

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

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Objective: Adults with serious mental illness are disproportionately affected by general medical comorbidity, earlier onset of disease, and premature mortality. Integrated self-management interventions have been developed to address both general medical and psychiatric illnesses. This systematic review examined evidence about the effect of self-management interventions that target both general medical and psychiatric illnesses and evaluated 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 general medical and psychiatric self-management interventions for adults with schizophrenia spectrum or mood disorders and general medical comorbidity were included.

Results: Fifteen studies (nine randomized controlled trials and six pre-post designs) reported on nine interventions:

automated telehealth, Health and Recovery Peer program, Helping Older People Experience Success, Integrated Illness Management and Recovery, Life Goals Collaborative Care, Living Well, Norlunga Chronic Disease Self-Management program, Paxton House, and Targeted Training in Illness Management. Most studies demonstrated feasibility, acceptability, and preliminary effectiveness; however, clinical effectiveness could not be established in most studies because of methodological limitations. Factors identified that may deter implementation included operating costs, impractical length, and workforce requirements.

Conclusions: Integrated general medical and psychiatric illness self-management interventions appear feasible and acceptable, with high potential for clinical effectiveness. However, implementation factors were rarely considered in intervention development, which may contribute to limited uptake and reach in real-world settings.

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

A series of randomized controlled trials has 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 focus on self-management of general medical or psychiatric conditions may be insufficient because of the interdependence of general medical and psychiatric symptoms and disorders (11–13). For example, psychiatric symptoms might exacerbate general medical illness and vice versa.

As a result, self-management interventions have been developed more recently that build on the existing evidence base and simultaneously address both general medical and psychiatric illnesses. However, the current state of evidence about integrated self-management interventions has not been examined. Our objective was to expand on prior reviews that focused on general 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 general

TABLE 1. Integrated general medical and psychiatric self-management interventions for adults with serious mental illness^a

Study	Design	Sample	Setting	Diagnosis	Intervention	Duration	Interventionist	Comparison	Measures	Main outcome
Automated telehealth Pratt et al., 2013 (22)	Pre-post	N=70 (54 female; 1 minority); mean age, 52.7±10.6	Remote and home based	12 bipolar disorder; 29 major depressive disorder; 18 PTSD; 11 schizophrenia; 7 COPD; 11 chronic pain; 6 congestive heart failure; 46 diabetes mellitus	A remote device that targets self-management of multiple psychiatric and general 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 general medical psychoeducation prompts	Remote technology in the consumer's home supported by a nurse at a mental health center	na	Feasibility based on participant adherence; SCDSES, SF-12, BPRS, self-reported service use, health measures collected by the remote technology (BP, weight, and blood glucose)	Adherence over 70%; significant (p<.05) improvements at 6-month follow-up in depression self-management (SCDSES) (ES=-.33) and decrease in diastolic BP (ES=-.60). Among those with diabetes, significant (p<.05) reductions in blood glucose (ES=.43), routine primary care visits (ES=.64), and urgent care visits (ES=.11)
HARP Druss et al., 2010 (23)	RCT	N=80 (41 HARP; 39 usual care; 56 female; 66 minority); mean age, 48.1±10.1	CMHC	26 bipolar disorder; 21 major depressive disorder; 9 PTSD; 23 schizophrenia; 39 arthritis; 18 asthma; 18 heart disease; 50 hypertension	Targets self-management (i.e., connection between mind and body, cross-systems medication coordination, psychiatric and general medical advance directives, healthy lifestyles, pain and fatigue management, finding and interacting with a doctor)	6 group sessions; 6 months	2 certified mental health peer specialists	Usual care (continuation of all general medical, mental health, and peer-based services prior to study entry)	PAM, BRFSS, health service use, self-reported medication adherence, SF-36 PCS and MCS	Significant (p<.05) improvement in patient activation (PAM) and use of primary care, compared with usual care
HOPES Bartels et al., 2004 (26)	Controlled pilot	N=24; mean age, 66.5±5.7	Assisted living facility	4 bipolar disorder; 2 major depressive disorder; 2 psychotic disorder NOS; 3 schizoaffective disorder; 13 schizophrenia; (mean medical diagnoses, 4.3±2.7)	Enhanced Skills Training and Healthcare Management (STHM), later renamed HOPES (22)	12 months of twice weekly group meetings and weekly nurse preventive health care visits	Rehabilitation specialist and psychiatric nurse	Health care management only (N=12)	ILSS, SBS, BPRS, SANS, GDS, MMSE	STHM resulted in significant (p<.05) improvements in care-of-possessions item (ILSS), compared with the control group, but not on the mean ILSS score. No between-group differences for other measures

