

Jennifer K. Carroll, MD, MPH, Kevin Fiscella, MD, MPH, Ronald M. Epstein, MD, Pascal Jean-Pierre, PhD, Colmar Figueroa-Moseley, PhD, Geoffrey C. Williams, MD, PhD, Karen M. Mustian, PhD, and Gary R. Morrow, PhD, MS
University of Rochester School of Medicine, Rochester, NY

University of Rochester Cancer Center (JKC, KF, RME, PJP, CFM, KMM, GRM), Department of Family Medicine (JKC, KF, RME, PJP), Department of Internal Medicine (GRW), Department of Psychiatry (RME), and Department of Community and Preventive Medicine (KF)

jennifer_carroll@urmc.rochester.edu

IN THIS ARTICLE

■ The difficulty of maintaining adherence to physical activity

Page 173

■ Promising strategies include office prompts, brief counseling

Pages 174

Getting patients to exercise more: A systematic review of underserved populations

Brief counseling and a written plan increase exercise rates in the underserved

Practice recommendations

- Use focused, brief (2–3 minute) physical activity counseling with patients (B).
- Have large-print, easy-to-understand program materials available to supplement your discussion (B). Provide patients with a simple written plan of their physical activity goals (B). Focus on a limited number of concepts to avoid information overload (B).
- Address patients' financial and logistical barriers to participation and adherence (B).
- Encourage flexibility in patients' choices for exercise, and incorporate cultural adaptations (such as preferences for music, dance, or group activities) where appropriate (B).
- Use trained support staff, preferably representing the community of interest, to promote physical activity in your patients (B).

Strength of recommendation (SOR)

- A Good-quality patient-oriented evidence
- B Inconsistent or limited-quality patient-oriented evidence
- C Consensus, usual practice, opinion, disease-oriented evidence, case series

Fewer than half of all Americans get sufficient physical activity, defined as 30 minutes or more per day, at least 5 times per week.¹ The need to increase physical activity applies particularly to underserved populations: they are even less likely to get enough physical activity, and are thus even more likely to suffer greater burden of disease.^{2,3}

The purpose of this systematic review was to assess clinical trials of clinician-initiated counseling interventions for promoting physical activity in underserved populations. We define *underserved populations* as individuals from minority ethnic backgrounds (such as African Americans, Hispanics, and Asian Americans), or vulnerable populations such as people with low educational attainment, low income, lack of insurance, or those residing in rural communities.

Primary care interventions are linked to a change in habits

Primary care physicians can have a significant impact on their patients' physical activity. Individuals with a regular primary care physician are more likely to report attempts to change their physical activity habits.⁴ However, underserved populations are more likely to have inconsistent access to medical care, which may con-

tribute to their greater risk of conditions linked to inadequate physical activity, such as diabetes, hypertension, and obesity.

Only about 25% of patients in primary care settings report receiving any counseling on physical activity.⁵ Those who are middle-aged or have a baccalaureate degree or higher are more likely to report such advice; African Americans and foreign-born immigrants are less likely to report it.

A study by Taira et al⁶ examined the relationship between patient income and discussion of health risk behaviors. Low-income patients were more likely to be obese and smoke than high-income patients; however, physicians were less likely to discuss diet and exercise with low-income patients. Among all the patients with whom some discussion occurred in this study, low-income patients were much more likely to attempt to change behavior based on physician advice than were high-income patients.

Clinical trials within^{7,8} and outside the US⁹⁻¹¹ support the potential value of physical activity counseling in primary care. In these studies, as little as 3 to 5 minutes of patient-clinician communication about physical activity was linked to short-term improvement in patients' exercise habits. As few as 2 or 3 office visits over 6 months were associated with increases in patients' physical activity levels up to 1 year later. Other features that contributed to their success included having a brief (<3 minutes) counseling component for clinicians, supplementing the counseling with a written exercise prescription, having follow-up contact, and tailoring the counseling to patients' needs and concerns.

These results are promising for primary care clinicians, whose longitudinal relationships with their patients afford them repeated opportunities to intervene to promote physical activity.

Few studies have focused on the underserved

A review by Taylor et al² of physical ac-

TABLE 1
Inclusion criteria and search terms

For inclusion, studies must have:

- Been conducted in the United States
- Targeted a primary care population
- Included adults, children, or both
- Used behavior change toward physical activity as an outcome measure
- Used an appropriate control or comparison group
- Employed a randomized or quasi-experimental design
- Reported data on participants from any of the previously defined underserved populations
- Incorporated a specific component of primary care clinician counseling

The key terms used for the literature search were:

ambulatory care	health communication	program evaluation
behavioral interventions	health promotion	socioeconomic factors
behavior therapy	intervention studies	underserved populations
body mass index	obesity	urban populations
community health	outpatient clinic	weight control
exercise	physical activity	weight loss
family physicians	poverty	weight management
health behavior change	primary health care	

tivity interventions in low-income, ethnic minority, or disabled populations identified 14 community-based studies, mostly with quasi-experimental “pre/post” study designs. Ten studies included ethnic minorities, but physical activity was documented in just 2 studies at baseline, and these 2 studies did not include any postintervention follow-up. None of the 10 interventions was conducted in a primary care setting.

