

In Brief

Peer support has become increasingly recognized as a viable and promising model for long-term diabetes self-management. Although there have been several reviews of peer support studies in diabetes, to date, there has been no review that has focused exclusively on interventions involving volunteer peer supporters. This article reviews volunteer-based peer support interventions and examines the implementation strategies and diabetes-related health outcomes associated with them.

A Review of Volunteer-Based Peer Support Interventions in Diabetes

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Given the complexity of diabetes self-management activities and patients' resultant need for lifelong diabetes self-management support (DSMS), peer support has been increasingly examined as a potential model for diabetes self-management education (DSME) and ongoing DSMS.¹ Dennis² defines peer support as "the provision of emotional, appraisal, and informational assistance by a created social network member who possesses experiential knowledge of a specific behavior or stressor and similar characteristics as the target population, to address a health-related issue of a potentially or actually stressed focal person." During the past decade, there has been a proliferation of research examining the feasibility, acceptability, and health-related impact of peer support interventions in the context of diabetes care.³⁻¹⁴

Based on a review of peer support interventions for patients with diabetes, Heisler^{15,16} identified five models of peer support, including 1) face-to-face group self-management programs, 2) peer coaches or mentors, 3) community health workers (CHWs), 4) telephone-based peer support, and 5) Internet or e-mail-based peer support.

Face-to-face group support typically involves a peer supporter or a team of peer supporters delivering DSME or DSMS in a group-based setting such as the diabetes-specific version of the chronic disease self-management program of Lorig and Gonzales.¹⁷ Peer coaching or mentoring usually involves individuals

working with patients on a less structured basis providing emotional support and serving as a role model.¹⁸ CHWs are individuals who live in the same community and share the same cultural background, values, and customs as the target patient population.^{19,20} CHWs provide informational, instrumental, and emotional support and often function as a bridge between community members and the health care system.^{19,20} In fact, some studies in a 2007 systematic review of diabetes interventions²¹ involving CHWs reported improvements in clinical (glycemic control, lipid values, blood pressure), self-care (diet, exercise, blood glucose testing), and psychosocial (e.g., fatigue, self-efficacy, and self-reported health) outcomes. Telephone-based and Internet-based interventions offer a mechanism of support that not only is low in cost, but also is not restricted by geographic boundaries or distance.^{15,16,22,23} In addition, these forms of technology-assisted peer support are especially suitable for patients who are less comfortable with face-to-face interactions or who live in rural areas where transportation may be a barrier to accessing services. No matter the specific form of peer support, they share the common goal of providing ongoing support to individuals in the day-to-day self-management of their diabetes.

In addition to the potential for improving diabetes-related health outcomes, peer support programs are also promising as a sustainable and

cost-effective component of a health care system given that they have been found to improve treatment adherence, reduce missed appointments, and allow health care specialists to focus on their areas of expertise.²³ Nevertheless, peer support interventions are still associated with some level of cost because peer supporters are often hired as employees either full time or part time, and, irrespective of pay, they require training, supervision, and coordination.^{24–26}

According to a review of eight CHW programs, six (75%) programs employed CHWs as full-time or part-time staff.²⁷ For example, in a randomized, controlled trial (RCT) of a nurse case manager and CHW team intervention, CHWs received a mean salary of \$20,000 for working with study participants.²⁸ Similarly, in a study examining the impact of a pharmacist- and health promoter-led intervention, the health promoter position was paid \$15 per hour to assist patients in improving their medication adherence via home, clinic, and telephone support interactions.²⁹ Finally, in a study by Ingram et al.³⁰ of a peer-led self-management intervention for Mexican Americans with diabetes, *promotoras* (the term for peer supporters in the Latino community) were employed as full-time staff by the community health center to conduct outreach and education and earned an hourly wage of \$7–10, with health benefits.

Previous research has also demonstrated potential costs associated with programs engaging volunteer peer supporters, ranging from the need for recognition and modest remuneration (for gas, phones, and other expenses) to the need for sustainable program infrastructure.³¹ Volunteer programs may also face unique challenges with regard to peer training and program activities as they strive to balance program needs with a respect for volunteers' time.

Although there have been several reviews of peer support studies in diabetes to date,^{1,15,16,21,27,32} there has been no review that has focused exclusively on interventions involving volunteer peer supporters. Examining the implementation and outcomes of volunteer-based peer support programs will shed light on additional strategies for improving patients' diabetes self-management, particularly in underserved communities where

few resources may be available to hire peer supporters. For this reason, the purpose of this article is to examine the diabetes-related health impact of volunteer-based peer support interventions in diabetes.

Review Methods

Data sources

The literature search was designed and implemented by a librarian (G.R.) in November 2010. To identify peer-support interventions in diabetes, searches were conducted in three databases: MEDLINE, Web of Science (i.e., Science Citation Index), and PsychINFO. Permutations of keywords and controlled vocabulary search terms were used in combination and represented three concept elements: "diabetes" AND "peer support" AND "outcomes." All three database searches used similar search terms to maintain consistency of search strategies and ensure relevant search retrieval. Wherever possible, the search strategies included search limiters to restrict retrieval to English-language articles, those published from 1990 to the present, and those conducted in adults. A total of 523 original article citations were retrieved. Figure 1 presents the literature search process.

The initial review involved two individuals (T.S.T. and A.C.) independently evaluating abstracts and titles of articles to determine potential inclusion. For studies deemed potentially eligible, the full-text articles were obtained to perform a more comprehensive examination. Final selection was rendered after discussion and consensus. Additional studies were identified via backward-searching strategies and contact with authors of included studies (regarding recently published articles).

Study selection

This review focused on patient-related health outcomes of diabetes interventions involving volunteer peer supporters. We considered peer supporters to be volunteers if they were not full- or part-time employees of the clinics, organizations, or universities in which they served. We did include programs in which peer supporters received a stipend or honorarium used to offset the costs of participation (e.g., transportation and childcare). For studies that did not explicitly report

information regarding employment status, we contacted the authors to obtain this information.