continued

TABLE 1, continued

Study	Design	Sample	Setting	Diagnosis	Intervention	Duration	Interventionist	Comparison	Measures	Main outcome
Bartels et al., 2014 (24); Mueser et al., 2010 (25)	RCT	N=183 (90 HOPES; 93 treatment as usual); mean age, 60.2	Mental health center or local senior center	26 bipolar disorder; 44 major depressive disorder; 52 schizoaffective disorder; 51 schizophrenia; 25 asthma; 23 heart disease; 42 COPD; 50 diabetes; 80 hypertension; 32 hypothyroidism	Targets psychosocial rehabilitation and psychiatric and general medical self-management (i.e., social skills, illness self-management, medication management, communication with health care providers)	12 months of weekly group meetings, two community trips per month to practice skills, and monthly preventive health care visits; during maintenance phase are monthly group skills training, community trips, and meetings with nurse	Groups co-led by a nurse and bachelor's-level case manager; nurse preventive health care visits	Treatment as usual (usual mental health services, including pharmacotherapy, case management or outreach by nonnurses, individual therapy, and rehabilitation services, such as groups or psychoeducation)	UPSA, MCAS, SBS, ILSS, RSES, SANS, cognitive functioning (ID-KEFS, CVLT-II, card sorting test, Tower of London task, proverbs test, word context test, 20 questions test), BPRS, SF-36, CESD, CCI	Retention was high (80%). Compared with treatment as usual at 2-year follow-up, HOPES resulted in significant ($p < .05$) improvements in performance skills (UPSA), psychosocial and community functioning (MCAS), leisure and recreation (ILSS), negative symptoms (SANS), and self-efficacy (RSES). Results at 3-year follow-up showed significant ($p < .05$) improvements in community living skills (ILSS and MCAS), performance skills (UPSA), self-efficacy (RSES), and psychiatric symptoms (BPRS). At 3-year follow-up, significantly ($p < .05$) greater use of preventive health care, screening, and care planning with advance directives
I-IMR Mueser, et al., 2012 (27)	Pre-post	N=7 (3 female); mean age, 59	CMHC	3 schizophrenia; 1 bipolar disorder; 3 major depressive disorder; 7 hypertension; 4 hyperlipidemia; 3 COPD; 2 osteoarthritis; 1 diabetes	Targets self-management of multiple psychiatric and general medical illnesses (i.e., individualized goal development, recovery strategies, connection between mind and body, psychoeducation, healthy lifestyles, managing stress, managing psychiatric and general medical health, medication management, and relapse prevention plans).	8 months of weekly individual sessions	Master's-level social worker supported by a nurse care manager	na	BPRS, IMR scales, SRAHP	High participation in I-IMR (71% attended ≥ 10 sessions); some improvements among individual participants but no aggregate results reported

