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Barriers to Participation in Web-Based and In-Person Weight Management Interventions for Serious Mental Illness

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Abstract

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Objective—This study examines barriers to participation and retention in two modalities (web-based and in-person) of a weight-management intervention tailored for individuals with serious mental illness (SMI).

Methods—Using a mixed-methods approach, we explored the barriers Veterans with SMI face when participating in a web-based (*WebMOVE*) or in-person (*MOVE-SMI*) version of the same SMI-adapted, weight-management program. Participants in the randomized controlled trial (n = 277) were recruited from specialty mental health clinics at a VA Medical Center. Barriers were analyzed across treatment condition and program attendance (engagement) at baseline and follow-up using a generalized lineal model. Post hoc analyses assessed whether changes in the trajectory of barriers over time were associated with engagement. A sub-sample of participants (n = 48) from the *WebMOVE* and *MOVE-SMI* treatment conditions completed a qualitative interview, and two coders used open-coding to analyze the data.

Results—Although barriers specific to treatment modality existed, most barriers cut across intervention modality, including financial hardship, lack of reliable housing and transportation, comorbid physical and mental health issues, and competing demands on personal time. Results of post hoc analyses found the association between engagement and emotional and motivational factors to be statistically significant.

Conclusions and Implications for Practice—This study is the first to identify barriers in a web-based intervention for SMI. Similar barriers persisted across treatment modalities. Known barriers, particularly socio-economic barriers, should be addressed to improve engagement and retention of individuals in weight-management interventions adapted for SMI, irrespective of modality.

Keywords

Mental illness; Obesity; Qualitative Methods; e-Health; Weight Loss

INTRODUCTION

Weight gain is a well-documented and prevalent side effect of medications used to treat individuals with serious mental illness (SMI) and can result in serious comorbid health problems and deteriorated quality of life. In-person, behavioral weight-management interventions have been developed and implemented with varying success in SMI. Although barriers to participation have been identified for in-person interventions, little is known about barriers to participation in web-based interventions adapted for SMI.

Increased weight has been associated with metabolic problems, including obesity, diabetes, hyperglycemia, and heart disease (Strassnig et al., 2017; Newcomer & Haupt, 2006; Newcomer, 2005). Individuals with SMI experience obesity at more than twice the rate of the general population (Allison et al., 2009) and have higher rates of weight-related mortality, with cardiovascular disease the leading cause of death (Druss, Zhao, Von Esenwein, Morrato, & Marcus, 2011; Saha, Chant, & McGrath, 2007). Inactivity and unhealthy eating compound medication-induced weight gain in individuals with SMI who are often less physically active and more likely to exhibit harmful health behaviors, such as

tobacco use, than the general population (Dipasquale et al, 2013; Scott & Happell, 2011; Osborn, Nazareth, & King, 2007; Daumit et al., 2005).

Behavioral interventions to address weight in SMI have sought to improve physical activity and diet through in-person delivery of intervention content. In efficacy studies and effectiveness trials conducted in various outpatient settings and at varying levels of program intensity (Daumit et al., 2013; Rosenbaum, Tiedemann, Sherrington, Curtis, & War, 2014; Cabassa, Ezell, & Lewis-Fernandez, 2010) findings varied from weight maintenance to modest weight loss compared to usual care (Daumit et al., 2013; Loh, Meyer, & Leckband, 2006; Erickson et al., 2016; Niv, Cohen, Hamilton, Reist, & Young, 2014; Bonfioli, Berti, Goss, Muraro, & Burti, 2012; Faulkner, Cohn, & Remington, 2007). Despite the benefits of even modest weight loss, barriers to participation in weight-management interventions pose significant challenges for participants.

In the general population, barriers to in-person participation include competing demands on participants' time, lack of motivation, comorbid physical health problems, stress and depression, lack of social support, issues with self-monitoring and self-control, and unhealthy eating in social situations (Metzgar, Miller, & Nickols-Richardson, 2015; Hammarstrom, Wiklund, Lindalh, Larsson, & Ahlgren, 2014; Vendetti et al., 2014; Sharifi, Mahdavi, & Ebrahimi-Mameghani, 2013; Abolhassani et al., 2012; Greaney et al., 2009).

Although individuals with SMI experienced similar barriers (Bassilios, Judd, & Pattison, 2014; Klingaman et al, 2014; Carpiniello, Primavera, Puli, Vaccargiu, & Pinna, 2013; Sokal et al., 2004), additional barriers included impaired cognitive and executive function (Mueser & McGurk, 2004), low energy and tiredness (Fraser, Chapman, Brown, Whiteford, & Burton, 2015; Klingaman et al, 2014; Carpiniello et al., 2013), cost of implementing intervention content (Faulkner, Taylor, Munro, Selby, & Gee, 2007), lack of interest (Bassilios et al., 2014; Deighton & Addington, 2014), and high socioeconomic need (Hudson, 2005). Effectiveness studies have identified psychiatric symptoms, stigma, and lack of motivation as further barriers to weight loss (Archie, Wilson, Osborne, Hobbs & McNiven, 2003; Daumit et al., 2013).

In general, barriers to participation in weight interventions are compounded by psychiatric illness. In two large-scale studies, participants with SMI were more likely to indicate medical issues, symptoms of poorly managed medical conditions, lack of social support, and barriers to healthy eating and physical activity compared to participants with no SMI diagnosis (Muralidharan, Klingaman, Prior, Molinari, & Goldberg, 2016; Klingaman et al., 2014). Moreover, similar barriers appeared to impact individuals with SMI more than individuals in the general population; individuals with SMI experienced less weight loss compared to individuals without SMI participating in the same weight-management intervention (Janney et al., 2018; Littman et al., 2015).