We also applied other criteria for study inclusion. Specifically, studies also had to 1) describe an intervention focused on self-management rather than prevention; 2) include an explicit training component for peer supporters; 3) report clinical, behavioral, knowledge, and/or psychosocial outcomes; and 4) use an RCT or quasi-experimental (e.g., pre-/post- or case-comparison) study design. Studies involving family members as peer supporters were excluded.

Data abstraction

Data abstraction was conducted in a two-stage process. First, one of the authors (T.S.T.) reviewed the selected studies and abstracted the relevant data using a standardized outline. Second, two other authors (G.X.A. and A.C.) performed a subsequent review to confirm the accuracy of the abstraction. Any disagreement was discussed by at least two of the reviewers and resolved.

Abstracted data were organized into two general categories: study characteristics (Table 1) and study outcomes (Table 2). Study characteristics included the study design, participant selection and characteristics, peer supporter selection and characteristics, peer supporter training, and description of the intervention. Participant demographic characteristics were presented for the total study sample at baseline. In cases where studies reported demographic information separately for the intervention and control groups, we took an average of the two values. Study outcomes included the length of follow-up and retention rate, clinical outcomes, behavioral and knowledge outcomes, psychosocial outcomes, and program satisfaction.

Review Results

Studies included

Twelve intervention studies met the inclusion criteria in 16 publications (four were companion papers).^{3–14,33–36} The 12 interventions included seven RCTs, four studies using a pre-/post-design,^{6,8,10,13} and one study using nonrandomized allocation of intervention and comparison groups.¹⁴

Intervention delivery

Face-to-face, group-based programs.

Seven (58%) studies were face-to-face, group-based interventions.^{3,5,6,10-12,14} They ranged in length from six weekly 90-minute group discussions³ to 46 weekly 90-minute group discussions.¹⁰ In all but a few cases, the intervention was delivered by a single peer supporter.^{3,5,10,14} None of the interventions appeared to involve other health care providers in the delivery of the peer-support component. However, all of the group-based interventions incorporated skills-development components such as goal setting, action-planning, and problem solving.

Telephone-based platforms. Five studies tested telephone-based interventions, with two interventions engaging peers to help patients follow through on physician treatment recommendations.^{4,7} Two studies used an interactive voice response (IVR) platform to facilitate communication and exchange reciprocal support between two peer partners.^{8,9} And, one study involving CHWs used telephone support as one modality of intervention delivery.¹³

Intervention setting

Six studies were conducted in a community setting.^{6,10-14} Two studies were conducted in a clinic setting.^{3,5} The four studies using a telephone/IVR platform were conducted in a home setting.^{4,7-9} Eight studies were conducted in the United States,^{4,6,8-13} three were conducted in the United Kingdom,^{3,5,7} and one was conducted in Canada.¹⁴

Target population

Six studies recruited samples that were largely white.^{5,7-10} Five studies targeted ethnic minority populations,^{4,6,11-13} and one study did not report the racial or ethnic breakdown of the sample.¹⁴ With exception of studies by Heisler et al.^{8,9} involving male Veterans Administration (VA) patients, participants across all studies were largely female (range 42–78%) and middle-aged to older (range 52.9–72.7 years). Participants were recruited from the clinic registry,³ VA databases,^{8,9} primary care practices or community health centers,^{4,5,7,13,14} and community-based organizations and sites.^{6,10,11}

Of the six studies that reported language proficiency as a demographic descriptor of the sample,^{3,4,7,8,11,14} 41% of participants in one study had lim-

ited English proficiency,⁴ whereas a majority of participants from another study were proficient in both Spanish and English.¹¹ Of the three studies that reported employment status,^{5,6,13} employment rates ranged from 12 to 39%. Of the five studies that reported income,^{6,8-10,13} the percentage of participants who earned < \$30,000 per year ranged from 48 to 73%.

Peer supporter recruitment

Peer supporters were recruited from multiple sources, including advertisements in diabetes-focused magazines,³ diabetes care centers,^{3,7} primary care practices,⁵ physician referrals,¹³ membership at a senior citizen center,⁴ previous diabetes education or health promotion programs,^{6,11,14} community presentations,¹² community postings,⁶ and word of mouth.⁶ In two studies,^{8,9} the peer supporters were patients trained to support another patient with diabetes.

Several studies explicitly outlined a set of criteria used to identify and select potential peer supporters. Desirable characteristics and attributes included being actively engaged

in community-based activities,⁴ being willing and available to be trained and conduct the subsequent intervention,^{5,6} demonstrating proficiency in the target community's primary language,⁶ having good interpersonal skills,^{6,13} possessing similarities to target participants,¹⁰ being respected in the community,¹⁰ having previous experience facilitating groups,¹⁰ having the ability to motivate others,¹⁰ having good listening skills,¹⁰ having basic problem-solving skills,¹⁰ living in the community being served,^{11,12} and being willing to help the community.¹³ Although some studies only involved peer supporters who were diagnosed with diabetes,^{5,8-10} other studies included peer supporters who had cared for or who were living with someone with diabetes.^{6,13}

Training of peer supporters

Peer supporter training varied substantially with regard to duration and intensity. We classified training intensity level into three categories (low, moderate, and high) based on the number of hours or days allotted for training. Six studies had training

