Systematic Review of Integrated Medical and Psychiatric Self-Management Interventions for Adults with Serious Mental Illness

Karen L. Whiteman,

Dartmouth Centers for Health and Aging. Geisel School of Medicine at Dartmouth - Department of Psychiatry. CDC Health Promotion Research Center at Dartmouth, Lebanon, New Hampshire

John A. Naslund,

Dartmouth Centers for Health and Aging. CDC Health Promotion Research Center at Dartmouth. Geisel School of Medicine at Dartmouth - Department of Psychiatry

Elizabeth A. DiNapoli,

VISN 4 Mental Illness Research, Education and Clinical Center (MIRECC), VA Pittsburgh Healthcare System. Department of Psychiatry, University of Pittsburgh School of Medicine Pittsburgh, Pennsylvania

Martha L. Bruce, and

Dartmouth Centers for Health and Aging. Geisel School of Medicine at Dartmouth - Department of Psychiatry. CDC Health Promotion Research Center at Dartmouth

Stephen J. Bartels

Dartmouth Centers for Health and Aging. Geisel School of Medicine at Dartmouth - Department of Psychiatry. CDC Health Promotion Research Center at Dartmouth

Karen L. Whiteman: Karen.L.Whiteman@dartmouth.edu

Abstract

Objective—Adults with serious mental illness are disproportionately affected by medical comorbidity, earlier onset of disease, and premature mortality. Integrated self-management interventions have been developed to address both medical and psychiatric illnesses. This systematic review aimed to: review the evidence of the effect of self-management interventions targeting both medical and psychiatric illnesses and evaluate the potential for implementation.

Methods—Databases including CINAHL, Cochrane Central, Ovid Medline, PsycINFO, and Web of Science were searched for articles published between 1946 and July 2015. Studies evaluating integrated medical and psychiatric self-management interventions for adults with schizophrenia spectrum or mood disorders and medical comorbidity were included.

Results—Fifteen studies reported on nine interventions (i.e., nine randomized control trials, six pre/post designs). Most studies demonstrated feasibility, acceptability, and preliminary effectiveness; however, clinical effectiveness could not be established in most of the studies due to methodological limitations. Factors identified that may deter implementation included operating costs, impractical length of the intervention, and the workforce needs of these interventions.

Conclusions—Integrated medical and psychiatric illness self-management interventions appear feasible and acceptable, with high potential for clinical effectiveness. However, implementation

considerations were rarely considered in intervention development, contributing to limited uptake and reach in real-world settings.

Adults with serious mental illness are disproportionately affected by medical comorbidity (1), earlier onset of disease, and die up to 32 years earlier than the general population (median of 10.1 years) (2). These high rates of morbidity and early mortality are often linked to poorly managed medical and psychiatric illnesses (3). This prompted the development of interventions to support self-management of medical conditions in this high-risk group (4, 5). Self-management interventions generally focus on a combination of three tasks: medical management (e.g., teaching people how to follow through on treatment); role management (e.g., encouraging healthy behaviors); and emotional management (e.g., learning how to monitor symptoms and identify early warning signs of relapse) (6).

A series of randomized control trials have also demonstrated the effectiveness of psychiatric self-management interventions (7–10) in improving mental health outcomes for adults with serious mental illness. However, interventions that exclusively focus on self-management of medical *or* psychiatric conditions may be insufficient due to the interdependence of medical and psychiatric symptoms and disorders (11–13). For example, psychiatric symptoms might exacerbate medical illness and vice versa.

As a result, more recently, self-management interventions have been developed that build on this existing evidence-base and simultaneously address *both* medical and psychiatric illnesses. However, the current state of evidence of integrated medical and psychiatric self-management interventions has not been examined. Our objective was to expand on prior reviews that focused on medical self-management only (14) or selective reviews of illness self-management (15) and conduct a systematic review to assess the feasibility, acceptability, and potential effectiveness of integrated medical and psychiatric self-management interventions that target adults with serious mental illnesses and chronic medical conditions. We also examined the potential for implementation of these interventions.

Methods

Search Strategy

We searched the following databases from 1946 to July 2015 (dates reflect available high quality electronic reference databases beginning in 1946): CINAHL, Cochrane Central, Ovid Medline, PsycINFO, and Web of Science. We used the following search terms for serious mental illness: *schizophrenia, schizophrenia and disorders with psychotic features, psychotic, bipolar, schizoaffective, paranoia, severe mental illness, serious mental illness, serious mental disease, serious psychotic illness, persistent mental illness*, and *persistent mental disease*. These terms were used in combination with the following terms for self-management: *illness self-management, self-management interventions, self-care, self-management, patient advocacy, self-advocacy*, and *empowerment*.

Each term was entered as a keyword and assigned the corresponding medical subject heading (MeSH) term. To identify articles not included in our original database search, we

reviewed reference lists of studies that met inclusion criteria for relevant articles and searched Google Scholar using different combinations of the terms.

Study Selection Criteria

Studies were selected by the first two authors independently screening titles and abstracts for inclusion criteria: self-management intervention studies that address both medical and psychiatric self-management, defined as interventions that target medical management, role management, and/or emotional management (6, 16) and enrolled adults aged 18+ with a diagnosis of schizophrenia, schizoaffective disorder, or bipolar disorder and a medical illness including diabetes, heart disease, chronic obstructive pulmonary disease, or arthritis/chronic pain. We excluded preventative interventions and health promotion or lifestyle interventions targeting substance use, smoking cessation, weight loss, weight-gain prevention, physical activity, or fitness. The first and second authors independently reviewed the full text of articles that met inclusion criteria. Any discrepancies were discussed and agreed upon by these authors.

There was no restriction on language, and we included randomized control trials, pre/post designs, and secondary data analyses if outcomes were relevant to the effect of the self-management intervention. Research protocols, review articles, pharmacological studies, and theoretical articles were excluded.

Data Extraction

Study characteristics extracted included country of origin, study design, sample size, sociodemographic characteristics of the sample, study duration, control group, intervention duration, location of intervention, intervention description, interventionist, measures, and main outcomes.

