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REVIEW ARTICLE

Lay Advisor Interventions in Rural Populations: A Systematic Review and Meta-analysis

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Context: Age-adjusted death rates for heart disease are higher in rural areas than in urban areas. Lay advisors could potentially facilitate improvement in cardiovascular health outcomes. The aim of this systematic review and meta-analysis is to estimate lay advisor intervention effects on cardiovascular health metrics in rural populations.

Evidence acquisition: Searches of databases including MEDLINE, CINAHL, and Scopus from 1975 through October 2017 retrieved 323 citations, of which 272 abstracts were reviewed. Two authors independently abstracted data from eligible studies. Analysis was conducted in March 2018.

Evidence synthesis: Of 21 articles included in the systematic review, eight were RCTs and 13 were pre- and post-intervention studies. Of the RCTs, three took place in the U.S. Only two studies had low risk of bias. Using a random effects model, meta-analysis of six RCTs (1,641 participants) showed that lay advisor interventions in rural residents were associated with improvement in HbA1c of 0.4% (95% CI=0.13, 0.66, p=0.004, I^2=60.65%). From four RCTs (873 participants), lay advisor interventions significantly improved BMI with pooled effect of 2.18 (95% CI=1.13, 3.24, p<0.001, I^2=0.00%). Most studies had normal baseline blood pressure and cholesterol levels before intervention, and no significant effects were noted for these outcomes. Diverse types of measures used for diet, physical activity, and smoking precluded statistical synthesis.

Conclusions: Lay advisor interventions had significant positive effects on glycemic control and BMI for rural residents; however, further rigorous studies are needed in U.S. rural populations, and elements of effective lay advisor interventions require further investigation.
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CONTEXT

A 2017 Morbidity and Mortality Report found higher age-adjusted death rates for the five leading causes of death (heart disease, cancer, unintentional injury, chronic lower respiratory tract disease, and stroke) in rural areas compared with urban areas.[1] From 2010 to 2015, heart disease mortality increased in adults younger than 65 years living in nonmetropolitan and rural counties.[2] Of all cardiovascular deaths, 29% are thought to be avoidable, and in people aged less than 65 years, 56% are potentially avoidable.[3] Cardiovascular health is defined by seven metrics: BMI, smoking status, diet, physical activity, cholesterol, blood pressure, and glucose.[4,5] Ideal cardiovascular health is associated with reduced cardiovascular disease−related mortality.[6−8] Rural residents have fewer ideal findings on many of these measures. For example, a 2013 report on health-related behaviors by urban−rural county classification found higher prevalence of smoking and lower

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prevalence of ideal body weight and physical activity in rural residents compared with their urban counterparts.[9] The Rural Healthy People 2020 survey identified healthcare access as its top priority, followed by nutrition, weight status, and diabetes.[10] Of the survey's 1,214 rural stakeholders, 400 (33%) identified educational and community-based programs as one of their top ten priorities.[10] In an analysis of RCTs looking at factors moderating the effectiveness of behavioral programs on diabetes outcomes, a Bayesian network meta-analysis showed that programs delivered in person and with 11 or more contact hours led to clinically important improvements in glycemic control.[11] Traditional healthcare systems have failed to reduce rural communities' metabolic health disparities.[12] However, community-based programs might be a feasible option.[13]

The WHO and the National Academy of Medicine have identified lay advisors as important resources for influencing social and behavioral determinants of health.[14,15] Lay advisors are referred to variously as *promotoras*, coaches, community health workers (CHWs), peer mentors, peer navigators, and community health representatives.[16] Self-management education programs delivered by lay leaders may improve health education access in rural areas.[14] The American Public Health Association states that a CHW

> is a frontline public health worker who is a trusted member of and/or has an unusually close understanding of the community served. This trusting relationship enables the worker to serve as a liaison/link/intermediary between health/social services and the community to facilitate access to services and improve the quality and cultural competence of service delivery. A community health worker also builds individual and community capacity by increasing health knowledge and self-sufficiency through a range of activities such as outreach, community education, informal counseling, social support, and advocacy.[17]