Another recent review¹² found that studies that were ethnically inclusive placed greater emphasis on involving communities and building coalitions right from study inception, and they tailored messages (and messengers) that were culturally specific. Several of these studies showed better outcomes among ethnic minority participants than the white participants they sampled.

Taken together, previous reviews have examined the effectiveness of primary care interventions for the general population,^{13,14} as well as community-based programs for underserved populations.² However, little information exists

FAST TRACK

These results are promising for primary care physicians, whose relationships with patients afford repeated opportunities to intervene

about effective physical activity counseling strategies for underserved groups in primary care.

■ Methods

Looking for studies in underserved populations

We conducted a systematic review of the literature involving clinical trials in the US, looking for trials where counseling interventions are initiated by primary care clinicians, and that assessed behavioral change related to physical activity.

Inclusion criteria

TABLE 1 shows the inclusion criteria and search terms for the literature review. We searched Ovid, Medline, CINAHL, PsycINFO, PubMed, Cochrane, and HealthSTAR for studies published between 1966 and 2005. We also searched bibliographies of retrieved articles, and contacted experts in the field in an effort to obtain other relevant data.

The principal investigator (JKC) reviewed titles and abstracts of all potentially relevant articles to determine whether they met eligibility criteria. Studies that met the criteria were retrieved and abstracted.

Using these predefined criteria, data were extracted from each eligible article. Studies were also rated according to the Strength of Recommendation Taxonomy (SORT), because of its emphasis on patient-oriented outcomes and the quality, quantity, and consistency of evidence.¹⁵

■ Results

6 of 8 studies report increases in physical activity

We reviewed a total of 253 titles and abstracts. Eight studies¹⁶⁻²³ met our inclusion criteria. We were not able to locate any clinical trials that both 1) examined the effect of primary care clinician counseling on physical activity outcomes, and 2) had a study population focused on an underserved group. **TABLE 2** (available at

www.jfponline.com) shows the characteristics of these 8 studies.

Although we sought trials that defined “primary care clinician” as a professional—such as MD, nurse practitioner (NP), or physician assistant (PA)—who provides longitudinal primary health care, several of these studies considered dietitians, exercise physiologists, or health care workers as primary care clinicians.

Only 1 study²⁰ examined physical activity counseling with an intervention that incorporated a follow-up visit by the primary care clinician, and looked at the long-term effect on physical activity as an outcome. Thus, the degree to which the clinician’s counseling influenced the physical activity outcome in these studies is unclear.

Identifying underserved groups

Information on race or ethnicity (which tended to be reported as a single variable), level of education, and income of participants was reported in the demographic data of all studies’ results, but relationships between these variables and physical activity outcomes were not consistently reported. One study²³ stratified participants by race/ethnicity and health center; 2 studies^{16,21} reported analyses and findings for participants according to ethnicity, income, and educational level, as that was their focus.

Overall, however, it is not clear to what extent the interventions succeeded for various underserved groups, even if they were included as participants.

Study designs and the nature of exercise interventions

Seven^{16,18-23} of these studies (88%) were randomized controlled trials; the unit of randomization and control group varied. Trials were conducted at 1 or multiple (up to 11) primary care sites. Use of more than 1 method to recruit participants—such as mailings, use of office staff to promote/recruit, advertising, and community announcements—tended to be most effective.

FAST TRACK

We looked at trials where counseling was initiated in primary care, and that looked at changes in patients’ physical activity

Intervention types included phone and mail interventions,¹⁷⁻²³ computer-based interventions,^{18,19,21} visits from a community health worker,^{22,23} group classes,^{16,22,23} directly supervised physical activity sessions,^{16,22,23} clinician counseling,¹⁶⁻²³ and prescription protocols (eg, written, guided action plans).¹⁷⁻²³ Those delivering the intervention varied, and included primary care physicians,¹⁷⁻²³ nurse practitioners or physician assistants,^{17-19,22,23} nutritionists,¹⁶ exercise physiologists,¹⁶ community health educators,^{20,22,23} and other study personnel.^{19,21} Specific elements of interventions that were likely to contribute to patients' success included addressing financial or environmental/safety issues for exercise,¹⁶ use of trained office staff to provide exercise counseling,^{18-20,23} and offering flexibility in choice by tailoring the goals and plans to the patients' needs and interests.¹⁷⁻²³

The "dose" of clinician counseling varied from very brief (1 to 3 minutes of direct contact on 1 occasion) to more extended (>5 minutes of direct counseling over repeated intervals). Duration of follow-up for the 8 studies ranged from 4 months to 2 years.

Several studies designed their interventions to make the clinician counseling brief,^{17-20,23} in order to enhance feasibility for busy primary care settings. Three studies^{16,21,22} described strategies they used for tailoring the intervention to a specific culture, or for addressing issues of literacy for the written materials. Two studies^{16,22} reported that their study staffs were ethnically or culturally representative of the targeted population.