Methodological Quality Assessment

To determine the methodological quality of the studies included, we used the Methodological Quality Rating Scale (MQRS) (17). MQRS has been used in other systematic reviews (18,19). We measured 12 methodological attributes of quality. Cumulative scores range from zero (poor quality) to 17 (high quality). Studies that receive a cumulative score of at least 14 are considered to be high quality studies (17). The first and second authors independently completed the MQRS for the studies that met inclusion criteria. Discrepancies in MQRS rating were addressed through agreement between the first two authors.

Potential for Implementation

To examine potential for implementation, we picked variables that could facilitate uptake and also be reported in the articles included in this review. These included intervention structure, duration of the intervention, setting, and interventionist.

Results

The search strategy identified 739 citations. Of these, 76 citations were duplicates. A total of 663 titles and abstracts were reviewed, and 605 did not meet inclusion criteria. The full text of the remaining 64 articles was assessed for inclusion criteria, of which 50 did not meet criteria; no foreign language articles met inclusion criteria. Four additional articles were found by searching reference lists from the 14 articles that met inclusion criteria; one article met inclusion criteria. Overall, there were a total of 15 studies that met our inclusion criteria and were included in this review (see Figure 1).

Many of the eliminated studies reported on interventions targeting only psychosocial skills training (e.g., Functional Adaptation Skills Training and Behavioral Social Skills Training [20]), medical comorbidities (e.g., Chronic Disease Self-Management Program [4]), or serious mental illness (e.g., FOCUS [21]).

The 15 included studies reported on nine interventions (Table 1), including: Automated Telehealth (22); Health and Recovery Peer program (HARP) (23); Helping Older People Experience Success (HOPES) (24–26); Integrated Illness Management and Recovery (I-IMR) (27,28); Life Goals Collaborative Care (LGCC) (29–31); Living Well (32); Norlunga Chronic Disease Self-Management program (33); Paxton House (34); and Targeted Training in Illness Management (TTIM) (35,36) (Table 1). Interventions were studied within diverse types of settings. Two interventions, HOPES (24–26) and I-IMR (27, 28), were developed to target middle-aged and older adults with serious mental illness.

Evidence of Intervention Feasibility, Acceptability, and Effectiveness

Six interventions (i.e., Automated Telehealth, HARP, HOPES, I-IMR, Living Well, and Norlunga Chronic Disease Self-Management program) targeted a heterogeneous set of serious mental illnesses and medical illnesses that require ongoing treatment (i.e., congestive heart failure, hypertension, diabetes, chronic obstructive pulmonary disease, hypothyroidism, asthma, and heart disease) (22, 24–28).

One intervention (i.e., LGCC) specifically addressed bipolar disorder and medical illnesses that require ongoing treatment (i.e., hypertension, hyperlipidemia, diabetes mellitus, obesity, and heart disease) (29–31).

Two interventions (i.e., Paxton House and TTIM) addressed both a heterogeneous set of serious mental illnesses and one medical illness that requires ongoing treatment (i.e., diabetes) (34–36).

The studies reported findings on an array of clinical outcomes (Table 1). Clinical outcomes examined in more than one study included self-management skills and behaviors, self-management attitudes, biological outcomes, services utilization, and functional status. More than 70 different outcome measures were used in these studies, ranging from self-report to biological measures. Self-management skills and behaviors significantly increased in seven studies (22–25,28,32,33). Self-management attitudes significantly increased in four studies (25,26,28,32) and one study reported qualitative evidence of increased self-management

attitudes (35). Biological outcomes related to premature mortality risk factors (e.g., blood pressure, weight) significantly decreased in consumers receiving integrated self-management interventions in four studies (22,34,36,31). Acute service use significantly decreased in two studies (22,28). Functional status in seven studies significantly positively changed (25,28,29–33).

Methodological Quality Assessment

Using the MQRS, we evaluated the methodological quality of the studies. The MQRS scores ranged from 3 to 14, with a mean score of 8.69±3.88, median 9, with two studies with a score over 14 indicating a high quality study (Table 2). Factors that contributed to lower scores included lack of objective measurement of outcomes (n=8, 61.5%) and not enumerating dropouts (n=8, 61.5%). Strengths included use of a manualized intervention design (n=9, 69.2%), providing sufficient information for replication (n=11, 84.6%), and including baseline characteristics (n=10, 76.9%).

Potential for Implementation

To assess for implementation, we examined: intervention structure, duration of the intervention, setting, and interventionist. The majority of these interventions primarily met as a group including HARP (23), HOPES (24,25), LGCC (29–31), and Living Well (32) (Table 2). The average group intervention duration was 18.75 group sessions, ranging from 4 to 52 group sessions. Telephone care management, community trips, and monthly preventative healthcare supported these interventions (23–25, 29–32).

Other interventions included hybrid, individual, and group model. The Paxton House intervention included 6 months hybrid individual and group model (34), TTIM included 12 weekly 60–90 minute group and 4-week maintenance period consisting of weekly telephone sessions (35,36), and Norlunga Chronic Disease Self-Management included 12 months of a group/hybrid model (33). The remaining interventions consisted of Automated Telehealth, which provided daily self-management prompts using a device within a person's home for 6-months (24 weeks) (22), and I-IMR, which required weekly individual sessions for 8-months (32 weekly sessions) (27,28).

Interventions were studied in a range of settings, including remote/home-based (22), community mental health center (23, 27, 28), assisted living facility (26), mental health center or local senior center (24,25), Veterans Affairs outpatient mental health facility (29,30), Veterans primary care (31), primary care (33, 35, 36), outpatient clinic and psychiatric rehabilitation programs (32), and in a supported housing residence (34).

Interventionists ranged from rehabilitation specialist and psychiatric nurse (26), nurse and bachelor-level case manager (24,25), social worker supported by a nurse care manager (27,28), nurse (29), masters-level social worker/health specialist (30,31), advanced practice nurse and clinical staff (34), peers (23, 32, 33), to peers and nurse educators (35,36). In one study, the interventionists monitored progress via technology and intervened only when clinically necessary (22).