Peer health coaches and lay community health representatives can satisfy some of the CHW's roles, such as providing social support, informal counseling, and culturally appropriate education. Ideally, community members will trust lay advisors because of a shared socioeconomic and cultural background, as well as shared experience with a health condition.[18]

Although several systematic reviews have evaluated the effectiveness of lay advisors, none have focused on their effectiveness in rural areas. A systematic review of studies using predominantly urban, underserved populations showed CHWs were effective in improving hypertension outcomes.[19] A 2009 Cochrane systematic review of self-management education programs by lay advisors for people with chronic conditions looked at health status (pain, disability, fatigue, quality of life, and depression), health behaviors (aerobic exercise), healthcare use, and self-efficacy.[20] Authors concluded that lay-led self-management programs may lead to small, short-term improvements in participants' self-efficacy, self-rated health, cognitive symptom management, and frequency of aerobic exercise. A 2010 systematic review of CHW intervention outcomes and costs showed certain CHW interventions improved health outcomes in underserved populations and increased appropriate healthcare utilization.[21] A 2015 systemic review that included 31 studies with 35 study arms showed strong evidence of effectiveness for interventions that engage CHWs in a team-based care model to improve blood pressure and cholesterol.[18] The review identified an evidence gap of interventions engaging CHWs in rural settings. A 2005 review of CHWs for cardiovascular disease prevention highlighted a need for studies in high-risk geographic areas.[22]

During the past decade, several lay advisor intervention studies have measured cardiovascular disease risk factor outcomes in rural populations. This systematic review and meta-analysis assesses the effectiveness of lay advisor interventions in rural populations with regard to cardiovascular health metrics (BMI, smoking, diet, physical activity, cholesterol level, blood pressure, and glucose levels). Because of higher risk of bias in nonrandomized studies, the authors conducted a meta-analysis of RCTs and a narrative summarization of nonrandomized studies. Within the stricter criteria and environments of RCTs, self-management and health promotion interventions may be less generalizable; therefore, a narrative review of nonrandomized studies can provide important contextual perspectives.

EVIDENCE ACQUISITION

The PRISMA statement was used to report the findings of this systematic review.[23]

Search Strategy and Study Selection

Included studies mentioned lay advisor interventions in rural adult populations and measured at least one of the seven cardiovascular health metrics. Randomized and nonrandomized study designs were included. Settings were defined as rural, based on each study's description. Research team members experienced in rural–urban classification used their judgment and generally accepted that a study was done in rural setting if so classified by the study authors.

Lay-led programs were defined as those including education or support provided by *promotoras*, coaches, CHWs, peer mentors, peer navigators, and community health representatives. Typically, lay leaders have been trained and adopted a philosophy of self-management rather than a medical model.[24] Lay advisors may themselves have a chronic disease similar to that of the intervention participants, for whom they may act as role models.

Because this study's goal was to summarize all lay advisor interventions conducted in rural areas, interventions with a lay advisor component, regardless of additional interventions, were included. However, for the meta-analysis, only RCTs were included, in which the difference between intervention and control groups was the presence of a lay advisor–delivered intervention. Any interventions that were delivered by lay advisors and designed to improve self-management or health behaviors, or to provide emotional or social support with the goal of improving cardiovascular health were included.

Primary outcomes for this review were BMI, diet, exercise, smoking, glycemic levels, blood pressure levels, and cholesterol levels. The authors anticipated that studies would measure diet, exercise, and smoking using diverse scales varying from self-report to quantitative values and planned to include studies regardless of their measuring scales. Studies based on study duration were not limited.

Data Sources

The authors searched English and non-English articles from 1975 through October 2017 using Ovid MEDLINE, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, CINAHL, PsycINFO, Scopus, Online Computer Library Center First Search, ProQuest Dissertations and Theses A and I, BioOne Abstracts and Indexes, Social Service Abstracts, and Sociological Abstracts. Groups of search terms included keywords for: *lay lead*, *peer*, *community health worker*, *promotora*, *expert patient*; *rural* or *remote area* or *nonurban* or *non-urban* or *non-metropolitan* or *nonmetropolitan* or *remote community*; *diet*; *diabetes*, *HbA1c* or *glucose*; *hypertension*; *BMI* or *weight*; *cholesterol level*; *exercise* or *physical activity*; *tobacco smoking*; *alcohol*; *stroke*; *cardiovascular disease*; *cardiovascular health*; *cerebrovascular disorder* (Appendix Text provides detailed search strategy for the Ovid MEDLINE database). Two reviewers (SJP and ML) independently screened citations, and another co-author (JS) reviewed and confirmed the final included studies.