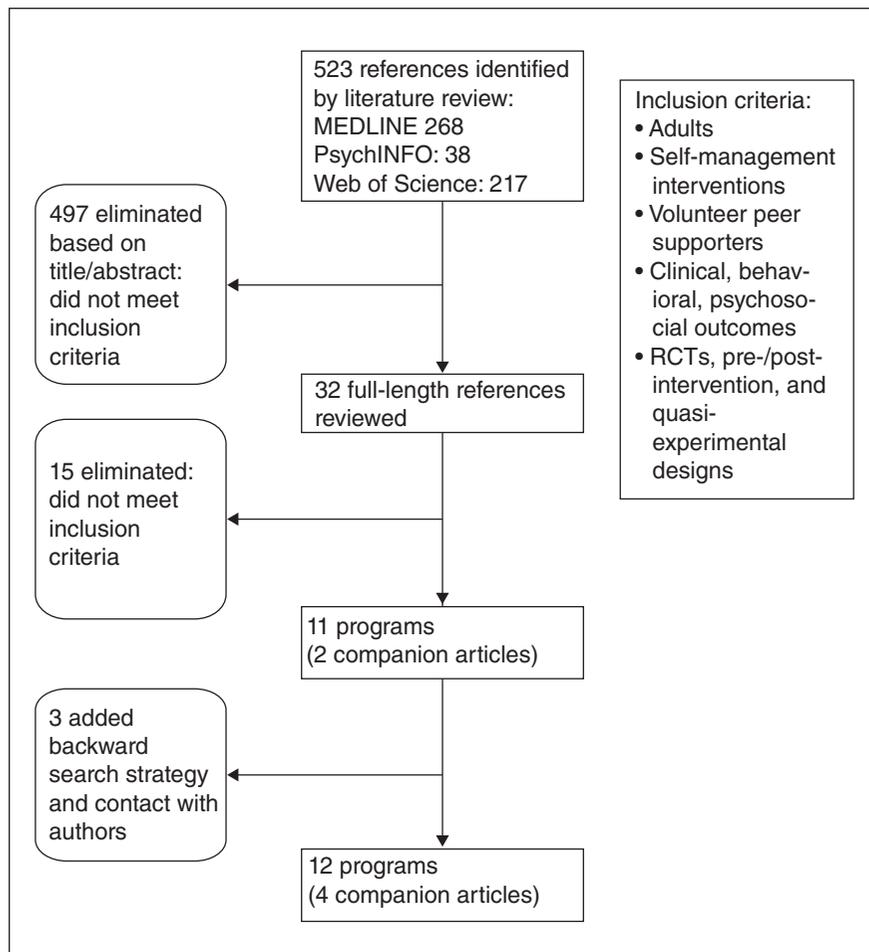


Figure 1. Literature search.

Table 1. Study Characteristics

| Study Reference | Study Design | Participants ³ | | Peer Supporters | | | Intervention |
|--------------------|------------------|---|--|--|--|--|---|
| | | Selection | Demographics | Selection | Training | Support Structure | |
| Baksi et al., 2008 | RCT | Random sample of adults ($n = 83$) with diabetes between the ages of 18 and 75 years and affiliated with a secondary care diabetes center | Average age 59.9 years 48% female Employment NR Income NR Ethnicity NR 100% English-language proficient | Volunteers from a diabetes care center ($n = 9$) | Completion of basic training consisting of 18 weekly sessions of DSME and communication skills training (90 minutes per session) plus additional 33 sessions led by specialist health professionals (SHPs); SHPs modeled presentation followed by peer advisor rehearsal with feedback | No stipend or honorarium for training; 40£ (U.K.) per session of teaching in the intervention ⁵ | Ix ₁ = 6 weekly 90-minute sessions of group-based DSME taught by peer advisors in diabetes Ix ₂ = same as above, but taught by SHPs |
| Batik et al., 2008 | RCT | Adults ≥ 65 years of age ($n = 305$) identified through patient registries of two community clinics; had to have received care within the past 18 months | Average age 72.7 years 69% female Employment NR Income NR 83.5% non-White 59% English-language proficient | Members of a senior citizen center ($n = 5-8$ volunteers at any given time) ⁵ | Modified Active Choices training program plus additional training by program coordinator; the training was a 5-hour workshop focused on motivational interviewing skills ⁵ | No stipend or honorarium | Ix: 12-month telephone support (based on Active Choices); focus on building and sustaining motivation for following a physical activity regimen developed by patients and providers Control: delayed treatment |
| Cade et al., 2009 | RCT ¹ | Adults with type 2 diabetes ($n = 317$) ² recruited from primary care practices in greater Lancashire, U.K. | Average age 65.8 years 42% female 12% employed Income NR 95% white Language NR | Peer educators recruited in similar manner as participants • 5 recruited • 1 dropped out because of delays • 2 dropped out because of health • 2 more recruited • $n = 4$ | Residential 4-day training course provided by the National Health Service Expert Patients Programme and additional training to deliver diabetes-specific components of the course, plus first session supervised | No stipend or honorarium; ongoing meetings | Ix: Seven weekly 2-hour group sessions using the Expert Patients Programme Control: standard care, individual 15- to 20-minute appointment with dietitian |

continued on p. 89

programs that were categorized as low intensity.^{4,7-10,14} The low-intensity trainings ranged from a brief 3-hour session teaching empowerment-based communication skills and behavior-change strategies^{8,9} to a 2.5-day workshop addressing the intervention's goals and objectives, program content and curriculum, adult learning principles, and facilitation techniques.¹⁴

Three studies had trainings that were moderate in intensity.^{6,11,12} As an example, in the program by Lorig et al.,^{11,12} peer supporters completed a 4-day workshop that trained them how to deliver the tightly scripted six-session diabetes self-management

program (2.5 hours per session), conduct intervention sessions using role-play and simulation techniques, present diabetes education information, set goals, develop action plans, solve problems, and address problematic group dynamics.^{11,12}

Finally, three studies had peer supporter training programs that were high intensity and required peer supporters to start with basic training followed by more specialized training modules.^{3,5,13} For example, the training for the program by Baksi et al.³ consisted of a basic 18-session (27 hours in total) program that addressed the roles and functions of

peer advisors in diabetes (PADs), core diabetes education content areas (e.g., diabetes disease process, nutrition, and acute and chronic complications), and communication skills. This basic training was followed by an apprentice component during which potential PADS conducted 33 simulated education sessions supervised by a health professional.