To address known barriers to in-person participation, web-based interventions have been developed and evaluated, though none were adapted for SMI needs. Efficacy studies of web-based interventions showed modest weight-loss for participants (Kodama et al., 2011; Neve, Morgan, Jones, & Collins, 2010; Tate, Jackvony, & Wing, 2006; Gold, Burke et al., 2006),

with greater weight-loss effects observed for interventions that included face-to-face support (Bennet et al., 2010; Tate, Jackvony, & Wing, 2003). Nonetheless, web-based interventions presented unique challenges, including low program utilization and high attrition (Kaipainen, Payne, & Wansink, 2012; Neve, Collins, & Morgan, 2010; Eysenbach, 2005). One study of a publicly-available web-based intervention identified three types of participation barriers: intervention-specific (e.g., suggested changes were problematic/incompatible), personal (e.g., forgetting or being busy), and external (e.g., travel) (Kaipainen et al., 2012).

Although web-based programs have helped to address some barriers to in-person participation, primarily in the general population, barriers persist and are likely heightened in individuals with SMI. To our knowledge, this is the first effectiveness trial to compare web-based and in-person modalities of an SMI-adapted, weight-management intervention, in individuals with SMI. WebMOVE is a self-administered, SMI-adapted, web-based intervention consisting of interactive online nutrition and physical activity modules, knowledge quizzes, weight-tracking, and personalized goal-setting (Young et al., 2017). Participants are supported by weekly telephonic peer-coaches with lived SMI experience who are supervised by a clinical psychologist (Young et al., 2017). WebMOVE was based on MOVE-SMI, the in-person version of the intervention that includes weekly in-person group sessions led by a clinician with experience in weight management and SMI. In a randomized controlled trial (RCT) comparing WebMOVE to MOVE-SMI and usual care, WebMOVE participants experienced an average change in Body Mass Index (BMI) equivalent to 6.2 pounds from baseline to six-months, while MOVE-SMI and usual care participants saw no significant change (Young et al., 2017).

The study's primary objectives were to extend the literature on barriers to web-based weight-management interventions for SMI and examine if identified barriers differ by treatment modality (i.e., the same intervention delivered via web versus in-person). While most existing studies have primarily assessed barriers to participation in SMI populations in small to large efficacy studies, this study is one of the few large-scale *effectiveness* studies of an SMI-adapted weight intervention. Further, it is the only study to assess a web-based, SMI-adapted modality.

Other study goals were 1) to examine the effect of treatment condition (web or in-person) on barriers to healthy eating and physical activity over time, 2) to examine the association between anticipated baseline barriers and patient engagement in their respective interventions, and 3) to determine if patient engagement in treatment impacted perceived barriers over the course of treatment.

METHODS

Study Design and Participants

Data were drawn from a RCT comparing three weight-loss conditions for SMI – the web-based program (WebMOVE), the in-person program (MOVE-SMI), and a Usual Care group (Young et al., 2017). WebMOVE participants accessed 30-interactive, web-based modules, and were assigned a peer-coach for weekly telephonic support and a pedometer to encourage

physical activity. MOVE-SMI participants attended eight one-on-one sessions and 16 group sessions led by two VA social workers with extensive experience working with individuals with SMI. They were supervised weekly by a senior staff psychologist with decades of experience developing and implementing weight-management intervention for SMI.

The WebMOVE and MOVE-SMI programs covered the same curriculum. Usual Care participants received an educational weight-loss handout. Participants were assessed at baseline and six-months. The study was approved by the VA Institutional Review Board, and all participants provided written informed consent.

Potential participants were identified using VA medical records. Eligibility criteria included: being at least 18 years of age; having a DSM-IV diagnosis of schizophrenia, schizoaffective disorder, bipolar disorder, recurrent major depressive disorder with psychosis, or chronic post-traumatic stress disorder; taking antipsychotic medication for at least three months prior to enrollment; having a BMI > 30 or a BMI 28 – 29.9 with self-reported weight gain of at least 10 pounds in the last three months; and having medical clearance from a VA physician when their Physical Activity Readiness Questionnaire (PAR-Q) (Thomas, Reading, & Shephard, 1992) score was greater than one. Exclusion criteria included current participation in weight loss groups, pregnant or currently nursing, a history of bariatric surgery, dementia, psychiatric hospitalization in the prior month, and limited control over food preparation. In total, 1,429 Veterans were screened for eligibility, and 277 were randomized to a treatment condition: WebMOVE (n = 93), MOVE-SMI (n = 95), and Usual Care (n = 89).

At six months, proportional quota sampling was used to identify a sub-sample of participants (n = 48) from the WebMOVE and MOVE-SMI groups. The sub-sample was randomly selected and stratified by treatment condition and program attendance (attended most, attended some, and non-attender) (see Table 1). Participants in this sub-sample completed a second written informed consent to complete a semi-structured, qualitative interview about their participation in the intervention.

Measures

Quantitative Measures—Demographic data were collected at baseline and number of sessions completed was tabulated from administrative records. At baseline and six-months, twenty-nine items assessed participants' barriers to physical activity (e.g., competing demands on time, comorbid mental and physical health issues, and access to safe exercise locations) and to healthy eating (e.g., healthy food access, financial hardship, and food preferences). Barrier items included a sub-scale of the MOVE!23 Survey (Kinsinger et al., 2009), a clinical assessment constructed from other validated instruments and empirically-based clinical experience with weight-management treatments (for more information on its development, visit: <https://vaww.move.va.gov>).

Qualitative Measures—For the qualitative sub-sample, semi-structured interview guides were developed for WebMOVE and MOVE-SMI participants. Participants were asked about their program modality preference (web-based versus in-person), satisfaction with assigned modality, program content, and their peer-coach (WebMOVE) or clinician (MOVE-SMI),

suggestions for program improvements, and use of other weight-management services. Non-attenders were asked additional questions about their non-attendance.

