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Effects of Health Plan-Sponsored Fitness Center Benefits on Physical Activity, Health Outcomes, and Health Care Costs and Utilization: A Systematic Review

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PREFACE

Quality Enhancement Research Initiative's (QUERI's) Evidence-based Synthesis Program (ESP) was established to provide timely and accurate syntheses of targeted healthcare topics of particular importance to Veterans Affairs (VA) managers and policymakers, as they work to improve the health and healthcare of Veterans. The ESP disseminates these reports throughout VA.

QUERI provides funding for four ESP Centers and each Center has an active VA affiliation. The ESP Centers generate evidence syntheses on important clinical practice topics, and these reports help:

- develop clinical policies informed by evidence,
- guide the implementation of effective services to improve patient outcomes and to support VA clinical practice guidelines and performance measures, and
- set the direction for future research to address gaps in clinical knowledge.

In 2009, the ESP Coordinating Center was created to expand the capacity of QUERI Central Office and the four ESP sites by developing and maintaining program processes. In addition, the Center established a Steering Committee comprised of QUERI field-based investigators, VA Patient Care Services, Office of Quality and Performance, and Veterans Integrated Service Networks (VISN) Clinical Management Officers. The Steering Committee provides program oversight, guides strategic planning, coordinates dissemination activities, and develops collaborations with VA leadership to identify new ESP topics of importance to Veterans and the VA healthcare system.

Comments on this evidence report are welcome and can be sent to Nicole Floyd, ESP Coordinating Center Program Manager, at nicole.floyd@va.gov.

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TABLE OF CONTENTS

FIGURES

TABLES

EVIDENCE REPORT

INTRODUCTION

Regular physical activity has many positive health benefits, including protection against chronic disease, improved physical and mental health and cognitive function, and better health-related related quality of life.[1-9] Moreover, lack of physical activity is associated with higher health care costs and utilization.[10,11] The current U.S. guidelines recommend that adult Americans (1) engage in at least 150 minutes of moderate-intensity aerobic activity or 75 minutes of vigorous-intensity aerobic activity each week (or an equivalent mix of moderate- and vigorous-intensity aerobic activity) and (2) perform strengthening activities that target all major muscle groups on at least 2 days a week.[12] However, many Americans do not get the recommended levels of physical activity.[13] More Veterans are sufficiently active than non-Veterans. However, Veterans who use Veterans Affairs (VA) health care are more likely to be physically inactive (22.6% vs. 14.9%) and are less likely to meet physical activity recommendations (42.6% vs. 46.7%) compared with Veterans who do not use VA health care.[14]

Multiple personal, social, and environmental factors influence a person's participation in physical activity.[15] Consequently, multiple internal and external barriers to obtaining regular physical activity exist. Internal barriers include a lack of time and motivation, health problems, and emotional difficulties. External barriers involve weather; cultural issues; safety concerns; limited access to facilities, equipment, and transportation; and monetary expenses such as those associated with attending a fitness center. The perceived cost of engaging in physical activity is a significant barrier that increases the likelihood of sedentary behaviors and decreases the likelihood of participation in vigorous physical activity.[16] Thus, reducing the cost of being physically active through providing full or partial memberships to fitness centers may be a viable option to increase physical activity and the positive health outcomes associated with such activity. Given that most Americans (84%) have access to some form of health insurance,[17] health plan promotion of and coverage for fitness center memberships has the potential to address multiple barriers to physical activity (e.g., cost, access) and extend fitness center access to many Americans.

The effects of physical activity on health care utilization and costs, various health outcomes, and general well-being are well established. However, the evidence base on health plan-sponsored benefits—specifically involving fitness center memberships—that support these outcomes has not been synthesized. Therefore, we conducted a systematic review of the current literature to assess the impact of health plan benefits, or policies that promote access to fitness centers, on physical activity levels, health outcomes, overall health care costs and utilization, and satisfaction with and retention in the health plan to inform future Veterans Health Administration (VHA) policy changes.

OBJECTIVE OF THIS REPORT

Our objective in this evidence synthesis was to summarize the results of diverse studies of health plan-sponsored fitness center memberships in an effort to understand how these benefits affect physical activity, clinical outcomes, health care costs and utilization, retention of plan members, and member satisfaction.

METHODS

TOPIC DEVELOPMENT

This review was commissioned by the VA Evidence-based Synthesis Program. The topic was nominated and key questions developed after a refinement process that included a preliminary review of published peer-reviewed literature and consultation with experts, investigators, and key stakeholders. The final key questions (KQs) were:

KQ 1. What are the effects of policy/benefits packages that include vouchers, rebates, premium reductions, or other economic incentives to encourage physical activity through fitness center memberships on:

(a) Physical activity participation rates among plan members?
(b) Health outcomes demonstrated to be improved by physical activity (i.e., weight, pain, glucose, blood pressure, health-related quality of life)?
(c) Overall health care costs and health care utilization?

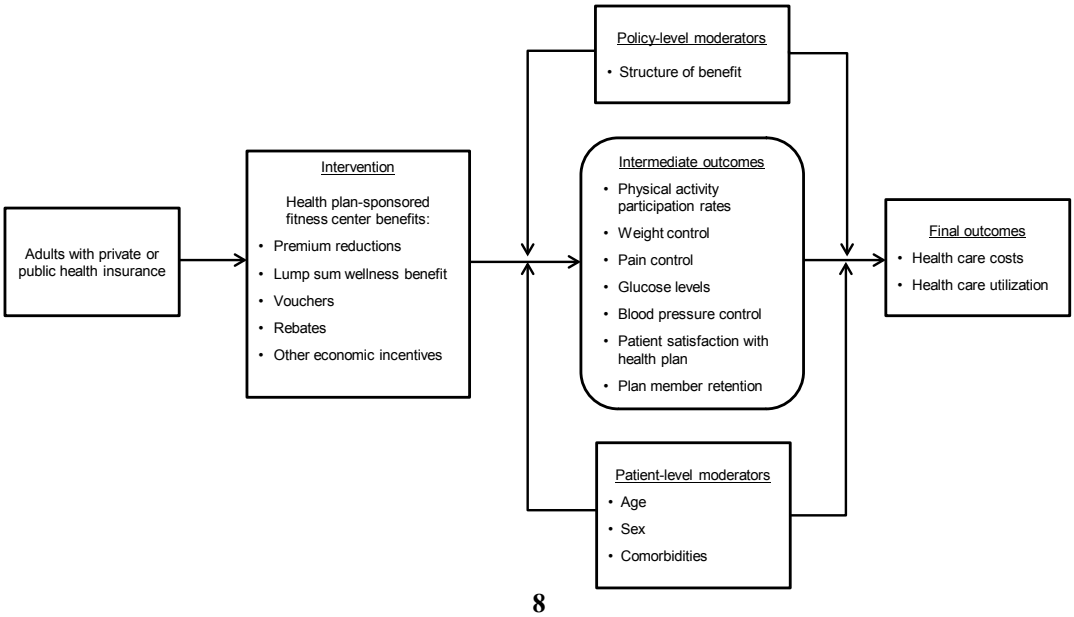
KQ 2. What are the effects of policy/benefits packages that include vouchers, rebates, premium reductions, or other economic incentives to encourage physical activity through fitness center memberships on satisfaction with the health plan and retention of members in the health plan?