continued

TABLE 1, continued

Study	Design	Sample	Setting	Diagnosis	Intervention	Duration	Interventionist	Comparison	Measures	Main outcome
Bartels et al, 2014 (28)	RCT	N=71 (36 I-IMR; 35 usual care; 39 female; 2 minority); mean age, 60.3±6.5	CMHC	13 bipolar disorder; 31 major depressive disorder; 27 schizophrenia spectrum; 16 COPD; 34 diabetes; 33 hyperlipidemia; 29 hypertension; 46 osteoarthritis	See above (27)	8 months of weekly individual sessions	Master's level social worker supported by a nurse care manager	Usual care (included pharmacotherapy, case management or outreach by nonnurse clinicians, individual therapy, and access to psychosocial support and rehabilitation services)	I-IMR scales, SCDSES (SCDSES-adapted measures of diabetes, COPD, hypertension, hyperlipidemia, arthritis self-management), BPRS, MCAS, SPCS, API, self-reported hospitalizations and emergency visits	Compared with usual care, I-IMR resulted in significant improvements (I-IMR scales) in psychiatric (ES=.46) and general medical (ES=.29) illness self-management and significant improvements (SCDSES) in diabetes (ES=.15). During primary care visits, there was an increase (API subscale) in preference for comprehensive diagnosis and treatment information (ES=.88) and decreases in self-reported psychiatric or medical hospitalizations (p=.037).
LGCC Kilbourne et al, 2008 (29)	RCT	N=58 (all veterans; 27 BCM; 31 usual care; 5 female; 6 minority); mean age, 55.3±8.4	Veterans Affairs outpatient mental health facility	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 COPD; 4 chronic hepatitis; 19 osteoarthritis	BCM, later renamed LGCC (30)	4 2-hour group sessions followed by 6 months of monthly telephone care management services	Care management by a nurse; groups led by a nurse manager	Usual care	SF-12, WHO-DAS, ISS, LSMECD, CAS, current medication use, number of outpatient general medical visits	Compared with usual care, BCM resulted in significant (p<.05) improvements in physical health –related quality of life (SF-12 PCS).
Kilbourne et al, 2012 (30)	RCT	N=65 (32 LGCC; 33 usual care; 39 female; 12 minority); mean age, 45.3±12.8	Community-based mental health outpatient clinic	65 bipolar disorder; 35.2±7.3 BMI; 45.0±6.0 inches waist circumference; 133.9±1.7 mmHg systolic BP; 85.1±11.1 mmHg diastolic BP	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 cope with symptoms); care management, and	4 2-hour group sessions followed by 6 months of telephone care management services	Master's-level social worker	Enhanced treatment as usual (included monthly receipt of mailings on wellness topics over the 6-month LGCC intervention period, in addition to available mental health care and referral to primary care services off site	Cardiometabolic risk (BMI, systolic/diastolic BP), SF-12; WHO-DAS, ISS	Only for consumers with BMI ≥30, compared with usual care, LGCC resulted in a significant decrease in impaired functioning (WHO-DAS) (β=-2.2) and depressive symptoms (ISS) (β=-2.0). Among those with systolic BP ≥140, LGCC

continued

TABLE 1, continued

Study	Design	Sample	Setting	Diagnosis	Intervention	Duration	Interventionist	Comparison	Measures	Main outcome
Kilbourne et al., 2013 (31)	RCT	N=118 (all veterans; 60 LGCC; 58 usual care; 20 female; 6 minority; mean age, 52.8±9.9)	Outpatient mental health or primary care clinic	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	See above (30) self-management practice guidelines are given to providers	4 2-hour group sessions followed by 6 months of telephone care management services	Master's-level health specialist	Enhanced usual care (regular mailings on wellness topics, in addition to standard mental health and general medical treatment; standard treatment included outpatient case management and group psychotherapy sessions specifically focused on mental health treatment and provided by a mental health team, as well as access to a primary care provider)	Systolic/diastolic BP, cholesterol, SF-12, WHO-DAS, ISS	resulted in a significant decrease in impaired functioning (WHO-DAS) ($\beta = -3.8$) and depressive symptoms (ISS) ($\beta = -3.5$). Compared with usual care, LGCC resulted in a significant ($p < .05$) reduction in systolic ($\beta = -3.1$) and diastolic BP ($\beta = -2.1$) and fewer manic symptoms (ISS) ($\beta = -23.9$).
Living Well Goldberg et al., 2013 (32)	RCT	N=63 (32 Living Well; 31 usual care; 33 female; 42 minority); mean age, 49.5±9.1	Outpatient clinic and psychiatric rehabilitation day program	All bipolar disorder with psychotic features or schizophrenia spectrum disorder; 27 arthritis; 17 cardiovascular disease; 31 diabetes; 25 respiratory disease	Targets psychiatric and general 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 status and vice versa	13 weekly group sessions and weekly follow-up telephone calls	Groups co-led by a mental health peer and a mental health provider or by 2 mental health peers who also have a chronic general medical condition; follow-up telephone calls by peers	Usual care	SF-12, SMSES, PAS, MHL, RAS-SF, IMSM, MMAS	Compared with usual care, between baseline and 13 weeks, Living Well resulted in significant ($p < .05$) improvements as follows: in physical functioning (ES= .55), emotional well-being (ES= .66), and general health functioning (ES= .68) (SF-12 MCS and PCS); in self-management self-efficacy (ES= .65) (SMSES); in patient activation (ES= .55) and approach to health care (ES= .61) (PAS); and in self-management