The difficulty of maintaining adherence to physical activity

Three studies^{18,19,21} reported having difficulty with attrition among their minority participants; they did not, however, include information specific to minorities in their physical activity outcomes. Studies with highest retention rates (>80%) tended to specifically address barriers to participation, including cultural issues, or they used a "lead-in" period.^{16,20,21,23}

The studies with the best adherence and retention among black and Hispanic participants, and those participants with low educational attainment,^{16,21} used baseline qualitative data regarding management of health behaviors when they designed their interventions. For example, 1 study¹⁶ mentioned cultural adaptations derived from prior qualitative work—such as using program materials that extensively depicted African American individuals, families, and community settings—and using language in the intervention reflecting social values and situations relevant to African Americans.

How exercise data were reported

Six of the 8 (75%) studies^{16,17,19,20,22,23} reported some improvement in short-term physical activity outcomes (**TABLE 2**, available at www.jfponline.com); however, there was considerable heterogeneity in how these studies measured physical activity outcomes. All 8 incorporated a self-report measure of physical activity, such as the Patient-centered Assessment and Counseling for Exercise (PACE),¹⁷⁻¹⁹ Paffenbarger Physical Activity Questionnaire (PPAQ),¹⁷ 7-day Physical Activity Recall (PAR),^{17,20,21,23} and other self-report recall measures to assess physical activity. (A **RESOURCE LIST** of these instruments is available at www.jfponline.com.) Two studies also measured "states of change,"^{17,20} but these states were not consistently defined.

Three studies^{17,20,23} included objective measures of physical activity, such as accelerometers; in these studies, there was not substantial variance in physical activity outcomes between the objective and subjective measures.

Discussion

More study needed in the underserved

This review reflects in part the difficult task of designing and implementing realistic interventions for the underserved in primary care. However, interventions must

FAST TRACK

One study used language in the intervention reflecting social values and situations relevant to African Americans

be replicated in these populations before we can necessarily assume that findings from other trials are generalizable, due to issues of access, financial resources, health literacy, beliefs, cultural differences, self-efficacy, and other logistic barriers to traditional care that disproportionately affect underserved groups.

Integrate known personal, social, and environmental factors

Several studies²⁴⁻²⁶ have explored the social, demographic, and environmental factors associated with physical activity in minority populations. These studies shed light on the reasons why clinical trials that focus on white, affluent, educated populations might not be generalizable to underserved groups.

To be maximally effective, any interventions for promoting physical activity in the underserved need to find ways to address any cultural or financial barriers, and incorporate factors associated with success. For example, among African American and Hispanic women, having lower “social role strain,” higher attendance at religious services, and a greater feeling that one’s neighborhood was safe were all associated with increased likelihood of exercise.²⁴⁻²⁶ Such studies suggest that differences in beliefs, resources, self-efficacy, prior experience, and competing life demands can all contribute to promoting physical activity in some underserved groups. Practically, such findings encourage clinicians to work with patients to help them identify sources of social support and positive influences on their health, and help them articulate internal strengths and personal attributes to succeed in behavioral change.

Despite the variations in training or means of communication in the studies we identified, 2 studies used interventions that were successful at explicitly anticipated and addressed barriers to physical activity.^{16,21} These 2 studies also had interventionists who represented the communities of interest, and they used cultural adaptations to promote exercise where

appropriate. Thus, limited data suggest that some primary care-based programs improve physical activity in underserved patients, but the effects of communication from the primary care clinician on physical activity is lacking, consistent with other work in the field.^{12,27}

Promising strategies include office prompts, brief counseling

Primary care clinicians face many time pressures, fiscal constraints, administrative burdens, and competing priorities; these make addressing health promotion behaviors such as physical activity quite difficult. These issues are magnified for clinicians practicing in medically underserved areas. Despite these many challenges, promising opportunities do exist.

On a systems level, practice-based systems to manage chronic diseases have been successfully developed and implemented in the primary care setting; such systems can be tested to promote physical activity, as well. These practice-based approaches include patient registry data, office prompts, and other electronic systems to promote clinician counseling. For example, studies in this review using computer-based programs in primary care offices were feasible and effective.^{18,19,21}

Bodenheimer²⁸ has argued for a redesign of primary care systems to more effectively address chronic conditions rather than acute care needs. Several health care systems have successfully implemented the pillars of such a redesign imperative, and they have shown convincingly the promise of addressing competing priorities, physician competence and confidence, motivation, and durability in improving patient self-management.²⁸

At the level of the clinician-patient relationship, data suggest that patient physical activity can be increased (at least in the short term) by counseling that:

- is brief (5 minutes or less)^{17-20,23}
- is focused/goal-oriented¹⁷⁻²³
- is molded to the patient’s specific health needs¹⁷⁻²³

FAST TRACK

Higher attendance at religious services and a greater feeling that one’s neighborhood was safe were associated with greater likelihood of exercise

- is delivered over multiple contacts (whether it be office visits, telephone, or group sessions)^{17–23}
- contains a written plan to achieve goals.^{17–23}

We do not know what “dose-response” relationship exists for primary care clinician communication with patients over the long term, and what effect repeated counseling would have on long-term sustainability of physical activity levels. This is even less clear for underserved groups. It is also unknown to what extent collaborative links with community programs might increase physical activity when added to primary care–based counseling. Future research should evaluate the optimal “dose-response” to the interventions, the effect of repeated visits and continuity of care, and the effect of community-based referrals for physical activity programs for underserved populations in primary care.