KQ 3. Do the effects of policy/benefits packages to encourage physical activity vary by specific characteristics of the package (premium vs. lump sum) or age, sex, and physical illness of participants?

ANALYTIC FRAMEWORK

The standard protocol used for this review maps to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist.[18] Our approach was guided by the analytic framework shown in Figure 1.

Figure 1. Analytic framework for assessing effects of health plan-sponsored fitness center benefits



SEARCH STRATEGY

In consultation with a master librarian, we searched MEDLINE® (via PubMed®), Embase®, and the Cochrane Database of Systematic Reviews for peer-reviewed publications comparing health plan-sponsored strategies to encourage physical activity through fitness center memberships with standard benefit plans from database inception through January 2012. We selected free-text terms to search titles and abstracts as well as validated search terms for both randomized controlled trials[19] and relevant observational studies adapted from the Cochrane Effective Practice & Organization of Care Group search, version 1.9. We limited the search to articles published in the English language involving human subjects 18 years of age and older. The full search strategy is provided in Appendix A. An updated search for publications was conducted in May 2012. We also evaluated the bibliographies of included primary studies. All citations were imported into an electronic database, EndNote® Version X5 (Thomson Reuters, Philadelphia, PA) for referencing. As a mechanism to assess the risk of publication bias, we searched www.ClinicalTrials.gov for completed but unpublished studies in July 2012.

STUDY SELECTION

Using prespecified inclusion and exclusion criteria, two reviewers assessed titles and abstracts for relevance to the KQs. Full-text articles identified by either reviewer as potentially relevant were retrieved for further review. Each article retrieved was examined by two other reviewers against the eligibility criteria. Disagreements on inclusion, exclusion, or major reason for exclusion were resolved by discussion or by a third reviewer. The criteria to screen articles for inclusion or exclusion at both the title-and-abstract and full-text screening stages is shown in Table 1. Studies excluded at the full-text review stage are listed with the reasons for exclusion in Appendix B.

Table 1. Summary of inclusion and exclusion criteria

Study characteristic	Inclusion criteria	Exclusion criteria
Population	Adults ≥18 years of age with or without a chronic illness	Studies with populations <18 years of age
Intervention	• Intervention or "exposure" must meet the following definition: Health plan-sponsored strategies (e.g., vouchers, rebates, premium reductions) to encourage physical activity through fitness center memberships If the intervention includes a variety of fitness or exercise-related strategies in addition to facilitating gym memberships, the majority of activities (50% or more) should be like those typically provided through a gym to increase physical activity (e.g., yoga classes, walking clubs, trainer)	Study excluded if exposure meets any of the following criteria: • Studies of health plan-sponsored access to rehabilitation facilities • Studies of access to fitness centers not offered through health plan-sponsored economic incentives • Worksite wellness programs • Interventions that use a wide array of health promotion strategies not typically provided at a fitness center (e.g., health risk assessments, preventive health screenings) if the effects of fitness-related activities are not distinguishable from other components of the intervention

Study characteristic	Inclusion criteria	Exclusion criteria
Comparator	• Standard benefits packages (health plans that do not offer strategies to encourage physical activity through fitness center memberships • Head-to-head comparisons of different health plan-sponsored programs to encourage physical activity through fitness center memberships	None; study must have a control group
Outcome	KQs 1 and 3: • Physical activity participation rates (e.g., minutes spent being physically active, visits to fitness center) • Weight control (i.e., weight loss or maintenance of current weight) • Pain level using validated measures • Biophysical markers such as laboratory or physiological markers of glucose control or blood pressure • Health-related quality of life • Health care utilization of medical resources (e.g., in-patient admissions, emergency visits, primary care or specialty visits) • Health care costs (prioritizing total health care costs) KQ 2: • Member satisfaction with health plan • Retention of plan members	None
Timing	For longitudinal studies, outcomes must be measured at ≥6 months from start of assessment period	For longitudinal studies, outcomes reported <6 months from start of assessment period
Setting	• Study conducted in North America, Western Europe, Australia, New Zealand[a] • Public or private health plans	Conducted in countries other than those specifically listed as included
Study design[b]	• Original data • Prospective and retrospective observational studies with comparator (sample size ≥100 subjects) • Patient or cluster randomized trials (all sample sizes) • Interrupted time-series designs that have ≥3 measurement points prior to and after the intervention is begun	Cross-sectional studies and other observational study designs not specifically listed as "included" study designs
Publications	• English-language only • Peer-reviewed article	Non-English language publication

[a]Rationale is that medical systems in economically developed countries with sufficient similarities in the system and culture are applicable to U.S. medical care.

[b]Study designs recommended by the Cochrane Effective Practice and Organization of Care Group.

Abbreviation: KQ = Key Question

DATA ABSTRACTION

We designed the data abstraction forms to collect the data required to evaluate the eligibility criteria for inclusion in this review, as well as population characteristics and other data needed for determining outcomes and risk of bias (Appendix C). We paid particular attention to the details of the intervention to assure that it was offered through a health insurance plan as a health benefit and that it was engaged in by the participant at a fitness center. We did not evaluate studies on workplace wellness or health plan access to rehabilitation facilities. One researcher abstracted the data, and a second reviewed the completed abstraction form alongside the original article to check for accuracy and completeness. As with full-text review, disagreements were resolved by discussion or by a third reviewer. We supplemented abstraction of published data by contacting authors for missing information. We contacted one author who replied with additional information about benefits structure and costs.

