzer & associates, 2002), including social support (Sarason, Levine, Basham & Sarason, 1983); experiential knowledge (Borkman, 1990); helper-therapy principle (Riessman, 1965; Skovholt, 1974); social learning theory (Bandura, 1998a; 1998b); and social comparison theory (Festinger, 1954).

Theoretical frameworks provide invaluable guidance in designing effective mHealth interventions (Bull & Ezeanochie, 2016); however, the application of accepted theories of peer support for informing the development of peer-delivered mHealth interventions for people with SMI has received little attention in early intervention development (Fortuna et al., in press). Our findings demonstrate constructs from accepted theories that guide peer-delivered services and health behavior change. The combination of peers using mHealth to facilitate health behavior change in self-management interventions based on relevant theories of peer support shows promise for supporting medical and psychiatric self-management skill development among older adults with SMI.

This study has several limitations. First, we do not know if we met saturation as the design of this pilot study pre-determined the number of participants and interviews. Qualitative interviews and focus groups are often conducted until the researchers meet saturation (i.e., saturation is defined as the point in which collecting more data will not result in more

information [Seale et al., 2004]). Saturation commonly occurs with 20–30 total participants (Seale et al., 2004); however, the sample size was small since the primary study was designed to examine feasibility. In interpreting these findings, it is important to note that findings cannot be generalized; however, the themes identified can be used to guide the development of combined peer and technology-based medical and psychiatric illness self-management interventions.

Second, stratifying our data by demographic characteristics was not possible due to the small sample size. It is not known if people with different diagnosis had different opinions. Third, the consumer sample included people predominately with a diagnosis of major depressive disorder, limiting generalizability to other serious mental illnesses. Fourth, the consumer participants in this study were all receiving mental health care. Our findings may not generalize to people with SMI not enrolled in treatment or those who do not have access to mental health care. Finally, the results elucidate common themes of how peers support health behavioral change in older people with SMI in a combined peer and technology-based medical and psychiatric illness self-management intervention. However, it is not known if the peer to consumer in-person or smartphone App exchanges can improve self-management and other clinical outcomes. A future study with adequate power and a suitable comparison condition is necessary in order to isolate the impact of peers' influence on health outcomes.

Despite these limitations, the findings of this exploratory, qualitative study suggest that peer support has the potential to facilitate the use of technology by enhancing key perceptions of accountability, confidence, hope, human bonding, and social support. Future research is warranted to explore if targeting and directly enhancing these attributes may increase the impact and sustained use of technology to support positive health behavioral change in a combined peer and technology-based medical and psychiatric illness self-management intervention.

Acknowledgments

References

Aschbrenner KA, Naslund JA, Gill LE, Bartels SJ, Ben-Zeev D (2016) A qualitative study of client–clinician text exchanges in a mobile health intervention for individuals with psychotic disorders and substance use. J Dual Diagn, 12(1):63–71. [PubMed: 26829356]

Adams KB, Sanders S, Auth E (2004) Loneliness and depression in independent living retirement communities: Risk and resilience factors. Aging Ment Health, 8(6):475–485. [PubMed: 15724829]

Badcock JC, Shah S, Mackinnon A, Stain HJ, Galletly C, Jablensky A (2015) Loneliness in psychotic disorders and its association with cognitive function and symptom profile. Schizophr Res 169, 268–273. [PubMed: 26527247]

Bandura AS (1998) Neurobiology of learning, emotion and affect (pp. 229–270). New York: Raven.

Bandura AS (1998) Encyclopedia of human behavior. New York: Raven.