Data Analysis

Quantitative Analysis—Quantitative analyses were performed on the overall sample (n=277). Participants' responses to the physical activity and healthy eating barrier scales were analyzed across treatment condition and program attendance levels. Factor analysis was used to determine the factor structure of the barrier scales. Glorfeld's variant of Horns Parallel Analysis (Glorfeld, 1995) was used to determine the number of factors to extract from the physical activity and healthy eating barriers scales, and factors were extracted using Principal Axis Factoring with a Varimax rotation. The change from baseline to follow-up in these subscales was analyzed using a generalized linear model (GLMM) with treatment group (WebMOVE, MOVE-SMI, Usual Care) as between-subject factor and time as within-subject factor. The model includes random effects for subject to account for baseline differences between participants.

Post hoc analyses were conducted to determine if engagement was related to the rate of change in physical activity and healthy eating barriers in the treatment groups. For each group, we determined if the trajectory of change in barriers over time was associated with the percent of possible sessions the participant completed (patient engagement). Groups were analyzed separately as it is not clear that this measure of engagement is comparable across the treatment modalities due to differences in accessibility. Further, regression analyses were conducted to determine associations between baseline barriers and engagement.

Qualitative Analysis—Forty-eight, 15–30 minute interviews were conducted by three assessors, audio-recorded, and transcribed verbatim. Atlas.ti version 8 was used to organize analysis of the data into thematic sections. Two research team members used open-coding to code the transcripts first to the interview questions and secondly for any additional, pertinent factors emerging during coding. Discrepancies in coding were discussed and reconciled after initial coding and a 92% coding agreement was reached between coders across all interviews. Overarching-themes were identified from the open-coding through an iterative process, with a focus on identifying participants' barriers to participation in the intervention.

RESULTS

Quantitative Results

Demographics—Demographics for the overall study sample and for the sub-sample interviewed are presented in Table 2. Chi-square and F-tests revealed no significant differences between treatment groups at baseline in either sample. Of note, close to 25% of the overall sample and 33% of the qualitative sub-sample reported not having Internet access.

Barriers to Physical Activity and Healthy Eating: Factor Analysis—To determine if combining data from WebMOVE, MOVE-SMI, and Usual Care for the factor analysis was

warranted, a MANOVA was run which showed that the treatment groups did not differ significantly from each other (Wilks Lambda = .771, $F(58, 490) = 1.17$, $p = .19$; Roy's Largest Root = .149, $F(29, 246) = 1.26$, $p = .17$). In factor analysis, barriers to healthy eating identified one factor, "Lack of control over food preparation," and the scale was accordingly aggregated into one summary variable. Barriers to physical activities showed three factors: 1) socioeconomic (too little time; too little money; safety concerns; no place to walk or be active; no transportation), 2) motivation and emotional (lack of support/encouragement from others; difficulties with stress, depression, etc.; do not like to exercise; daily habits/routines that do not include exercise; being too tired), and 3) physical problems (pain; back problems; arthritis; muscular problems; joint problems). Subscales were created based on these results using unit-weighting.

Change over Time in Barriers to Physical Activity and Healthy Eating—

Trajectory analyses showed that all barrier factors significantly decreased over time across both treatment conditions: barriers to healthy eating ($F(2, 548) = 54.45$, $p < .01$), socioeconomic factor ($F(2, 548) = 14.17$, $p < .01$), motivation and emotional factor ($F(2, 548) = 23.23$, $p < .01$), and the physical problems factor ($F(2, 548) = 11.68$, $p < .01$), no ($F(4, 548) = 0.93$, $p = .44$). However, there were no significant differences in trajectories *between* treatment groups over time.

Engagement and Barriers—Pearson correlation coefficients were computed to assess the relationship between baseline barriers and engagement. For WebMOVE participants, there was a negative correlation between the motivation and emotional factor for barriers to physical activity and engagement ($r = -0.28$, $p < 0.01$). No statistically significant correlation was found for MOVE-SMI participants. In regression analyses looking at the associations between baseline barriers and engagement, only the motivation and emotional factor was statistically significant ($r = -0.33$, $p < 0.01$), and only in WebMOVE.

In post hoc analyses, the average session completion rate for WebMOVE participants was 35% (about 10.5 sessions). We found a significant effect of engagement on the trajectory of the motivation and emotional factor of the physical activity barrier. For a hypothetical WebMOVE participant with 0% completion, the factor score changed from 0.56 (SE = 0.04) at baseline to 0.29 (SE = 0.04) at study endpoint. For a participant completing 100% of sessions, the estimated factor score changed from 0.37 (SE = 0.6) to 0.42 (SE = 0.06). There was no effect of engagement on the trajectories of the healthy eating barrier or socioeconomic and physical problems factors. In MOVE-SMI, the average completion rate was 31% (about 5 sessions). There was no effect of engagement on the trajectories of the healthy eating barrier and the three physical activity factors.

Qualitative Results

Participants who attended at least some WebMOVE or MOVE-SMI sessions were generally satisfied with program content and with the support they received from the peer-coaches and clinical instructors. Nonetheless, participants in both treatment groups experienced significant barriers to program participation and engagement. Participant-level barriers included financial hardship, issues with transportation and distance traveled, lack of reliable

housing, competing demands on personal time, co-morbid physical and mental health conditions, technology access, and limited technology literacy. Program-level barriers included technical issues with WebMOVE content and interacting with other MOVE-SMI participants.