Quality Assessment

Two authors (NW, KM) assessed study quality using the Cochrane Collaboration's risk of bias tool for RCTs.[25] The primary author (SJP) checked for inter-rater comparability and made final decisions after independently reviewing all the articles.

Data Extraction

Prior to data extraction, one author (SJP) created a codebook with all variables of interest and predefined subgroups; another author (ML) reviewed the form. Two authors (KM, NW) extracted data independently, and a third author (ET) performed an additional review. One author (ML) independently confirmed the extraction accuracy of numerical data. The primary author (SJP) verified all data abstractions, including quantitative outcomes.

Data were extracted on the characteristics of the study setting, participants, and lay advisors. For intervention characteristics, the authors extracted method of delivery, planned sessions, components of the lay advisor intervention, comparator group intervention, SES of the study population, and cultural components of the intervention. Quantitative values and measures of statistical variation were extracted for baseline and study conclusions.

Data Synthesis and Analysis

The primary author (SJP) performed the statistical analysis using Comprehensive Meta-analysis Software, version 3. The authors used all reported intention-to-treat data without adjusting for missing data or loss to follow-up. To compute effect sizes, the DerSimonian and Laird random effects model was used because it provides more conservative estimates by incorporating both within-study and between-study variation.[26] A standardized mean difference effect size (Cohen's d) was calculated, which reflects the difference in means between treatment and control subjects in terms of their shared SD.[27] The authors calculated 95% CIs and considered a p-value of <0.05 statistically significant for all analyses other than the Q statistic. A correlation coefficient of 0.5 between initial and final values was assumed, as recommended by Follman and colleagues.[28] Meta-regression was conducted to analyze the interaction between baseline values X effect sizes for all outcomes. Heterogeneity among studies was evaluated using the Q statistic, with a p-value <0.10 indicating heterogeneity, and using I^2 statistics (I^2 values <40% may indicate insignificant heterogeneity, 30%–60% may indicate moderate heterogeneity, 50%–90% may indicate substantial heterogeneity, and 75%–100% indicates significant heterogeneity).[29] Publication bias was assessed with funnel plots and the Egger regression test.[30]

EVIDENCE SYNTHESIS

Study Selection

The searches returned 323 citations. After removing duplicates and reviewing 272 abstracts, the authors examined 38 full articles and included 21 in this systematic review. Figure 1 shows the literature search flow diagram and reasons for article exclusions. Of the 21 articles, nine studies took place in the U.S.,[31–39] two in South America,[40,41] two in China,[42,43] one in India,[44] one in both India and China,[45] one in Bangladesh, Pakistan, and Sri Lanka,[46] and one each in Uganda,[47] Australia,[48] Iran,[49] England,[50] and Canada.[51] Four studies were RCTs, four were cluster RCTs, three were two-group pre- and post-intervention studies, and the remaining ten were single-group pre- and post-intervention studies. Sample sizes varied from 46 to 2,086 participants. Of the eight RCTs, three were conducted in the U.S.,[34,36,37] two in China,[42,43] one in China and India,[45] and one each in England[50] and Australia[48] (Appendix Table 1 [available online] provides study description details).