Discussion

There is growing evidence that integrated medical and psychiatric interventions can improve the lives of adults with serious mental illness. This systematic review identified 15 studies that reported on nine integrated medical and psychiatric self-management interventions. The majority of these interventions established support for the feasibility, acceptability, and preliminary clinical effectiveness related to enhancing participants' knowledge of self-management skills, promoting behavioral and attitudinal changes towards managing illnesses, reducing psychiatric symptomology, stimulating changes in biological indicators of medical illnesses, and/or reducing acute services utilization.

While these studies had positive findings, outcome measures varied greatly. As more than 70 different measures were used to collect data, this finding provides evidence of the complexity in simultaneously measuring multiple medical and psychiatric outcomes. Composite measures that aggregate biological outcomes of varying diseases and severity may more efficiently measure outcomes for multiple morbidities.

However, composite measures such as the Framingham Risk Score may not be optimal for adults with serious mental illness. A systematic review found the Framingham Risk Score was not associated with any changes within multicomponent intervention models with adults with serious mental illness (37). Variations in findings between the general population and adults with serious mental illness may be explained because the algorithms used to establish the Framingham Heart Study risk scores were determined with a sample that excluded adults with serious mental illness (38). Adults with serious mental illness experience unique biobehavioral and environmental risk exposures such as antipsychotic medication (39) and trauma (40), and chronic stress (41) that could result in different risk scores on biometric indices of cardiovascular disease compared to the general population. Risk prediction models that included biobehavioral variables including social deprivation, psychiatric diagnosis, prescriptions for antidepressants and antipsychotics, and alcohol use resulted in better predictive risk models than the Framingham Risk Score for adults with serious mental illness (42). Future development of risk assessments for morbidity and mortality may be improved by considering unique biobehavioral and environmental risk exposures of adults with serious mental illnesses.

The current evidence highlights the feasibility and acceptability of addressing cardiovascular disease and early mortality risk factors (e.g., high blood pressure, obesity) in individuals with serious mental illness. However, the clinical effectiveness of these interventions could not be established due to methodological limitations (see Figure 2). Therefore we do not know the extent to which integrated medical and psychiatric self-management interventions has a direct impact on physical health of individuals with serious mental illness. More rigorous evaluations of these interventions is warranted.

The evidence-base for integrated medical and psychiatric self-management interventions is predominantly built on single-site trials that included small sample sizes and varied in follow-up length, consequently greatly limiting the external validity of these interventions in real-world settings. The one intervention, HOPES (24,25) had a score of 14 on the MQRS

indicating a high quality study. However, despite the effectiveness of HOPES and sustained long-term outcomes (24,25), the required effort and associated costs of professional staff consisting of a 12-month weekly group intervention may deter broad implementation.

A strength of this systematic review was the examination of the potential for implementation of these interventions. Although the identified interventions for adults with serious mental illness have demonstrated feasibility, acceptability, and preliminary clinical effectiveness, their impact may be limited due to the costly effort of professional staff and intensity and duration of these interventions. As such, potential to widely disseminate and implement effective self-management interventions for adults with serious mental illness is limited due to the workforce needs, the length and intensity, and the associated costs of implementing these interventions.

There were promising intervention characteristics that may increase the potential for implementation, including limiting the physical resources required to implement interventions, utilizing technology, and hiring and training peers to deliver services. Limiting the physical resources required to implement the identified interventions may facilitate implementation. Meeting as a group can also lessen the duration of the intervention; however, this may have an impact on intervention effect. To identify necessary treatment components, future research is necessary to examine active intervention components and mechanisms of behavioral change. This research can allow for the possibility of reducing the duration of the intervention.

One study identified used automated telehealth to deliver an integrated medical and psychiatric self-management intervention (22). Results of this study suggest that a remote technology-based integrated medical and psychiatric self-management intervention is feasible acceptable, and may be effective with heterogeneous medical and psychiatric diagnoses. While remote technology-based interventions are promising, it is not clear if this type of technology provides similar benefits as in-person integrated medical and psychiatric self-management interventions that promote community participation (24,25), and practicing self-management skills in the community (e.g., grocery shopping, cooking). Remote technology-based interventions may be best suited for adults with serious mental illness who are constrained by mobility limitations, transportation difficulties, or rural settings. An emerging research literature documents that adults with serious mental illness are using mHealth technology and eHealth technologies, including online, wearable, or remote devices to engage in behavioral health interventions (43). However, it is not known if such technologies can facilitate the implementation and delivery of effective integrated medical and psychiatric self-management interventions outside of remote locations.

Peer delivered integrated medical and psychiatric self-management interventions are another potentially viable option. Evidence has shown that involving peers in interventions for adults with serious mental illness may solve problems related to workforce shortages. Interventions that included peers including HARP (23), Living Well (32), Norlunga Chronic Disease Self-Management program (33), and Targeted Training in Illness Management (35,36) may produce costs savings. A systematic review found that peers were as effective as professional staff (44). In some settings, peers have a sustainable financial infrastructure (i.e., Medicaid

reimbursement for licensed mental health peer specialist services) (45), which can help "scale-up" peer-delivered integrated self-management interventions. Incorporating integrated illness self-management training in peer specialists' state licensure requirements could create a sustainable, low-cost national workforce of integrated illness self-management providers.

Limitations

To our knowledge, this is the first systematic review of integrated medical and psychiatric self-management interventions for adults with serious mental illness. We found that several characteristics of the existing literature limited our capacity to draw definitive conclusions on the aggregate effectiveness and implementation readiness of integrated medical and psychiatric self-management interventions. First, the identified studies used more than 70 different instruments to collect data; therefore, the variability of measurement made it impossible to conduct a meta-analysis to examine the effectiveness of these interventions. Second, we picked variables that are likely to enhance the likelihood of an intervention being implemented; however, these studies were limited to feasibility and effectiveness trials and did not report if these interventions have been implemented in real-world settings.