continued

TABLE 1, continued

Study	Design	Sample	Setting	Diagnosis	Intervention	Duration	Interventionist	Comparison	Measures	Main outcome
Norlunga program Lawn et al., 2007 (33)	Pre-post	N=38 (35 Flinders care planning; 17 Stanford groups; 3 Stanford groups only; 21 female); males/mean age, 39; females' mean age, 46	Primary care	4 anxiety disorder; 5 bipolar disorder; 8 major depressive disorder; 1 personality disorder; 4 schizoaffective disorder; 16 schizophrenia; 22 with ≥2 conditions; most common conditions: obesity, asthma and other respiratory conditions, heart disease, and diabetes	Targets psychiatric and general medical self-management through education and peer support	12 months of a hybrid individual and group approach	Peer educators	na	PH, P&G, WSAS, SF-12	Norlunga program resulted in significant ($p<.05$) improvements at 3 and 6 months in self-management (PIH) and mental functioning (SF-12 MCS), in social leisure activities (WSAS), and in reduced problem impact (P&G). Qualitative feedback was supportive of the intervention.
Paxton House Teachout et al., 2011 (34)	Pre-post	N=13 (4 female; 9 minority); mean age, 45.0±6.9	Supported housing residence	2 major depressive disorder; 1 psychotic disorder NOS; 6 schizophrenia; 4 schizoaffective disorder; all with type II diabetes	Offers psychosocial rehabilitation and diabetes self-management services (i.e., diabetes education and nutritional programs), intensive case management, and residential support	6 months of individual and group sessions	Advanced-practice nurses and clinical staff	na	Weekly weight; daily blood glucose, satisfaction survey, DES-SF	At 6-month follow-up, Paxton House resulted in weight loss for all participants (mean=20.35 pounds), improved fasting glucose for 40%, and overall satisfaction with the program.

continued

TABLE 1, continued

Study	Design	Sample	Setting	Diagnosis	Intervention	Duration	Interventionist	Comparison	Measures	Main outcome
Blixen et al. 2011 (35); Sajatovic et al., 2011 (36)	Pre-post	N=12; age range, 33–62; median age, 49.5	Primary care	Bipolar disorder, major depressive disorder, schizophrenia, or schizoaffective disorder; all with diabetes	Targets psychiatric and diabetes self-management	12 weekly 60- to 90-minute group sessions and 4-week maintenance period consisting of weekly telephone sessions	Groups co-led by peer educator with serious mental illness and diabetes and nurse educator	na	BPRS, MADRS, CGI, GAF, SDS, HbA1c, BMI; SF-12, SDSCA	TTIM qualitative findings suggest increased illness knowledge, self-confidence, and motivation. Quantitative findings suggest increased self-management of serious mental illness and diabetes, such as reduction in psychiatric symptom severity (BPRS) and improvement in perceived mental and physical health status (SF-12 MCS and PCS). For 8 participants, improvement in HbA1c was noted. Significant ($p < .05$) improvement in dietary behaviors for diabetes self-management (SDSCA)

