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Peer-based health interventions for people with serious mental illness: A systematic literature review

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ABSTRACT

Health interventions delivered by peer specialists or co-facilitated by peer specialists and health professionals can help improve the physical health of people with serious mental illness (SMI). Yet, the quality of the studies examining these health interventions and their impact on health outcomes remains unclear. To address this gap, we conducted a systematic literature review of peer-based health interventions for people with SMI. We rated the methodological quality of studies, summarized intervention strategies and health outcomes, and evaluated the inclusion of racial and ethnic minorities in these studies. We used the Preferred Reporting Items for Systematic Review and Meta-Analysis guidelines to conduct our systematic literature review. Electronic bibliographic databases and manual searches were used to locate articles that were published in English in peer-reviewed journals between 1990 and 2015, described peer-based health interventions for people with SMI, and evaluated the impact of the interventions on physical health outcomes. Two independent reviewers used a standardized instrument to rate studies' methodological quality, abstracted study characteristics, and evaluated the effects of the interventions on different health outcomes. Eighteen articles were reviewed. Findings indicated that the strength of the evidence generated from these studies is limited due to several methodological limitations. Mixed and limited intervention effects were reported for most health outcomes. The most promising interventions were self-management and peer-navigator interventions. Efforts to strengthen the evidence of peer-based interventions require a research agenda that focuses on establishing the efficacy and effectiveness of these interventions across different populations and settings.

1. Introduction

People with schizophrenia and other serious mental illnesses (SMI; e.g., schizoaffective disorder, bipolar disorder) have shortened life expectancies compared to the general population largely due to preventable medical conditions (e.g., cardiovascular disease (CVD), diabetes) (Colton and Manderscheid, 2006; Druss et al., 2011; Janssen et al., 2015). This mortality gap has worsened in recent decades despite advances in medical care for the general population (Saha et al., 2007). A constellation of behavioral, pharmacological, social, and health care factors contribute to these health disparities. Unhealthy behaviors, including tobacco smoking, physical inactivity, poor dietary habits, and risky sexual behaviors are more prevalent in people with SMI than in the general population (Brown et al., 1999; Daumit et al., 2005). The metabolic side-effects of psychiatric medications also contribute to the elevated rates of obesity, high cholesterol, hypertension, and diabetes mellitus in people with SMI (Morden et al., 2009; Newcomer and Hennekens, 2007). Poverty levels are higher among people with SMI compared to the general population (Draine et al., 2002; Luciano et al., 2014) and the social conditions related to living in poverty (e.g., unemployment, unstable housing), negatively impact physical health and quality of life (Cabassa et al., 2014; Draine et al., 2002). Lastly, people with SMI face serious barriers accessing, utilizing, and receiving high quality medical care (Institute of Medicine, 2006; Morden et al., 2009).

Various approaches (e.g., health care manager programs, healthy lifestyle interventions) are being used worldwide to promote the physical health of people with SMI (Cabassa et al., 2010; Druss et al., 2010a). One approach is the use of health

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interventions delivered by peer specialists or co-facilitated by peer specialists and health professionals (e.g., nurses, social workers). Peer specialists are individuals with lived experiences recovering from mental illness who are trained to deliver services that promote recovery, resiliency, and wellness (SAMHSA-HRSA Center for Integrated Health Solutions, 2016). Peer specialists are an added value to health interventions as they bring credibility, trust, resiliency and hope to people with SMI. They also serve as positive role models that use their experiences to provide instrumental, informational, and emotional support. (Cook, 2011). Peer specialists are a growing segment of the mental health workforce in the U.S. and other countries (Repper and Carter, 2011). For example, in the United States more than 30 states have some level of Medicaid reimbursement for peer specialists, and this number is expected to grow with the implementation of the Affordable Care Act (Chinman et al., 2013; National Association of State Mental Health Program Directors., 2014).

Peer-based programs for people with SMI produce as good or better results than non-peer-based programs for certain outcomes (e.g., hospitalizations, engagement in care, empowerment), particularly when peer specialists deliver evidence-based interventions (Chinman et al., 2014; Davidson et al., 2006). For instance, Cook et al. (2012) reported that a manualized peer-led self-management program was superior to usual care services at lowering the severity of mental health symptoms and producing greater hopefulness and quality of life. Despite these promising results, the impact of peer-based interventions on the physical health of people with SMI remains unclear. To address this important gap, we conducted a systematic literature review of peer-based health interventions for people with SMI. The aims of this review were to: rate the methodological quality of peer-based health intervention studies, summarize the intervention strategies and study outcomes, and evaluate the inclusion of racial and ethnic minorities in these studies.

2. Materials and methods

2.1. Data sources and search methods

We followed the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines to inform our systematic literature review (Moher et al., 2009). Electronic bibliographic databases, including PsychInfo, Web of Science, PubMed, and Google Scholar were used to locate articles written in English and published in peer-reviewed journals from 1990 to November 2015. Our search strategy included terms for SMI (e.g., schizophrenia, schizoaffective disorder), health interventions (e.g., self-management programs, healthy lifestyle interventions), peer specialists (e.g., peer educators, peer coaches, peer advocates) and outcome studies (e.g., quasi-experimental studies, randomized controlled trials). We also conducted manual searches of the reference section of eligible articles to locate overlooked articles.