Bartels SJ, Clark RE, Peacock WJ, Dums AR, Pratt SI (2003) Medicare and Medicaid costs for schizophrenia patients by age cohort compared with costs for depression, dementia, and medically ill patients. Am J Geriatr Psychiatry 11(6):648–657. [PubMed: 14609805]

Bartels S, Pratt S, Mueser K, Naslund J, Wolfe R, Santos M, Xie H, Riera E (2014) Integrated IMR for psychiatric and general medical illness for adults aged 50 or older with serious mental illness. Psychiatr Serv 65, 3: 330–337. [PubMed: 24292559]

Beebe L, Smith KD, Phillips C (2014) A comparison of telephone and texting interventions for persons with schizophrenia spectrum disorders. Issues Ment Health Nurs 35(5):323–329. [PubMed: 24766166]

Ben-Zeev D Schueller SM, Begale M, Duffecy J, Kane JM, Mohr DC (2015) Strategies for mHealth research: Lessons from 3 mobile intervention studies. Adm Policy Ment Health 42(2):157–167. [PubMed: 24824311]

Berrouiguet S, Baca-García E, Brandt S, Walter M, Courtet P (2016) Fundamentals for future mobile-health (mHealth): A systematic review of mobile phone and web-based text messaging in mental health. J Med Internet Res 18(6):e135. [PubMed: 27287668]

Braun V, Clarke V (2006). Using thematic analysis in psychology. Qual Res Psychol 3, 2:77–101.

Brown GH, Harris T (1978) Social origins of depression: A study of psychiatric disorder in women. New York: The Free Press.

Borkman T (1990). Experiential professional and lay frames of reference In Powell TJ (Ed.) Working with self-help groups, (pp.3–30), Silver Springs, MD: NASW Press.

Bull S, Ezeanochie N (2016) From Foucault to Freire through Facebook: Toward an integrated theory of mHealth. Health Educ Behav 43, 399–411. 10.1177/1090198115605310 [PubMed: 26384499]

Cacioppo JT, Hughes ME, Waite LJ, Hawkley LC, Thisted RA (2006) Loneliness as a specific risk factor for depressive symptoms: Cross-sectional and longitudinal analyses. Psychology and aging 21(1):140. [PubMed: 16594799]

Calsyn RJ, Winter JP (2002) Social support, psychiatric symptoms, and housing: A causal analysis. J Community Psychol 30(3):247–259.

Cohen CI, Sokolovsky J (1978) Schizophrenia and social networks: ex-patients in the inner city. Schizophr Bull 4(4):546. [PubMed: 734366]

Davidson L, Bellamy C, Guy K, Miller R (2012) Peer support among persons with severe mental illnesses: A review of evidence and experience. World Psychiatry 11(2), 123–128. [PubMed: 22654945]

DE Hert M, Correll CU, Bobes J, Cetkovich-Bakmas M, Cohen D, Asai I, Detraux J, Gautam S, Möller HJ, Ndetei DM, Newcomer JW, Uwakwe R, Leucht S (2011) Physical illness in patients with severe mental disorders. I. Prevalence, impact of medications and disparities in health care. World Psychiatry 10(1):52–77. [PubMed: 21379357]

Depp CA Harmell AL, Vahia IV, Mausbach BT (2016) Neurocognitive and functional correlates of mobile phone use in middle-aged and older patients with schizophrenia. Aging Ment Health 20(1): 29–35. [PubMed: 25768842]

Gunther Eysenbach (2005) The law of attrition. J Med Internet Res 7(1):e11. [PubMed: 15829473]

Festinger L (1954). A theory of social comparison processes. Human Relations 7, 117–140.

Fortuna KL, DiMilia P, Lohman M, Bruce M, Zubritsky C, Halaby M, Walker R, Brooks J, Bartels SJ (2017a). Feasibility, acceptability, and preliminary effectiveness of a peer-delivered and technology supported self-management intervention for older adults with serious mental illness. Psychiatr Q doi: 10.1007/s11126-017-9534-7.

Fortuna KL, Lohman MC, Batsis JA, DiNapoli EA, DiMilia PR, Bruce ML, Bartels SJ (2017b) Patient experience with healthcare services among older adults with serious mental illness compared to the general older population. Int J Psychiatry Med 52: 4–6.

Fortuna KL Storm M Aschbrenner KA, Bartels SJ (in press). Integration of Peer Philosophy into a Standardized Self-Management Mobile Health Intervention. Psychiatr Q.