QUALITY ASSESSMENT

Data necessary for assessing quality and applicability, as described in the Agency for Healthcare Research and Quality (AHRQ) *Methods Guide for Effectiveness and Comparative Effectiveness Reviews*,[20] also were abstracted. Per the AHRQ *Methods Guide*,[20] threats to internal validity of systematic review conclusions based on observational studies were identified through assessment of the body of observational literature as a whole, with an examination of characteristics of individual studies. Study-specific issues that were considered include: potential for selection bias (i.e., degree of similarity between intervention and control patients); performance bias (i.e., differences in care provided to intervention and control patients not related to the study intervention); attribution and detection bias (i.e., whether outcomes were differentially detected between intervention and control groups); and magnitude of reported intervention effects (see the section on "Selecting Observational Studies for Comparing Medical Interventions" in the *Methods Guide*). Using these quality criteria, we assigned a summary quality score (good, fair, poor) to included studies.[20] For each study, two investigators independently assigned a summary quality rating; disagreements were resolved by consensus or by a third investigator as before.

DATA SYNTHESIS

We critically analyzed studies to compare their characteristics, methods, and findings to determine the feasibility of completing a quantitative synthesis (i.e., meta-analysis) based on the volume of relevant literature, the completeness of the results reported and the conceptual homogeneity of the studies. As quantitative synthesis was not possible, we analyzed the results qualitatively.

RATING THE BODY OF EVIDENCE

In addition to rating the quality of individual studies, we evaluated the overall quality of the evidence for each KQ as described in the *Methods Guide*,[20] if feasible. This approach requires assessment of four domains: risk of bias, consistency, directness, and precision. Additional domains considered were strength of association (magnitude of effect) and publication bias. These domains were considered qualitatively, and a summary rating of high, moderate, low, or insufficient strength of evidence was assigned after discussion by two reviewers.

PEER REVIEW

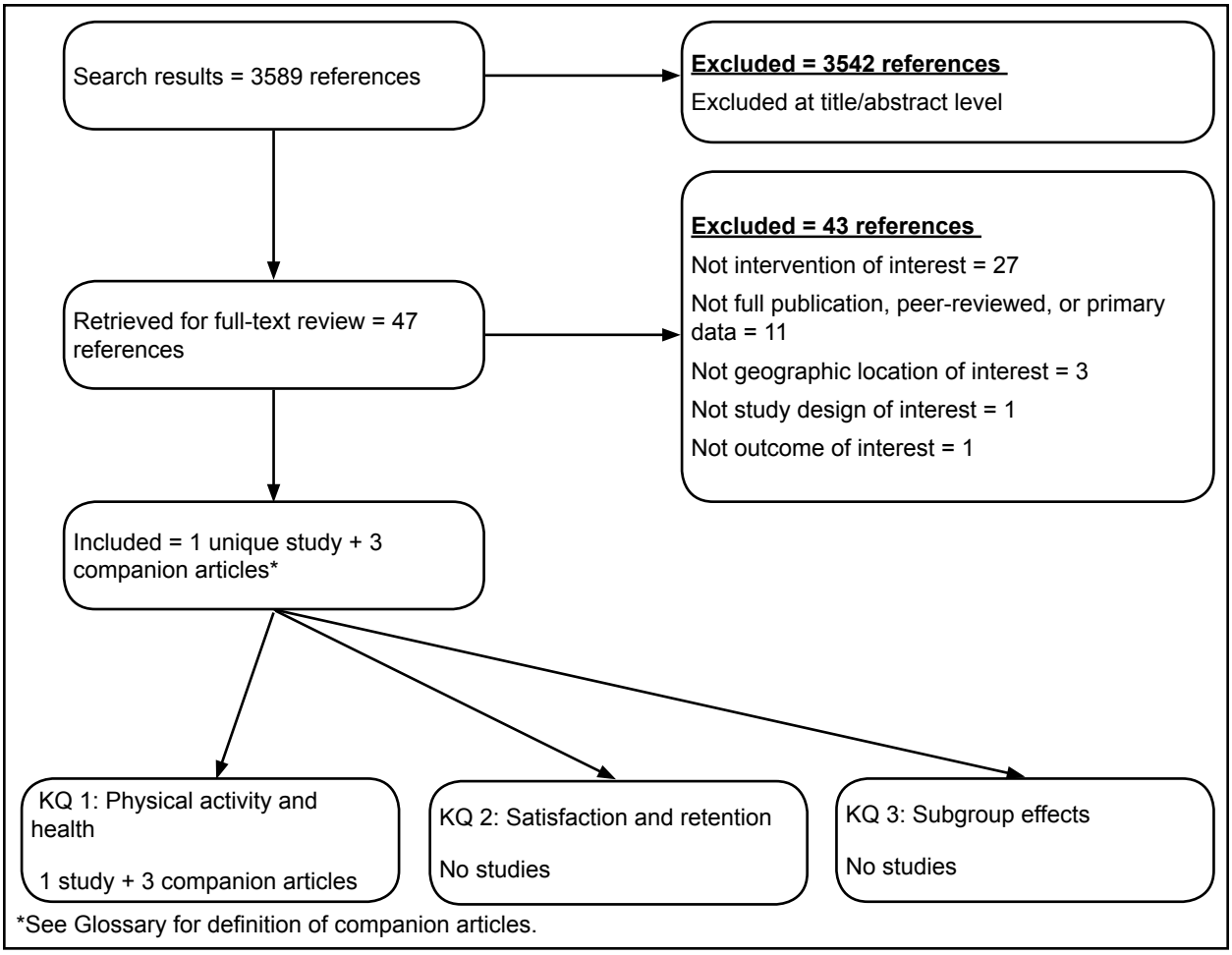
A draft version of the report was reviewed by technical experts and clinical leadership. A transcript of their comments can be found in Appendix D, which elucidates how each comment was considered in the final report.

RESULTS

LITERATURE SEARCH

The flow of articles through the literature search and screening process is illustrated in Figure 2. We identified 3584 unique citations from a combined search of MEDLINE (via PubMed, n=3560), Embase (n=24), and the Cochrane database (n=0). Manual searching of included study bibliographies and review articles identified 5 additional citations for a total of 3589 citations. After applying inclusion/exclusion criteria at the title-and-abstract level, 47 full-text articles were retrieved and screened. Of these, 43 were excluded at the full-text screening stage, leaving 4 articles (representing 1 unique study) for data abstraction. Most studies were excluded at full-text review because they assessed types of physical activity promotion strategies other than fitness center memberships (e.g., worksite wellness) provided through health plan benefits. Our search of www.ClinicalTrials.gov did not suggest publication bias. There were no completed studies that were unpublished. In addition, there were no ongoing studies on this topic.