Participant-Level Barriers to Program Participation

Financial hardship—Participants in both treatment groups experienced frustration and concern over their ability to implement program content. For many, program recommendations about what to eat and how to exercise proved cost-prohibitive. One MOVE-SMI participant explained:

“...they said...introduce a little variety...I put...half a can of green chili in my beans, and there went my budget.” [1216, MOVE-SMI – Attended Some]

Among participants who initiated healthier behaviors, financial issues hindered sustainment:

“I can’t remember why I stopped juicing...I didn’t get tired of it. It was a matter of getting money...” [1257, WebMOVE – Attended Some]

Although financial barriers impacted participants across all treatment conditions and attendance levels, MOVE-SMI participants who attended some sessions, most often identified financial barriers as directly impacting their weight loss and participation.

Transportation and Distance Travelled—MOVE-SMI participants attended in-person program sessions at a VA Medical Center. Lack of transportation and distance travelled to the Center were common barriers for non-attenders and participants who only attended some sessions.

“...I don’t have means of transportation, just a bike. Getting from point A to point B was difficult.” [1048, MOVE-SMI – Non-Attender]

As a result, several MOVE-SMI participants would have preferred WebMOVE:

“I wanted to do the online one...because I wouldn’t have to drive...about forty miles.” [1111, MOVE-SMI – Attended Some]

Interestingly, transportation and distance issues were also barriers for WebMOVE participants who lacked convenient and reliable technology access and traveled to a VA-based kiosk:

“I was logging in here on the kiosk...But it was hard for you to get here to do it? Yes, just transportation...” [1026, WebMOVE – Attended Some]

WebMOVE participants for whom transportation was a barrier were at times relieved to have been assigned to the web-based program:

“I wouldn’t have to worry about coming here, and traffic, and getting late. I thought it would be better if I did it online.” [1227, WebMOVE – Attended Some]

Intersection of Financial Hardship and Transportation—For some MOVE-SMI participants, the intersection of financial hardship and lack of transportation was a

substantial barrier. One participant explained that deciding between bus fare to attend the program and food for the day was not uncommon. When asked what the MOVE-SMI program could do to help, he explained:

“...[bus] tokens...maybe a light lunch... you have to make a choice sometimes... bus fare or food... So, what you gonna choose?” [1148, MOVE-SMI – Attended Some]

For one WebMOVE participant, lack of transportation and financial hardship conflated with lack of technology access and limited technology literacy made barriers to participation too difficult to surmount:

“It would cost me \$5–7... to come use a computer that I don’t want to use...on a program I’m having a hard time with anyway...It’s just...too hard, too many obstacles.” [1252, WebMOVE – Non-attender]

Lack of Reliable Housing—Although only a small number of participants cited lack of reliable housing as a barrier, it seemed the most limiting in terms of participants’ ability to implement program content, thus impacting program attendance and progress. One WebMOVE participant who attended most sessions provided the following critique of the physical activity content:

“I found a lot of the... way they spoke to you, implied that you lived in a house... dancing around the house. Doing housework when you got a 20×15 room is probably not as applicable...” [1251, WebMOVE – Attended Most]

Similarly, participants living in temporary housing had little control over their food preparation:

“Where I’m living at...None of us have control over what they serve...” [1048, MOVE-SMI – Non-Attender].

Varying degrees of housing stability and of agency to make food and physical activity choices impacted participants’ attendance and progress in WebMOVE and MOVE-SMI.

Competing Demands on Personal Time—Non-attenders and participants who only attended some sessions of WebMOVE and MOVE-SMI were also burdened by competing demands on their personal time, including attending school, working full-time, looking for work, and looking after family members. For most participants, competing demands were numerous and concurrent. This resulted in feelings of being overwhelmed and unable to prioritize weight loss and program participation:

“...[my diet] is caught up in the whole mélange of stuff that I have to deal with on a daily basis. Until then, it gets shunned to the wayside.” [1216, MOVE-SMI – Attended Some]

Co-morbid Physical and Mental Health Issues—Managing other physical and mental health conditions in addition to weight was a commonly cited barrier to attendance in WebMOVE and MOVE-SMI and to implementing program content. The effects of comorbid mental health issues were also limiting. A participant in MOVE-SMI explained how the side

effects of his mental health medications kept him from participating in VA weight-management programs:

“... [The VA’s] got a lot of yoga and a lot of programs ...I don’t participate in that because I was so weak from all the medication I was on. I just wanted to sleep, just daydream all day long.”[1045, MOVE-SMI – Attended Some]

Issues of mobility and chronic pain were also factors. One participant in WebMOVE explained his inability to implement the physical activity content:

“Well, I was limited because of my pains to my knees and back and different things.”[1078, WebMOVE, Attended Most]

Technology Access and Limited Technology Literacy—Technology access and literacy limitations emerged as barriers for WebMOVE participants who completed some or no sessions. These participants expressed difficulties with accessing computers and with using computers:

“I’m computer illiterate, computer intimidated, you know? ...[it’s] like a foreign object... So, I knew, if I don’t do it for fun time, I wasn’t going to do it for losing weight.” [1252, WebMOVE – Non-attender]

Even when participants had computer access, limited computer/technology literacy prevented their program access. One participant who completed some WebMOVE sessions from the VA kiosk, explained why accessing the program from home was a barrier:

“I tried one time at home... and I couldn’t do it on my own... And I’m not asking for help! That was part of my problem... I was trying to do it on my own.”[1026, WebMOVE – Attended Some]

Nonetheless, some participants expressed enthusiasm for improving their literacy:

“If you all can take time to show me how to use [the computer], eventually I’ll end up doing it.” [1023, WebMOVE – Non-attender]

Program-level Barriers to Program Participation

Participants also experienced barriers related to their assigned modality, such as technical issues for WebMOVE participants and difficulty interacting with others for MOVE-SMI participants.

