doi: 10.1111/obr.12205

Review

A systematic review of physical activity interventions among African American adults: evidence from 2009 to 2013

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Received 8 June 2014; revised 9 June 2014; accepted 10 June 2014

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Summary

This review extends findings from four previous reviews of physical activity (PA) interventions among African Americans (AA) and includes papers published between January 2009 and August 2013. Eligible papers were retrieved using strategies employed in previous reviews. Overall, 16 relevant papers were identified, including four pilot studies and 12 full trials. Interventions were based on a variety of behavioural sciences theories. The most common setting for interventions was churches. Most interventions lasted >6 months; few interventions included >6 months of post-intervention follow-up. Overall, studies identified within-group differences showing positive improvements in PA, and most studies showed statistically significant between-group differences in at least one measure of PA. A quality score was used to rate various elements of the studies and provide a numerical assessment of each paper; scores ranged from 3 to 10 out of 13 possible points. The current review indicates a continued need for studies that use objective PA measures, assess long-term intervention impact, provide specific PA goals for interventions, include more attention to strategies that can increase retention and adherence among AA study participants, include AA men and determine the independent and synergistic effects of individual and environmental (socio-cultural and built) change strategies.

Keywords: African American, black, exercise, intervention, maintenance.

obesity reviews (2014) **15** (Suppl. 4), 125–145

Introduction

Physical activity (PA) can reduce the likelihood of morbidity and mortality from a myriad of poor health outcomes, including heart disease, cancer, diabetes, cerebrovascular disease and obesity (1–3). Despite the known benefits, most U.S. adults do not obtain the recommended amount of PA, which is 150 min of moderate-to-vigorous intensity PA weekly. African American adults report lower participation in PA than other racial/ethnic subgroups, and African American women report lower rates of PA than African American men (4–6). In addition, African American women report higher rates of sedentary behaviour than other racial/ethnic subgroups (7,8). Consequently, African Americans suffer higher morbidity and mortality from poor health outcomes associated with insufficient levels of PA and sedentary behaviour (9,10). Successful strategies to increase and maintain increases in PA among this at-risk population are critical.

Previous reviews of the literature have attempted to synthesize findings from interventions to identify and understand the most promising strategies for increasing PA in African Americans. A 1998 review identified 14 intervention studies published between 1983 and 1997 targeting low-income, ethnic minorities, and populations with disabilities (11). Ten studies were included that involved

ethnic minority groups; major conclusions from the review were that more work is needed that includes rigorous experimental designs, theoretically based interventions, and validated instruments for identifying changes in PA behaviour.

In 2002, a review was published that identified intervention studies targeting PA among African American women (12). Papers published between 1984 and 2000 were included in the review; 18 relevant studies were identified. Weaknesses in studies identified, and the basis of recommendations for future research, included lack of rigorous study design, lack of validated instruments for identifying change in PA behaviour, significant attrition of African American participants in studies, and potentially questionable timing of measurement of outcome variables.

In 2009, two additional reviews of PA interventions were published – one focused on African Americans in general (13) and the other focused on African American women and girls (14). The review focused on African Americans in general identified 29 relevant studies published between 1985 and 2006. The authors identified several characteristics of effective programmes, including use of a randomized controlled trial design and inclusion of a structured exercise programme. Weaknesses noted were small sample sizes with limited follow-up and limited use of objective PA measures. The 2009 review focused on African American women and girls identified 11 additional studies published between 2007 and 2009, and again identified the need for more rigorous study designs and long-term follow-up, objective PA measures, and specific strategies to reduce participant attrition and increased intervention adherence (e.g. a 'run-in period', which is a time before a trial begins when no treatment is given to study participants, to test participants' potential adherence to an intervention). The study also suggested additional research may be needed to determine whether focus on one behaviour at a time versus multiple behaviours is more beneficial, the extent to which cultural adaptation of the intervention influences outcomes, and the simultaneous effects of behavioural interventions and strategies to alter the socio-cultural and built environments on PA behaviour.

The current paper extends previous reviews and examines interventions intended to improve PA participation or used PA as a strategy for improving related outcomes (e.g. weight status), and that reported change in PA, among African American adults.

The review was specifically conducted for the 10th anniversary invited workshop of the African American Collaborative Obesity Research Network (AACORN) and was intended to examine evidence about the state of knowledge on PA interventions that are effective for African American adults. The current review highlights studies published since 2009, identifies elements of studies that contribute to successful interventions, determines whether recommendations from previous reviews are reflected in more recent research, and where applicable, the extent to which incorporating those recommendations impacted study findings, and provides additional recommendations for future research.