Figure 2. Literature flow diagram



Note: At the request of a peer reviewer, we reconsidered one reference[21] that was initially excluded at the title/abstract level; however, we retained our original conclusion that the reference could not be included based on our inclusion/exclusion criteria.
Abbreviation: KQ = Key Question

STUDY CHARACTERISTICS

Only one main study[22] and three companion articles[23-25] met inclusion criteria for this review (Table 2). All articles we identified addressed KQ 1; none addressed KQ 2 or KQ 3. The main study was a retrospective cohort study rated fair quality that used administrative and claims data to assess the effects of a health plan-sponsored fitness center membership benefit (known as the Silver Sneakers program) on health care costs and utilization among adults 65 years of age and older who were enrolled in the Group Health Cooperative of Puget Sound Medicare Advantage plan. The Group Health Cooperative is a consumer-governed, staff-model, health maintenance organization of more than 500,000 members.

Two companion articles assessed the effect of distance from the fitness center[23] and history of depression[24] on the uptake of fitness center benefits and frequency of use among participants. One additional companion article[25] assessed the effect of this benefit on health care costs and utilization among health plan members with diabetes. All variables used in analyses (e.g., patient demographics, costs) were obtained from health plan administrative data. Relevant results are discussed in detail following the table.

Table 2. Overview of articles evaluating effects of fitness center membership

Reference	Study Details	KQ	Included Outcomes
Main study			
Nguyen et al., 2008[22]	Group Health Cooperative Medicare Advantage enrollees ≥ age 65 Selection dates: Jan 1998–Dec 2003 Participants: 4766 benefit users Matched controls: 9035 benefit nonusers	1a 1c	• Physical activity participation • Health care cost • Health care utilization
Companion articles			
Berke et al., 2006[23]	Group Health Cooperative Medicare Advantage enrollees ≥ age 65 Selection dates: Jan 2002–Dec 2003 Participants: 1728 benefit users Matched controls: 4838 benefit nonusers	1a	Role of distance from fitness center on: • Uptake of benefit • Frequency of use of benefit
Nguyen et al., 2008[24]	Group Health Cooperative Medicare Advantage enrollees ≥ age 65 Selection dates: Jan 1998–Dec 2003 Participants: 4766 benefit users Matched controls: 9035 benefit nonusers	1a	Role of depression history on: • Uptake of benefit • Frequency of use of benefit, risk of participation lapse
Nguyen et al., 2008[25]	Group Health Cooperative Medicare Advantage enrollees ≥ age 65 Selection dates: Jan 1998–Dec 2003 Participants: 618 benefit users with diabetes Matched controls: 1413 benefit nonusers with diabetes	1a 1c	• Physical activity participation • Health care cost • Health care utilization

KEY QUESTION 1. What are the effects of policy/benefits packages that include vouchers, rebates, premium reductions, or other economic incentives to encourage physical activity through fitness center memberships on:

(a) Physical activity participation rates among plan members?

(b) Health outcomes demonstrated to be improved by physical activity (i.e., weight, pain, glucose, blood pressure, health-related quality of life)?

(c) Overall health care costs and health care utilization?

KQ 1a: Physical Activity Participation

None of the included articles assessed physical activity as a primary outcome. The only metric of physical activity was the frequency of fitness center visits by participants in the Silver Sneakers program such as that reported in the main study[22] and one companion article.[25] Two additional companion articles assessed the associations between (1) the distance from the fitness center[23] and (2) a history of depression[24] on the uptake and frequency of use of the health plan-sponsored fitness center membership benefit.

The Silver Sneakers program assessed in all analyses allowed eligible health plan enrollees 65 years of age and older to access selected fitness centers and all activities (e.g., structured conditioning classes) and facilities (e.g., exercise equipment, pool) associated with these fitness centers. Participation in Silver Sneakers was voluntary; participants who opted to enroll contacted their local fitness centers to join. The health plan covered the full cost of memberships for each year; there were no additional costs to the member for the fitness center membership. No other details of the benefit structure or characteristics of selected fitness centers were provided in any of the included articles or through communications with study authors. Visits to the fitness center were documented by swipe cards at participating facilities; average attendance was calculated by dividing all fitness center visits over 2 years by 104 weeks.

In the main study,[22] Nguyen et al. used administrative and claims data from a Medicare Advantage plan administered through a health maintenance organization to assess the effects of the fitness center benefit, Silver Sneakers, on health care costs and utilization among adults 65 years of age and older. In these analyses, Silver Sneakers participants (n = 4766) were compared with up to three age- and sex-matched controls (n = 9035) from the same health plan who did not elect to participate in the health plan-sponsored fitness center benefit. The followup interval was 2 years. Silver Sneakers participants were more likely to be male, have arthritis, use more preventive health services, and have higher total health expenditures at baseline than the age- and sex-matched controls. However, Silver Sneakers participants were less likely to have diabetes or congestive heart failure compared with controls. Main study limitations were the inability to (1) control for confounding from potential selection bias that could not be accounted for through analysis, (2) rule out concurrent exposures to other sources of physical activity that may have biased results, and (3) measure quality and type of physical activity; the number of visits to the fitness center was the only measure of physical activity.

In Year 1, Nguyen et al.[22] reported that the average number of fitness center visits among Silver Sneakers participants was 75 (median 49; interquartile range [IQR] 11 to 120). In Year 2, the average number of visits declined to 55 (median 12; IQR 0 to 89). While participation dropped in Year 2, 61 percent of participants continued to visit fitness centers.

A separate analysis[25] using a subset of members with diabetes (n = 618) from the main study[22] also reported the average number of fitness center visits among participants, which was similar to those reported in the main study. Silver Sneakers participants averaged 72 visits in Year 1 and 49 visits in Year 2.

Two companion articles provided information on other factors associated with uptake and frequency of use. In a separate analysis of 1728 Silver Sneakers participants and 4838 nonparticipants, Berke et al.[23] found that plan members who chose the fitness center benefit lived closer to fitness centers compared with nonparticipants (p = 0.017; adjusted model). The odds of participating in Silver Sneakers decreased by 1.3 percent for every kilometer farther that a plan member lived from a fitness center. Additionally, participants who lived closer to fitness centers used these facilities more frequently than those who lived farther away. Controlling for age, sex, socioeconomic status, distance from center, use of selected preventive services (e.g., cancer screenings, vaccinations), and composite measure of disease burden (i.e., RxRisk[26]), participants made an average of 4.2 visits per month (standard deviation 3.4).