Quality of Studies

All eight RCTs described their randomization method (Appendix Table 2, available online). Four studies were single-blinded.[34,43,45,50] Allocation concealment occurred in three studies.[43,45,50] Only two studies had low risk of bias.[45,50]

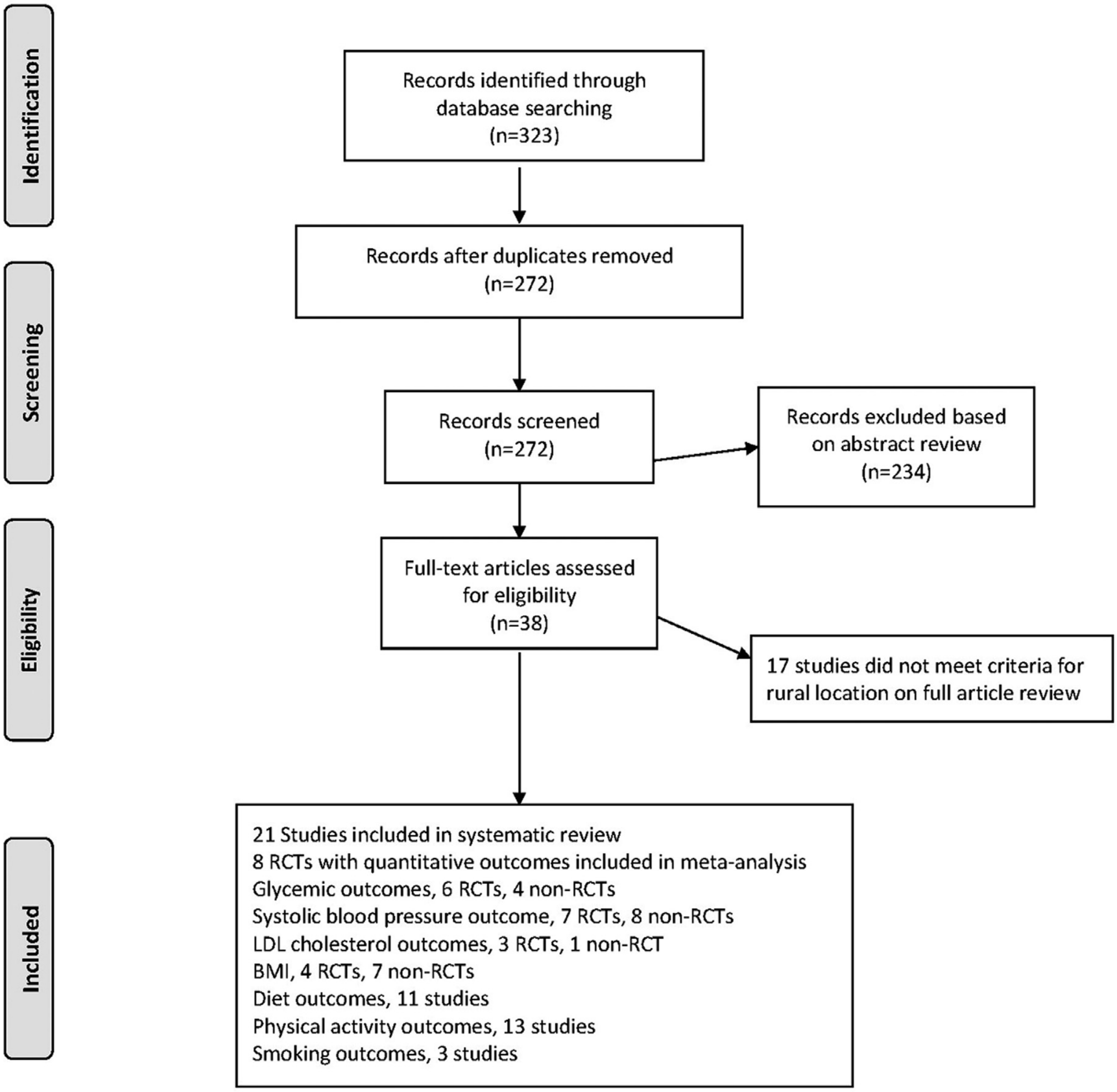

Figure 1. Results of literature search.
Source: Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med*. 2009;6(7):e1000097. https://doi.org/10.1371/journal.pmed.1000097.
LDL, low-density lipoprotein.

Participants

Of the five studies with predominantly white participants, four took place in the U.S.[31,33,35,37] and one in England.[50] Five of the nine U.S. studies included predominantly African American participants.[32,34,36,38,39] The Ugandan study included local participants.[47] One study from China mentioned 100% Asian participants.[42] None of the remaining studies explicitly reported participants' ethnicities.