Technical Issues – WebMOVE—Only WebMOVE participants who attended at least some program sessions were asked about their use of program content and tools. Some WebMOVE participants experienced trouble at first sign-on but could troubleshoot the issue quickly with help from their peer-coaches. Other technical issues, including trouble printing and a glitch with the program’s physical activity tracking generated feelings of frustration:

“...I think there was only three times where printing did work... it wouldn’t discourage me, but it was frustrating.”[1250, WebMOVE – Attended Most]

The most common technical issues reported involved the use and function of the pedometers provided. Pedometers were intended as a weight loss tool, however some participants

viewed them as a hindrance. Remembering to wear the pedometer daily required practice and several participants misplaced or accidentally broke their pedometers during the study period. Perhaps the most frustrating aspect of the pedometer was having to log the daily steps in WebMOVE:

“The only thing I had a problem with was the pedometer. It was confusing to me.”
[1227, WebMOVE – Attended Some]

Interacting with Other Participants – MOVE-SMI—Four MOVE-SMI participants who attended some or no sessions expressed having trouble interacting with others and meeting new people. For one participant, getting to know new people in the group sessions and having to share personal information was difficult. Changes to his MOVE-SMI group made the experience more difficult:

“I find it difficult to get to know somebody; to expand on what bothers me. This group that we ‘re in... it switched people on me, so I’ve had to adjust to that.”
[1276, MOVE-SMI – Attended Some]

Although a few participants reported being uncomfortable with the in-person modality, several others were satisfied and shared preferences for either the group or individual sessions. MOVE-SMI participants who attended most sessions did not cite interacting with others as a barrier to their participation.

DISCUSSION

WebMOVE was designed, in part, to address known barriers to in-person participation in weight-management programs for participants with SMI. Findings indicate that while the web-based intervention reduced some barriers, most barriers persisted and were similar across intervention modalities. Barriers to weight loss (financial hardship, lack of reliable housing, comorbid physical and mental health issues, and competing demands on personal time) and to program participation (transportation, distance travelled to the VA, comorbid physical and mental health issues, and competing demands on personal time) were present for WebMOVE and MOVE-SMI participants. These findings suggest that adapting weight interventions to address the cognitive and psycho-social needs of individuals with SMI is insufficient. Additional efforts to address the socio-economic needs of participants are also warranted.

In post hoc analyses, WebMOVE participants with higher engagement rated their emotional and motivational barriers higher at study endpoint than baseline, while less-engaged WebMOVE participants reported a decrease in those barriers. One hypothesis is that the emotional and motivation barriers, such as lack of support, become more salient with increased engagement. Thus, higher program engagement might make obvious the degree to which a perceived barrier at baseline was actually a factor, resulting in a more accurate assessment of the barrier at study endpoint. MOVE-SMI participants did not experience the same effect on the emotional and motivation barrier, suggesting that the in-person group activities may have helped provide support participants needed. As could be expected, no

significant changes were observed in the trajectory of socioeconomic and physical problem factors across modalities.

Financial hardship and lack of reliable housing were commonly cited barriers among WebMOVE and MOVE-SMI participants. For many, implementing intervention content was perceived as cost-prohibitive and/or difficult. In some cases, participants felt forced to choose between paying for transportation to access the intervention and other important expenses. Participants living in temporary residential housing were particularly limited in their ability to cook and to exercise at home. Although financial hardship is a common barrier across treatment modalities and in different patient populations, financial barriers seem less surmountable when compounded with the pervasive housing issues experienced by Veterans with SMI.

Weight-management interventions have been found to improve participant engagement and attendance by providing resource incentives (McKibbin, Golshan, Griver, Kitchen, & Wykes, 2010; Roberts & Bailey, 2011). Providing modality-specific incentives (e.g., free lunch and bus tokens for in-person and food or gym vouchers for web-based modalities) and adapting program content to account for a variety of living arrangements may make weight-management interventions more accessible for a broader range of individuals with SMI. In addition, subsidizing a meal and/or transportation may also “free up” participants’ limited budget to afford healthier food choices and improve engagement.

In prior research, individuals with SMI experienced greater barriers related to their medical conditions and symptoms (Muralidharan et al., 2016; Klingaman et al., 2014). Our findings were similar with participants citing barriers related to their physical and mental health (i.e., limited mobility, chronic pain, and difficulty with social interactions). Adapting program content to provide resources that address coordination of medical and mental health care needs is important. Including examples of therapeutic or low-impact physical activity to encourage participation by those with limited mobility or chronic pain is another option. Present findings also support the use of web-based interventions for participants who are less comfortable in social, interaction-driven environments. Most WebMOVE participants appreciated the option to check in one-on-one with a peer-coach over the phone, stating that they preferred that interaction to the in-person peer-group.

For WebMOVE specifically, identified barriers included limited technology literacy, lack of computer and Internet access, limited experience with web-based interfaces, and a need for technical support. Notwithstanding these challenges, several participants found workarounds, including asking family members, program staff, and other support persons for help. Although peer-coaches were available, providing additional robust technical support to help with sign-in and printing issues may help reduce frustrations and should be tested. Also, several participants expressed a desire to learn how to use a computer. Thus, facilitating linkages to no- and low-cost computer-literacy resources for participants may improve engagement in web-based interventions. The final program barrier of note for WebMOVE participants was the frequent loss of the pedometer provided, which impaired sustained use of the device. At study completion, program staff had ordered the equivalent of

five pedometers per WebMOVE participant. Studies seeking to use similar devices should budget for multiple devices per participant to account for loss and damage.

A main limitation of the study is a lack of generalizability due to the sample. Participants in the overall study and in the qualitative sub-sample were predominantly male Veterans, over the age of 50, who were unemployed. The homogeneity of the samples may explain, in part, the identification of similar barriers across treatment groups. The high rates of unemployment for example, may partially explain the socio-economic nature of several barriers (e.g. financial hardship, challenges accessing reliable housing, and transportation issues). Most participants were also older, which may account for the frequency with which technology access and limited technology literacy were barriers for WebMOVE participants. Studies that include a younger demographic and a greater variation in socio-economic variables may highlight additional barriers to weight-management interventions in general, and to web-based interventions specifically.