^a Abbreviations: API, Autonomy Preference Index; BCM, Bipolar Disorder Medical Care Model; BMI, body mass index; BP, blood pressure; BPRS, Brief Psychiatric Rating Scale; BRFS, Behavioral Risk Factor Surveillance System; CAS, Cunningham Access Survey; CCI, Charlson Comorbidity Index; CDSMP, Chronic Disease Self-Management Program; CESD, Center for Epidemiologic Studies Depression Scale; CGI, Clinical Global Impressions; CMHC, community mental health center; COPD, chronic obstructive pulmonary disease; CVLT-II, California Verbal Learning Test-II; DES-SF, Diabetes Empowerment Scale Short Form; D-KEFS, Delis-Kaplan Executive Functioning System; ES, effect size; GAF, Global Assessment of Functioning; GDS, Geriatric Depression Scale; HARP, Health and Recovery Peer Program; HbA1c, hemoglobin A1c; HOPES, Helping Older People Experience Success; I-IMR, Integrated Illness Management and Recovery; IIMR scales, Illness Management and Recovery Scales (client-rated and clinician rated); ILSS, Independent Living Skills Survey; IMSM, Instrument to Measure Self-Management; ISS, Internal State Scale; LGCC, Life Goals Collaborative Care; LSMED, Lorig Self-Management Efficacy in Chronic Disease 6-Item Scale; MADRS, Montgomery-Asberg Depression Rating Scale; MCAS, Multnomah Community Ability Scale; MHLC, Multidimensional Health Locus of Control; MMAS, Morisky Medication Adherence Scale; MMSE, Mini Mental State Exam; Norlunga program, Norlunga Chronic Disease Self-Management program; P&G, Problem and Goals Assessment; PAM, Patient Activation Measure; PAS, Patient Activation Scale; PHQ-9, Patient Health Questionnaire; PIH, Partners in Health scale; RAS-SF, Recovery Assessment Scale–Short Form; RCT, randomized controlled trial; RSES, Revised Self-Efficacy Scale; SANS, Scale for the Assessment of Negative Symptoms; SBS, Social Behavior Schedule; SCDSES, Stanford Chronic Disease Self-Efficacy Scale; SDS, Sheehan Disability Scale; SDSCA, Self-Rated Diabetes Self-Care Activities; SF-12, 12-item Short-Form Health Survey; SF-36, 36-item Short-Form Health Survey (mental component score [MCS] and physical component score [PCS]); SMSES, Self-Management Self-Efficacy Scale; SPCS, Stanford Physician Communication Scale; SRAHP, Self-Rated Abilities for Health Practices Scale; TTIM, Targeted Training in Illness Management; UPSA, UCSD Performance-Based Skills Assessment; WHO-DAS, World Health Organization Disability Assessment Scale; WSAS, Work and Social Adjustment Scale

medical and psychiatric self-management interventions that target adults with serious mental illnesses and chronic general 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 term. To identify articles not included in our original search, we reviewed reference lists of studies that met inclusion criteria and searched Google Scholar by using different combinations of the terms.

Study Selection Criteria

Studies were selected by the first two authors, who independently screened titles and abstracts for inclusion criteria: self-management intervention studies that addressed both general medical and psychiatric self-management, defined as interventions that target general medical management, role management, or emotional management (6,16) and that enrolled adults ages 18 and older with a diagnosis of schizophrenia, schizoaffective disorder, or bipolar disorder and a medical illness, including diabetes, heart disease, chronic obstructive pulmonary disease, or arthritis or chronic pain. We excluded preventive 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 resolved by these authors.

There was no restriction on language. We included randomized controlled 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 0 (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 ratings were addressed and resolved by the first two authors.