There was also a range of training topics taught, including core diabetes education content areas,^{3,5,6,10} the stages-of-change model,⁴ behavior change,¹⁰ patient empowerment,⁷⁻⁹ facilitation skills,^{10,13,14} group dynamics and process,^{6,11,12} motivational

Table 1. Study Characteristics, continued from p. 88

| Study Reference | Study Design | Participants ³ | | Peer Supporters | | | Intervention |
|-------------------------|------------------------|--|--|---|--|---|---|
| | | Selection | Demographics | Selection | Training | Support Structure | |
| Comellas et al., 2010 | Pre-/post-intervention | English- and Spanish-speaking adults ($n = 17$) diagnosed with diabetes for at least 1 year and recruited from two community settings in East and South Bronx | Average age 66.8 years 71% female 12% employed 58% annual income < \$30,000 47% Latino/Hispanic Language NR | Community Health promoters (CHPs) recruited from the community 6 recruited (4 with diabetes, 2 without); 1 dropped out ($n = 5$) | Five 7-hour sessions conducted over a 5-week period (35 hours total); 10 hours of the 35-hour training focused on DSME training Observed an ADA-accredited diabetes education class delivered by two certified diabetes educators (CDEs); attended an optional informal lunch with CDE trainers after diabetes education class; reviewed educational material used for discussion circles, including goal-setting, problem-solving, and patient-physician communication materials | \$100 for completing 5-session training; \$200 for facilitating the 5 discussion circles; supervised by a CDE | Ix: 5 weekly group discussion sessions delivered by 2 CHPs; sessions addressed self-management support, diabetes education, behavioral change, and communication skills development through storytelling and interactive activities |
| Dale et al., 2009 | 3-arm RCT | Adults with A1C > 7.4% ($n = 231$) who were affiliated with 1 of 40 primary care practices in central England and had been counseled to make lifestyle changes | 57.5% were between 51 and 69 years of age 54% female Employment NR Income NR 94% white 100% English-language proficient | Telecare supporters recruited from diabetes care center 11 recruited; 2 could not master skills ($n = 9$) | 2-day training based on empowerment and motivational interviewing principles; used role-play and practice | 100£ (U.K.) for attending 10-hour training program. ⁵ 15£ for each assigned participant (case load of ~ 25 participants per peer); ⁵ stipend was given only once | Ix ₁ = Peer-delivered telecare support Ix ₂ = Nurse-delivered telecare support Control group |
| Heisler and Piette 2005 | Pre-/post-intervention | Adult males with A1C > 8% ($n = 38$) and receiving care at the Ann Arbor, Mich., Veterans Administration (VA) Health Care System | Average age 63.6 years 0% female Employment NR 67% annual income < \$30,000 79% white 100% English-language proficient | Participants also served as peer partners ($n = 38$) | Both peer partners received basic training in the use of the interactive voice response (IVR) system and empowerment-based communication strategies | No stipend or honorarium | Ix = Weekly contacts between participant pairs using an IVR-based platform over a 6-week period |

continued on p. 90

interviewing,^{3,7} communication skills,^{3,8,9,13} active listening skills,^{3,7} goal setting,⁶ action planning and problem solving,^{9,10} communication with health care providers,⁶ adult learning principles,¹⁴ instructional methods,¹¹⁻¹³ use of an IVR,^{8,9} and delivery program curriculum.^{3,5,6,11-14}

Training programs employed various instructional approaches, with several studies describing the opportunity for peer supporters to receive feedback from a professional,^{3,10-12} the opportunity to observe a professional,^{6,11,12} and supervision during the initial phases of intervention delivery.⁵

Only four studies described an evaluation component to the peer support training.^{3,10-12} For example, to be certified as a peer advisor in diabetes, participants must have completed a 40-minute oral examination conducted by eight health care providers.³ Examination domains included fac-

Table 1. Study Characteristics, continued from p. 89

| Study Reference | Study Design | Participants ³ | | Peer Supporters | | | Intervention |
|---------------------------------|------------------------|--|--|---|--|---|--|
| | | Selection | Demographics | Selection | Training | Support Structure | |
| Heisler et al., 2010 | RCT | Adult men with A1C > 7.5% during the previous 6 months (<i>n</i> = 244) recruited from one of two VA health care facilities | Average age 62 years 0% female Employment NR 63% annual income < \$30,000 82% White Language NR | Participants also served as peer partners (<i>n</i> = 244) | 3-hour group session to review clinical results and create an action plan; basic training in empowerment-based communication strategies; received DVD and workbook to help facilitate support calls | No stipend or honorarium; three optional 90-minute group sessions to share experiences and strategies | Ix ₁ = Participants were paired and used the IVR system to provide and receive weekly reciprocal peer support Ix ₂ = 90-minute education session and assignment to a nurse case manager |
| Klug et al., 2008 | Pre-/post-intervention | Adults ≥ 55 years of age (<i>n</i> = 179) ⁶ recruited from eight public and nonprofit community sites in urban and suburban settings | Average age 69.2 years 78% female Employment NR 73% annual income < \$25,000 74% white Language NR | Peers selected based on shared characteristics with target population, standing in the community, ability to motivate and lead a group, listening and problem-solving skills, and experience with diabetes (<i>n</i> = ~ 21 ⁵) | 2-day workshop conducted by investigators; training addressed group facilitation skills, behavior change skills, diabetes self-management education, and data collection; peer leaders practiced conducting sessions and received feedback from trainers | No stipend or honorarium; support provided via bimonthly meetings to address challenges and ensure program fidelity | Ix = 46 weekly 90-minute group sessions delivered by peer leaders with the goal of increasing physical activity and improving dietary habits and practices |
| Lorig et al., 2008 ⁴ | RCT | Spanish-speaking Latino adults ≥ 18 years of age (<i>n</i> = 417) recruited from the community | Average age 52.9 years 62% female Employment NR Income NR Ethnicity 72.5% born in Mexico Spanish- and English-language proficient | Recruited peer leaders from graduates of previous programs and through word of mouth; Spanish speaking with type 2 diabetes (<i>n</i> = 43) | 4-day training on how to deliver the diabetes self-management program protocol; role-modeling by trainers and role-playing by peer leaders; presenting lectures, brainstorming, and dealing with group dynamics | \$150 stipend for facilitating the 6-session program ⁵ | Ix: 6-week group-based program (2.5 hours per session) of a community-based diabetes self-management program delivered by two peer leaders Control: usual care |

continued on p. 91

tual knowledge, written knowledge, understanding, application of knowledge, and observed practice sessions. Other studies such as that of Lorig et al.^{11,12} required peer leaders to conduct as least two practice sessions in which a trainer observed their performance and provided feedback. Similarly, Klug et al.¹⁰ required peer supporters to lead at least one supervised session.