In another analysis using Silver Sneakers participant data, Nguyen et al.[24] assessed the impact of history of depression as identified by International Classification of Diseases (ICD)-9-CM codes on benefit uptake and patterns of use (n = 13,801; 4766 participants and 9035 matched controls). This analysis found that depression in the 12 months before the start of the Silver Sneakers program was not associated with enrollment in the fitness membership benefit (odds ratio 1.03; 95% confidence interval [CI] 0.89 to 1.20, p=0.67; adjusted model). Participants with a depression diagnosis, however, made fewer visits per month to fitness centers compared with participants who were not depressed (range -0.64 to -1.5 visits). Additionally, depressed participants had a 19-percent higher risk of participation lapse (hazard ratio 1.19; 95% CI 1.04 to 1.37, p=0.01; adjusted model) compared with participants who were not depressed at baseline.

KQ 1b: Physical Health Outcomes

No identified studies addressed KQ 1b.

KQ 1c: Health Care Costs and Utilization

The main study[22] and one companion article[25] reported the effects of health plan-sponsored fitness center memberships on health care costs and utilization. In adjusted models for Year 1, Nguyen et al.[22] reported that adjusted total health care costs were not different between Silver Sneakers participants and nonparticipants (+$2; 95% CI -$341 to +$344, p=0.99). However, participants experienced fewer inpatient admissions (-1.0%; CI -2.1% to -0.1%, p=0.5) but made more primary care visits (+0.40; CI 0.27 to 0.53, p<0.001) and specialty care visits (+0.22; CI 0.11 to 0.33, p<0.001) compared with controls. By the end of Year 2, participants incurred significantly lower total health care costs (-$500; CI -$892 to -$106, p=0.01). This decrease was likely due to fewer inpatient admissions (-2.3%; CI -3.3% to -1.2%, p<0.001) and lower inpatient care costs (-$270; CI -$533 to -$6, p=0.05) compared with controls.

Silver Sneakers participants had significantly more primary care visits (+0.26; CI 0.13 to 0.40, p<0.001) and specialty care visits (+0.25; CI 0.14 to 0.36, p<0.001) for Year 2, which resulted in higher costs for those services (primary care: +$80, p<0.001; specialty care: +$37, p=0.14). There was also evidence of a dose-response by average number of health club visits. Compared with participants who attended fitness centers less than one time per week, participants who averaged two to less than three or three or more visits per week over 2 years had lower adjusted health care costs (2 to < 3 visits -$1252, p<0.001; ≥ 3 visits -$1309, p=0.001).

Another article[25] used a subset of participants from the retrospective cohort study.[22] Claims data for 2031 older adults with diabetes were examined to assess the impact of Silver Sneakers on health care utilization and costs among this group. Participants with diabetes (n = 618) were more likely to be male, have lower chronic illness burden, use more preventive health services, have more outpatient visits for arthritis, and make more primary and specialty care visits compared to nonparticipants with diabetes (n =1413). Level of diabetes control, age, and total health care costs at baseline were not significantly different between diabetic participants and nonparticipants.

Participants in Silver Sneakers with diabetes had lower adjusted total health care costs compared with age- and sex-matched nonparticipants with diabetes after 1 year of enrollment in the fitness center program ($1633; 95% CI -$2620 to -$646, p=0.001). This cost savings was likely due to fewer hospitalizations (-3.0%, p=0.07) and lower adjusted inpatient costs (-$1021; CI -$1688 to $367, p=0.002). However, in Year 1 diabetic participants had more primary care visits (0.77; CI 0.34 to 1.2, p<0.001) and primary care costs ($129; CI $32 to $266, p=0.009). In Year 2, participants accumulated lower total health care costs, but these savings were not statistically significantly different from diabetic nonparticipants (-$1230; CI -$2494 to $33, p=0.06).

KEY QUESTION 2. What are the effects of policy/benefits packages that include vouchers, rebates, premium reductions, or other economic incentives to encourage physical activity through fitness center memberships on satisfaction with the health plan and retention of members in the health plan?

No identified studies addressed KQ 2.

KEY QUESTION 3. Do the effects of policy/benefits packages to encourage physical activity vary by specific characteristics of the package (premium vs. lump sum) or age, sex, and physical illness of participants?

No identified studies addressed KQ 3.

SUMMARY AND DISCUSSION

Health plan-sponsored fitness center memberships have the potential to reach many Americans and may be an effective strategy to increase physical activity and its associated health benefits. Surprisingly few studies assessed the impact of health plan-sponsored fitness membership benefits—we identified only one main study and three companion articles that assessed the impact of such benefits. Overall, the data are insufficient to grade the strength of the evidence for health plan-sponsored access to fitness centers through member benefits.

The four included articles provided limited data on rates of physical activity (KQ 1a) and health care costs and utilization (KQ 1c). There were no data on physical health outcomes of interest (i.e., weight, pain, glucose, blood pressure, health related quality of life) (KQ 1b) and none on satisfaction with health plans or retention of plan members (KQ 2). No studies assessed whether effects of health plan benefits varied by characteristics of the participants (KQ 3). Further, only one type of plan was assessed in all analyses; thus, no included studies assessed whether effects of health plan-sponsored fitness center memberships varied by benefit type (KQ 3). Data were of limited applicability; all analyses were conducted exclusively in patients 65 years of age and older and were from one geographic location in the United States.

SUMMARY OF EVIDENCE

None of the included articles assessed physical activity as a primary outcome; the only metric of physical activity provided was descriptive information on frequency of fitness center visits. Overall, health plan members who opted to participate in the health plan-sponsored fitness center memberships made few visits to facilities. In the main study,[22] members averaged 1.44 visits per week in Year 1 and 1.06 visits per week in Year 2. These averages were similar to those reported in a subset of members with diabetes.[25] Additional analyses suggest that distance from fitness centers and history of depression influence the uptake of health plan-sponsored fitness center memberships. Enrollment in a fitness center and frequency of use are both associated with distance from gyms.[23] While history of depression is not associated with participation in a fitness center benefit, health plan members with a history of depression made fewer visits and were at greater risk of lapses in their participation compared with nondepressed members.[24]

We found some limited evidence to support the effects of health plan-sponsored fitness center memberships on health care costs and utilization. While participants in the Silver Sneakers program made more primary and specialty care visits, overall health care costs were significantly lower.[22] These saving were likely due to fewer inpatient admissions. Similar patterns of health care use and costs were seen among health plan members with diabetes.[25]

IMPLICATION OF FINDINGS

The clearest finding of this evidence synthesis is that the existing knowledge base does not provide enough data to make evidence-driven policy recommendations about the health and economic effects of health plan-sponsored fitness center membership benefits. The limited evidence available suggests that, if offered, health plan members will use fitness center memberships. However, internal and external barriers to optimal rates of use of such benefits remain.