2.2. Study selection

Articles were included if they met the following criteria: (1) published in English in a peer-reviewed journal between 1990 and 2015; (2) described a health intervention delivered by peer specialists (peer-led) or co-facilitated by peer specialists and health professionals; (3) included people with SMI; and (4) evaluated the impact of the intervention on physical health outcomes. To evaluate articles' eligibility, two of the authors reviewed the identified articles' titles, abstracts, and full-text and disagreements in eligibility were settled via consensus. Fig. 1 presents the study flow chart. Our initial search produced 434 articles. After removing duplicates, we screened 412 articles for eligibility and excluded 394. Eighteen articles met our inclusionary criteria and were included in our review.

2.3. Analytical strategy

A standardized data abstraction form was used to systematically code study characteristics, including study aims, sites, design, intervention characteristics (e.g., format, intervention duration), type of peer involvement, peer training and supervision, study eligibility criteria, total sample size, sample characteristics (e.g., age, gender, racial and ethnic groups), outcome measures, summary of study findings, and study limitations. Two independent reviewers abstracted this information from each eligible article and coding disagreements were resolved by consensus with reviewers coming together and reviewing the text in question.

To rate the methodological quality of each article, we used an adapted version of the Methodological Quality Rating Scale (MQRS) (Vaughn and Howard, 2004). This instrument measures the methodological quality of intervention studies across 12 dimensions (e.g., study design, replicability of procedures, reporting of baseline characteristics, use of manualized intervention, follow-up rates). We added one dimension to the scale to assess the presence or absence of cultural and/or linguistic adaptations in these peer-based health interventions. This added dimension has been used in previous systematic literature reviews of intervention studies (Cabassa et al., 2010). Two independent reviewers rated each article using the adapted version of the MQRS. Agreement between MQRS coders was excellent with an interclass correlation coefficient (ICC) of 0.89 (95% confidence interval = 0.73, 0.96). Differences in MQRS ratings between coders were then resolved via consensus. MQRS scores for each study were derived by adding the 13 items and ranged in our study from 5 to 12 with higher scores representing higher methodological quality.

We used the guidelines from the Agency for Healthcare Research Quality Methods Guide for Comparative Effectiveness Review (Agency for Healthcare Research, 2014) and other recent systematic literature reviews (McGinty et al., 2016) to rate the effects that peer-based health interventions included in our review had on different health outcomes. We developed a categorization system that considered the direction and statistical significance of the effects of the intervention on specific health outcomes and the consistency of the effects across the studies reviewed. Three categories were created: beneficial, mixed, and limited. Beneficial effects indicated that the majority of studies that examined a particular health outcome reported consistent statistically significant beneficial intervention effects on that specific outcome. Mixed effects were defined when multiple studies reported conflicting effects in the direction and significance of the intervention's effects on specific health outcomes. Limited effects indicated that the majority of studies examining intervention effects on a specific health outcome did not reach statistical significance or did not present a clear benefit for the specific outcome.

3. Results

3.1. Study characteristics

The characteristics of the 18 studies included in our review are displayed in Table 1. Study samples ranged in size from 12 to 844 participants, with a median sample size of 57 participants. Studies were conducted in a variety of settings, including community mental health clinics, primary care clinics, psychiatric emergency departments, and programs for first episode psychosis. Twelve studies were conducted in the US and six in Australia. Participants' average age across studies ranged from 21 to 59 years

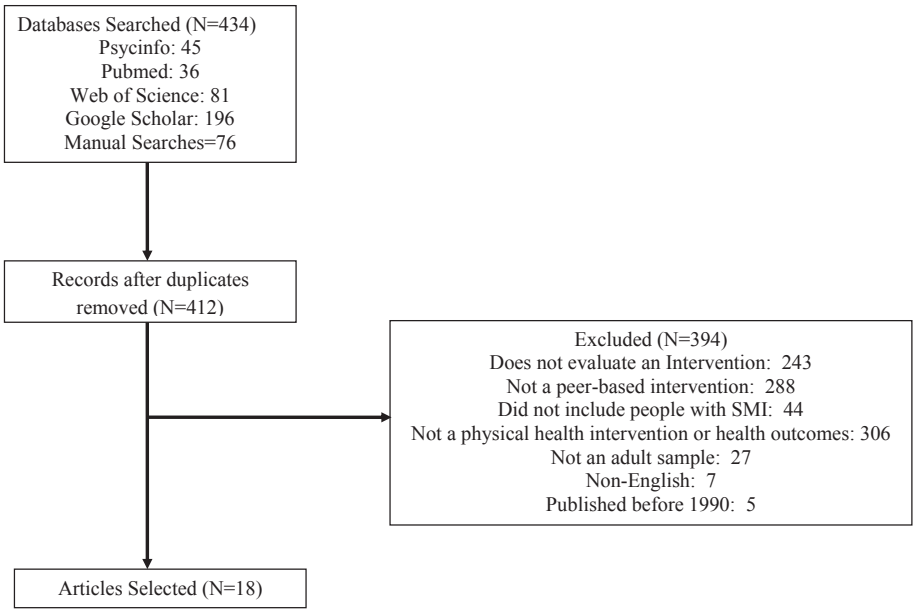

Fig. 1. Study flow chart.

(median = 44). The most common psychiatric disorders across studies were schizophrenia, bipolar disorder, major depression, and schizoaffective disorder. A variety of health outcomes were evaluated including: self-management attitudes and behaviors (e.g., patient activation, goal setting, problem solving), health behaviors (e.g., diet, physical activity, smoking, medication adherence), health indicators including self-rated health status (e.g., good, fair, poor), and self-reports of symptoms or health complaints (e.g., cough, fever muscle/joint pain, headaches), anthropometric measures (e.g., weight, BMI), cardiometabolic indicators (e.g. Hemoglobin A1c, fasting glucose and lipids, blood pressure), use of health care services (e.g., primary care, emergency department), and quality of life. Study endpoints ranged from nine to 104 weeks with a median length of 24 weeks.