Conclusions

Compared to previous systematic reviews (14, 15), we found five additional studies and three additional interventions. This study expands on earlier systematic reviews that focused on medical self-management only (14) and psychiatric self-management only (15) by focusing on integrated medical and psychiatric disease states and identifying potential mechanisms to facilitate implementation. The available evidence on integrated medical and psychiatric self-management interventions has established strong support for the feasibility, acceptability, and potential clinical effectiveness. However, the likelihood for widespread dissemination and uptake of these interventions in their current state is limited by their designs and service delivery strategies.

As integrated medical and psychiatric self-management is likely to be an important approach for addressing multiple morbidities among adults with serious mental illness, future research is needed to address several issues. We should evaluate whether such interventions can address the early mortality gap affecting this group using composite measures that consider both specific biobehavioral and environmental risk exposures that impact adults with serious mental illnesses. Further, new and existing self-management interventions should consider alternative service delivery strategies to "scale up" interventions, including group-based interventions, use of mHealth or eHealth technology, and incorporating peer delivered services. Future research could consider expanding on efforts to modify and deliver programs widely available to the general public to meet the needs of high-risk groups such as individuals with serious mental illness and co-occurring chronic health conditions. For example, the widely used Chronic Disease Self-Management Program that has been adapted for individuals with serious mental illness to manage medical conditions (4) could also include psychiatric self-management. Additional efforts are needed to further explore the potential of using emerging technologies to facilitate implementation and delivery of

integrated psychiatric and medical illness self–management programs across usual clinical settings serving this population.

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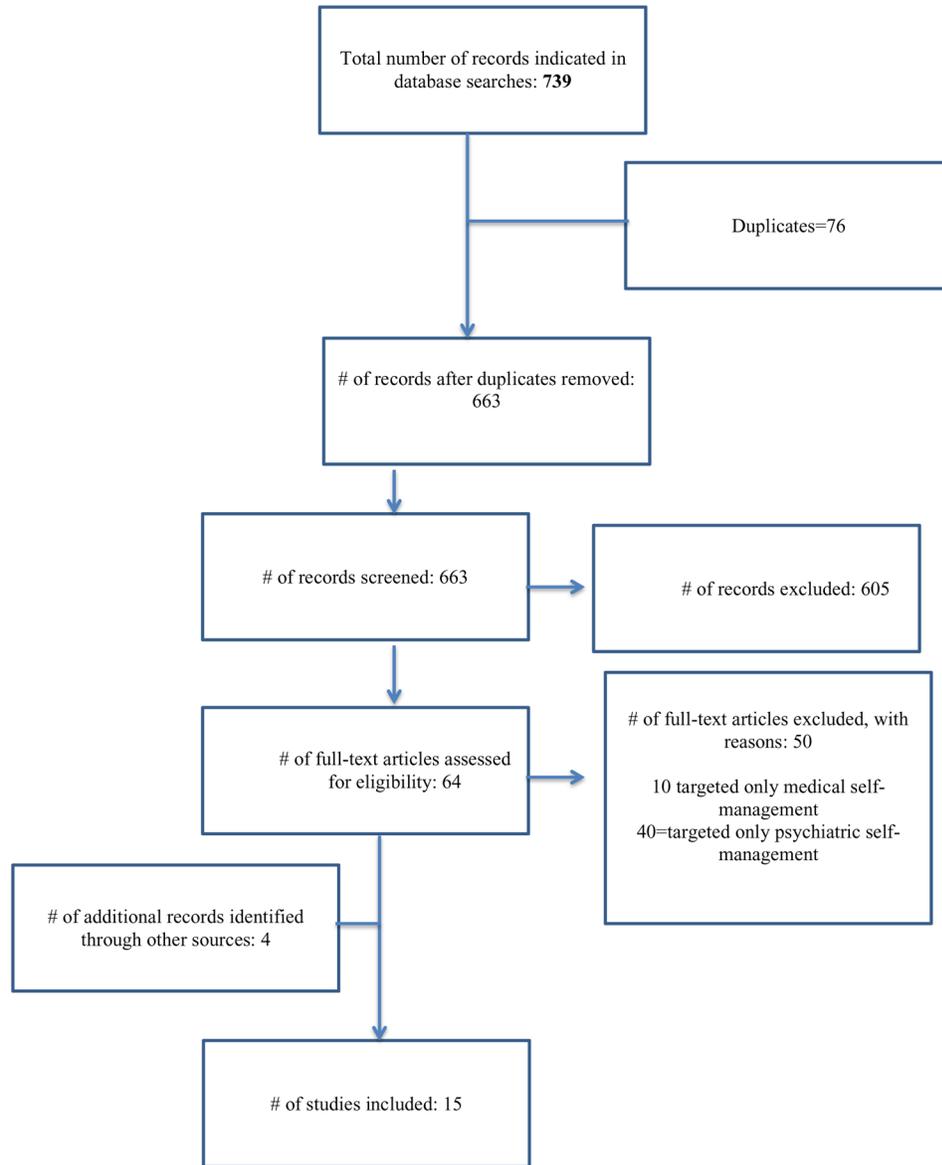
Figure 1.
Study selection flow diagram