All studies included some description of SES, with all but three having participants of predominantly low SES, low literacy, or residence in low-resource areas. The three exceptions include two U.S. studies[33,35] with predominantly white women, more than half of whom reported having annual household incomes of $60,000 or completing college. In the third exception, two thirds of participants in a study conducted in England had managerial or professional backgrounds.[50]

Participants' ages ranged between 40 and 62 years. Six studies had predominantly female participants (>80%), and the remaining 15 studies had between 40% and 75% female participants. Thirteen of the 21 studies had participants with diabetes,[32,34,36,38,40,42–45,47–50] including one looking at participants with diabetes and hypertension[49] and another examining participants with diabetes and cardiovascular disease.[38] Four studies included participants with cardiovascular diseases,[33,38,45,51] three studies had participants with hypertension,[31,41,46] and two studies enrolled obese participants.[35,39]

Interventions

Lay advisors in 12 studies were CHWs,[31,33,34,37,38,40,41,44–46,48,49] seven studies had peer supporters,[35,36,42,43,47,50,51] and two studies had members from the community as lay health advisors.[32,39] Lay advisor interventions in most of the trials included healthy lifestyle counseling and self-management support. In two studies, advisors assisted participants with navigating health systems and appointment reminders.[35,37] In 12 of the studies, advisors provided ongoing support during weekly or monthly meetings. Two studies included weekly or monthly phone calls for ongoing support; two studies had options between phone calls or meetings in person; and one study had team-based community activities. Three studies had a home visit,[38,45,48] including one that focused on counseling all family members.[38] In one study, church members created bulletins and posters. One study used an electronic decision–support system on mobile devices.[35] One had a peer-led Internet discussion group.[45] Two U.S. studies testing faith-based interventions had predominantly African American participants.[32,39] Most studies mention interventions tailored to the local community. Interventions were mostly 3–12 months in duration, with one lasting for 18 months. Eight studies had a health professional–delivered co-intervention with the lay advisor intervention.

Meta-analysis Results

One RCT from quantitative summarizations was excluded because the intervention group received monthly self-management sessions from healthcare providers for 12 months in addition to the lay advisor intervention, which may confound the effectiveness of the lay advisor interventions.[43]

For HbA1c, six RCTs were identified with a total of 1,641 participants.[34,36,37,42,48,50] The overall pooled effect of lay-led interventions on glycemic control was a standardized mean difference of 0.250 (95% CI=0.082, 0.418, p=0.004, I^2=60.65%), which translates to improvement in HbA1c of 0.4% (95% CI=0.13, 0.66; Figure 2). The Q statistic was significant for heterogeneity with a p-value of 0.026. The Eggers regression and funnel plot did not indicate publication bias (Appendix Figure 1, available online). Meta-regression did not show any interaction of effect sizes X baseline HbA1c (Appendix Figure 2, available online). Participants' baseline HbA1c in two of the six studies averaged betweeen 7% and 8%,[34,36] whereas baseline average HbA1c ranged from 8% to 10.7% in the remaining four studies.[37,42,48,50]

For systolic blood pressure (SBP), the authors included six trials with 3,519 participants.[34,36,37,45,48,50] The pooled effect of lay-led interventions was a nonsignificant standardized mean difference of −0.043 (95% CI= −0.163, 0.077, p=0.479, I^2=46.37%), equivalent to a SBP change of −1.06 mmHg (95% CI= −4.03, 1.9 mmHg; Appendix Figure 3, available online). The Q statistic was significant for heterogeneity with p-value of 0.08. Baseline average SBP for all participants in five of the six studies was betweeen 130 and 140 mmHg,[34,36,37,48,50] whereas one study had participants with average baseline SBP of 161 mmHg.[45] Meta-regression showed significant interaction of average baseline SBP X effect sizes with a p-value of 0.01 (Appendix Figure 4, available online).