Limitations of this review

Because our inclusion criteria were strict, we omitted potentially meaningful studies that were less directly relevant to our aims. For example, there has been substantial creative community-based work with underserved populations in the US to promote physical activity, and many innovations have been designed by researchers outside the US. Results from these programs and trials should be incorporated into primary care settings working with underserved populations.

Another limitation is that our definition of “underserved” is not the only possible definition. The most marginalized underserved groups with the least access to the health care system (such as the uninsured or homeless) were more likely to be omitted from our results, because we wanted to examine physical activity programs among patients in primary care settings.

Finally, this review did not address the need to understand the connection between sustained improvements in physical activity and patient-oriented health outcomes for underserved populations.

Conclusion

Information on exercise counseling interventions in primary care for the underserved is limited: these groups have not been included in the majority of clinical trials of physical activity thus far. Physical activity interventions need to be replicated in underserved populations before we can assume their results are generalizable. Though characteristics of existing studies show promise, future research on physical activity in underserved populations should assess the effect of practice-based systems on reducing barriers and promoting physical activity, the dose-response effect of clinician counseling on physical activity outcomes, and the effect of the physician-patient relationship and continuity of care on physical activity outcomes. ■

Correspondence

Jennifer K. Carroll, MD, MPH, University of Rochester School of Medicine, Family Medicine Research Programs, 1381 South Avenue, Rochester, NY 14620; jennifer_carroll@urmc.rochester.edu

Funding

This study was supported by grant 1R25CA102618 from the National Cancer Institute.

Disclosure

The authors reported no potential conflict of interest relevant to this article.

References

1. Centers for Disease Control and Prevention. Prevalence of physical activity, including lifestyle activities among adults—United States, 2000–2001. *MMWR Morb Mortal Wkly Rep* 2003; 52:764–769.
2. Taylor WC, Baranowski T, Young DR. Physical activity interventions in low-income, ethnic minority, and populations with disability. *Am J Prev Med* 1998; 15:334–343.
3. Crespo CJ, Smit E, Andersen RE, Carter-Pokras O, Ainsworth BE. Race/ethnicity, social class and their relation to physical inactivity during leisure time: results from the Third National Health and Nutrition Examination Survey, 1988–1994. *Am J Prev Med* 2000; 18:46–53.
4. Mainous AG, Diaz VA, Koopman RJ, Everett CJ. Having a regular physician and attempted weight loss after screening for hypertension or hypercholesterolemia. *Int J Obes (Lond)* 2005; 29:223–227.
5. Honda K. Factors underlying variation in receipt of physician advice on diet and exercise: Applications of the behavioral model of health care utilization. *Am J Health Promot* 2004; 18:370–377.
6. Taira DA, Safran DG, Seto TB, Rogers WH, Tarlov AR. The relationship between patient income and physician discussion of health risk behaviors. *JAMA* 1997; 278:1412–1417.

CONTINUED

FAST TRACK

Counseling should:

- be brief
- be goal-oriented
- fit the patient’s health needs
- repeat over multiple contacts
- contain a written plan