Overall, health plan members who opted into the Silver Sneakers program tended to have fewer chronic illnesses. These findings complement a recent study that found health plans offering coverage for fitness center memberships attract and retain enrollees with better self-reported health.[27] Together, these finding suggest that adding fitness center memberships to health plan benefits facilitates favorable selection of healthier enrollees, which in turn may lower health care costs by adding and retaining less costly individuals to the risk pool. However, health systems such as the VA have a higher proportion of individuals with chronic diseases (e.g., obesity, diabetes, arthritis). If the VA is able to engage these populations to use fitness center memberships, the cost savings could be significant, particularly for Veterans whose average weekly attendance is more than 1 visit.[22] The results of the study by Nguyen et al.[25] suggest that there may be an earlier and greater return on investment for populations who are at higher risk. Specifically, diabetic participants in the Silver Sneakers program had greater reductions in total health care expenditures than the general population of participants analyzed in Nguyen et al. (-$1230 vs. $500).[22,25]

Other findings suggest that a participant's distance from the fitness center also plays a role in benefit uptake and, after enrollment, frequency of use.[23] Thus, health insurers who have a large proportion of rural enrollees who travel greater distances to fitness centers may have lower uptake of these benefits. Such health insurers may want to structure fitness center benefits that pay per visit instead of per membership or that automatically discontinue monthly fitness center memberships following lapses in use. This has implications for the VA patient population. Many Veterans travel long distances to access VA facilities. Thus, the VA would have to engage local and community-based facilities (e.g., commercial) closer to Veterans' homes in order to optimize benefit uptake and frequency of use. Also, health plans that have older enrollees with more physical limitations due to chronic health conditions may choose to selectively coordinate with fitness centers that offer appropriate exercise options (e.g., pool-based activities, low-impact aerobics classes). Despite these issues, evidence suggest that health plan members who elect to join fitness center programs incurred lower overall health care costs, even among members with chronic illnesses.[22,25] Health insurers evaluating whether to implement such programs should look for ways to enhance more frequent use of fitness centers over time, such as an attendance requirement for continued access, in the design structure of the benefit.

STRENGTHS AND LIMITATIONS

Our study has a number of strengths, including a protocol-driven review, a comprehensive search, and careful quality assessment. We also allowed inclusion of a wide array of observational and experimental studies and sought to collect both patient-level outcomes (e.g., physical activity levels, biophysical markers) and system-level outcomes (e.g., health care costs, health plan member retention rates). However, limitations to our evidence review exist. The greatest limitation of this review is the lack of relevant studies—and particularly no data relevant to KQ 2 and KQ 3. We limited our search to English-language articles and only included citations from North America, Western Europe, Australia, and New Zealand. We maintained this search limitation because we lacked translation resources and, more importantly, wanted to prioritize studies that were applicable to the U.S. medical system and populations, specifically Veterans. It was the opinion of the investigators and our stakeholders that the resources needed to translate non-English articles had a low potential likelihood of identifying relevant data. To the

extent that studies applicable to the United States were published in languages other than English or were conducted outside these countries, we may have failed to include relevant studies. Also, the single included study and its associated companion articles all used retrospective observational designs, which has important implications for the strength of associations explored in these studies. Some key limitations were the limited ability to control for residual confounding due to nonrandomized design, no measure of overall physical activity outside of fitness center visits, and no data on the type and quality of physical activity conducted during fitness center visits. In addition, it is crucial to assess fitness center membership prior to and separate from the rollout of fitness center benefits in order to assess whether the benefit is reaching new or lapsed gym users or supplanting memberships of existing fitness center users. In other words—is the benefit enhancing access for people who are not physically active without the benefit but who would become physically active with the benefit? One strength of the included studies, however, was their use of existing "real world" administrative and claims data.

RECOMMENDATIONS FOR FUTURE RESEARCH

Offering partial or full gym membership discounts is a common practice. For example, according to the Employer Health Benefits 2012 Annual Survey from the Kaiser Family Foundation and Health Research and Educational Trust,[28] 65 percent of all large firms (i.e., 200 or more workers) offer gym membership discounts or onsite exercise facilities—highlighting the need for evaluation and identification of best practices related to this increasingly offered benefit. However, results of our review confirm that the current body of literature is weak and insufficient to identify whether these programs improve outcomes and, if so, what are the best practices associated with implementing them. Thus, additional studies are needed to assess the potential merits, costs, and challenges of health plan-sponsored fitness center benefits in order to better inform VA policy. We used the framework recommended Robinson et al.[29] to identify gaps in evidence and classify why these gaps exist (Table 3).

Table 3. Evidence gaps and future research

Evidence Gap	Reason	Type of Studies to Consider
Patients		
Absence of data for patients other than those ≥ age 65	Insufficient information	• Multisite cluster RCTs • Quasi-experimental studies • Prospective cohort studies
Interventions		
Silver Sneakers program was the only benefit assessed	Insufficient information	• RCTs of head-to-head comparisons of different types of benefit structures • Quasi-experimental studies comparing different types of policy changes that impact benefit structures
Outcomes		
Uncertain effects on: • Physical activity levels • Physical health outcomes • Health care costs and utilization	Insufficient information	• Multisite cluster RCTs • Prospective cohort studies • Nonrandomized trials (pre-post designs) • Nonrandomized controlled before-and-after studies

Evidence Gap	Reason	Type of Studies to Consider
Uncertain effects on health plan member: • Satisfaction • Retention	Insufficient information	• Multisite cluster RCTs • Prospective or retrospective cohort studies • Nonrandomized controlled before-and-after studies • Qualitative studies

Abbreviation: RCT = randomized controlled trial

Potential Study Designs for Future Research

Existing studies lack diversity in included populations, benefits assessed, outcomes collected, and study designs employed. There are numerous possibilities regarding future research in this area. In particular, a variety of study designs can be employed—each having their own strengths and weaknesses. Three broad types of possible study designs and specific examples are introduced in Table 4, including (1) experimental (e.g., cluster randomized controlled trial), (2) quasi-experimental (e.g., interrupted time series design), and (3) observational (e.g., prospective cohort study, retrospective cohort study using administrative data).