Barriers to weight loss and participation in weight interventions for SMI persist across treatment modalities. The impact of those barriers can augment frustration, impact motivation, and limit the effectiveness of conventional and SMI-adapted weight interventions. Additional effectiveness studies are needed to understand how web-based interventions adapted for SMI can best address the cognitive, psychosocial, and socioeconomic needs of this population in a weight loss context.

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REFERENCES

- Abolhassani S, Irnai MD, Sarrafzadegan N, Rabiei K, Shahrokhi S, Pourmoghaddas Z, ...Moattar F (2012). Barriers and facilitators of weight management in overweight and obese people: Qualitative findings of TABASSOM project. *Iranian Journal of Nursing and Midwifery Research*, 17(3), 205–210. [PubMed: 23833613]
- Allison DB, Newcomer JW, Dunn AL, Blumenthal JA, Fabricatore AN, Daumit GL, ...Alpert JE (2009). Obesity among those with mental disorders a national institute of mental health meeting report. *American Journal of Preventive Medicine*, 36(4), 341–350. [PubMed: 19285199]
- Archie S, Wilson JH, Osborne S, Hobbs H, & McNiven J (2003). Pilot study: Access to fitness facility and exercise levels in Olanzapine-treated patients. *The Canadian Journal of Psychiatry*, 48(9), 628–632. [PubMed: 14631884]
- Bassilios B, Judd F, & Pattison P (2014). Why don't people diagnosed with schizophrenia spectrum disorders (SSDs) get enough exercise? *Australasian Psychiatry*, 22: 71–77. [PubMed: 24191294]
- Bennett GG, Herring SJ, Puleo E, Stein EK, Emmons KM, & Gillman MW (2010). Web-based weight loss in primary care: A randomized controlled trial. *Obesity*, 18: 308–313. [PubMed: 19696764]
- Bonfioli E, Berti L, Goss C, Muraro F, & Burti L (2012). Health promotion lifestyle interventions for weight management in psychosis: A systematic review and meta-analysis of randomized controlled trials. *BMC Psychiatry*, 12:78. [PubMed: 22789023]

- Cabassa LJ, Ezell JM, & Lewis-Fernandez R (2010). Lifestyle interventions for adults with serious mental illness: A systematic literature review. *Psychiatric Services*, 61(9), 774–782. [PubMed: 20675835]
- Carpiniello B, Primavera D, Pilu A, Vaccargiu N, & Pinna F (2013). Physical activity and mental disorders: a case-control study on attitudes, preferences and perceived barriers in Italy. *Journal of Mental Health*, 22(6): 492–500. [PubMed: 24206453]
- Daumit GL, Dickerson FB, Wang NY, Dalcin A, Jerome GJ, Anderson CAM, & Appel LJ (2013). A behavioral weight-loss intervention in persons with serious mental illness. *New England Journal of Medicine*, 368(17), 1594–1602 [PubMed: 23517118]
- Daumit GL, Goldberg RW, Anthony C, Dickerson F, Brown CH, Keyenbuhl J, ...Dixon, L.B. (2005). Physical activity patterns in adults with severe mental illness. *The Journal of Nervous and Mental Disease*, 193(10), 641–646. [PubMed: 16208158]
- Deighton S & Addington J (2014). Exercise practices of young people at their first episode of psychosis. *Schizophrenia Research*, 1: 311–312.
- Dipasquale S, Pariante CM, Dazzan P, Aguglia E, McGuire P, & Mondelli V (2013). The dietary pattern of patient with schizophrenia: A systematic review, 47(2): 197–207.
- Druss BG, Zhao L, Von Esenwein S, Morrato EH, & Marcus SC (2011). Understanding excess mortality in persons with mental illness 17-year follow up of a nationally representative US survey. *Medical Care*, 49(6), 599–604. [PubMed: 21577183]
- Erickson ZD, Mena SJ, Pierre JM, Blum LH, Martin E, Hellemann GS, ...Ames D (2016). Behavioral interventions for antipsychotic medication-associated obesity: A randomized, controlled clinical trial. *The Journal of Clinical Psychiatry*, 77(2), 183–189.
- Eysenback G (2005). The law of attrition. *Journal of Medical Internet Research*, 7(91): e11.
- Faulkner G, Cohn T, & Remington G (2007). Interventions to reduce weight gain in schizophrenia. *Cochrane Schizophrenia Group, Cochrane Library*.
- Faulkner G, Taylor G, Munro S, Selby P, & Gee C (2007). The acceptability of physical activity programming within a smoking cessation service for individuals with severe mental illness. *Patient Education & Counseling*, 66(1): 123–126. [PubMed: 17184957]
- Fraser SJ, Chpaman JJ, Brown WJ, Whiteford HA, & Burton NW (2015). Physical activity attitudes and preferences among inpatient adults with mental illness. *International Journal of Mental Health Nursing*, 24: 413–420. [PubMed: 26332079]
- Glorfeld LW (1995). An improvement on Horn's Parallel Analysis Methodology for selecting the correct number of factors to retain. *Educational and Psychological Measurement*, 55(3), 377–393.
- Gold BC, Burke S, Pintauro S, Buzzell P, & Harvey-Berino J (2007). Weight loss on the web: A pilot study comparing a structured behavioral intervention to a commercial program. *Obesity*, 15(1), 155–164. [PubMed: 17228043]
- Greaney ML, Less FD, White AA, Dayton SF, Riebe D, Blissmer B, Shoff S, Walsh JR, & Greene GW (2009). College students' barriers and enablers for healthful weight management: a qualitative study. *Journal of Nutrition Education and Behavior*, 41(4): 281–286. [PubMed: 19508934]
- Hammarstrom A, Wiklund AF, Lindal B, Larson C, & Ahlgren C (2014). Experience of barriers and facilitators to weight-loss in a diet intervention: A qualitative study of women in Northern Sweden. *BMC Women's Health*, 14:59. [PubMed: 24739099]
- Hudson CG (2005). Socioeconomic status and mental illness: Tests of the social causation and selection hypotheses. *American Journal of Orthopsychiatry*, 75(1), 3–18. [PubMed: 15709846]
- Janney CA, Greenberg JM, Moin T, Kim HM, Holleman RG, Hughes M, Damschroder LJ, Richardson CR, Young AS, Steinle N (2018). Does mental health influence weight loss in adults with prediabetes? Findings from the VA Diabetes Prevention Program. *General Hospital Psychiatry*, 53: 32–37. [PubMed: 29729586]
- Kaipainen K, Payne CR, & Wansink B (2012). Mindless eating challenge: Retention, weight outcomes, and barriers for changes in a public web-based healthy eating and weight loss program. *Journal of Medical Internet Research*, 14(6): e168. [PubMed: 23246736]
- Kinsinger LS, Jones KR, Kahwati L, Harvey R, Burdick M, Zele C, and Yevich SJ (2009). Design and Dissemination of the MOVE! Weight-Management Program for Veterans. *Preventing Chronic Disease*, 6(3): A98. [PubMed: 19527600]