Potential for Implementation

To examine potential for implementation, we picked variables that could facilitate uptake and that could also be reported in the articles included in this review. These included intervention structure, intervention duration, 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, and 50 did not meet criteria. None of the non-English language articles met inclusion criteria. Four additional articles were found by searching reference lists from the 14 articles that met inclusion criteria, and one of the four met inclusion criteria. Overall, 15 studies met our inclusion criteria and were included in this review. [A flowchart summarizing article selection is included in an online supplement to this article.]

Many of the eliminated studies reported on interventions targeting only psychosocial skills training (for example, Functional Adaptation Skills Training and Behavioral Social Skills Training [20]), general medical comorbidities (for example, the chronic disease self-management program [4]), or serious mental illness (for example, FOCUS [21]).

The 15 included studies reported on nine interventions (Table 1): 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). Interventions were studied in diverse types of settings. Two interventions, HOPES (24–26) and I-IMR (27,28), were developed for middle-aged and older adults with serious mental illness.

Evidence of Intervention Feasibility, Acceptability, and Effectiveness

Six interventions (automated telehealth, HARP, HOPES, I-IMR, Living Well, and Norlunga Chronic Disease Self-Management program) targeted a heterogeneous set of serious mental illnesses and general medical illnesses that require ongoing treatment (congestive heart failure, hypertension, diabetes, chronic obstructive pulmonary disease, hypothyroidism, asthma, and heart disease) (22,24–28). One intervention (LGCC) specifically addressed bipolar disorder and general medical illnesses that require ongoing treatment (hypertension, hyperlipidemia, diabetes mellitus, obesity, and heart disease) (29–31). Two interventions (Paxton House and TTIM) addressed a heterogeneous set of serious mental illnesses and one general medical illness that requires ongoing treatment (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, service use, 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 risk factors for premature mortality (for example, blood pressure and weight) significantly improved among consumers receiving integrated self-management interventions in four studies (22,31,34,36) (Figure 1). Use of acute services significantly decreased in two studies (22,28). In seven studies, functional status showed significant positive changes (25,28–33).

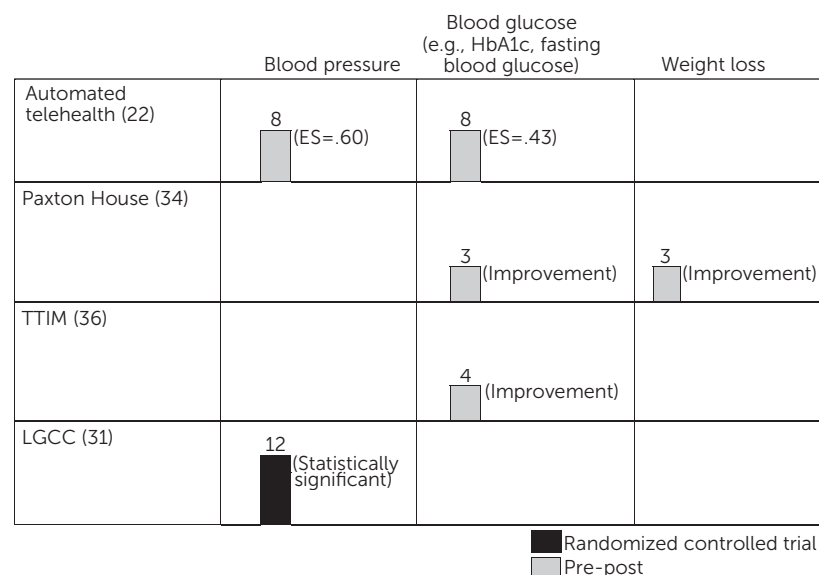
Methodological Quality Assessment

Using the MQRS, we evaluated the methodological quality of the studies. The MQRS scores ranged from 3 to 14, with a mean \pm SD score of 8.69 ± 3.88 and a median score of 9; two studies had a score over 14, indicating a high-quality study (Table 2). Factors that contributed to lower scores included lack of objective measurement of outcomes ($N=8$, 62%) and not enumerating dropouts ($N=8$, 62%). Strengths included use of a manualized intervention design ($N=9$, 69%), provision of sufficient information for replication ($N=11$, 85%), and inclusion of baseline characteristics ($N=10$, 77%).