Study name	Time point (months)	Statistics for each study: Std diff in means	Lower limit	Upper limit	p-Value
McDermott, 2015	18.000	0.311	0.041	0.582	0.024
Safford 2015	21.000	0.053	-0.138	0.244	0.586
Simmons, 2015	12.000	0.131	-0.036	0.297	0.124
Deng, 2016	7.000	0.601	0.322	0.879	0.000
Lutes, 2017	12.000	0.161	-0.117	0.438	0.256
Schoenberg, 2017	7.000	0.532	-0.092	1.155	0.095
		0.250	0.082	0.418	0.004

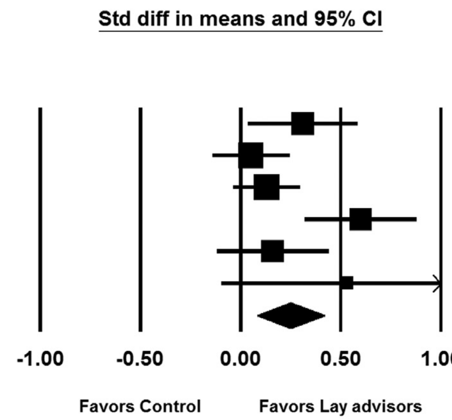

Figure 2. Effect of lay advisors on glycemic control.

The authors included three trials with a total of 678 participants to examine the pooled effect of lay-led interventions on low-density lipoprotein (LDL) cholesterol (LDL-C).[36,37,48] The pooled effect was a standardized mean difference of 0.113 (95% CI= −0.146, 0.372, p=0.39, I^2=44.17%), which converts to improvement in LDL-C of 1.31 mg/dL (95% CI= −1.69, 4.32 mg/dL). Two of the studies had baseline LDL-C values between 100 and 110 mg/dL, and the other had a mean baseline LDL-C of 133 mg/dL (121.5 mg/dL in the intervention group and 147.8 mg/dL in the control group; Appendix Figure 5, available online). The Q statistic was not significant for heterogeneity, with a p-value of 0.15. There were not enough studies to conduct meta-regression to check interaction of baseline LDL-C X effect sizes. The Eggers regression and funnel plot did not indicate publication bias (Appendix Figure 6, available online).

The pooled effect of lay-led interventions on BMI for four studies with a total of 873 participants was a standardized mean difference of 0.292 (95% CI=0.151, 0.433, p<0.001, I^2=0.00%).[34,36,37,42] This translates to an improvement in BMI of 2.18 (95% CI=1.13, 3.24; Figure 3). The Q statistic was not significant for heterogeneity (p=0.49). The Eggers regression and funnel plot did not show publication bias (Appendix Figure 7, available online). Mean baseline BMI in all three studies was betweeen 35 and 38. There were insufficient studies to conduct meta-regression to examine interaction of baseline BMI X effect sizes. The Eggers regression and funnel plot did not indicate publication bias.

Study duration for RCTs varied from 7 to 21 months. Most study interventions lasted until the end of the study duration, when outcomes were measured. One RCT had a 10-month intervention and measured outcomes between 15 and 21 months post-baseline.[36] Another had an intervention duration of 3 months and measured outcomes at 7 months.[37] Meta-regression showed no interaction between intervention duration X effect sizes for all the quantitative outcomes.

Diet, Physical Activity, and Smoking Results

The authors could not quantitatively summarize diet, physical activity, or smoking outcomes because of the use of incommensurable scales. Eleven studies measured dietary outcomes.[31,33,35,37,39,42−44,47] Diverse measures included knowledge about healthy eating, caloric intake, fruit and vegetable intake, dietary patterns over time, fiber intake, proportion of participants eating healthy foods, readiness to practice good eating habits, and whole grain intake. Four studies that measured fruit and vegetable servings and three studies that used varying healthy-eating questionnaires showed post-intervention improvement in these self-reported behaviors. Studies measuring the proportion of participants seen by a dietitian and proportion of participants aware of the harms of eating a high-salt diet showed improvement in these proportions. One study reported improvement in social support for healthy eating from family and friends (Appendix Table 1, available online).