- Klingaman EA, Viverito KM, Medoff DR, Hoffmann RM, & Goldberg RW (2014). Strategies, barriers, and motivation for weight loss among veterans living with schizophrenia. *Psychiatric Rehabilitation Journal*, 37: 270–276. [PubMed: 24884299]
- Kodama S, Saito K, Tanaka S, Horikawa C, Fujiwara K, Hirasawa R, ...Sone H (2012). Effect of web-based lifestyle modification on weight control: A meta-analysis. *International Journal of Obesity*, 36, 675–685. [PubMed: 21694698]
- Littman AJ, Damschroder LJ, Verchinina L, Lai Z, Kim HM, Hoerster KD, Klingaman EA, Goldberg RW, Owen RR, & Goodrich DE (2015). National evaluation of obesity screening and treatment among veterans with and without mental health disorders. *General Hospital Psychiatry*, 27(1): 7–13.
- Loh C, Meyer JM, & Leckband SG (2006). A comprehensive review of behavioral interventions for weight management in schizophrenia. *Annals of Clinical Psychiatry*, 18(1), 23–31
- McKibbin CL, Golshan S, Griver K, Kitchen K, & Wykes TL (2010). A healthy lifestyle intervention for middle-aged and older schizophrenia patients with diabetes mellitus: A 6-month follow-up analysis. *Schizophrenia Research*, 121(0).
- Metzgar CJ, Preston AG, Miller DL, & Nickols-Richardson SM (2015). Facilitators and barriers to weight loss and weight loss maintenance: A qualitative exploration. *Journal of Human Nutrition and Dietetics*, 28(6), 593–603. [PubMed: 25231461]
- Mueser KT, & McGurk SR (2004). Schizophrenia. *Lancet*, 363(9426), 2063–2072. [PubMed: 15207959]
- Muralidharan A, Klingaman EA, Prior SJ, Molinari V, & Goldberg RW (2016). Medical and psychological barriers to weight management in older veterans with and without serious mental illness. *Psychological Services*, 13(4): 419–427. [PubMed: 27441416]
- Neve M, Morgan PJ, Jones PR, & Collins CE (2010). Effectiveness of web-based interventions in achieving weight loss and weight loss maintenance in overweight and obese adults: a systematic review with meta-analysis. *Obesity Reviews*, 11(4): 306–321. [PubMed: 19754633]
- Neve MJ, Collins CE, & Morgan PJ (2010). Dropout, nonusage attrition, and pretreatment predictors of nonusage attrition in a commercial web-based weight loss program. *Journal of Medical Internet Research*, 12(4): e69. [PubMed: 21156470]
- Newcomer JW (2005). Second-generation (atypical) antipsychotics and metabolic effects: A comprehensive literature review. *CNS Drugs*, 19(Suppl 1), 1–93.
- Newcomer JW, & Haupt DW (2006). The metabolic effects of antipsychotic medications. *Canadian Journal of Psychiatry*, 51(8): 480–491. [PubMed: 16933585]
- Niv N, Cohen AN, Hamilton A, Reist C, & Young AS (2014). Effectiveness of a psychosocial weight management program for individuals with schizophrenia. *The Journal of Behavioral Health Services & Research*, 41(3): 370–380. [PubMed: 22430566]
- Osborn DP, Nazareth I, & King MB (2007). Physical activity, dietary habits and coronary heart disease risk factor knowledge amongst people with severe mental illness. *Social Psychiatry and Psychiatric Epidemiology*, 42(10), 787–793. [PubMed: 17721669]
- Roberts SH, & Bailey JE (2011). Incentives and barriers to lifestyle interventions for people with severe mental illness: A narrative synthesis of quantitative, qualitative and mixed methods studies. *Journal of Advanced Nursing*, 67(4), 690–708. [PubMed: 21323972]
- Rosenbaum S, Tiedemann A, Sherrington C, Curtis J, & War PB (2014). Physical activity interventions for people with mental illness: A systematic review and meta-analysis. *Journal of Clinical Psychiatry*, 75(0), 1–11.
- Saha S, Chant D, & McGrath J (2007). A systematic review of mortality in schizophrenia – Is the differential mortality gap worsening over time? *Archives of General Psychiatry*, 64(10), 1123–1131. [PubMed: 17909124]
- Scott D, & Happell B (2011). The high prevalence of poor physical health and unhealthy lifestyle behaviours in individuals with severe mental illness. *Issues in Mental Health Nursing*, 32(9), 589–597. [PubMed: 21859410]
- Sharifi NM, & Ebrahimi-Mameghani M (2013). Perceived barriers to weight loss programs for overweight or obese women. *Health Promotion Perspectives*, 3(1), 11–22. [PubMed: 24688948]