Potential for Implementation

To assess for implementation potential, we examined intervention structure, duration of the intervention, setting,

FIGURE 1. Harvest plots of the effectiveness of integrated general medical and psychiatric illness self-management interventions on risk factors for early mortality risk^a



^aTTIM, Targeted Training in Illness Management; LGCC, Life Goals Collaborative Care. Each bar represents a study categorized by intervention. The height of the bar shows the relative sample size, and the number is the Methodological Quality Rating Scale score. Possible scores range from 0, poor quality, to 17, high quality.

and interventionist. Most of these interventions were designed primarily for groups, 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 four to 52 group sessions. Telephone care management, community trips, and monthly preventive health care supported these interventions (23–25,29–32).

Other interventions included hybrid, individual, and group models. The Paxton House intervention includes a six-month hybrid individual and group model (34), TTIM includes 12 weekly 60–90 minute group sessions and a four-week maintenance period consisting of weekly telephone sessions (35,36), and Norlunga Chronic Disease Self-Management includes 12 months of a group-hybrid model (33). The remaining interventions were automated telehealth, which provides daily self-management prompts by using a device in a person's home for six months (24 weeks) (22), and I-IMR, which requires weekly individual sessions for eight months (32 weekly sessions) (27,28).

Interventions were studied in a range of settings, including remote (that is, within a person's home) (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 Affairs primary care (31), primary care (33,35,36), outpatient clinic and psychiatric rehabilitation programs (32), and a supported housing residence (34).

Interventionists included a rehabilitation specialist and psychiatric nurse (26), nurse and bachelor's-level case manager (24,25), social worker supported by a nurse care

TABLE 2. Methodological quality of studies included in the review, by attribute^a

Attribute (range of possible scores)	Sajatovic et al. (36); Blixen et al. (35)		Druss et al. (23)		Bartels et al. (26)		Goldberg et al. (32)		Mueser et al. (25); Bartels et al. (24)		Kilbourne et al. (29)		Kilbourne et al. (30)		Kilbourne et al. (31)		Lawn et al. (33)		Teachout et al. (34)		Mueser et al. (27)		Bartels et al. (28)		Pratt et al. (22)			
	1	0	3	1	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Study design (0–4)	1	1	3	1	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Replicability (0–1)	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Baseline (0–1)	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Quality control (0–1)	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Follow-up length (0–2)	0	1	1	1	2	0	2	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Follow-up rate (0–2)	0	1	1	1	0	2	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Objective measurement of outcomes (0–1)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Dropouts (0–1)	0	0	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Independent (0–1)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Analyses (0–1)	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Study site (0–1)	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Collateral (0–1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total score	4	4	10	10	6	10	10	10	14	12	13	12	12	13	12	12	12	12	12	12	12	12	12	12	12	12	12	12

^a As measured by the Methodological Quality Rating Scale. Total scores range from 0 (poor quality) to 17 (high quality), and studies that receive a score of ≥ 14 are considered to be high-quality studies

manager (27,28), nurse (29), master’s-level social worker or health specialist (30,31), advanced-practice nurse and clinical staff (34), peers (23,32,33), and 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 general 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 self-management interventions. Most of the studies established support for the feasibility, acceptability, and preliminary clinical effectiveness of the intervention in regard to enhancing participants’ knowledge of self-management skills, promoting behavioral and attitudinal changes toward managing illnesses, reducing psychiatric symptoms, stimulating changes in biological indicators of general medical illnesses, and reducing use of acute services.