Thirteen studies assessed exercise outcomes,[31−33,35,38−40,42−44,46,47,51] such as days with ≥30 minutes of physical activity; engagement in aerobic activity (frequency or minutes/week); MET minutes/week or hours/week; social support received from family and friends for engaging in physical activity; readiness to be physically active; engaging in stretching and strengthening exercises (minutes/week); engaging in moderate or vigorous activity (minutes/week); and daily energy expenditure. Twelve studies measured physical activity with some self-report measure of exercise duration or questionnaires[31−33,38−40,42−44,46,47,51]; improvement was noted in eight studies. One study assessed change in METs after

Study name	Time point (Months)	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Safford, 2015	21.000	0.225	0.106	0.011	0.017	0.433	2.124	0.034
Deng 2016	7.000	0.478	0.148	0.022	0.187	0.769	3.218	0.001
Lutes, 2017	12.000	0.284	0.142	0.020	0.005	0.563	1.998	0.046
Schoenberg, 2017	7.000	0.088	0.313	0.098	-0.525	0.701	0.281	0.779
		0.292	0.072	0.005	0.151	0.433	4.068	0.000

Statistics for each study

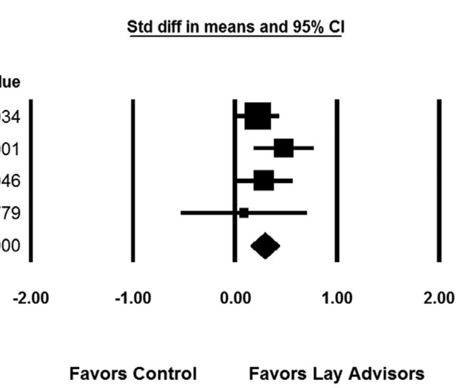

Figure 3. Effect of lay advisors on BMI.

the intervention and reported improvement.[46] One study reported a change in cardiorespiratory fitness.[35]

Four studies[31,45,46,48] measured smoking outcomes and reported them as the proportion of participants who were current smokers or showed readiness to quit smoking. None of the studies showed significant changes in smoking outcomes.

DISCUSSION

This study found significant positive effects of lay advisor interventions on glycemic control and BMI in rural participants, and noted no significant effects on blood pressure or LDL-C levels. This variation likely can be explained by the fact that average baseline values of HbA1c and BMI were higher than normal in all included RCTs with these outcomes, whereas baseline blood pressure and LDL-C was normal or minimally elevated in most included studies. Additionally, all but one RCT included in this meta-analysis was conducted in participants with diabetes where interventions may have frequently targeted glucose control for participants who had normal or only mildly abnormal baseline values of blood pressure. Meta-regression showed significant interaction between baseline blood pressure and effect sizes, indicating that lay advisor interventions had a positive effect on blood pressure when the average baseline blood pressure was high. A previous sytematic review of the effectiveness of CHWs on people with hypertension (irrespective of geographic areas) reported positive effects on mortality, blood pressure, and outcomes for healthcare utilization and access.[19] Futher studies of lay advisor interventions in rural participants with high-risk blood pressure are needed. The reported improvements in HbA1c (0.4%) and BMI (2.18) with lay advisor interventions are similar or better than improvements seen with patient activation interventions delivered by multidisciplinary teams of physicians, nurses, dietitians, and diabetes educators, which showed improvement in HbA1c of 0.37% and improvement in weight of 2.3 lb in adults with diabetes.[52] The positive effects of lay advisor interventions on glycemic control and BMI are particularly relevant, as a 2017 analysis of geographic inequality of life expectancy found that 74% of the variation was explained by behavioral and metabolic risk factors alone (including obesity and diabetes prevalence).[53]

It is notable that only three of the lay advisor RCTs with rural residents in this review were conducted in the U.S.[34,36,37] Of these, two were conducted in predominantly African American populations[34,36] and one with predominantly white non-Hispanic participants.[37] One of the RCTs with African American participants had a peer[36] as the lay advisor and the other two used a CHW.[34,37] In the U.S., there is a paucity of rigorous, effective lay advisor–delivered intervention studies targeting health outcomes and self-management behaviors in rural participants.