3.2. Methodological quality ratings and characteristics

Articles' MQRS scores (See Table 1) ranged from 5 to 12 with an average score of 8.6 (sd = 2.1) and a median score of 9. At the low end of the quality spectrum were the 13 (72%) single-group design studies that had an average MQRS score of 7.8 (sd = 1.9) (Aschbrenner et al., 2016; Ashton et al., 2010, 2015; Bartels et al., 2013; Bates et al., 2008; Gill, 2012; Griswold et al., 2010; Lawn et al., 2007; Lorig et al., 2014; Martin and Martin, 2014; Sajatovic et al., 2011; Schneider et al., 2011; Williams et al., 2011). The majority of studies lasted six months or less (N = 9, 69%), used manualized interventions (N = 10, 77%) and enumerated treatment drop outs (N = 8, 62%). However, many were single-site studies (N = 7, 54%), did not use collaterals to assess study outcomes (N = 12, 92%), did not enumerate study drop-outs (N = 5, 38%), and none used blind evaluators. In the middle of the quality spectrum were the two quasi-experimental studies with an average MQRS score of 9.5 (sd = 0.7) (Curtis et al., 2016; Kane and Blank, 2004). These two studies compared peer-based health interventions with usual care services delivered at different sites. Both studies used manualized interventions and enumerated drop-outs. One study lasted less than 6 months and the other lasted six to 11 months. Neither of these studies used collaterals or blinded evaluators to collect data. At the higher end of the quality spectrum were the three randomized controlled trials (RCT) with an average MQRS score of 11.3 (sd = 0.5) (Druss et al., 2010b; Goldberg et al., 2013; Kelly et al., 2014). All of these studies compared manualized interventions versus usual care services and enumerated drop-outs. One used blind assessors to collect data, two were multi-site studies, one lasted less than six months, and two lasted between six to 11 months.

3.3. Intervention characteristics

Table 2 summarizes the intervention characteristics for each of the articles in this review. Five different types of health interventions were evaluated in these articles: self-management interventions (Bartels et al., 2013; Druss et al., 2010b; Goldberg et al., 2013; Lawn et al., 2007; Lorig et al., 2014; Sajatovic et al., 2011), smoking cessation programs (Ashton et al., 2010, 2015; Williams et al., 2011), peer navigator programs (Bates et al., 2008; Griswold et al., 2010; Kelly et al., 2014), healthy lifestyle interventions (Aschbrenner et al., 2016; Curtis et al., 2016; Gill, 2012; Schneider et al., 2011) or multi-faceted programs that combined different types of interventions (e.g., smoking cessation, healthy lifestyle support, health care management) (Kane and Blank, 2004; Martin and Martin, 2014). This classification emerged from the review of the main intervention ingredients described in each article and is not completely mutually exclusive as some interventions included multiple elements. For example, Kelly et al. (2014) is mainly a peer navigator intervention that includes some self-management principles. Interventions varied in duration from one session (Williams et al., 2011) to programs that lasted 12 months (Griswold et al., 2010; Lawn et al., 2007) and were delivered using group formats, individual sessions or a combination of both approaches.

The majority of articles (83.3%) evaluated manualized interventions that were developed by the study team (e.g., peer navigator programs, smoking cessation interventions) (Bartels et al., 2013; Curtis et al., 2016; Kelly et al., 2014) or adapted an intervention with established efficacy in the general population, like the Chronic Disease Self-Management Program (CDSMP) (Druss et al., 2010b; Goldberg et al., 2013; Lawn et al., 2007; Lorig et al., 2014) and the Group Lifestyle Balance Program

Table 1
Study characteristics.