- Sokal J, Messiah E, Dickerson FN, Kreyenbuhl J, Brown CH, Goldberg R, & Dixon L (2004). Comorbidity of medical illnesses among adults with serious mental illness who are receiving community psychiatric services. *The Journal of Nervous and Mental Disease*, 192(6): 421–427. [PubMed: 15167405]
- Strassnig M, Kotov R, Cornaccio D, Fochtmann L, Harvey PD, & Bromet EJ (2017). Twenty-year progression of body mass index in a county-wide cohort of people with schizophrenia and bipolar disorder identified at their first episode of psychosis. *Bipolar Disorders*, 19(5), 336–343. [PubMed: 28574189]
- Tate DF, Jackvay EH, & Wing RR (2003). Effects of Internet behavioral counseling on weight loss in adults at risk for type 2 diabetes: a randomized trial. *Journal of the American Medical Association*, 289(14): 1833–1836. [PubMed: 12684363]
- Tate DF, Jackvony EG, Wing RR (2006). A randomized trial comparing human e-mail counseling, computer-automated tailored counseling, and no counseling in an internet weight loss program. *Journal of the American Medical Association*, 166(15): 1620–1625.
- Vendetti EM, Wylie-Rosett J, Delahanty LM, Mele L, Hoskin MA, & Edelstein SL. (2014). Short and long-term lifestyle coaching approaches used to address diverse participant barriers to weight loss and physical activity adherence. *International Journal of Behavioral Nutrition and Physical Activity*, 11(16).
- Young AS, Cohen AN, Goldberg R, Hellemann G, Kreyenbuhl J, Niv N, Nowlin-Fins N, Oberman R, & Whelan F (2017). Improving weight in people with serious mental illness: The effectiveness of computerized services with peer coaches. *Journal of General Internal Medicine*, 32(Suppl 1), 48–55. [PubMed: 28271427]

IMPACT

This study identifies barriers to participation in web-based and in-person modalities of a weight-management intervention adapted for individuals with serious mental illness. Although barriers were similar across modalities, future interventions should address socio-economic and other barriers to improve participants' engagement and retention in weight-management programs.

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Table 1.

Qualitative Sub-Sample by Treatment Group and Attendance

Program Attendance	MOVE-SMI (In-Person)	WebMOVE (Web-Based)	Total
Attended most sessions *	9	9	18
Attended some sessions **	7	7	14
Non-Attender	8	8	16
Total	24	24	48

* Attended Most Sessions: attended >12 sessions (MOVE-SMI) or >22 modules (WebMOVE)

** Attended Some Sessions: attended 1–11 sessions (MOVE-SMI), or 1–21 modules (WebMOVE)

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Table 2.

Overall Study Sample Demographics by Treatment Group

	Overall Study Sample			Qualitative Sub Sample			
	Usual Care (N=89)	WebMOVE (N=93)	MOVE-SMI (N=95)	X2 or F-score	WebMOVE (N=24)	MOVE-SMI (N=24)	X2 or F-score
Gender (%)				4.2			0.6
Male	87 (97.8%)	85 (91.2%)	88 (92.6%)		79.2 (19%)	87.5 (21%)	
Age (SD)	54.2 (9.8)	54.7 (8.9)	53.7 (9.6)	0.3	54.4 (6.0)	53.7 (10.5)	0.1
Ethnicity				3.7			2.1
Non-Hispanic/Latino	79 (88.8%)	78 (83.9%)	78 (82.1%)		18 (75%)	20 (83.3%)	
Hispanic/Latino	9 (10.1%)	15 (16.1%)	16 (16.8%)		6 (25%)	3 (12.5%)	
No response	1 (1.1%)	0 (0%)	1 (1.1%)		0 (0%)	1 (4.2%)	
Race				15.2			4.1
White	32 (36.0%)	35 (38.0%)	36 (38%)		7 (29.2%)	12 (50%)	
Black/African-American	46 (51.7%)	43 (46.0%)	43 (45%)		12 (50.0%)	9 (37.5%)	
Asian	2 (2.2%)	0 (0%)	3 (3%)		0 (0%)	1 (4.2%)	
Native Hawaiian/Other PI	2 (2.2%)	0 (0%)	0 (0%)		0 (0%)	0 (0%)	
American Indian/Alaskan Native	1 (1.1%)	5 (5.0%)	1 (1%)		3 (12.5%)	1 (4.2%)	
Multiple/No Response	6 (6.7%)	10 (11.0%)	12 (13%)		2 (8.3%)	1 (4.2%)	
Education				4.5			2.2
< HS diploma	6 (6.7%)	2 (2.2%)	5 (5.3%)		0 (0%)	0 (0%)	
HS diploma/GED	25 (28.1%)	32 (34.4%)	31 (32.5%)		12 (50%)	9 (37.5%)	
Some college/2yr college degree	48 (53.9%)	43 (46.2%)	45 (47.4%)		11 (45.8%)	11 (45.8%)	
> 4yr college degree	10 (11.2%)	16 (17.2%)	14 (14.7%)		1 (4.2%)	4 (16.7%)	
Employment				5.1			2.1
Employed	6 (6.7%)	13 (14.0%)	5 (5.3%)		2 (8.3%)	0 (0%)	
Unemployed	83 (93.3%)	80 (86.0%)	90 (94.7%)		22 (91.7%)	24 (100%)	
Internet Access				0.8			0.0
Yes	66 (74.2%)	74 (79.6%)	72 (75.8%)		16 (66.7%)	16 (66.7%)	
No					8 (33.3%)	8 (33.3%)	