A cluster randomized controlled trial is a form of randomized controlled trial where groups of subjects or sites (e.g., VA medical centers) are the unit of randomization to treatment or control rather than individual participants. An interrupted time series design involves multiple measurements prior to and following an event (e.g., policy change to add fitness center membership benefits), which allows for evaluation of temporal trends but does not include randomization to study conditions. In an observational prospective cohort study, a defined group of individuals is followed over time before outcomes and exposures are measured. Retrospective cohort studies examine past exposures and outcomes. Table 4 gives an overview of the major strengths and limitations of these selected study design alternatives tailored to future research on health plan-sponsored fitness center memberships. We considered a variety of domains such as level of control over benefit structure, measurement/assessment, internal validity, generalizability, and feasibility (e.g., time, cost).

Table 4. Comparisons of study designs used to assess effects of health plan-sponsored fitness benefits

Study Designs	Major Strengths	Major Limitations
Cluster randomized controlled trial	• Randomization to treatment (i.e., the fitness benefit) or control minimizes the influence of unaccounted, unmeasured factors (i.e., confounding variables) and reduces selection bias. • Substantial control exists over measurement, such as included measures, as well as length of followup and timing. • There is greater strength of evidence and confidence in results/causality. • There is the greatest level of control over structure of the intervention (i.e., benefit). • There is the possibility of comparing different benefit structures using multiple active comparators (i.e., comparative effectiveness trials).	• Threats to validity are still possible if randomization is not successful; results also may be undermined if significant and/or differential dropouts occur. • Design is potentially time-consuming, with a longer lag time in generating findings compared to retrospective cohort studies using existing administrative data. • Design has potentially higher costs than retrospective cohort studies using existing administrative data. • External validity/generalizability is potentially limited if there is a highly selected population, setting, and tightly controlled implementation with resources/staff not available in "real world" settings. • Design may pose a measurement burden for participants.
Interrupted time series design	• This design allows assessment of temporal trends in variables of interest before and after the event (i.e., policy change to include fitness center memberships). • There is potentially lower cost than RCTs and prospective designs if using existing data sources.	• This design has a lack of control over unaccounted, unmeasured factors (i.e., confounding variables). • Design is potentially less feasible; it would need to identify an event and have access to relevant data before and after a policy change. • Design may require a large sample size. • There is no control over structure of benefit unless policymakers consult with researcher.
Prospective cohort study	• Substantial control exists over measurement, such as measure diversity (number and type), as well as length of followup and timing. • There is greater "real-world" applicability compared to tightly controlled randomized trials. • There is greater strength of evidence than with other observational designs such as case-control and retrospective cohort designs because the sequence of event can be assessed.	• Time and cost investment is likely substantial because of the need for a large sample size and multiple assessments. • There is a significant measurement burden for participants. • This design is potentially less feasible and must identify the setting prior to benefit and enrollment, which may pose a significant logistical barrier. • There is a greater risk of bias, lower quality, and lower strength of evidence compared to RCTs. • There is no control over the structure of benefit.
Retrospective cohort study using administrative data	• This design is convenient if datasets are available and accessible (e.g., claims data). • Time and costs required are potentially less than other designs. • This design uses a similar method to existing studies, making it possible to confirm/replicate prior findings.	• Design is limited by the information available and existing variables (e.g., type, quality, timing, followup). • Relevant data must be available and affordable; a large sample size is necessary to create a cohort of interest and define an adequate control group. • Compared to other designs, risk of bias is highest and quality and strength of evidence are lowest. • There is no control over the structure of benefit.

Abbreviation: RCT = randomized controlled trial

When weighing which study designs to use, researchers should always start with what is the best design to answer the research question at hand. However, researchers must also carefully weigh the tradeoffs in costs, feasibility, time, quality of evidence, and generalizability, which differ among the various study design options. Previous research on health plan-sponsored access to fitness memberships has exclusively used retrospective observational designs. Compared with prospective or experimental designs, retrospective observational designs allow for rapid generation of findings if existing data can be used. However, they offer the lowest strength of evidence when compared with the other designs described above and do not allow for control over the benefit structure. Moreover, retrospective observational designs may offer only limited information on complex behaviors like physical activity. The existing literature is limited in this regard and only provides descriptive information on the number of gym visits. Future studies should assess the quality of the physical activity (e.g., moderate vs. vigorous) and the time spent engaging in the activity.

Prospective cohort and quasi-experimental designs, such as interrupted time series designs, provide greater strength of evidence through establishing temporality of events compared with retrospective designs, as well as offering control over the type and quality of measures collected. These designs also come at higher costs, are more time consuming, may pose significant measurement burden on participants, and are impractical for rare events such as shifts in policies. In addition, these designs do not allow for control over the structure of the benefits. Also for interrupted time series designs, it can be difficult to disentangle the effects of the benefit from natural temporal trends without establishing a contemporaneous control group, and use of existing datasets may limit the quality and type of variables assessed.

When assessing the impact of providing memberships to fitness centers through health plan-sponsored benefits, RCTs offer the greatest strength of evidence. These designs also allow for control over the intervention tested (i.e., the benefit structure). Moreover, randomized designs can allow for direct comparisons of different benefit structures through comparative effectiveness trials (head-to-head comparisons). Also, RCTs can allow testing of different incentive strategies (e.g., cash rewards, premium discounts, loss of benefit based on attendance) to encourage continued use of fitness centers. Measurement of complex outcomes like physical activity can be built into the design of trials through the use of objective and automatic physical activity monitoring (e.g., pedometers with wireless data upload). However, randomized trials also tend to be costly and time consuming. In addition, the evidence generated may have limited generalizability if the study was conducted in a tightly controlled research environment with highly selected populations. Efficiencies can be built into theses design such as using cluster randomized designs and using existing data sources such as VA electronic medical records.