Methods

Identification of studies

Data sources

The initial review began in June 2012 and concluded in August 2012, to coincide with the Fifth AACORN workshop in August 2012, during which preliminary review findings were presented. To ensure completeness of the search, one author (TGC) repeated the literature review after the AACORN workshop, using the criteria outlined previously. The second search extended the review to papers published through August 2013. Previously published reviews of PA programmes or interventions (11–20) were also identified as possible sources of information (e.g. to identify papers published before 2009 with subsequent follow-up studies published in or after 2009).

Search terms

Studies were identified through database searches that included Academic Search Premier; CINAHL; Medline; PsychINFO; PubMed/Medline; CDSR (Cochrane)/ Cochrane Library; ERIC; SPORTDiscus; ISI Web of Science; NIH RePORTER; Google Scholar; Physical Education Index ProQuest; Dissertation Abstracts International; and ProQuest Dissertations and Theses A&I. Search terms related to the population of interest included: black, African American, ethnic, minority, culturally diverse, and adults. Search terms related to intervention targets included: intervention, program, exercise, training, fitness, physical activity, physical function, sedentary behavior, inactive/inactivity, physical training, walking, recreation, dance, sport and health education. Search terms related to outcomes of interest included: physical activity, physical fitness, sedentary behavior and physical function. To facilitate the identification of references, combinations of these search terms were used to search the databases (e.g. African American AND program AND physical activity).

Criteria for inclusion/exclusion of studies

Titles and abstracts were reviewed to determine whether the abstract or full reference would be obtained. All titles that were identified, regardless of whether or not they were selected for full review, were retained in an EndNote database. Abstracts selected for further review were located and evaluated to determine whether paper review would occur. Full papers were reviewed to make a final determination of whether the studies met the inclusion criteria.

Study designs. All study designs were eligible for inclusion in this review (i.e. randomized, controlled trials, single group, quasi-experimental, non-randomized).

Participants. Studies were included if they focused primarily on African American adults aged 18 years and older (i.e. >80% of the study population include African American) or if study findings were stratified by race/ethnicity, such that the impact of the intervention on African Americans could be readily identified. Studies focused on children were excluded, because two other reviews included in the current supplement focused on PA, nutrition and weight loss interventions in African American children (21,22).

Outcomes. Studies that focused on increasing PA or physical fitness were included. Studies that focused on other outcomes (e.g. weight loss, blood pressure) in addition to PA or physical fitness were also included if they provided outcome data describing the impact of the intervention on PA or physical fitness. Studies were excluded if PA or physical fitness outcome data were not included in study findings.

Papers retrieved

Figure 1 shows an overview of the search strategy used for this review. Two authors (KV and LL) conducted the initial search of the aforementioned databases, saved retrieved papers to an EndNote file, and deleted duplicates. Four authors (MCW, NRK, KV and LL) reviewed abstracts and retained papers that met initial inclusion criteria (e.g. focused on PA or physical fitness, included African Americans). Two authors (NRK and LL) retrieved full text for papers that were retained for review. Initially, 135 potentially relevant papers published since 2009 were identified; after exclusions, 16 papers remained in the final review (4 pilot studies and 12 full trial studies or studies not explicitly identified as pilot studies).