Fortuna KL, Naslund JA, Aschbrenner KA, Lohman MC, Storm M, Batsis JA, & Bartels SJ. (in press). Text Message Exchanges between Older Adults With Serious Mental Illness and Older Certified Peer Specialists in a Smartphone-Supported Self-Management Intervention. Psychiatr Rehabil J.

Harp H, & Zinman S (1994). Reaching across II: Maintaining our roots/The challenge of growth. Sacramento, CA: California Network of Mental Health Clients.

Kaufman L, Kuhn W, Stevens Manser S (2016) Peer specialist: Training and certification programs: A national overview. Texas Institute for Excellence in. Mental Health, School of Social Work, University of Texas.

Lam JA, Rosenheck R (1999) Social support and service use among homeless persons with serious mental illness. Int J Soc Psychiatry 45(1):13–28. [PubMed: 10443246]

Maiga D (2011) Interest of using a mobile phone in response to appointments for patients with acute functional psychoses at the psychiatric ward of Niamey National Hospital - Niger - West Africa. Information Psychiatrique 87(2):127–132.

Martin D, Garske J, Davis M (2000) Relation of the therapeutic alliance with other outcome and other variables: A meta-analytic review. J Consult Clin Psychol 68(438–450). [PubMed: 10883561]

Martin P, Turner B (1986). Grounded theory and organizaional research. The J Appl Behav Sci 22,2: 141.

McCorkle BH, Rogers ES, Dunn EC, Lyass A, Wan YM (2008) Increasing social support for individuals with serious mental illness: Evaluating the compeer model of intentional friendship. Community Ment Health J 44(5):359. [PubMed: 18481176]

Meltzer H, Bebbington P, Dennis MS, Jenkins R, McManus S, Brugha TS (2013) Feelings of loneliness among adults with mental disorder. Soc Psychiatry Psychiatr Epidemiol 48: 5–13. [PubMed: 22570258]

Mohr DC, Cuijpers P, Lehman K (2011) Supportive accountability: A model for providing human support to enhance adherence to eHealth interventions. J Med Internet Res 13: e30. [PubMed: 21393123]

Montes JM, Medina E, Gomez-Beneyto M, Maurino J (2012) A short message service (SMS)-based strategy for enhancing adherence to antipsychotic medication in schizophrenia. Psychiatry Res, 200(2–3):89–95. [PubMed: 22901437]

Naslund J, Aschbrenner K, Barre L, Bartels SJ (2015a) Feasibility of popular m-health technologies for activity tracking among individuals with serious mental illness. Telemed J E 21, 3:213–216. doi: 10.1089/tmj.2014.0105

Naslund J, Marsch L, McHugo G, Bartels SJ (2015b) Emerging mHealth and eHealth interventions for serious mental illness: A review of the literature. JMH 24: 321–32. doi: 10.3109/09638237.2015.1019054

Naslund JA, Aschbrenner KA, Kim SJ, McHugo GJ, Unützer J, Bartels SJ, Marsch LA (2017) Health behavior models for informing digital technology interventions for individuals with mental illness. Psychiatr Rehabil J 40(3):325–335. [PubMed: 28182469]

Olff M (2015) Mobile mental health: a challenging research agenda. Eur J Psychotraumatol 19;6:27882.

Patton MQ (1999) Enhancing the quality and credibility of qualitative analysis. Health Serv Res 34 (5), 1189–1208. [PubMed: 10591279]

Price M, Yuen EK, Goetter EM, Herbert JD, Forman EM, Acierno R, Ruggiero KJ (2014) mHealth: A mechanism to deliver more accessible, more effective mental health care. Clin Psychol Psychother 21(5):427–436. [PubMed: 23918764]

Riessman F (1965). The "helper" therapy principle. Social Work 10, 27–32.

Sarason I, Levine H, Basham R, Sarason B (1983) Assessing social support: The social support questionnaire. J Pers Soc Psychol 44, 127–139.