CONCLUSIONS

Health plan-sponsored fitness center memberships have the potential to increase levels of physical activity and, subsequently, improve health and economic outcomes for Veterans. However, few studies have assessed the impact of health plan-sponsored fitness membership benefits. The evidence base for these claims remains weak due to study design limitations, and insufficient due to the paucity of literature. The limited evidence provides support for reductions in health care costs and utilization when comparing health plan members who choose to

participate in health plan-sponsored gym memberships with those who do not—but these results may not be generalizable to Veterans and are based on study designs that could be subject to bias. The existing literature provides little insight into other outcomes such as physical activity, physical health outcomes, or health plan member satisfaction or retention. Thus, further evidence is needed on which to base policy recommendations on the merits of providing health plan-sponsored fitness center memberships.

REFERENCES

1. Bauman AE. Updating the evidence that physical activity is good for health: an epidemiological review 2000-2003. *J Sci Med Sport*. 2004;7(1 Suppl):6-19.

2. Vogel T, Brechat PH, Lepretre PM, et al. Health benefits of physical activity in older patients: a review. *Int J Clin Pract*. 2009;63(2):303-20.

3. Tseng CN, Gau BS, Lou MF. The effectiveness of exercise on improving cognitive function in older people: a systematic review. *J Nurs Res*. 2011;19(2):119-31.

4. Bize R, Johnson JA, Plotnikoff RC. Physical activity level and health-related quality of life in the general adult population: a systematic review. *Prev Med*. 2007;45(6):401-15.

5. Glenister D. Exercise and mental health: a review. *J R Soc Health*. 1996;116(1):7-13.

6. Gerber M, Puhse U. Review article: do exercise and fitness protect against stress-induced health complaints? A review of the literature. *Scand J Public Health*. 2009;37(8):801-19.

7. Penedo FJ, Dahn JR. Exercise and well-being: a review of mental and physical health benefits associated with physical activity. *Curr Opin Psychiatry*. 2005;18(2):189-93.

8. Bucksch J, Schlicht W. Health-enhancing physical activity and the preventionof chronic diseases--an epidemiological review. *Soz Praventivmed*. 2006;51(5):281-301.

9. Taylor AH, Cable NT, Faulkner G, et al. Physical activity and older adults: a review of health benefits and the effectiveness of interventions. *J Sports Sci*. 2004;22(8):703-25.

10. Franklin BA. Physical activity to combat chronic diseases and escalating health care costs: the unfilled prescription. *Curr Sports Med Rep*. 2008;7(3):122-5.

11. Colditz GA. Economic costs of obesity and inactivity. *Med Sci Sports Exerc*. 1999;31(11 Suppl):S663-7.

12. Department of Health and Human Services. Centers for Disease Control and Prevention. 2008 Physical Activity Guidelines for Americans. Available at: http://www.cdc.gov/physicalactivity/everyone/guidelines/adults.html. Accessed August 1, 2012.

13. Department of Health and Human Services. Centers for Disease Control and Prevention. 2007 U.S. Physical Activity Statistics. Available at: http://apps.nccd.cdc.gov/PASurveillance/StateSumResultV.asp?CI=&Year=2007&State=0#data Accessed August 1, 2012.

14. Littman AJ, Forsberg CW, Koepsell TD. Physical activity in a national sample of veterans. *Med Sci Sports Exerc*. 2009;41(5):1006-13.

15. Cerin E, Leslie E, Sugiyama T, et al. Perceived barriers to leisure-time physical activity in adults: an ecological perspective. *J Phys Act Health*. 2010;7(4):451-9.

16. Salmon J, Owen N, Crawford D, et al. Physical activity and sedentary behavior: a population-based study of barriers, enjoyment, and preference. *Health Psychol*. 2003;22(2):178-88.

17. U.S. Census Bureau. Health Insurance Highlights 2010. Available at: http://www.census.gov/hhes/www/hlthins/data/incpovhlth/2010/highlights.html. Accessed August 1, 2012.

18. Moher D, Liberati A, Tetzlaff J, et al. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *J Clin Epidemiol*. 2009;62(10):1006-12.

19. Wilczynski NL, McKibbon KA, Haynes RB. Response to Glanville et al.: How to identify randomized controlled trials in MEDLINE: ten years on. *J Med Libr Assoc*. 2007;95(2):117-8; author reply 119-20.

20. Agency for Healthcare Research and Quality. Methods Guide for Effectiveness and Comparative Effectiveness Reviews. Rockville, MD: Agency for Healthcare Research and Quality. Available at: http://www.effectivehealthcare.ahrq.gov/search-for-guides-reviews-and-reports/?pageaction=displayproduct&mp=1&productID=318. Accessed August 1, 2012.

21. Fody-Urias BM, Fillit H, Hill J. The effect of a fitness program on health status and health care consumption in Medicare MCOs. *Manag Care Interface*. 2001;14(9):58-64.

22. Nguyen HQ, Ackermann RT, Maciejewski M, et al. Managed-Medicare health club benefit and reduced health care costs among older adults. *Prev Chronic Dis*. 2008;5(1):A14.

23. Berke EM, Ackermann RT, Lin EH, et al. Distance as a barrier to using a fitness-program benefit for managed medicare enrollees. *J Aging Phys Act*. 2006;14(3):313-323.

24. Nguyen HQ, Koepsell T, Unutzer J, et al. Depression and use of a health plan-sponsored physical activity program by older adults. *Am J Prev Med*. 2008;35(2):111-7.

25. Nguyen HQ, Maciejewski ML, Gao S, et al. Health care use and costs associated with use of a health club membership benefit in older adults with diabetes. *Diabetes Care*. 2008;31(8):1562-7.

26. Putnam KG, Buist DS, Fishman P, et al. Chronic disease score as a predictor of hospitalization. *Epidemiology*. 2002;13(3):340-6.

27. Cooper AL, Trivedi AN. Fitness memberships and favorable selection in Medicare Advantage plans. *N Engl J Med*. 2012;366(2):150-7.

28. The Kaiser Family Foundation and Health Research Educational Trust. Employer Health Benefits 2012 Annual Survey. Available at: http://ehbs.kff.org/. Accessed September 27, 2012.

29. Robinson KA, Saldanha IJ, Mckoy NA. Frameworks for Determining Research Gaps During Systematic Reviews. Methods Future Research Needs Report No. 2. (Prepared by the Johns Hopkins University Evidence-based Practice Center under Contract No. HHSA 290-2007-10061-I.) AHRQ Publication No. 11-EHC043-EF. Rockville, MD: Agency for Healthcare Research and Quality. June 2011. Available at: www.effectivehealthcare.ahrq.gov/reports/final.cfm. Accessed May 22, 2012.