Although these studies had positive findings, outcome measures varied greatly. More than 70 different measures were used to collect data, which indicates the complexity involved in simultaneously measuring multiple general medical and psychiatric outcomes. Composite measures that aggregate data on biological indicators of various diseases and their 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 that the Framingham Risk Score was not associated with any changes among adults with serious mental illness who were participating in multicomponent intervention models (37). One explanation for differences in findings between the general population and adults with serious mental illness may be that 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 to antipsychotic medication (39), trauma (40), and chronic stress (41), that could result in variations in risk scores on biometric indices of cardiovascular disease, compared with the general population. Research has shown that risk prediction models that included biobehavioral variables, such as social deprivation, psychiatric diagnosis, prescriptions for antidepressants and antipsychotics, and alcohol use, were better than the Framingham Risk Score for predicting risk among adults with serious mental illness (42). Future development of risk assessments for morbidity and mortality might be improved by inclusion of 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 risk

factors for early mortality (for example, high blood pressure and obesity) among individuals with serious mental illness. However, the clinical effectiveness of these interventions could not be established because of methodological limitations. Therefore, we do not know the extent to which integrated general medical and psychiatric self-management interventions have a direct impact on the general medical health of individuals with serious mental illness. More rigorous evaluations of these interventions are warranted.

The evidence base for integrated self-management interventions is predominantly built on single-site trials that included small samples and varied in follow-up length, which greatly limited the external validity of these interventions in real-world settings. One intervention, HOPEs (24,25), received 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 to conduct a weekly group intervention for 12 months may deter broad implementation.

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

Some promising intervention characteristics may increase the potential for implementation—such as limiting the physical resources required to implement an intervention, using technology, and hiring and training peers to deliver services. Meeting as a group can also shorten the amount of time a provider spends with consumers delivering the intervention; however, meeting as a group may have an impact on intervention effect. Future research is needed to examine active intervention components and mechanisms of behavioral change. This research has the potential to reduce the duration of the intervention.

In one study, automated telehealth was used to deliver an integrated self-management intervention (22). Results of this study suggest that a remote technology-based integrated general medical and psychiatric self-management intervention is feasible and acceptable and may be effective with participants who have heterogeneous general medical and psychiatric conditions. Although remote technology-based interventions are promising, it is not clear whether this type of technology provides benefits similar to those of in-person integrated self-management interventions that promote community participation (24,25) and practice of self-management skills in the community (for example, grocery shopping and cooking). Remote technology-based interventions may be best suited for adults with serious

mental illness who have mobility limitations or transportation difficulties or who live in rural areas. An emerging research literature documents that adults with serious mental illness are using mobile health and electronic health technologies, including online, wearable, or remote devices, to engage in behavioral health interventions (43). However, it is not known whether such technologies can facilitate the implementation and delivery of effective integrated self-management interventions outside remote locations.

Peer-delivered, integrated self-management interventions are another potentially viable option. Studies have shown that involving peers in interventions for adults with serious mental illness may solve problems related to workforce shortages. Interventions that include peers, including HARP (23), Living Well (32), Norlunga Chronic Disease Self-Management program (33), and TTIM (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 (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.

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

CONCLUSIONS

This review identified five additional studies and three additional interventions not identified in previous systematic reviews (14,15). Our review expands on earlier reviews that focused on general medical self-management only (14) and psychiatric self-management only (15) by focusing on integrated interventions and identifying potential mechanisms to facilitate implementation. Evaluations of integrated self-management interventions have established strong support for their 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.

Because integrated illness 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 adults with serious mental illness by using composite measures that consider specific biobehavioral and environmental risk exposures that affect this group. Furthermore, new and existing self-management interventions should consider alternative service delivery strategies to “scale up” interventions, including group-based interventions, mobile health or electronic health technologies, and peer-delivered services. Future research could consider expanding on efforts to modify and deliver programs that are 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 general medical conditions. For example, the widely used chronic disease self-management program, which has been adapted for individuals with serious mental illness to manage general 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 general medical illness self-management programs across the usual clinical settings that serve this population.

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