7. Burton LC, Paglia MJ, German PS, Shapiro S, Damiano AM. The effect among older persons of a general preventive visit on three health behaviors: smoking, excessive alcohol drinking, and sedentary lifestyle. The Medicare Preventive Services Research Team. *Prev Med* 1995; 24:492-497.
8. Norris SL, Grothaus LC, Buchner DM, Pratt M. Effectiveness of physician-based assessment and counseling for exercise in a staff model HMO. *Prev Med* 2000; 30:513-523.
9. Swinburn BA, Walter LG, Arroll B, Tilyard MW, Russell DG. The green prescription study: a randomized controlled trial of written exercise advice provided by general practitioners. *Am J Public Health* 1998; 88:288-291.
10. Imperial Cancer Research Fund OXCHECK Study Group. Effectiveness of health checks conducted by nurses in primary care: final results of the OXCHECK study. *BMJ* 1995; 310:1099-1104.
11. Bull FC, Kreuter MW, Scharff DP. Effects of tailored, personalized and general health messages on physical activity. *Patient Educ Couns* 1999; 36:181-192.
12. Yancey AK, Kumanyika SK, Ponce NA, McCarthy WM, Fielding JE. Population-based interventions engaging communities of color in healthy eating and active living: a review. *Prev Chron Dis* 2004; 1:1-18.
13. Eden KB, Orleans CT, Mulrow CD, Pender NJ, Teutsch SM. Does counseling by clinicians improve physical activity? A summary of the evidence for the US Preventive Services Task Force. *Ann Intern Med* 2002; 137:208-215.
14. Eakin EG, Glasgow RE, Riley KM. Review of primary care-based physical activity intervention studies: effectiveness and implications for practice and future research. *J Fam Pract* 2000; 49:158-168.
15. Ebell MH, Siwek J, Weiss BD, et al. Simplifying the language of evidence to improve patient care: Strength of recommendation taxonomy (SORT): a patient-centered approach to grading evidence in medical literature. *J Fam Pract* 2004; 53:111-120.
16. Agurs-Collins TD, Kumanyika SK, Ten Have TR, Adams-Campbell LL. A randomized controlled trial of weight reduction and exercise for diabetes management in older African-American subjects. *Diabetes Care* 1997; 20:1503-1511.
17. Calfas KJ, Long BJ, Sallis JF, Wooten WJ, Pratt M, Patrick K. A controlled trial of physician counseling to promote the adoption of physical activity. *Prev Med* 1996; 25:225-233.
18. Calfas KJ, Sallis JF, Zabinski MF et al. Preliminary evaluation of a multi-component program for nutrition and physical activity change in primary care: PACE+ for adults. *Prev Med* 2002; 34:153-161.
19. Patrick K, Sallis JF, Prochaska JJ, et al. A multicomponent program for nutrition and physical activity change in primary care: PACE+ for adolescents. *Arch Pediatr Adolesc Med* 2001; 155:940-946.
20. Pinto BM, Goldstein MG, Ashba J, Sciamanna CN, Jette A. Randomized controlled trial of physical activity counseling for older primary care patients. *Am J Prev Med* 2005; 29:247-255.
21. Staten LK, Gregory-Mercado KY, Ranger-Moore J, et al. Provider counseling, health education, and community health workers: The Arizona WISE-WOMAN project. *J Womens Health (Larchmt)* 2004; 13:547-556.
22. Saelens BE, Sallis JF, Wilfley DE, Patrick K, Cella JA, Buchta R. Behavioral weight control for overweight adolescents initiated in primary care. *Obesity Res* 2002; 10:22-32.
23. Writing Group for the Activity Counseling Trial Research Group. Effects of physical activity counseling in primary care: The Activity Counseling Trial: A randomized controlled trial. *JAMA* 2001; 286:677-687.
24. Wilbur J, Chandler PJ, Dancy B, Lee H. Correlates of physical activity in urban Midwestern Latinas. *Am J Prev Med* 2003; 25:69-76.
25. Wilbur J, Chandler PJ, Dancy B, Lee H. Correlates of physical activity in urban Midwestern African-American women. *Am J Prev Med* 2003; 25:45-52.
26. Rohm YD, Voorhees CC. Personal, social, and environmental correlates of physical activity in urban African-American women. *Am J Prev Med* 2003; 25:38-44.
27. Yancey AK. Building capacity to prevent and control chronic disease in underserved communities: Expanding the wisdom of WISEWOMAN in intervening at the environmental level. *J Womens Health (Larchmt)* 2004; 13:644-649.
28. Bodenheimer T, Wagner EH, Grumbach K. Improving primary care for patients with chronic illness: The chronic care model, Part 2. *JAMA* 2002; 288:1909-1914.