Peer supporter compensation

Six studies did not provide a stipend or honorarium to peer supporters.^{4,5,8-10,14} Five studies provided peer supporters with a stipend or honorarium for participating in training^{6,7} or conducting the intervention.^{3,6,7,11,12} One study provided peer supporters with gift cards.¹³

Clinical outcomes

Nine studies examined glycemic control as an outcome measure. Of the six RCTs,^{3-5,7,9,12} two reported improvements in glycemic control compared to the control or comparison condition,^{9,12} and four found no between-group differences.^{3-5,7} Although four RCTs found no between-group differences, one of these studies compared a peer-led intervention to a professional-led intervention and found no differences by delivery source.³ The only study that used a pre-/post-intervention design found a significant reduction in A1C after the peer support intervention.¹³

Three studies measured partial or full lipid profiles. However, only

two reported results, and neither found intervention effects.^{5,13} Of the four studies that assessed blood pressure, three yielded no between- or within-group differences in systolic or diastolic blood pressure.^{5,9,13} One study that compared a peer-led intervention to a professional-led intervention found significant reductions in systolic and diastolic blood pressure after intervention for both groups but no group-by-time interaction.³

BMI was assessed in five studies,^{5,7,10,13,14} but only four of these reported results. Three studies found no between- or within-group changes in BMI,^{5,10,13} and one found improvements in BMI for both conditions.¹⁴

Table 1. Study Characteristics, continued from p. 90

| Study Reference | Study Design | Participants ³ | | Peer Supporters | | | Intervention |
|--------------------------|--|--|--|--|--|--|--|
| | | Selection | Demographics | Selection | Training | Support Structure | |
| Lorig et al., 2009 | RCT | Adults ($n = 45$) | Average age 66.5 years 64% female Employment NR Income NR 67.5% non-Hispanic white Language NR | Recruited peer leaders from community presentations about the program ($n = 18$) | 4-day training on how to deliver the diabetes self-management program protocol; training involved role-modeling by trainers and role-playing by peer leaders; presenting lectures, brainstorming, and dealing with group dynamics | \$150 stipend for facilitating the 6-session program ⁵ | Ix = 6-week program of a community-based diabetes self-management program delivered by two peer leaders Control: usual care |
| Thompson et al., 2007 | Pre-/post-intervention | Latino adults ($n = 142$ who completed baseline and follow-up assessment) affiliated with two community health centers located in Oakland, Calif. | Average age 57 years 66% female 39% Employed 48% annual income < \$30,000 100% Latino Language NR | Community health workers (CHWs) were patients who had diabetes or had a family member with diabetes, who were recruited by their physicians based on communication skills and willingness to help community ($n = 10$ active at any given time) | 10 sessions of general training focusing on skills such as group facilitation, decision making, instructional approaches, group presentations, communication, and analysis, followed by 30 hours of training in diabetes self-care and the Transtheoretical Model of behavior change | Stipends were provided in the form of Costco gift cards based on a point system; biweekly booster training was provided on request of the CHWs | Ix = weekly contacts initiated by CHWs during the first 6 months followed by monthly contacts; other available CHW-led activities included individual telephone counseling, support groups, walking club, diabetes classes, and depression education and support group |
| Tudor-Locke et al., 2009 | Two non-equivalent groups and not randomized | Patients age 40–70 years ($n = 295$) affiliated with diabetes education centers in Canada with low baseline activity level | Average age 55.7 years 63% female Employment NR Income NR Ethnicity NR 100% English-language proficient | Graduates of the First Step Program (FSP) who increased physical activity levels and who were nominated by FSP leader Recruited 9; 3 dropped out ($n = 6$) | 2.5-day workshop that described goals and objective of FSP, program curriculum, adult learning principles, and facilitation techniques | No stipend or honorarium; supported by FSP coordinator; paid travel expenses during training | Ix ₁ : Peer-led ($n = 63$) 16-week program starting with four weekly group sessions to receive pedometer, instructional guidebook with goal-setting and problem-solving activities, diaries for monitoring and documenting progress, and support; subsequent 12-week maintenance phase to encourage participants Ix ₂ : Professional-led ($n = 157$) same 16-week program |

¹This was an RCT. However, given study design issues, it no longer meets the assumptions of an RCT.

²Inconsistencies were found in the number recruited (319 vs. 317). In addition, the final analytic sample was 239.

³Demographic information reported across all groups; if manuscript reported separately, averages were computed for total sample.

⁴This article reported two randomized trials. We are only reporting on the randomized 6-month study because it is relevant to peer support. The 18-month reinforcement study relates to an automated telephone support system.

⁵This information was obtained through personal e-mail communication with the author.

⁶Number of participants who completed baseline assessment (total enrolled $n = 243$).

Ix, intervention; NR, not reported.

Self-care and knowledge outcomes

The only study that assessed knowledge observed improvements although no group-by-time interaction.³ Nutrition behaviors were measured in four studies.^{5,6,10,12} Of the two RCTs that did so, one did not find any improvements in nutrition behavior,⁵ and the other found the peer support condition to be associated with following a healthy diet and reading food labels.¹² The two studies using a pre-/post-intervention design that assessed nutrition behaviors found peer support to have a positive impact on fruit and vegetable consumption⁶ and frequency of following a healthy eating plan.¹⁰

Six studies assessed self-reported physical activity.^{4,6,10–12,14} Of the three RCTs that did so,^{4,11,12} two found no differences in physical activity between the peer support and control or comparison conditions,^{4,11} and one found that participants in the peer support condition slightly increased their total minutes of aerobic activity compared to the usual care condition.¹² A nonrandomized two-group study found increases in the number of steps taken per day for both conditions combined.¹⁴ Two of the six studies used a pre-/post-intervention design and found participation in peer support interventions led to increases in the number of days exercising at least 30 minutes a day and engaging in a specific exercise activity.^{6,10}

Although nutrition behaviors and physical activity were the most frequently measured self-care behaviors, other behaviors were evaluated. Neither RCT demonstrated significant improvements in medication use⁹ or in practicing good self-care behaviors as a whole.³ There were mixed results for blood glucose testing, with one study reporting no between-group difference¹¹ and another reporting a slight improvement in blood glucose testing for the peer support condition compared to the usual care condition.¹² Of the studies using a pre-/post-intervention design, relationships were found between peer support and performing foot exams⁶ and practicing good self-care behaviors as a whole.