	Blood Pressure	Blood Glucose (e.g., HbA1c, fasting blood glucose)	Weight Loss
Automated Telehealth (22)	8 (ES=.60)	8 (ES=.43)	
Paxton House (34)		3 (Improvement)	3 (Improvement)
TTIM (36)		4 (Improvement)	
LGCC (31)	12 (Statistically Significant)		
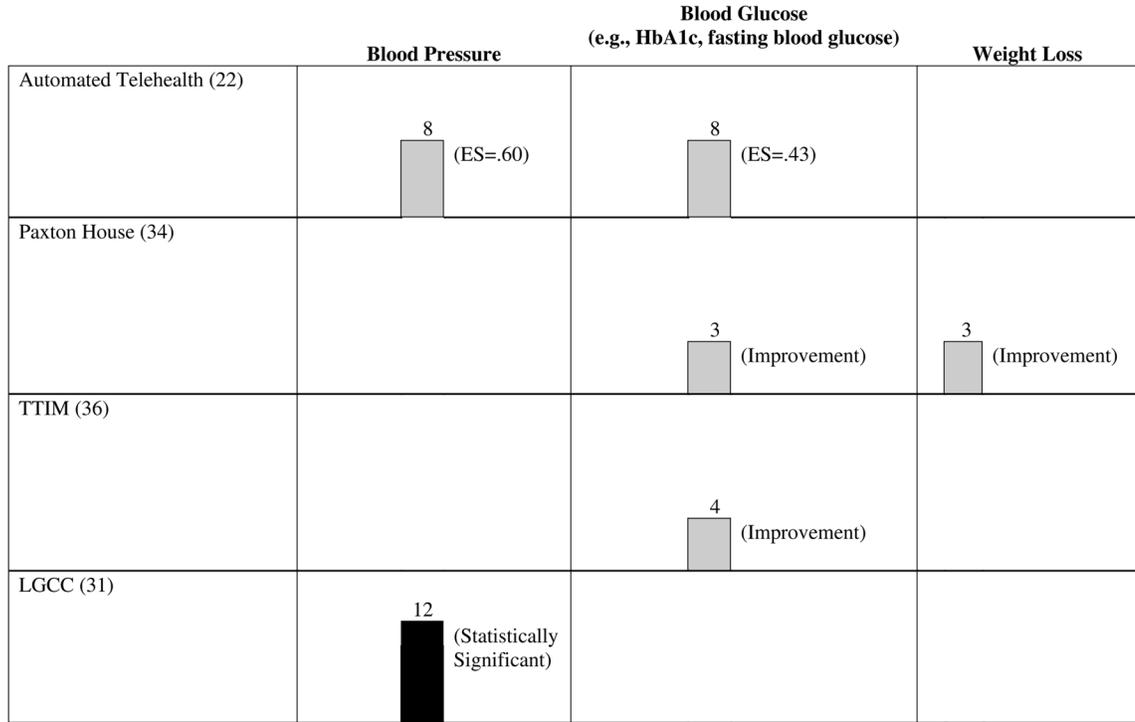
Figure 2.
Harvest plots show the effectiveness on early mortality risk factors of integrated medical and psychiatric self-management

■ Randomized Control Trial ▨ Pre/post

Note: Each bar represents a study categorized by intervention. The color, height and number indicate the three criteria for assessing the evidence of each study. The color of the bar indicates the study design, the height of the line shows the sample size, and the number is the MQRS score.

Table 1

Integrated Medical and Psychiatric Self-Management Interventions for Adults with SMI

Study	Design	Setting	Sample	Sample diagnosis	Intervention description	Duration	Interventionist	Comparison	Outcome Measures	Main outcomes
Automated Telehealth										
Pratt et al., 2013	Pre/post	Remote/Home-based	70 participants; 54 female; 1 minority; mean age=52.7 (SD=10.6).	12 bipolar disorder; 29 major depressive disorder; 18 post traumatic stress disorder; 11 schizophrenia; 7 chronic obstructive pulmonary disease; 11 chronic pain; 6 congestive heart failure; 46 diabetes mellitus;	Automated telehealth intervention is a remote device that targets self-management of multiple psychiatric and medical illnesses.	6 months of automated self-management behavioral prompts (e.g., "have you taken your medication today"), prompts to input biological indicators of health (e.g., blood glucose, weight), and psychiatric and medical psychoeducation prompts.	Remote technology within consumers' home supported by a nurse at a mental health center	n/a	Feasibility based on participant adherence; SCDSES; SF-12; BPRS; self-reported service use; health measures including blood pressure, weight, and blood glucose collected by the remote technology	Adherence was over 70%. At 6-month follow-up there was significant (p<.05) improvements in depression self-management on the SCDSES (ES=−.33); and decrease in diastolic blood pressure (ES=−.60). Among participants with diabetes, there were significant (p<.05) reductions in blood glucose (ES=.43); routine primary care visits (ES=0.64); and urgent care visits (ES=1.11).
Health and Recovery Peer Program (HARP)										
Druss et al., 2010	RCT	CMHC	80 participants (HARP n=41; Usual Care n=39); 56 female; 66 minority; mean age=48.1 (SD=10.1)	26 bipolar disorder; 21 major depressive disorder; 9 post traumatic stress disorder; 23 schizophrenia; 39 arthritis; 18 asthma; 18 heat disease; 50 hypertension	HARP targets self-management (i.e.. connection between mind and body, cross-systems medication coordination, psychiatric and medical advanced directives, healthy lifestyles, pain and fatigue management, finding and interacting with a doctor). (N=41)	6 group sessions; 6 months	2 certified mental health peer specialists	Usual Care - continuation of all medical, mental health, and peer-based services prior to entry into the study (N=39).	PAM; BRFSS; health services use; self-reported medication adherence; SF-36 PCS; SF-36 MCS	Compared to Usual Care, HARP resulted in significant improvement in patient activation (PAM) and utilizing primary care (p<0.05).
Helping Older People Experience Success (HOPES)										
Bartels et al., 2004	Controlled pilot study	Assisted living facility	24 participants; mean age=66.5 (SD=5.7).	4 bipolar disorder; 2 major depressive disorder; 2 psychotic disorder NOS; 3 schizoaffective; 13 schizophrenia; mean number of	Enhanced Skills Training and Healthcare Management (STHM) later renamed to HOPES; see Pratt, Bartels, &	12 months of twice weekly group meetings and weekly nurse preventative healthcare visits.	Rehabilitation specialist and psychiatric nurse	Healthcare Management only (N=12)	ILSS; SBS; BPRS; SANS; GDS; MMSE	STHM resulted in significant improvements in the Care of Possessions item on the ILSS compared to the control (p<0.05), but not on the mean ILSS score. No between group