TABLE 2

8 studies on physical activity intervention in primary care

STUDY/DESIGN/ SORT RATINGS	SETTING/PROVIDERS/ SUBJECTS	ASSESSMENTS/ INTERVENTIONS	OUTCOME MEASURES	RESULTS	COMMENTS/LIMITATIONS
Agurs-Collins et al, 1997 ¹⁶ RCT at patient level (LOE: 2)	<i>Setting:</i> Washington, DC clinics <i>Providers:</i> Dietician (N=1) and exercise physiologist (N=1) <i>Subjects:</i> Overweight adults (N=64; n=32 in each arm) • 76% female • 100% racial minority (African Americans) • 57% unemployed • 43% no college education • 50% diabetic	<i>Assessments:</i> 0, 3, and 6 months <i>Interventions:</i> • <i>Arm 1:</i> standard care (1 class + informational mailings) • <i>Arm 2:</i> intervention (12 weekly group sessions, 1 individual session, 6 biweekly group sessions)	• PASE = total score	• PASE 3- and 6-month change Standard care = -25.3; 0.9 Intervention = 24.1; 9.5 (<i>P</i> <.001)	• Intervention resulted in significant improvement in physical activity among the intervention group compared with controls at 3 months • Improvements did not remain at 6 months • 85% completed 6-month follow-up visit • Study was underpowered given authors' sample size calculations
Calfas et al, 1996 ¹⁷ Non-RCT at primary care professional level (LOE: 2)	<i>Setting:</i> San Diego, CA clinics (N=17) <i>Providers:</i> PCPs (N=16), NP (N=1) <i>Subjects:</i> Healthy adults (N=212; n=98 intervention, n=114 control) • 84% female • 28% racial minority • 33% unemployed • 14.5 mean years education	<i>Assessments:</i> baseline and 4–6 weeks <i>Interventions:</i> • <i>Arm 1:</i> original print-based PACE intervention (contemplation protocol only) plus booster phone call by a health educators 2 weeks later • <i>Arm 2:</i> educational control (hepatitis B information)	• PACE (11 PACE questions) = total score • PPAQ = total walking and walking for exercise score • NHIS = walking for exercise score • 7-Day PAR = hrs/wk of moderate-intensity physical activity • Caltrac (waist-worn accelerometry with basal metabolic rate set to zero) = activity counts/hr	• PACE PACE RC = 0.46; Control RC = -0.38 (<i>P</i> <.005) • PPAQ total PACE RC = 0.11; Control RC = -0.11 (<i>P</i> <.025) • PPAQ exercise walking PACE RC = 0.20; Control RC = -0.17 (<i>P</i> <.05) • NHIS PACE RC = 0.23; Control RC = -0.19 (<i>P</i> <.05) • 7-Day PAR PACE RC = 0.08; Control RC = -0.07 (<i>P</i> <.08) • Caltrac PACE RCS = 0.25; Control RCS = -0.33 (<i>P</i> <.005)	• 52% PACE patients vs 12% control patients moved from "contemplation" to "action" stage and adopted regular physical activity • PACE is feasible and successful in adults • PACE easy to implement • 90% compliance by primary care professionals to PACE • PACE patients walked specifically for exercise an average of 11 min/day post-intervention, which does not meet CDC or ACSM recommendations • No randomization • Selection and motivation bias for primary care professionals due to required interest in physical activity for eligibility • Self-reporting of physical activity is a concern • Objective measures of physical activity are favorable • No long-term follow-up to examine maintenance of physical activity • Participants with lower education had increased study dropout, with no further subgroup analyses based on minority status
Calfas et al, 2002 ¹⁸ RCT at patient level (LOE: 2)	<i>Setting:</i> San Diego, CA clinics (N=4) <i>Providers:</i> PCPs and NPs (N=10) <i>Subjects:</i> Healthy adults (N=173) • 69% female • 28% racial or ethnic minority • 14% unemployed • 33% no college degree	<i>Assessments:</i> baseline, 1 week, and 4 months <i>Interventions:</i> • <i>Arm 1:</i> computer-delivered PACE+ intervention and bimonthly booster postcards • <i>Arm 2:</i> computer-delivered PACE+ intervention intervention and infrequent booster phone calls and mailings • <i>Arm 3:</i> computer-delivered PACE+ intervention and weekly booster phone calls and mailings • <i>Arm 4 (control):</i> PACE+ intervention only	• Modified PACE (stages of physical activity change) = % of participants in action or maintenance stage for both moderate and vigorous physical activity	• No significant difference in activity overall • Participants with a goal of increased <i>moderate</i> physical activity = more likely to progress in stage of change (<i>P</i> <.001) • Participants with a goal of increased <i>vigorous</i> physical activity = more likely to progress in stage of change (<i>P</i> <.001)	• Extended interventions did not result in improvements over PACE alone • Nonvalidated self-reporting of physical activity and stages of change is a concern • No objective measures of physical activity • Racial and ethnic minorities had increased study dropout, with no further subgroup analyses based on minority status