Psychosocial outcomes

Five studies measured quality of life.^{5–7,9,12} Of the four RCTs that did so, one found a significant reduction in health-related distress for the peer support group.¹² The only study using

a pre-/post-intervention design did not report any improvement in overall quality of life.⁶ However, when examining the five domains of quality of life separately, Commellas et al.⁶ found a positive association between peer support and feeling “more active and vigorous.”

Self-efficacy was examined as an endpoint in five studies.^{7,8,10–12} Of the three RCTs that did so, two studies found significant improvements for the peer support condition compared to the control condition,^{11,12} and one study found increased self-efficacy in the peer support condition but no group-by-time interaction.⁷ Increased self-efficacy after the peer support intervention was noted in two studies using a pre-/post-intervention design.^{8,10}

The two studies that assessed depression^{8,12} yielded inconsistent results. The RCT found a significant reduction in depression for the peer support condition compared to usual care.¹² The study using a pre-/post-intervention design did not report any changes in depression scores after the intervention.⁸

Review Discussion

As peer support becomes increasingly recognized as a viable and promising model for long-term diabetes self-management, greater attention has been focused on evaluating the health-related impact of peer support interventions and understanding the underlying mechanisms. Previous reviews of peer support studies in diabetes^{1,15,16,21,32} examined peer support programs in general, irrespective of the compensation status of the peer supporter. This approach limits the identification of strategies that may be unique to volunteer-based programs. The objective of this review was to investigate implementation strategies and diabetes-related health outcomes associated with peer support interventions led by volunteers.

Findings from this review indicate that volunteer-based peer support interventions were predominantly group-based or by telephone. This may reflect a desire to contain costs, particularly costs associated with delivering the intervention by the volunteer peer supporters. This is consistent with our experience with both volunteer and paid models of peer support.³¹

Although peer support interventions involving volunteers may be the

most viable strategy for low-resource agencies, there are a number of practical difficulties with implementing a peer-led intervention. Retention of volunteers is crucial to program success and yet extremely difficult if the volunteers are employed or have other significant obligations. In addition, retention is positively associated with a fulfilling experience, requiring program administrators to invest resources in providing support to the peer supporters.³⁷ Intervention programs wishing to assess reach or dose³⁸ may experience difficulty obtaining these process evaluation data given that the volunteers are not paid to conduct administrative work.³¹

As with the review of CHW interventions by Norris et al.,²¹ our review yielded inconsistent findings with regard to diabetes-related health outcomes. With the exception of the study by Lorig et al.,¹¹ data from the few RCTs using usual-care control subjects provided little evidence that peer support interventions improve metabolic and cardiovascular outcomes. However, some studies found that peer-led interventions are as effective as,⁷ if not more effective than,⁹ professional-led interventions in lowering A1C.

Although participation in peer support interventions is positively associated with improvements in self-care behaviors such as diet and physical activity,^{6,10} generally, these changes do not differ from those observed in control conditions.^{4,5,11} Indeed, the most favorable findings are for psychosocial outcomes, with peer support interventions leading to greater self-efficacy,^{9–12} higher diabetes-specific quality of life, and fewer depressive symptoms¹² even when compared to usual-care control groups.^{11,12}

Additionally, participant satisfaction ratings for interventions included in this review were generally positive. These findings are not unexpected given that peer supporters are often selected based on their motivation to help. In addition, peer supporters are trained to engage in a number of supportive behaviors consistent with social support theories.^{39,40} For example, several programs reported that the peer supporters provided appraisal support in the form of feedback to participants on their progress in goal-setting. Informational and emotional support were common strategies used

Table 2. Dose, Diabetes-Related Outcomes, and Satisfaction

| Study Reference | Follow-up and Retention | Attendance | Clinical Outcomes | Behavioral and Knowledge Outcomes | Psychosocial Outcomes | Participant Satisfaction |
|-----------------------|--|--|---|--|---|--|
| Baksi et al., 2008 | 6 months: 75% | 93% Ix ₁ peer advisors in diabetes (PADs) 95% Ix ₂ specialist health professionals (SHPs) | No between-group differences in A1C No within-group differences | No between-group differences in knowledge Within-group differences: Ix ₁ PADs ↑ 5 domains of knowledge Ix ₂ SHPs ↑ 3 domains of knowledge | No between-group differences in any diabetes care profile (DCP) domains Within-group differences: Ix ₁ PADs ↑ 3 domains of DCP (understanding, negative attitude, and self-care ability) Ix ₂ SHPs no within-group differences for any domain of DCP | High satisfaction for both PAD- and SHP-led interventions with significantly higher score for the SHP-led intervention |
| Batik et al., 2008 | 6 months ² : 10% (n = 14) | NR | No between-group differences in A1C No within-group differences | No between-group differences in physical activity No within-group differences | Not measured | Not measured |
| Cade et al., 2009 | 6 months • Ix: 55% • Control: 77% 12 months: • Ix ◦ Clinical: 77% ◦ Self-report: 66% • Control ◦ Clinical: 93% ◦ Self-report: 80% | 16% one session 20% all seven sessions 57% last session only ¹ | No between-group differences in BMI, weight, waist circumference, A1C, lipids, or diastolic and systolic blood pressure at 12 months No within-group differences | No between-group differences in 3-day food diaries at 12 months No within-group differences | No between-group differences in diabetes empowerment or diabetes-specific quality of life No within-group differences | Not measured |
| Comellas et al., 2010 | 5 weeks: 94% | Average: 89.1% English-speaking group Average: 83.3% Spanish-language group | Not measured | ↑ Healthy eating and physical activity No significant change in smoking behavior ↑ Number of steps recorded from week 5 to week 8 (P ≤ 0.05) | ↑ One item on the 5-item World Health Organization well-being scale (feeling more active and vigorous) | Information provided was useful and relevant, augmented previous diabetes education, and social support was satisfactory Participants suggested lengthening program or sessions |
| Dale et al., 2009 | 6 months: 91% | No between-group differences in call length Mean number of calls received by patients: 4.5 Mean minutes of calls: 9.5 Mean minutes of total contact per patient: 54.8 | No between-group differences in A1C Within-group improvements in A1C for all groups | Not measured | No between-group differences in self-efficacy or diabetes-related distress Within-group differences: Ix ₁ Peer: ↑ Self-efficacy Ix ₂ Nurse: ↓ diabetes-related distress | 77% of Ix ₁ peer respondents and 94% of Ix ₂ nurse respondents recommended telecare intervention to others No between-group differences in other satisfaction domains |