Schrank B, Stanghellini G, Slade M (2008) Hope in psychiatry: A review of the literature. Acta Psychiatr Scand 118:421–433. [PubMed: 18851720]

Seale C, Gobo G, Gubrium JF, Silverman D (2004) Grounded Theory, in Qualitative Research Practice. London: Sage.

Shankar A, McMunn A, Banks J, Steptoe A (2011) Loneliness, social isolation, and behavioral and biological health indicators in older adults. Health Psychol 30(4):377. [PubMed: 21534675]

Skovholt T (1974). The client as helper: A means to promote psychological growth. Counseling Psychologist 13, 58–64.

Sims H, Sanghara H, Hayes D, Wandiembe S, Finch M, Jakobsen H, Tsakanikos E, Okocha CI, Kravariti E (2012) Text message reminders of appointments: A pilot intervention at four community mental health clinics in London. Psychiatr Serv 63(2):161–168. [PubMed: 22302334]

Smith CA, Tong EM, Ellsworth PC (2016) The differentiation of positive emotional experience as viewed through the lens of appraisal theory. Handbook of Positive Emotions 11–27.

Solomon P (2004). Peer support/peer provided services underlying processes, benefits, and critical ingredients. Psychiatr Rehabil J 27, 4.

Substance Abuse and Mental Health Services Administraion (2013) 10×10 wellness campaign: Information for general health care providers. Available At: http://store.samhsa.gov/shin/content/SMA10-4566/SMA10-4566.pdf.

Thomas EC, Muralidharan A, Medoff D, Drapalski A (2016) Self-efficacy as a mediator of the relationship between social support and recovery in serious mental illness. Psychiatr Rehabil J 39(4):352–360. [PubMed: 27845532]

Wang J, Lloyd-Evans B, Giacco D, Forsyth R, Nebo C, Mann F, Johnson (2017) Social isolation in mental health: A conceptual and methodological review. Soc Psychiatry Psychiatr Epidemiol 52(12):1451–1461. [PubMed: 29080941]

Whiteman KL, Naslund JA, DiNapoli EA, Bruce ML, Bartels SJ (2016) Systematic review of integrated general medical and psychiatric self-management interventions for adults with serious mental illness. Psychiatr Serv 67(11):1213–1255. [PubMed: 27301767]

Whiteman KL, Lohman M, Gill L, Bruce M, Bartels SJ. (2017a). Adapting a psychosocial intervention for smartphone delivery to middle-aged and older adults with serious mental illness. Am J Geriatr Psychiatry 25, 8: 819–828 [PubMed: 28169129]

Whiteman KL, Lohman M, Bartels SJ (2017b). Peer and technology supported integrated medical and psychiatric self-management intervention for older adults with serious mental illness. Psychiatr Serv 68,4:420. doi: 10.1176/appi.ps.68404 [PubMed: 28366124]

Wiles RC, Cott C, Gibson BE (2008) Hope, expectations, and recovery from illness: A narrative synthesis of qualitative research. Journal of Advanced Nursing 64 (6): 564–573. [PubMed: 19120569]

Table 1

PeerTECH eModule Sessions

Session #1–2: Identifying Your Personal Recovery and Wellness Goals and Plan: Setting recovery and health goals and strategies to achieve goals to maximize functioning and orientation to the smartphone application.

Session #3: Psychoeducation: Psychoeducation on SMI and medical illness.

Session#4: Stress Vulnerability and Illness: Causes of mental illness and factors that impact its course.

Session #5: Building Social Supports and Recovery and Wellness: How to build social supports to improve well-being and sustain wellness.

Session #6: Medication Adherence Strategies: Behavioral tailoring and motivational techniques for psychiatric and medical medication adherence.

Session #7: Psychiatric and Medical Relapse Prevention: Identify warning signs and develop a relapse prevention plan for psychiatric symptoms.

Session #8–9: Coping with Psychiatric Symptoms and Health-related Stress and Solving Problems: Establish a step-by-step method managing psychiatric symptoms
and problem solving.