Study	Design	Sample	Setting	Sample diagnosis	Intervention description	Duration	Interventionist	Comparison	Outcome Measures	Main outcomes
										differences observed for the other measures.
Bartels et al., 2014a; Mueser et al., 2010	RCT	183 participants (HOPES=n=90; Treatment as Usual=n=93; mean age= 60.2	Mental health center or local senior center	medical diagnosis 4.3 (SD=2.7); 26 bipolar disorder; 44 major depressive disorder; 52 schizoaffective; 51 schizophrenia; 25 asthma; 23 cardiac disease; 42 chronic obstructive pulmonary disease; 50 diabetes; 80 hypertension; 32 hypothyroidism	HOPES targets psychosocial rehabilitation and psychiatric and medical self-management (i.e., social skills, illness self-management, medication management, communication with healthcare providers). Mueser, 2008 (N=12)	12 months weekly group meetings, two community trips to practice skills per month, and monthly preventative healthcare visit; Maintenance phase: monthly group skills training, community trips, and meetings with nurse.	Groups co-led by a nurse and bachelor-level case manager; nurse preventative healthcare visits.	Treatment as Usual - usual mental health services including pharmacotherapy, case management or outreach by non-nurses, individual therapy, and rehabilitation services such as groups or psychoeducation (N=93)	UPSA; MCAS; SBS; ILSS; RSES; SANS; Cognitive Functioning (D-KEFS; CVLT-II; card sorting test; Tower of London task; proverbs test; word context test; 20 questions test); BPRS; CESD; CCI	Retention was high (80%). Compared to Treatment as Usual 2-year follow-up, HOPES resulted in significant (p<.05) improvements in performance skills on the UPSA; psychosocial and community functioning on the MCAS; leisure and recreation on the ILSS; negative symptoms on the SANS; and self-efficacy on the RSES. Long-term results at 3-year follow-up showed significant (p<.05) improvements in community living skills on the ILSS and MCAS; performance skills on the UPSA; self-efficacy on the RSES; psychiatric symptoms on the BPRS. At 3-year follow-up there was also significantly (p<.05) greater use of preventative healthcare, screening, and care planning with advanced directives.
Integrated Illness Management and Recovery (I-IMR)										
Mueser, Bartels, Santos, Pratt, & Riera, 2012	Pre/post	7 participants; 3 female; mean age 59.	CMHC	3 schizophrenia; 1 bipolar disorder; 3 major depressive disorder; 7 hypertension; 4 hyperlipidemia; 3 chronic obstructive pulmonary disease; 2 osteoarthritis; 1 diabetes	I-IMR targets self-management of multiple psychiatric and medical illnesses (i.e., individualized goal development, recovery strategies, connection between mind and body, psychoeducation, healthy lifestyles, managing stress, managing psychiatric and medical health, medication	8 months of weekly individual sessions.	Masters degree in social work supported by a nurse care manager	n/a	BPRS; IMR Scale; SRAHP	Participation in I-IMR was high, 71% attended at least 10 sessions. Some improvements among individual participants, but no aggregate results reported.

Study	Design	Setting	Sample	Sample diagnosis	Intervention description	Duration	Interventionist	Comparison	Outcome Measures	Main outcomes
Bartels et al., 2014b	RCT	CMHC	71 participants (I-IMR *n*=36; *n*=35 Usual Care); 39 female; 2 minority; mean age=60.3 (*SD*=6.5).	13 bipolar disorder; 31 major depressive disorder; 27 schizophrenia spectrum; 16 chronic obstructive pulmonary disease; 34 diabetes; 33 hyperlipidemia; 29 hypertension; 46 osteoarthritis	management, and relapse prevention plans). I-IMR; see Mueser, Bartels, Santos, Pratt, & Riera, 2012 (*N*=36)	8 months of weekly individual sessions	Masters degree in social work supported by a nurse care manager	Usual Care, which included pharmacotherapy, case management or outreach by non-nurse clinicians, individual therapy, and access to psychosocial support and rehabilitation services (N=35).	IIMR; SCDSES; SCDSES adapted measures of diabetes, COPD, hypertension, hyperlipidemia, and arthritis self-management; BPRS; MCAS; SPCS; API; self-reported hospitalizations and emergency visits	Compared to Usual Care, I-IMR resulted in significant improvements on the IIMR scales for psychiatric (ES=0.46) and medical (ES=0.29) illness self-management; on the SCDSES scale for diabetes self-management skills (ES= .15); on the API subscale during primary care visits, there was an increase in preference for comprehensive diagnosis and treatment information (ES = .88); and decreases in self-reported psychiatric or medical hospitalizations (*p*=.037).

Life Goals Collaborative Care (LGCC)

Study	Design	Setting	Sample	Sample diagnosis	Intervention description	Duration	Interventionist	Comparison	Outcome Measures	Main outcomes
Kilbourne et al., 2008	RCT	Veterans Affairs Outpatient Mental Health Facility	58 participants (BCM *n*=27; Usual Care *n*=31); 5 female; 6 minority; mean age 55.3 (*SD* 8.4); 100% veterans.	44 bipolar disorder I; 4 bipolar disorder II: 10 bipolar disorder NOS; 19 diabetes; 52 obesity; 47 hypertension; 44 hyperlipidemia; 11 coronary artery disease; 10 chronic obstructive pulmonary disease; 4 chronic hepatitis; 19 osteoarthritis	Bipolar Disorder Medical Care Model (BCM) later renamed to LGCC; See Kilbourne et al., 2012	Four 2-hour group sessions followed 6-months of monthly telephone care management services.	Care management by nurse; Groups led by nurse care manager	Usual Care (N=31)	SF-12; WHO-DAS; ISS; LSMECD; CAS; current medication use; number of outpatient medical visits	Compared to Usual Care, BCM resulted in statistically significant (p<.05) improvements in physical health-related quality of life on the SF-12 (*t*=2.01, *df*=173, *p*=.04).
Kilbourne et al., 2012	RCT	Community-based Mental Health Outpatient Clinic	65 participants (LGCC *n*=32; Usual Care *n*=33); 39 female; 12 minority; mean age 45.3 (*SD* 12.8).	65 bipolar disorder; 35.2 +/− 7.3 body mass index; 45.0 +/− 6.0 inches waist circumference; 133.9+/−1.7 mmHg systolic blood pressure; 85.1 +/ − 11.1 mmHg diastolic blood pressure	LGCC targets self-management of bipolar spectrum disorder and risk factors for cardiovascular disease (i.e., individualized goal development, healthy behavioral change, and action plans to	Four 2-hour group sessions followed 6-months of telephone care management services.	Master-level social worker	Enhanced Treatment as Usual included monthly receipt of mailings on wellness topics over the course of the 6-month LGCC intervention period in addition to available mental health care, and referral to	Cardiometabolic risk (BMI; systolic/diastolic blood pressure); SF-12; WHO-DAS; ISS	Only among consumers with BMI >=30, compared to Usual Care, LGCC resulted in a significant decrease in impaired functioning (β = −2.2) on the WHO-DAS and depressive symptoms (β = −2) on the ISS. Among consumers with systolic