Study	Sample size	Setting/Location	Design	Study endpoint in weeks	Physical health outcomes assessed in each article	MQRS score
Self-Management						
Druss et al., 2010b	80	One CMHC/USA	RCT	24	• Self-management: patient activation* • Health behaviors: physical activity, medication adherence • Use of services: Primary care* • Quality of life: health and mental health related quality of life	11
Goldberg et al., 2013	63	One outpatient mental health clinic and 3 psychiatric rehabilitation day programs/USA	RCT	21	• Self- management: Self-management behaviors, self-management self-efficacy, patient activation, health locus of control, recovery • Health behaviors: healthy eating*, physical activity* medication adherence • Use of Services: Use of ER for medical services • Quality of life: general health functioning, physical functioning and emotional well-being	11
Lawn et al., 2007	38	Outpatient mental health clinic/ Australia	Single-group	104	• Self-management: health goals*, knowledge*, lifestyle choices*, managing impact of condition* • Use of services: Hospitalizations* • Quality of life: health and mental health-related quality of life*	9
Lorig et al., 2014	139	10 CMHC/USA	Single-group	24	• Health behaviors: communication with health providers*, medication adherence* • Health indicators: Self-reported global health, stress, sleep problems*, fatigue*, tiredness, and functioning • Use of Services: use of primary care and ER • Quality of life: quality of life*, health distress scale*	9
Sajatovic et al., 2011	12	Safety-net primary care clinic/USA	Single-group	16	• Health behaviors: healthy dietary changes for diabetes self-care* • Health indicators: Hemoglobin A1c, body mass index • Quality of life: Health and mental health-related quality of life	7
Bartels et al., 2013	17	CMHC and a primary care clinic/USA	Single-group	9	• Self-managements: Patient activation*, perceived self-efficacy in patient-physician interactions, patients' preference for health care decision making and information seeking. • Health behaviors: Communication with doctors*	8
Smoking Cessation						
Ashton et al., 2010	183	10 CMHC/Australia	Single-group	62	• Health behaviors: Smoking behaviors, status and interests in quitting	10
Ashton et al., 2015	844	11 CMHC/Australia	Single-group	52	• Health behaviors: smoking cessation rates, cigarettes smoked per day*, and CO readings	9
Williams et al., 2011	102	Behavioral health agencies/USA	Single-group	24	• Health behaviors: Current tobacco use*, motivation to quit, and changes in smoking behavior	7
Peer Navigators						
Bates et al., 2008	25	3 CMHC/Australia	Single-group	24	• Health behaviors: healthy eating, physical activity, smoking • Health indicators: weight loss • Use of Services: visits to primary care	5
Griswold et al., 2010	175	One psychiatric ER/USA	Single-group	52	• Use of Services: Use of primary care*	10
Kelly et al., 2014	24	Two sites of a large CMHC/USA	RCT	24	• Self-management: Health care self-efficacy • Health indicators: Self-reported health problems, physical health symptoms*, and pain* • Use of Services: Use of primary care*, ER* and urgent care,	12
Healthy Lifestyle						
Aschbrenner et al., 2016	13	One CMHC/USA	Single-group	24	• Health Behaviors: Weight and 6 min walk test	10
Curtis et al., 2016	28	Two community-based first episode psychosis programs/Australia	Quasi	12	• Health Behaviors: food frequency questionnaire*, physical activity*, medication adherence • Health Indicators: Weight*, BMI*, waist circumference*, blood pressure, fasting lipids and glucose	9
Gill, 2012	55	An outpatient mental health clinic/ Australia	Single-group	16	• Health indicators: 6 min walk test*, BMI, waist girth* • Quality of life: mental and physical well-being*	5
Schneider et al., 2011	14	One community mental health clinic/ USA	Single-group	19	• Health Behaviors: Self-rated dietary habits • Health Indicators Weight, and self-reported health	8
Multi-faceted						
Kane and Blank, 2004	59	2 CMHC/USA	Quasi	24	• Self-management: Health promotion • Health Indicators: Physical symptoms	10
Martin and Martin, 2014	118	CMHC/USA	Single-group	52	• Health behaviors: physical activity, smoking • Health Indicators: Blood pressure, weight hemoglobin A1c • Use of Services: Use of primary care and ER	5

Note: CMHC: Community Mental Health Center; ER: Emergency Room; RCT: Randomized Controlled Trial; Quasi: Quasi-experimental design; BMI: Body Mass Index; MQRS: Methodological Quality Rating Scale. *Outcomes reported to be statistically significant.

(Aschbrenner et al., 2016; Schneider et al., 2011). Most interventions evaluated in these studies focused on health education and used established behavioral strategies, such as action planning, goal-setting, problem-solving, motivational support, and shared decision-making, to improve health outcomes. Several interventions focus on improving access and use of health care services by improving system navigation, care coordination, health monitoring, health care management, and patient-provider

Table 2
Intervention characteristics.

Study by type of intervention	Intervention length	Format	Manualized intervention	Peer-led or Co-facilitated with professional	Peer specialist training
Self-Management					
Druss et al., 2010a,b	6 weekly sessions	Group	Yes	Peer-led	Certified mental health peer specialists participated in a community-based 5-day CDSMP master training course and received 3-day training on the Health and Recovery Peer Program.
Goldberg et al., 2013	13 weekly sessions	Group	Yes	Co-facilitated	Study's principal investigator completed the 5-day CDSMP master training and then trained and supervised all peer co-leaders.
Lawn et al., 2007	12 months	Group and individual	Yes	Co-facilitated	Peer educators were trained in the CDSMP and to provide one-to-one education and motivational support by the study team.
Lorig et al., 2014	6 weeks	Group	Yes	Peer-led	Certified peer support specialists completed a 60 h program and 3 credit hours from a community college to complete their peer support specialization certification and completed the 18 h CDSMP master training.
Sajatovic et al., 2011	16 weeks	Group and individual	Yes	Co-facilitated	Peer educators participated in a 2-day intensive training and received on-going training via supervision with project staff.
Bartels et al., 2013	9 weeks	Group	Yes	Co-facilitated	Wellness peer specialists were trained on the program manual by the study team. The program leaders (social workers) also met weekly with the wellness peer specialist to coordinate the educational and experience-based components of the program. Program fidelity was monitored via weekly supervision and protocol review session. The principal investigator also observed at least one session during the course of the program and provided feedback.
Smoking Cessation					
Ashton et al., 2010	10 weeks	Group	Yes	Co-facilitated	Peer worker training was not described in the article.
Ashton et al., 2015	10 weeks	Group	Yes	Co-facilitated	Peer worker training was not described in the article.
Williams et al., 2011	20 min peer-to peer session	Individual	Yes	Peer-led	Consumer tobacco advocates received 30 h of intensive training and a detailed manual of the program. The training included classroom and experiential learning.
Peer Navigators					
Bates et al., 2008	6 months	Individual	Yes	Peer-led	Peer supporters training lasted three weeks and consisted of weekly workshops facilitated by the project staff, employees of participating NGO's, and invited speakers. The training consisted of an orientation to the program objectives, description and discussion of peer specialist roles and responsibilities. Each trainee was provided a program manual that included the complete set of workshop presentations.
Griswold et al., 2010	12 months	Individual	No	Peer-led	Mental health peers were employed at a peer-advocacy organization. They received formalized training with a curriculum that focused on peer advocacy, empowerment, self-help facilitator training, ways to address stigma, and understanding the lived experience of mental illness. The training also included community speakers. The duration of training was unspecified.
Kelly et al., 2014	6 months	Individual	Yes	Peer-led	Peers navigators completed a peer training program consisting of 10 weeks of classroom instruction and 6 weeks of intensive internship at a mental health agency. Their training on the intervention consisted of being placed at the local site and shadowed by local providers for 2 months. The peer was then trained on the intervention and tried out parts of the intervention with clients under the supervision of the study team.
Healthy Lifestyle					
Aschbrenner et al., 2016	24 weeks	Group	Yes	Co-facilitated	The training for the wellness peer was not specified. The qualification was an individual with SMI who had participated in a healthy lifestyle intervention and was recommended by the CMHC.
Curtis et al., 2016	12 weeks	Group and individual	No	Co-facilitated	The training for the youth peer wellness coaches was not specified. These wellness coaches are young people with lived experiences of the impact of antipsychotic-induced weight gain. They participated in cooking classes and attended exercise sessions at the gym. They provided participants motivation and support.
Gill, 2012	16 weeks	Group	Yes	Co-facilitated	Former patients who completed the New Moves program were offered the opportunity to be trained as peer educators and help co-facilitate the program. Training for these peer educators was not specified.
Schneider et al., 2011	19 weeks	Group and individual	Yes	Co-facilitated	Peer specialists were trained on the DPP by study experts over five half-day sessions. This training included: 1) information on the history of DPP and the rationale for the underlying protocol, 2) detailed instructions on the structure of the intervention, 3) basic behavioral counseling for health behaviors, 4) an orientation to using the DPP facilitator manual and protocol materials, intervention delivery methods, and tools, 5) discussion of difficult patient situations, such as noncompliance. Peers also received biweekly telephone supervision from the study experts.
Multi-faceted					
Kane and Blank, 2004	24 weeks	Individual	No	Co-facilitated	Consumer peer providers participated in a training conducted by the investigators and an advanced practice psychiatric mental health nurse that covered the following topics: social skills, community living, and health promotion behaviors. The duration of the training was not specified. They also received ongoing supervision and training throughout the project.
Martin and Martin, 2014	12 moths	Group and individual	No	Co-facilitated	Training for the peer patient navigator (PPN) was not described. The PPN acted as a health advocate and life coach and assisted participants to receive proper non-emergency health services.