Session #10: Coping with Stress, Chronic Pain and Medical Symptoms, and Solving Problems: Identifying stressors that exacerbate symptoms and strategies to cope with stress.

Session #11: Substance Abuse and Medication Misuse: Overcoming substance abuse and the effects on symptoms and functioning.

Session #12: A Guide to Navigating the Mental Health and Medical Healthcare System: Accessing mental health and medical health services and insurance benefits, making informed decisions.

Table 2

Selected Quotes

Theme		Consumer Selected Quotes	Peer Selected Quotes
Accountability			
External Accountability		"I owed it to her [the peer] to do something. It might be the walking or interaction with other people".	N/A
		"I had that feeling that I had somehow let her down by not going through with the goals and by not doing whatever that we had decided on for that week."	
Internal Accountability		As far as accountability is concerned, what about a daily mood temperature, like you could every day assess the person to assess their mood feeling"	"I think that's one of the main things the research program should focus on is the growth through the accountability, your personal growth is helped by the accountability."
Confidence			
Confidence in others		"The thing was it was [the peer] started me thinking. One suggestion she gave me led me to thinking in myself saying maybe I can do this. Maybe [the peer] is right."	"By demonstrating to her every week by saying oh this is what I'm working on, what are you working on? So challenging her to not only stay with the program, but like wow, [blinded for confidentiality] doing this too."
Self-confidence		"I like the idea the App lets you see how much confidence you have in your health and what you can do."	
Hope			
Internal Locus of Hope		"And if you have hope it makes you think if I can do this maybe I can do that too. What a thought that is."	"I think the reason why we saw improvements in all the areas because of that improvement of HOPE….I mean just think, if you have more hope then the likelihood that gets translated into many more areas in your life."
External Locus of Hope		"She knows other veterans, and it's not hopeless to be a disabled veteran. It's not hopeless."	"[Texting] let them know that you were invested in them. And that again it's part of offering hope."
Human Bonding		"What really helps the most is …She knows I love her, I know we have a loving and caring relationship. There is no contact between us. It is important to your mental health to know that someone cares about you. That she knows that I love her and she loves me. I do not see her. No one knows about this."	"[Peers are] not like a provider you see once every three months, you see that you have an investment in them and they're investing in you."
		"I love [blinded to protect peer confidentiality] just as a friend. I feel like we can talk the rest of our lives."	
Peer Support			
Self-Determination		"[my goal was to" to get me off my butt and walking. And not to feel like I'm a hopeless case. I'm not hopeless."	"You know peer support 101 is you focus on their interest, their strengths, we don't try to introduce different kinds of interests to see if they would like this or like that."
Shared Experience		"She knows other veterans that from my experience from being homeless with veterans can help her with other veterans."	"You know I shared parts of my own story very judiciously because I felt it was really all about her and I really focused on her."
Companionship		"It was nice just to talk to her, airing out my feelings, telling her what I do and how I cope with things."	"I think for me the major breakthrough with [blinded for confidentiality] was breaking her out of her isolation, which was a major contributor to her paralyzing depression."
		"It is nice to have somebody come in and just chat, it just help out especially for people like myself who is stuck in and don't get really talk to people that much."	"[text messaging on the smartphone] developed a better relationship….Because she could tell me what she was thinking and what she was feeling and what was going on and not having to wait until next week.

Theme	Consumer Selected Quotes	Peer Selected Quotes
	"The phone helps when you're alone."	"I think with [blinded for confidentiality] my messages to her showed demonstrated my investment in our relationship.… I think that that was of value to her."
	A consumer stated "You cant really talk to a phone. I'm lonely.…The personal touch is better, and then the phone is good also as a backup."	" You asked how the phone helped. Initially people were not responding .… But once they did, they started changing, I noticed. Because then it made it easier for us and encouraged us to be in contact with them in between visits. So once they got how to send messages back and forth seemed like their engagement and our engagement increased."