continued on p. 94

Table 2. Dose, Diabetes-Related Outcomes, and Satisfaction, *continued from p. 93*

| Study Reference | Follow-up and Retention | Attendance | Clinical Outcomes | Behavioral and Knowledge Outcomes | Psychosocial Outcomes | Participant Satisfaction |
|--------------------------|---|--|---|---|---|---|
| Heisler and Piette, 2005 | 6 weeks: 95% | > 80% of pairs communicated \geq 1 time for 2 of the 6-week period; 56% communicated with partner \geq 4 times | Not applicable | No changes in difficulty in performing self-management behaviors | No changes in depressive symptoms \uparrow self-efficacy scores | 90% indicated that this type of peer support would increase their satisfaction with their health care; 70% were satisfied with the support calls |
| Heisler et al., 2010 | 6 months • 89% completed A1C • 95% completed survey | Number of calls per pair: 0.8–2.4 calls per month for 6 months; calls lasted 6.8–15.6 minutes on average | Between-group differences in A1C with reciprocal peer support (RPS) group demonstrated greater improvements at 6 months compared to nursing care management (NCM) group No between-group changes for systolic and diastolic blood pressure | No between-group differences in medication adherence Between-group differences in insulin therapy initiation with more patients in RPS group started insulin than in NCM group (8 vs. 1) | Between-group differences in diabetes-specific social support with RPS group demonstrating greater improvements compared to NCM group Within-group differences: \downarrow diabetes distress for RPS and for NCM groups | Not measured |
| Klug et al., 2008 | 4 months: 54% | Average attendance 12.9 sessions (range 0–46) ³ | No changes in self-rated health or BMI (as measured by self-report) | \uparrow Dietary habits and physical activity | \uparrow Self-efficacy \uparrow Use of supportive resources \uparrow Dietary self-efficacy, exercise self-efficacy, and confidence in overcoming barrier to illness management \uparrow Use of community resources | Majority indicated that program helped them manage their diabetes (75%), achieve goals (76%), communicate with providers (73%), and increase use of community resources (68%) |

continued on p. 95

in the telephone-based components. Considering these findings, peer support interventions may have the greatest potential for improving psychological and emotional functioning.

On further examination, there were no specific characteristics common to successful interventions compared to unsuccessful interventions. However, given the heterogeneity in intervention characteristics (e.g., intervention duration and delivery; peer support selection, recruitment, and support structure; and roles and responsibilities of peer supporters) across studies included in this review, it is unlikely that we would be able to identify predictors of success.

In contrast to previous reviews, a large percentage of studies (33%) in this review compared peers versus professionals rather than peers

versus controls.^{3,7,9,14} Overall, peer-led interventions performed as well as professional-led interventions. Moreover, in one study,⁹ participants in the peer support intervention had greater improvements in clinical and psychosocial outcomes than those in the intervention led by a nurse case manager. These findings suggest that, although peers cannot substitute for health care professionals, they may serve a vital role in low-resource settings in which access to health care professionals and health care is poor.

Although there has been greater interest in comparing peers versus professionals, the prevailing view of organizations such as the Institute of Medicine, the American Public Health Association, and the American Association of Diabetes Educators is that CHWs function in a comple-

mentary role to health professionals or serve as important members of the health care team. In fact, some studies have found that health care professionals have a positive view of peer supporters⁴¹ and recognize the value of peer-to-peer communication in self-management efforts.⁴²

Consistent with an overview of peer training curriculums in diabetes by Nettles and Belton,⁴³ the training process for peer supporters in this review also varied substantially. Generally, the duration and intensity of training was commensurate to that of the intervention itself. For example, interventions that required peer supporters to take a primary role in leading weekly, face-to-face, group-based DSME sessions (90–120 minutes per session) conducted training during a period of several

Table 2. Dose, Diabetes-Related Outcomes, and Satisfaction, *continued from p. 94*

| Study Reference | Follow-up and Retention | Attendance | Clinical Outcomes | Behavioral and Knowledge Outcomes | Psychosocial Outcomes | Participant Satisfaction |
|--------------------------|---|--|---|---|---|--------------------------|
| Lorig et al., 2008 | 6 months • Ix: 82% • Control: 87% | Delivered 46 workshops | Between-group differences in ↓ A1C, symptoms of hypo- and hyperglycemia No between-group differences in BMI and fatigue | No between-group differences in physical activity, communication with provider, blood glucose monitoring, self-rated health, or any dimension of health care use | Between-group differences in ↓ health-related distress and ↑ self-efficacy | Not measured |
| Lorig et al., 2009 | 6 months • Ix: 87% • Control: 84% 12 months • Ix: 81% of those eligible • Control: not applicable ⁴ | Mean attendance: 4.9 of 6 sessions | No between-group differences in A1C Between-group differences in ↓ hypoglycemic symptoms at 6 months Ix: Within-group improvements in ↓ hypoglycemic symptoms at 12 months | Between-group differences in ↑ healthy eating, ↑ reading food labels, and ↑ communication with physicians at 6 months Ix: Within-group improvements in ↑ healthy eating, ↑ reading food labels, and ↑ communication with physicians at 12 months | Between-group differences in ↓ depression at 6 months Between-group differences in ↑ patient activation and self-efficacy at 6 months Ix: Within-group improvements in ↓ depression, ↑ patient activation, and ↑ self-efficacy at 12 months | Not measured |
| Thompson et al., 2007 | 6 months: 100% 12 months: 100% | Average contacts per week 1 contact: <i>n</i> = 38 2 contacts: <i>n</i> = 50 3 contacts: <i>n</i> = 30 4 contacts: <i>n</i> = 24 | ↓ A1C from baseline to 6 months and baseline to 12 months No significant changes in LDL cholesterol, systolic and diastolic blood pressure, and BMI | Not reported | Not reported | Not measured |
| Tudor-Locke et al., 2009 | 16 weeks: 75% of total sample | No between-group differences in attendance 64%: four meetings 36%: three or fewer meetings | No between-group difference for any clinical outcome Within-group differences: Ix ₁ and Ix ₂ : Improvements in weight, waist girth, resting heart rate, and systolic and diastolic blood pressure | No between-group differences for physical activity Within-group differences: Ix ₁ and Ix ₂ : ↑ physical activity (steps/day) | Not measured | Not measured |