communication (Bartels et al., 2013; Kane and Blank, 2004; Kelly et al., 2014). A few studies tested the impact of interventions that focus on diet, physical activity, and medication management (Curtis et al., 2016; Gill, 2012; Schneider et al., 2011) and one combined these approaches with the use of mobile health technology (e.g., Fitbit) to promote and support participants' engagement, adherence, motivation, and self-monitoring (Aschbrenner et al., 2016).

Peer specialists engaged in a variety of roles, including delivering the intervention by themselves or with another peer (peer-led; 33%) or co-facilitating the intervention with a professional (e.g., registered nurse, social worker; 67%). All studies defined peer specialists as people with lived experiences recovering from a mental illness, but their qualifications varied from having a high school diploma to completing a formal peer specialist certification program that included classroom instruction and some form of internship. Peer specialists' training on the health intervention also differed in intensity, duration, and method. For interventions like the CDSMP with established training curriculums, peer specialists completed the mandatory 18 h training on this program (Lorig et al., 2014). Others completed workshops delivered by the study team that included didactic and experiential learning. Few details, other than mentioning the person in charge of supervising the peer specialists, were provided regarding the strategies and methods used to supervise peer specialists and ensure the fidelity of the interventions being evaluated.

3.4. Study outcomes

In this section, we summarized the findings for each of the health outcomes examined across the 18 articles, including self-management attitudes and behaviors, diet, physical activity, smoking, medication adherence, communication with doctors, self-rated health and physical symptoms, weight-related indicators, cardiometabolic indicators, use of services, and quality of life (See Table 3). We also categorized the effects that interventions had on these outcomes as beneficial, mixed or limited based on study findings.

3.4.1. Self-management

Six articles (Bartels et al., 2013; Druss et al., 2010b; Goldberg et al., 2013; Kane and Blank, 2004; Kelly et al., 2014; Lawn et al., 2007) reported self-management outcomes, including patient activation, self-efficacy, health locus of control, and illness self-management behaviors (e.g., problem solving, action planning). The effects of these interventions on self-management outcomes were beneficial. Four (Bartels et al., 2013; Druss et al., 2010b; Goldberg et al., 2013; Lawn et al., 2007) of the six articles reported statistically significant improvements on self-management outcomes, but in Goldberg et al. (2013) the improvements in self-management from pre to post were not sustained at the two-month follow-up.

3.4.2. Diet

Five articles (Bates et al., 2008; Curtis et al., 2016; Goldberg et al., 2013; Sajatovic et al., 2011; Schneider et al., 2011) reported dietary outcomes, including self-rated measures of healthy eating, healthy dietary changes for diabetes self-care, and food frequency questionnaires to assess nutrition status. The effects of these interventions on dietary outcomes were beneficial. Three (Curtis et al., 2016; Goldberg et al., 2013; Sajatovic et al., 2011) of the five studies reported statistically significant improvements on self-reported dietary habits.

3.4.3. Physical activity

Seven articles (Aschbrenner et al., 2016; Bates et al., 2008; Curtis et al., 2016; Druss et al., 2010b; Gill, 2012; Goldberg et al., 2013; Martin and Martin, 2014) reported physical activity outcomes, including self-reported physical activity levels, 6-min walk test, and exercise capacity. The effects of these interventions on physical health outcomes were limited. Only three (Curtis et al., 2016; Gill, 2012; Goldberg et al., 2013) of the seven articles reported statistically significant improvements on physical activity.