Study	Design	Sample	Setting	Sample diagnosis	Intervention description	Duration	Interventionist	Comparison	Outcome Measures	Main outcomes
					cope with symptoms), care management, and self-management practice guidelines are given to providers. (N=32)			primary care services off-site (N=33).		blood pressure >=140, LGCC resulted in significant decrease in impaired functioning (β = −3.8) on the WHO-DAS and depressive symptoms (β = −3.5) on the ISS.
Kilbourne et al., 2013	RCT	118 participants (LGCC n=60; UC 58); 20 female: 6 minority; mean age 52.8 (SD 9.9); 100% veterans.	Outpatient mental health or primary care clinics	44 bipolar disorder I; 26 bipolar disorder II; 45 bipolar disorder; 3 schizoaffective bipolar disorder subtype; 30 diabetes mellitus; 22 heart disease; 98 hyperlipidemia; 81 hypertension; 58 obesity	LGCC; See Kilbourne et al., 2012	Four 2-hour group sessions followed 6-months of telephone care management services.	Masters-level health specialist	Enhanced Usual Care received regular mailings regarding wellness topics in addition to standard mental health and medical treatment. Standard treatment included outpatient case management and group psychotherapy sessions specifically focused on mental health treatment that were provided by a mental health provider team, as well as access to a primary care provider (N=58).	Systolic/diastolic blood pressure; cholesterol; SF-12; WHO-DAS; ISS	Compared to Usual Care, LGCC resulted in a significant (p<.05) reduction in systolic (β = −3.1) and diastolic blood pressure (β = −2.1), and fewer manic symptoms (β = −23.9) on the ISS.
Living Well										
Goldberg et al., 2013	RCT	63 participants (Living Well n=32; Usual Care n=31); 33 female; 42 minority; mean age=49.5 (SD=9.1).	Outpatient clinic and psychiatric rehabilitation day programs	100% bipolar disorder with psychotic features or schizophrenia spectrum disorder; 27 arthritis; 17 cardiovascular disease; 31 diabetes; 25 respiratory disease	Living Well targets psychiatric and medical illness self-management (i.e., healthy lifestyles, medication management, addictive behaviors, and cross-system coordination of services). Adapted from the CDSMP and focuses on confidence building to develop self-management skills, with additional material on how serious mental illness affects general medical	13 weekly groups and weekly follow-up telephone	Groups co-led by (1) a mental health peer and a mental health provider or (2) two mental health peers who also have a chronic general medical condition; follow-up telephone calls by peers	Usual Care (N=31)	SF-12; SMSES; PAS; MHLC; RAS-SF; IMSM; MMAS	Compared to Usual Care, between baseline and 13-weeks, Living Well resulted in significant (p<.05) improvement in physical functioning (ES=.55), emotional well-being (ES=.66), and general health functioning (ES=.68) on the SF-12; self-management self-efficacy on the SMSES (ES=.65); patient activation (ES=.55) and approach to health care (ES=.61) on the PAS; and self-management behaviors (ES=.57) and use of health care (ES=.81) on the IMSM. (p>.05). Only improvement

Study	Design	Sample	Setting	Sample diagnosis	Intervention description	Duration	Interventionist	Comparison	Outcome Measures	Main outcomes
					status and vice versa. (N=32)					in use of health care on the IMSM remained significant at two-month follow-up (ES=.54). At two-month follow-up, there were significant improvements in internal locus of control on the MHLC (ES=.66); and physical activity (ES=.56) and healthy eating (ES=.64) on the IMSM.

Norlunga Chronic Disease Self-Management program

Study	Design	Sample	Setting	Sample diagnosis	Intervention description	Duration	Interventionist	Comparison	Outcome Measures	Main outcomes
Lawn et al. 2007	Pre/post	38 participants (N=35 Flinders care planning, 17 attended Stanford groups, and 3 attended Stanford groups only); 21 women; mean age 39 for males and 46 for females.	Primary care	4 anxiety disorder; 5 bipolar disorder; 8 major depressive disorder; 1 personality disorder; 4 schizoaffective; 16 schizophrenia; 22 two or more conditions, most common were obesity, asthma and other respiratory conditions, heart disease, and diabetes	Norlunga Chronic Disease Self-Management program targets psychiatric and medical self-management through education and peer support.	12-months of a hybrid individual and group approach	Peer educators	n/a	PIH; P&G; WSAS; SF-12	Norlunga Chronic Disease Self-Management program resulted in significant improvements in self-management on the PIH and mental functioning on the SF-12 at 3 and 6 months (p<.05). Improvement in social leisure activities on the WSAS (p<.05) and reduced problem impact on the P&G (p<.05). Qualitative feedback was supportive of the intervention.

Paxton House

Study	Design	Sample	Setting	Sample diagnosis	Intervention description	Duration	Interventionist	Comparison	Outcome Measures	Main outcomes
Teachout, Kaiser, Wilkniss, & Moore, 2011	Pre/post	13 participants; 23% female; 69% minority; mean age 45 (SD 6.9).	Supported housing residence	15% major depressive disorder; 8% psychotic disorder NOS; 46% schizophrenia; 31% schizoaffective; type II diabetes	Paxton House offers psychosocial rehabilitation and diabetes self-management services (i.e., diabetes education, nutritional programs), psychiatric support, intensive case management, and residential support.	6 months individual and group sessions.	Advanced practice nurses and clinical staff	n/a	Weekly weight; daily blood glucose; satisfaction survey; DES-SF	At 6-month follow-up Paxton House program resulted in weight loss in 100% of participants (M=20.35 pounds lost); improved fasting glucose in 40% of participants; and overall satisfaction with the program.