TABLE 2

8 studies on physical activity intervention in primary care, continued

STUDY/DESIGN/ SORT RATINGS	SETTING/PROVIDERS/ SUBJECTS	ASSESSMENTS/ INTERVENTIONS	OUTCOME MEASURES	RESULTS	COMMENTS/LIMITATIONS
<p>Patrick et al, 2001¹⁹ RCT at patient level (LOE: 2)</p>	<p><i>Setting:</i> Pediatric/adolescent clinics in San Diego, CA (N=3) and Pittsburgh, PA (N=1) <i>Providers:</i> Pediatricians (N=12-27), NPs, and trained intervention research staff <i>Subjects:</i> Adolescents (N=117) • 37% female • 43% ethnic minority</p>	<p><i>Assessments:</i> baseline and 4 months <i>Interventions:</i> • <i>Arm 1:</i> Computer-delivered PACE+ with no further contact • <i>Arm 2:</i> PACE+ with frequent mailings • <i>Arm 3:</i> PACE+ with infrequent mailings • <i>Arm 4:</i> PACE+ with both frequent mailings and phone calls (Note: extended interventions were based on the Relapse Prevention Model)</p>	<ul style="list-style-type: none"> • Self-report of days/wk engaging in minimum of 30 min of <i>moderate</i> physical activity • Self-report of days/wk engaging in minimum of 20 min of <i>vigorous</i> physical activity 	<ul style="list-style-type: none"> • No significant differences in activity overall between groups • Adolescents setting a target goal of changing <i>moderate</i> exercise behavior improved ($P<.001$) 	<ul style="list-style-type: none"> • Adolescents who did not set a target goal for changes in <i>moderate</i> exercise behavior declined • There were no differences in <i>vigorous</i> exercise behavior between adolescents who set target goals to change and those who did not • The extended interventions did not provide superior benefits over the brief PACE+ intervention • PACE+ is effective for improving physical activity among adolescents in primary care settings if they choose moderate exercise change as a target for behavior change • There were many technical difficulties ("software and computer crashes"), resulting in participants being unable to complete the computer portion of the intervention in a timely fashion • Racial minorities had increased study dropout, with no further subgroup analyses based on minority status
<p>Pinto et al, 2005²⁰ RCT at patient level (LOE: 1)</p>	<p><i>Setting:</i> Hospital-based Internal Medicine practices in Providence, RI (N=2) <i>Providers:</i> PCPs and health educators <i>Subjects:</i> Adults (N=100; n=52 intervention, n=48 control) • 63% female • 15% racial minority • 65% unemployed • 42% no college education</p>	<p><i>Assessments:</i> 0, 3, and 6 months <i>Interventions:</i> • <i>Arm 1:</i> brief advice arm (BA): patients received advice to exercise from a clinician • <i>Arm 2:</i> extended advice (EA) arm: in addition to brief advice, patients received clinician advice and exercise counseling via telephone by research staff</p>	<ul style="list-style-type: none"> • 7-Day PAR = min/wk and kcal/wk of moderate-intensity physical activity • Biotrainers (wrist-worn accelerometers) = mean activity counts per day (crude and weight-adjusted) • 5-item exercise stage of change survey = preparation, action/maintenance, or progressed 	<ul style="list-style-type: none"> • 7-Day PAR: 3- and 6-month change in min/wk BA=12 min/17 min; EA=58 min/63 min ($P<.05$) • 7-Day PAR: 3- and 6-month change in moderate kcal/wk BA=0.8/1.1; EA=3.9/4.2 ($P<.05$) • Biotrainers: 3- and 6-month change in mean counts BA= -11.1/-24.18; EA=50.8/42.4 ($P<.05$) • Stages of change survey: Preparation stage 3-month change BA=45.7%; EA=72.0% Action/maintenance stage 3-month change BA=13.0%; EA=17.0% Progressed stage 6-month change BA=30.4%; EA=59.6% 	<ul style="list-style-type: none"> • Clinician advice coupled with follow-up telephone counseling promotes regimen of moderate physical activity in older primary care patients • Counseling improves motivational readiness for physical activity • 78%-82% retention rates • Limited generalizability based on demographics in sample
<p>Saelens et al, 2002²¹ RCT at patient level (LOE: 2)</p>	<p><i>Setting:</i> primary care clinics in CA (N=2) <i>Providers:</i> n/a <i>Subjects:</i> Adolescents (N=44; n=23 Healthy Habits, n=21 control) • 41% female • 30% ethnic and racial minority</p>	<p><i>Assessments:</i> baseline, 4 and 7 months <i>Interventions:</i> • <i>Arm 1:</i> Healthy Habits Multiple Behavior Change Intervention, a computer-based, multiple-component behavior change intervention • <i>Arm 2:</i> 1 session of provider counseling</p>	<ul style="list-style-type: none"> • 7-Day PAR = hrs/wk of moderate-intensity physical activity • Body-mass index (BMI) = kg/m² 	<ul style="list-style-type: none"> • 7-Day PAR (Arm 1) Baseline=6.7; 4 months=7.8; 7 months=6.3 • 7-Day PAR (Arm 2) Baseline=5.6; 4 months=6.4; 7 months=6.9 • BMI: Significant difference in BMI for intervention group ($P<.03$) 	<ul style="list-style-type: none"> • Adolescents were satisfied by the program • Despite differential weight change outcomes between groups, there was no significant change in physical activity from baseline to post-treatment between groups • The intervention revealed short-term improvements for controlling adolescent weight change through primary care settings