3.4.4. Smoking

Five articles (Ashton et al., 2010, 2015; Bates et al., 2008; Martin and Martin, 2014; Williams et al., 2011) reported smoking outcomes, including, number of cigarettes smoked per day, changes in smoking behaviors, quit rates, and expired carbon monoxide levels. The effects of these interventions on smoking outcomes were limited. Two studies reported statistically significant reductions in the number of cigarettes smoked per day (Ashton et al., 2015; Williams et al., 2011). The remaining articles reported reductions in smoking, but they either did not report the significance of their findings or did not find statistically significant reductions in smoking (Ashton et al., 2010; Bates et al., 2008; Martin and Martin, 2014).

3.4.5. Medication adherence

Four articles (Curtis et al., 2016; Druss et al., 2010b; Goldberg et al., 2013; Lorig et al., 2014) reported medication adherence outcomes using self-reported adherence measures. Intervention effects were limited. Only one study reported statistically significant improvements in self-reported medication adherence (Lorig et al., 2014).

3.4.6. Communication with doctors

Two articles (Bartels et al., 2013; Lorig et al., 2014) reported outcomes related to improving communication with doctors or health care providers measured via self-reported scales (e.g., Perceived Efficacy in Patient-Physician Interactions Scale) or performance-based assessments (e.g., Social Skills Performance Assessment). Intervention effects were beneficial, with both studies finding statistically significant improvements in communication with doctors.

3.4.7. Self-rated health or physical symptoms

Four articles (Kane and Blank, 2004; Kelly et al., 2014; Lorig et al., 2014; Schneider et al., 2011) reported outcomes related to self-rated health status or physical symptoms, including general health status, health complaints, physical symptoms (e.g., fever, cough, chest pain, fatigues, bodily pain), and general health distress. The effects of these interventions on self-rated health or physical symptoms were mixed. Only two articles reported statistically significant improvements in self-rated health status or symptoms (Kane and Blank, 2004; Lorig et al., 2014).

3.4.8. Weight-related

Seven articles (Aschbrenner et al., 2016; Bates et al., 2008; Curtis et al., 2016; Gill, 2012; Martin and Martin, 2014; Sajatovic et al., 2011; Schneider et al., 2011) reported weight-related outcomes, including body mass index, waist circumference, waist girth, and total weight loss. The effects of these interventions on weight-related outcomes were limited. Only two articles (Curtis et al., 2016; Gill, 2012) reported statistically significant improvements on weight-related outcomes, including preventing weight gain and reducing waist girth.

3.4.9. Cardiometabolic indicators

Three articles (Curtis et al., 2016; Martin and Martin, 2014; Sajatovic et al., 2011) reported cardiometabolic outcomes,

Table 3
Summary of effects of interventions on health outcomes.

Health outcomes	Type of studies	Type of interventions	Effect of interventions on outcomes (beneficial, mixed, limited)
Self-management	RCT (3) Quasi (1) Single-Group (2)	Self-management (4) Peer navigator (1) Multifaceted (1)	Beneficial
Diet	RCT (1) Quasi (1) Single-Group (3)	Self-management (2) Peer navigator (1) Healthy Lifestyle (2)	Beneficial
Physical Activity	RCT (2) Quasi (1) Single-Group (4)	Self-management (2) Peer navigator (1) Healthy lifestyle (3) Multifaceted (1)	Limited
Smoking	Single-Group (5)	Smoking cessation (3) Peer navigator (1) Multifaceted (1)	Limited
Medication Adherence	RCT (2) Quasi (1) Single-Group (1)	Self-management (3) Healthy lifestyle (1)	Limited
Communication with doctors	Single-Group (2)	Self-management (2)	Beneficial
Self-rated health	RCT (1) Quasi (1) Single-Group (2)	Self-management (1) Peer navigator (1) Healthy lifestyle (1) Multifaceted (1)	Mixed
Weight-related	Quasi (1) Single-Group (6)	Self-management (1) Peer navigator (1) Healthy lifestyle (4) Multifaceted (1)	Limited
Cardiometabolic	Quasi (1) Single-Group (2)	Self-management (1) Healthy lifestyle (1) Multifaceted (1)	Limited
Use of Services	RCT (3) Single-Group (5)	Self-management (4) Peer navigator (3) Multifaceted (1)	Mixed
Quality of Life	RCT (2) Single-Group (4)	Self-management (5) Healthy lifestyle (1)	Mixed

including hemoglobin A1c, fasting glucose and lipids, triglycerides, and blood pressure. The effects of these interventions on cardiometabolic outcomes were limited as none achieved statistically significant improvements in these outcomes.

3.4.10. Use of services

Eight articles (Bates et al., 2008; Druss et al., 2010b; Goldberg et al., 2013; Griswold et al., 2010; Kelly et al., 2014; Lawn et al., 2007; Lorig et al., 2014; Martin and Martin, 2014) reported outcomes related to the use of services, including visits to primary care providers, use of emergency room services for physical and mental health problems, number of hospitalizations for physical and psychiatric issues, and use of urgent care services for physical health problems. The effects of these interventions on use of services were mixed. Four articles reported statistically significant changes in the use of services either by reducing the use of emergency room services or hospitalizations or increasing the use of primary care services (Druss et al., 2010b; Griswold et al., 2010; Kelly et al., 2014; Lawn et al., 2007).