Targeted Training in Illness Management (TTIM)

Study	Design	Sample	Setting	Sample diagnosis	Intervention description	Duration	Interventionist	Comparison	Outcome Measures	Main outcomes
Blixen, Perzynski, Sajatovic, & Dawson, 2011;	Pre/post	12 participants; age range 33–62 years; median 49.5 years.	Primary care	Bipolar disorder, major depressive disorder, schizophrenia, or	TTIM targets psychiatric and diabetes self-management.	12 weekly 60–90 minute group sessions and 4-week maintenance period consisting	Groups co-led by peer educator with SMI and diabetes and nurse educator	n/a	BPRS; MADRS; CGI; GAF; SDS; HbA1c; BMI; SF-12; SDSCA	TTIM qualitative findings suggest increased illness knowledge, self-confidence, and

Study	Design	Sample	Setting	Sample diagnosis	Intervention description	Duration	Interventionist	Comparison	Outcome Measures	Main outcomes
Sajatovic et al., 2011				schizoaffective, and diabetes		of weekly telephone sessions				motivation. Quantitative findings suggest increased self-management of SMI and diabetes, such as reduction in psychiatric symptom severity on the BPRS; improvement in perceived mental health and physical health status on the SF-12; and improvement in HbA1c in 8 participants. Significant improvement in dietary behaviors for diabetes self-management ($p<.05$) on the SDSCA.

Outcomes Measures

API: Autonomy Preference Index

BASIS: Behavioral Symptom Identification Scale

BRFSS: Behavioral Risk Factor Surveillance System

BMI: Body Mass Index

BPRS: Brief Psychiatric Rating Scale

CAS: Cunningham Access Survey

CCI: Charlson Comorbidity Index

CESD: Center for Epidemiologic Studies Depression Scale

CGI: Clinical Global Impressions

CVLT-II: California Verbal Learning Test-II

DES-SF: Diabetes Empowerment Scale Short Form

D-KEFS: Delis-Kaplan Executive Functioning System

FRS: Framingham Risk Score

GAF: Global Assessment of Functioning

GDS: Geriatric Depression Scale

HbA1c: Hemoglobin A1c

HRQOL: Health Related Quality of Life

ILSS: Independent Living Skills Survey

IIMR Scales: Illness Management and Recovery Scales (client-rated & clinician rated)

IMSM: Instrument to Measure Self-Management

IPAQ-SF: International Physical Activity Questionnaire-Short Form

ISS: Internal State Scale

LSMECD: Lorig Self-Management Efficacy in Chronic Disease 6-Item Scale

RAS-SF: Recovery Assessment Scale-Short Form

SANS: Scale for the Assessment of Negative Symptoms

SBS: Social Behavior Schedule

SCDSES: Stanford Chronic Disease Self-Efficacy Scale

SDSCA: Self-Rated Diabetes Self-Care Activities

SPCS: Stanford Physician Communication Scale

MCAS: Multnomah Community Ability Scale

MHLC: Multidimensional Health Locus of Control

MMAS: Moriksy Medication Adherence Scale

MMSE: Mini Mental State Exam

PAM: Patient Activation Measure

RSES: Revised Self-Efficacy Scale

SANS: Scale for the Assessment of Negative Symptoms

SDS: Sheehan Disability Scale

SF-12: Short-Form Health Survey

SF-36 (MCS/PCS): 36-item Short Form Health Survey

SMSES: Self-Management Self-Efficacy Scale

SRAHP: Self-Rated Abilities for Health Practices Scale

PAS: Patient Activation Scale

P&G: Problem and Goals assessment

PHQ-9: Patient Health Questionnaire

PIH: Partners in Health scale

MADRS: Montgomery-Asberg Depression Rating Scale

MCAS: Multnomah Community Ability Scale

UPSA: UCSD Performance-based Skills Assessment

VR-12: Veterans Short Form, Physical Health (PCS) and Mental Health (MCS)

WHO-DAS: World Health Organization Disability Assessment Scale

WSAS: Work and Social Adjustment Scale

Table 2

Methodological Quality of Included Studies

Study	Sajatovic et al (2011)/ Blixen et al (2011)	Druss et al (2010)	Bartels et al (2004)	Goldberg et al (2013)	Mueser et al (2010)/ Bartels et al (2014a)	Kilbourne et al (2008)	Kilbourne et al (2012)	Kilbourne et al 2013	Lawn et al (2007)	Teachout et al (2011)	Mueser et al (2012)	Bartels et al (2014b)	Pratt et al (2013)
A. Study Design (0–4)	1	3	2	3	3	3	3	3	1	1	1	3	1
B. Replicability (0–1)	1	1	1	1	1	1	1	1	0	0	1	1	1
C. Baseline (0–1)	0	1	1	1	1	1	1	1	0	0	1	1	1
D. Quality Control (0–1)	1	1	0	1	1	1	1	1	0	0	1	1	0
E. Follow-up length (0–2)	0	1	2	0	2	1	2	2	1	1	1	2	1
F. Follow-up rate (0–2)	0	1	0	2	2	2	2	0	1	0	0	1	2
G. Objective measurement of outcomes (0–1)	1	0	0	0	0	0	1	1	0	1	0	0	1
H. Dropouts (0–1)	0	1	0	0	1	1	0	1	1	0	0	0	0
I Independent (0–1)	0	0	0	0	1	1	0	1	0	0	0	1	0
J. Analyses (0–1)	0	1	0	1	1	1	1	1	0	0	0	1	1
K. Study Site (0–1)	0	0	0	1	1	0	1	1	0	0	0	1	0
L. Collateral (0–1)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Quality Score (0 low to 17 High)	**4**	**10**	**6**	**10**	**14**	**12**	**13**	**12**	**4**	**3**	**5**	**12**	**8**