TABLE 2

8 studies on physical activity intervention in primary care, continued

STUDY/DESIGN/ SORT RATINGS	SETTING/PROVIDERS/ SUBJECTS	ASSESSMENTS/ INTERVENTIONS	OUTCOME MEASURES	RESULTS	COMMENTS/LIMITATIONS
<p>Staten et al, 2004²² RCT at patient level (LOE: 2)</p>	<p>Setting: Clinics in Tucson, AZ (N=2) Providers: PCPs and NPs Subjects: Women participating in National Breast and Cervical Cancer Early Detection Program (N=217; Arm 1 n=77, Arms 2 n=73, Arm 3 n=67)</p> <ul style="list-style-type: none"> • 100% female • 75% ethnic minority (Hispanic only) • 65% unemployed • 100% no college degree • 63% Spanish as first language 	<p>Assessments: baseline and 12 months Interventions:</p> <ul style="list-style-type: none"> • Arm 1: provider counseling (PC) • Arm 2: PC plus health education classes and monthly newsletter (PC + HE) • Arm 3: PC plus HE plus community health worker support (PC + HE + CHW) 	<ul style="list-style-type: none"> • BRFSS = min/wk of moderate/vigorous physical activity • AAFQ = total score 	<ul style="list-style-type: none"> • BRFSS PC = 15 PC + HE = 23 PC + HE + CHW = 23 ($P < .01$) • AAFQ Not reported 	<ul style="list-style-type: none"> • Physical activity increased in all 3 conditions • None of the extended interventions were superior to brief provider counseling • PCP involvement not clearly described and appears very limited with interventions being delivered primarily by NPs • Follow-up was problematic for low-income populations due to transportation and immigration difficulties • No objective physical activity measure
<p>Writing Group for ACT, 2001²³ Multicenter RCT at patient level (LOE: 1)</p>	<p>Setting: Primary care clinics in US (N=11); US clinical research centers (N=3) Providers: PCPs (N=51), PAs (N=2), NPs (N=1), health educators (N >9) Subjects: Healthy adults (N=874; n=292 advise control, n=293 assistance, n=289 advise plus counseling)</p> <ul style="list-style-type: none"> • 45% female • 28% racial and ethnic minority • 11% unemployed • 16% no college education 	<p>Assessments: baseline, 6, 12, and 24 months Interventions:</p> <ul style="list-style-type: none"> • Arm 1: Provider Standard Advice on National Recommendations for physical activity and quick referral to health educator for limited clarification and written materials • Arm 2: provider advice plus expanded health educator assistance and counseling session with a motivational video with a follow-up phone call, monthly newsletters, and pedometers • Arm 3: provider advice plus assistance components and additional biweekly health educator telephone counseling with weekly classes on behavioral change skills 	<ul style="list-style-type: none"> • VO₂ Max Treadmill Testing (maximal graded exercise testing) = VO2 Max • 7-Day PAR = total energy expenditure (kcal/kg/day) 	<ul style="list-style-type: none"> • For both men and women, no significant differences in self-reported physical activity between groups • For women at 6 months, there was a higher caloric daily expenditure in the counseling than the assistance group ($P < .01$) • A higher percentage of women in the counseling group (25.7%) than the assistance group (9.9%) were achieving recommended levels of activity at 24 months ($P = .005$) • A higher percentage of men in the assistance group (29.9%) than the advice group (16.4%) were achieving recommended levels of activity at 24 months ($P = .02$) 	<ul style="list-style-type: none"> • Both counseling interventions were equally effective and superior over standard recommended care among women • 26% of women in counseling arm met or exceeded CDC/ACSM exercise guidelines of 30 min/moderate physical activity 5 days/wk or 30 min/vigorous physical activity 3 days/wk • 30% of men in assistance arm met or exceeded CDC/ACSM exercise guidelines of 30 min/moderate physical activity 5 days/wk or 30 min/vigorous physical activity 3 days/wk • None of the counseling interventions were superior to standard recommended care for men • Primary care professional advice alone may be sufficient for men, but extended counseling may be more effective for women • Feasibility of implementing extended counseling in primary care is unclear • Self-reporting of physical activity is a concern • Objective measures of physical activity are favorable

AAFQ, Arizona Activity Frequency Questionnaire; ACSM, American College of Sports Medicine; BRFSS, Behavioral Risk Factor Surveillance Survey; CDC, Centers for Disease Control and Prevention; LOE, level of evidence; NHIS, National Health Interview Survey; NP, nurse practitioner; PA, physician assistant; PACE, Patient-centered Assessment and Counseling for Exercise; PCP, primary care provider; PPAQ, Paffenbarger Physical Activity Questionnaire; PASE, Physical Activity Scale for the Elderly; PAR, Physical Activity Recall; RC, reliability coefficient; RCT, randomized controlled trial; SORT, Strength of Recommendation Taxonomy.

Resources for measures of physical activity

Behavioral Risk Factor Surveillance System

www.cdc.gov/brfss/questionnaires/pdf-ques/2007brfss.pdf

Healthy Habits Multiple Behavior Change Intervention

www.motivatehealthyhabits.com

National Health Interview Survey

Adams PF, Benson V. Current estimates from the National Health Interview Survey, 1990. *Vital & Health Statistics - Series 10: Data From the National Health Survey* 1991; 181:1–212.

PACE (Patient-centered Assessment and Counseling for Exercise)

www.paceproject.org/Home.html

PACE+

Prochaska JJ, Zabinski MF, Calfas KJ, Sallis JF, Patrick K. PACE+: interactive communication technology for behavior change in clinical settings. *Am J Prev Med* 1999; 2:127–131.

PASE (Physical Activity Scale for the Elderly)

Washburn RA, Smith KW, Jette AM, Janney CA. The Physical Activity Scale for the Elderly (PASE): development and evaluation. *Clin Epidemiol* 1993; 46:153–162.

The scale is for sale at www.neriscience.com/web.

PPAQ (Paffenbarger Physical Activity Questionnaire)

Paffenbarger RS Jr, Hyde RT, Wing AL, Hsieh CC. Physical activity, all-cause mortality, and longevity of college alumni. *N Engl J Med* 1986; 314:605–613.

7-day Physical Activity Recall interview

Sallis JF, Haskell WL, Wood PD et al. Physical activity assessment methodology in the Five-City Project. *Am J Epidemiol* 1985; 121:91–106.

The instrument is available at www.sdprc.net/lhn-tools/PAR-interview-instructions-English.doc