3.4.11. Quality of life

Six articles (Druss et al., 2010b; Gill, 2012; Goldberg et al., 2013; Lawn et al., 2007; Lorig et al., 2014; Sajatovic et al., 2011) reported quality of life outcomes, including health and mental health-related quality of life. The effects of these interventions on quality of life indicators were mixed. Only three articles reported statistically significant improvements in quality of life (Gill, 2012; Lawn et al., 2007; Lorig et al., 2014).

3.5. Inclusion of racial and ethnic minority populations

Twelve articles (67%), all conducted in the U.S., reported the racial and ethnic characteristics of their sample. The total sample size of these 12 studies was 725: 377 (52%) were non-Hispanic whites, 274 (38%) were African Americans, 19 (3%) were Hispanics, 9 (1%) were Asian/Pacific Islander, and 35 (5%) were other unspecified racial/ethnic minorities. None of these articles included Native Americans or non-English speaking participants. Cultural or linguistic adaptations were not mentioned in any of the articles reviewed.

4. Discussion

Despite the growth and valuable contributions peer specialists bring to the mental health workforce, little is currently known about the state of the evidence of health interventions delivered or co-facilitated by peer specialists. Our systematic literature review addresses this important gap. Findings indicated that the strength of the evidence generated from these studies is limited due to several methodological limitations. Beneficial intervention effects were reported for a limited number of health outcomes related to self-management, dietary habits, and communication with doctors. Mixed and limited intervention effects were reported for all other health outcomes (e.g., physical activity, smoking, medication adherence) examined in these studies. The most promising interventions were self-management and peer-navigator interventions.

Findings from our methodological quality ratings revealed that the strength of the evidence generated from these studies was limited due to several methodological limitations. Only three RCTs and two quasi-experimental studies, all with small samples ranging from 23 to 80 participants, were included in this review. The rest of the studies reviewed, with the exception of Ashton et al. (2015), tended to be relatively small single-group evaluations that lasted

less than 12 months. These findings indicate that the majority of the articles included in this review were pilot studies that focused on examining the feasibility, acceptability, and initial impact of these interventions, and that these peer-based interventions are in their initial stages of development. Pilot study designs have many methodological limitations, but are a necessary step to develop interventions and to prepare for larger clinical trials. More rigorous designs (e.g., RCTs) are needed to strengthen the evidence generated from these studies.

The majority of studies reviewed tested brief interventions and had short follow-up periods with a median of 24 weeks. This is in stark contrast with the intervention durations (e.g., 12 months or more) and follow-up periods commonly used in RCTs examining the reduction of cardiovascular risk factors in the general population (e.g., Appel et al., 2011; Knowler et al., 2002). Longer intervention durations and follow-up periods seem warranted when examining interventions for people with SMI since a series of barriers, including the impact of psychiatric symptoms on motivation and functioning, social isolation, and difficulties accessing services among many others, can impede intervention participation and engagement in behavioral changes necessary to achieve health benefits.

Studies reviewed also tended to rely on self-reported measures to capture health outcomes, and only half used objective health measurements (e.g., anthropometric indicators, laboratory tests). Future studies should use standard objective health measures and test whether peer-based health interventions produce clinically significant improvements, particularly on those linked to CVD (e.g., weight, smoking, cholesterol). We also found great variability in the intensity, duration, and methods used to train and supervise peer specialists in these studies. Identifying and developing the best approaches to select, train, and supervise peer specialists to deliver health interventions is an area ripe for future work given the growth of the peer specialist workforce and the need to develop standards of practice and supports for this field (Cook, 2011).

None of the articles reviewed were able to disentangle the unique contributions of using peer specialists from the overall effects produced by the actual health interventions since none compared the impact of peer-based health interventions to the same health intervention delivered by non-peers (e.g., health professional, non-peer specialist paraprofessional) or examined interventions' mediators and moderators. A series of potential critical ingredients of peer-based approaches have been proposed, including trust, rapport, credibility, shared lived-experiences, hope, support, working alliance, and role modeling (Cook et al., 2012; Davidson et al., 2006; Solomon, 2004). Understanding and empirically identifying the unique benefits and added value of using peer-based approaches over non-peer based approaches when delivering interventions and services to people with SMI is a longstanding gap in this literature and a critical area for future work (Chinman et al., 2014; Davidson et al., 2006). Efforts to address this important gap would benefit from the development and use of standardized measures to capture these critical ingredients and modeling how these ingredients moderate and/or mediate the treatment effects of peer-based interventions on health outcomes. Lastly, all of the studies reviewed tested interventions in clinical settings, mostly in outpatient mental health clinics in the U.S and Australia. Given the diversity of settings and countries that employ peer specialists (e.g., supportive housing, clubhouses), future studies should test the impact of health interventions across a variety of settings worldwide to improve their reach and impact.

We were unable to conduct a formal meta-analysis of these 18 articles due to the heterogeneity of study designs, sample sizes, intervention approaches, and outcome measures used across these studies. However, our examination of the intervention effects on specific health outcomes enabled us to identify areas with the most promising results and those with mixed and limited evidence. Self-management interventions (e.g., CDSMP) produced the most promising results and tended to use the most rigorous designs comprising two of the three RCTs in this review. These interventions reported beneficial effects mostly on self-management outcomes (e.g., patient activation), and to a lesser extent on self-reported dietary changes and communication with doctors.