¹Based on a sample size of 110, which is 12 less than the number recruited because of missing dose information.

²Physical activity was measured at enrollment and ≥ 6 months after enrollment; A1C was measured within 6 months of study start and at follow-up clinic visits ≥ 6 months after study start.

³Average attendance based on *n* = 235 enrolled in program; however, total sample (*n* = 179) is those who completed the baseline assessment.

⁴Only the intervention group was followed from 6 to 12 months to examine whether improvements were sustained or further improved.

days.^{3,5,11,12} In contrast, interventions that engaged peer supporters to provide brief telephone-based support conducted training during several hours.^{4,8,9}

Nevertheless, conclusions must be drawn with caution given that the description of the peer training process also differed across studies. Some studies provided a detailed description

of peer training either in the article itself or in a companion article.^{3,6} On the other hand, other articles offered only a brief and succinct overview of training, making it difficult for

researchers to replicate the training process. Similarly, although there is a great deal of published research on peer support interventions, curriculums used to train peer supporters is not as easily accessible or available to the public.⁴³

Only recently have articles been published describing the development and implementation of programs training peers to facilitate DSME and DSMS programs.^{44,45} For example, in one article,⁴⁴ the authors provided an in-depth “how-to” guide for developing an empowerment-based peer training program. The article not only presented the theoretical underpinnings of the training process, but also outlined the core components of the training program (e.g., knowledge acquisition, skills development, and experiential learning), specific competencies peer supporters are expected to learn and master (e.g., communication, facilitation, and behavior-change skills), instructional methods used for training (e.g., role-play, simulation, and brainstorming), assessment instruments for formative and summative evaluation, and preestablished competency criteria for successful graduation.⁴⁴ Notably, few studies in this review included a formal evaluation component of the peer training process.^{3,10–12}

Without knowing what competencies peer supporters are expected to achieve and how those competencies are assessed, we have no assurance that peer supporters have acquired the knowledge and skills to perform their roles and duties successfully. Consequently, even the most well-designed interventions may not produce positive results if peer supporters are not adequately trained.

Although not formally employed or paid, volunteer peer supporters from 6 of the 12 studies^{3,6,7,11–13} received a stipend or honorarium for the training or intervention phase of the study. Interestingly, many of the studies that provided stipends required more intensive involvement of peer supporters in terms of roles, responsibilities, or time commitment. Alternatively, of the six studies that did not provide a stipend or honorarium,^{4,5,8–10,14} four were telephone-based interventions,^{4,8,9,14} which are typically less labor-intensive and present fewer barriers to peer supporter participation. Based on these findings, it would appear that there is an implicit recognition regarding work

burden and volunteerism. Specifically, with greater monetary incentive (whether in the form of salary, wage, stipend, or honorarium) comes the expectation of greater involvement, responsibility, and commitment on the part of peer supporters.

What is most compelling about the peer support model is its potential to pick up where health professionals leave off. In other words, in a health care system where professional-led DSME interventions are time-limited because of insurance coverage constraints, the peer support model may offer greater longevity.

Intervention sustainability is dependent on multiple factors, one of which is peer supporter retention. Although volunteer-based peer support does not rely on a continuous funding source for viability, this model is not without its drawbacks. For example, peer support interventions involving volunteer peer supporters are associated with a higher dropout rate than those involving paid peer supporters.⁴⁶ Therefore, in the absence of stipends or any form of monetary incentive, are volunteer-based programs sustainable over the long term? Because the length of follow-up for interventions in this review ranged from 5 weeks to 12 months, this question cannot be answered.

Nevertheless, prior studies do shed some light on potential strategies for engaging and retaining peer supporters. For example, recognition within the community and concrete acts of appreciation such as luncheons and newspaper articles are sometimes as important as or more important than financial remuneration.³¹ Also, attention to peer supporters' needs such as their desires for continuing education and interaction with the medical team could provide support and stem burnout and turnover.⁴⁷ Future research should investigate the extent to which factors such as the aforementioned are associated with the sustainability of volunteer-based peer support programs, as well as what motivates individuals to volunteer as peer supporters.⁴⁸

Preliminary evidence for volunteer-based peer support interventions in diabetes is promising, but limited. Of note, there is little available information to guide the integration of peer support efforts with those of clinical professional teams, and strategies vary widely. Emerging evidence sug-

gests that peer supporters value interaction with the medical team.⁴⁹ However, provider preferences regarding interaction with peer supporters and how those preferences may differ by discipline (i.e., nurses vs. case managers vs. physicians) have not been adequately explored. Thus, practices wishing to implement peer support interventions will likely need to assess the preferences within their own organization to allow appropriate communication between peers and providers for their specific setting.

Although the peer support model offers greater flexibility and customization compared to the professional-led model, these characteristics also make the empirical examination of peer support challenging. In addition to quantitative investigations, more qualitative research is needed to understand how incentives of any form affect peer supporters' initial and continued motivation to participate in interventions. In addition, greater transparency is required regarding the peer training process and the assessment methods used to evaluate peer supporters' skills and competency. Without more extensive examination, we cannot replicate, nor can we understand, the underlying mechanisms of the peer support model.

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