Narrative descriptions of nonrandomized studies show some positive effect of lay advisor interventions on diet and physical activity, which is consistent with the improvement found in BMI. Literature on lay advisor interventions to improve smoking outcomes in rural participants is limited, with no study in the U.S. This could be a valuable area for future research because cigarette smoking is a risk factor with high attributable burden in the U.S.,[54] and smoking prevalence is higher in rural areas than in urban areas.[1]

More than half the studies included in this review evaluated lay advisor intervention effects in people with diabetes. Diabetes self-management training has proven to be effective in improving diabetes outcomes. However, an analysis of 2010 Medicare claims indicated that only 5% of Medicare beneficiaries participated in diabetes self-management training delivered by a health professional, even though Medicare has reimbursed these services since 2000.[55] Research has shown that users of Medicare diabetes self-management training have lower health service utilization and costs than nonusers.[56] Even among privately insured individuals with newly diagnosed diabetes, as few as 7% of patients receive diabetes self-management training delivered by a health professional.[57] In a systematic review of remote health interventions for diabetes self-management, a common reason for dropping out was the decline in patient engagement in the interventions.[58] A statewide survey of providers, diabetes educators, and people with diabetes found that access issues and aversion to group classes were commonly cited as reasons for not attending diabetes self-management classes.[59] To improve diabetes education access, one of Rural Healthy People 2020's top priority for rural adults,[10] it is crucial to provide community-based interventions that promote patient engagement via individualized tailoring of self-management education and support. Lay advisors are a feasible way to support healthy behaviors and improve health system navigation in rural populations. A Medicaid program where CHWs delivered community-based services for high resource utilizers demonstrated reduced resource utilization and costs as well as improved access to preventive and social services.[60] Care delivery beyond clinic and hospital walls is needed to identify people who are disadvantaged and at risk of developing serious health problems.[61,62] Lay advisors can provide culturally competent and easily accessible case management in rural communities.

Limitations

The authors found few rigorous studies conducted in rural settings that assessed lay health advisor effectiveness on high-risk cardiovascular health metrics. The paucity of rigorous studies in rural settings could be because of urban locations of the majority of academic centers and healthcare researchers. Additionally, there is marked heterogeneity between studies in the geographic locations and selection, training, and responsibilities of the lay health advisors. This is consistent with the literature on CHWs and selection.[63] Interaction of SES of participants with lay advisor intervention effects would provide insights beyond the effects of rurality of participants. However, current lack of consistent measures of SES preclude such analyses. Lack of information on optimal training, qualifications, work experience, and well-defined roles for lay advisors have limited their widespread use in clinical practices. Recently, organizations including the Centers for Disease Control and Prevention have made several CHW resources available, which may assist in improved utilization of lay advisors in rural settings.[16]

Most of the studies included in this systematic review had moderate or high risk of bias. The interventions were diverse, and common elements of successful interventions could not be identified. Diet and physical activity outcomes could not be summarized because of the use of diverse measurement scales and the common use of recall, which is subject to bias.

CONCLUSIONS

Lay advisor interventions had positive effects on glycemic control and BMI for rural participants. Common elements of effective lay advisor interventions should be further defined. Further rigorous studies of lay advisor interventions targeting high-risk cardiovascular disease risk factors, specifically blood pressure, cholesterol, smoking, diet, and physical activity, are needed in rural populations.

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SJP contributed to the study conception and design, screening of the articles, data analysis and interpretation, writing the manuscript, drafting and revising the article, and final approval of the manuscript. ML contributed to the screening of the articles, study design, drafting and revising the article, and final approval of the manuscript. NKW contributed to data abstractions, study design, drafting tables, revising and formatting the article, and the final approval of the manuscript. EMT, KSM, JJS, RLK, and DRM contributed to data abstractions, study design, drafting tables and the article, and final approval of the manuscript. SGE contributed to article search and screening, drafting and revising the article, and final approval of the manuscript.

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SUPPLEMENTAL MATERIAL

Supplemental materials associated with this article can be found in the online version at https://doi.org/10.1016/j.amepre.2019.02.007.

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