These findings are consistent with the results of a recent systematic literature review of studies describing the outcomes of chronic disease self-management programs for people with SMI (Siantz and Aranda, 2014). Self-management interventions are a natural fit for peer specialists since they can combine the educational and behavioral approaches used in these interventions with their lived experiences empowering people to develop the knowledge, confidence, and skills to cope with their physical health issues in their everyday lives. These interventions have established manuals and training curricula that can be used to train and supervise peer specialists to deliver these interventions (Lorig and Holman, 2003). Given these promising results and resources, RCTs with larger and diverse samples and longer follow-up periods are needed to fully examine the effectiveness of peer-based self-management interventions on improving the health of people with SMI beyond self-management outcomes.

We found that the effects of peer-based health interventions on self-rated health, use of services, and quality of life were mixed. Given these conflicting findings, no clear conclusions can be drawn at this time to identify the type of peer-based health interventions that produce the most beneficial impacts on these outcomes. However, a closer examination of the articles with the highest methodological quality ratings that examined these outcomes suggest that certain peer navigator programs (Kelly et al., 2014) and self-management interventions (Druss et al., 2010b) may hold some promise in improving the use of services. These two studies suggest that these peer-based health interventions can help connect participants with primary care providers and change their service use orientation away from emergency rooms. These findings are consistent with previous studies that have found that peer-based interventions can improve the use of services via reductions in hospitalization and the use of inpatient services (Chinman et al., 2014). Peer specialists can improve healthcare linkages since they bring personal experiences navigating the health care system and are in a unique position to address the barriers that prevent people with SMI from accessing and using health services (Kelly et al., 2014). More studies are needed in this area to follow-up on these promising findings.

The effects of peer-based health interventions on physical activity, smoking, medication adherence, weight-related outcomes, and cardiometabolic indicators were limited. These findings indicate that the strength of the evidence to date supporting the beneficial impacts of peer-based health interventions on reducing risk factors for CVD, cancer, and diabetes, the leading causes of premature mortality and excess morbidity for people with SMI (Janssen et al., 2015), is low. Moreover, the articles that examined these health outcomes had multiple methodological limitations. For example, the three smoking cessation studies had limited internal validity since they used single-group designs without comparison or control conditions. No RCTs were used to test the impact of peer-based health interventions on weight-related outcomes or cardiometabolic indicators.

A recent systematic literature review of behavioral and pharmacological interventions designed to address medical conditions (e.g., diabetes) and health-risk behaviors (e.g., obesity) among people with SMI found that for most health conditions and risk factors the strength of the evidence was also low except for four

interventions: metformin and behavioral health interventions for weight loss and bupropion and varenicline to reduce tobacco smoking (McGinty et al., 2016). Considering our findings and the state of the evidence of health interventions for people with SMI, future studies testing the impact of peer-based approaches on these health outcomes and risk factors should focus on those interventions with the strongest and most promising evidence. For instance, peer-based approaches could be used to deliver behavioral weight-loss interventions as is being tested in an ongoing effectiveness trial supported by the National Institute of Mental Health (R01MH104574; Cabassa et al., 2015). Another potential avenue is to incorporate peer specialists into interventions that aim to increase the adherence of bupropion and varenicline to reduce tobacco smoking.

Similar to the findings from two previous systematic literature reviews of health interventions for people with SMI (Cabassa et al., 2010; Siantz and Aranda, 2014), we found a stark underrepresentation of racial, ethnic, and language minority groups, particularly Hispanics, Asian/Pacific Islanders, Native Americans, and non-English speaking participants, and a complete inattention to cultural and linguistic issues. These findings severely limit the generalizability of this evidence. The silence in this literature towards linguistic and cultural factors is also very concerning since these factors influence critical intervention elements, such as treatment initiation and engagement, health behavior change, dietary habits, and communications and interactions with health providers among many others (Cabassa et al., 2014; Institute of Medicine, 2003). Funding from governmental and non-governmental agencies is clearly needed to develop, test, and implement culturally and linguistically appropriate peer-based health interventions across diverse populations worldwide using rigorous methodologies.

Our review has several limitations. The variety of outcome measures, study designs, sample sizes and interventions prevented us from identifying which intervention elements were most effective for specific outcomes and groups. No systematic literature review is free of biases or errors (e.g., missing published studies, publication biases). To minimize these biases, we followed the PRISMA guidelines, searched a variety of sources (e.g., databases, manual searchers) to locate relevant articles, and used independent raters and an established measure to rate the methodological quality of eligible articles.

5. Conclusion

To our knowledge, this is the first systematic literature review of peer-based health interventions for people with SMI. Our findings indicate that the strength of the evidence generated from these studies is limited due to a variety of methodological limitations associated with the use of pilot study designs and the lack of racial, ethnic, and language diversity in the samples included in these studies. Mixed and limited intervention effects were reported for most health outcomes examined in the 18 articles included in this review. The most promising interventions seem to focus on self-management approaches that aimed to improve self-management indicators and peer navigator interventions that aimed to improve healthcare linkages. Efforts to strengthen the evidence of peer-based interventions requires a robust research agenda that moves beyond the use of pilot study designs and focuses on establishing the efficacy and effectiveness of these interventions across different populations and settings, developing best practices to train and supervise this growing workforce, and deepening the field's identification and understanding of the mechanisms of change in these interventions that can help reduce the health inequities faced by people with SMI.

Contributors

Dr. Cabassa developed the research questions and conceptualized the idea for this systematic literature review. He was also involved in screening and selecting articles for the review, abstracting article information, rating the methodological quality of selected articles and drafting and editing the manuscript. Mr. Camacho conducted the literature search, abstracted information from articles, constructed the article's figure, and helped write the manuscript. Mrs. Vélez-Grau and Dr. Stefancic helped with the conceptualization of the manuscript and critically reviewed, edited, and revised the manuscript.

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Conflict of interest

The authors report no conflict of interest.

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