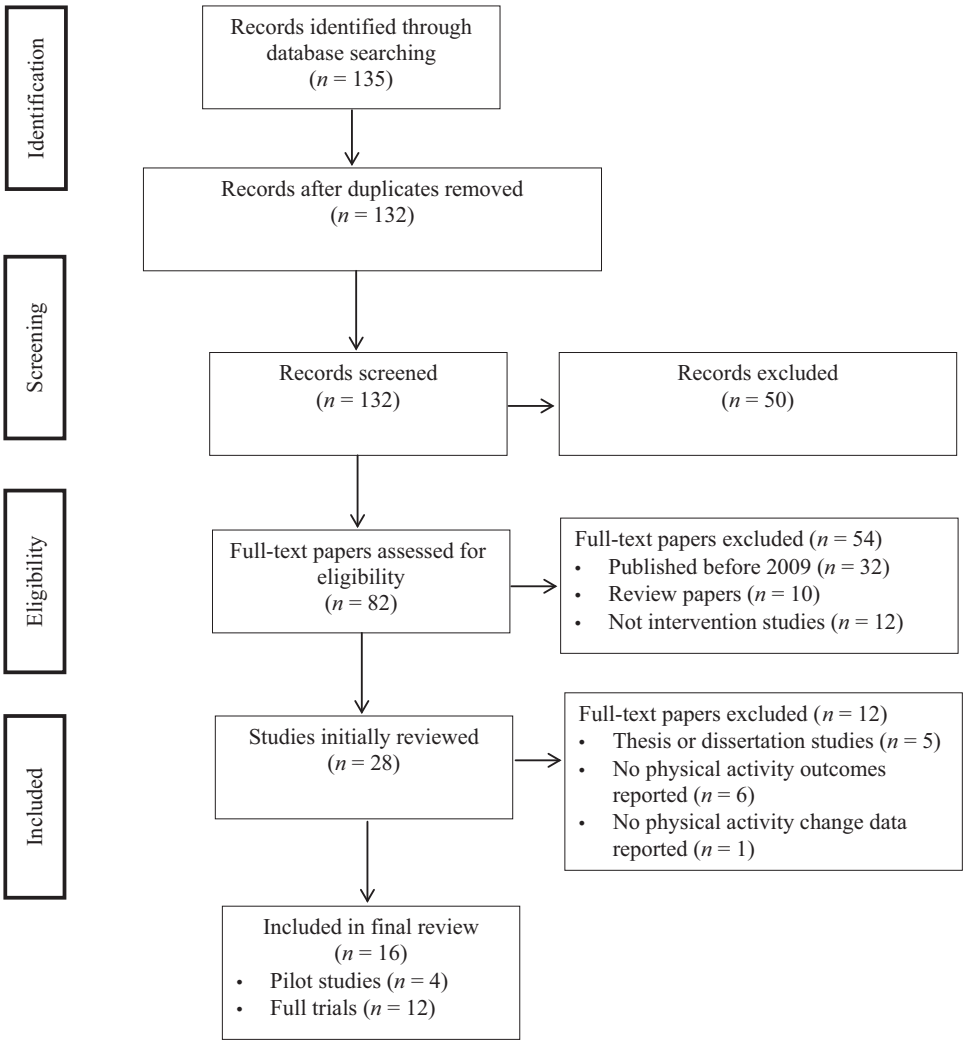

Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram.

Data synthesis

Data from retained studies were abstracted by three authors (KV, LL and TGC) using a standardized form. The following information was recorded for each paper included in the current review: (i) publication citation; (ii) overall study objective and specific behavioural goals for PA, fitness or caloric expenditure; (iii) description of study participants; (iv) study design, primary and secondary study outcomes, and intervention/programme length; (v) the behavioural sciences theory used to drive the intervention and a description of intervention methods, including intervention setting and delivery method; (vi) description of PA/fitness assessment; (vii) study findings (including within-group and between-group findings) for PA, fitness, caloric expenditure or sedentary behaviour; and (viii) study limitations noted by study authors and any additional limitations noted by review authors.

The level of cultural adaptation included in each intervention was also identified and recorded for papers included in the current review. Researchers have identified cultural sensitivity/cultural adaptation as an important element for success for community-based programmes (13,23,24). Cultural adaptation can be conceptualized by two primary dimensions – surface structure and deep structure (25). Surface structure is described as matching intervention materials and messages to observable characteristics of the population of interest, such as commonly used products, behaviour patterns, and environmental and social contexts in which behaviours occur. Deep structure refers to programmes that reflect ways by which culture, social, psychological, environmental, and historical factors and values can influence behaviour, and particularly how these factors influence behaviours across different population subgroups. Attention to surface and deep structures has also been proposed by other researchers as necessary for successfully implementing culturally appropriate behaviour modification interventions among population subgroups, particularly African Americans (23,26).

A composite quality score was created to construct a quantitative score for objectively evaluating and rating studies. The quality score rated elements (scores from 0 to 2) in recommendations from earlier reviews of the literature (13) previously suggested as factors that could improve PA interventions in African Americans. Factors included: study design (uncontrolled = 0, non-randomized = 1, randomized = 2); intervention focus (focused on multiple behaviours = 0, focused on PA/fitness = 1); stated PA goals for intervention participants (no goals identified = 0, goals implied but not clear = 1, goals explicitly stated = 2); use of behavioural sciences theory (no behavioural sciences theory identified = 0, behavioural sciences theory identified = 1); cultural adaptation (none noted = 0, surface structure = 1, deep structure = 2); PA assessment tool (subjective/self-report = 0, objective or combination of subjective and objective = 1); intervention length (<3 months = 0, 3–<6 months = 1, >6 months = 2); follow-up period (<6 months = 0, >6 months = 1); and participant attrition (<20% for <6 months = 1, 30% for >6 months = 1, anything greater = 0). A summary of each individual quality assessment score was used to create an overall quality score for each retained paper (overall scores ranged from 0 to 13 points). Two authors (MCW and TGC) independently reviewed each retained paper and assigned a quality score; the two authors discussed scores for each paper and disagreements were resolved by consensus. The other authors reviewed and provided feedback on summarized findings.

Results

Overall findings

A total of 16 papers met the inclusion/exclusion criteria for the current review. Study sample sizes ranged from 18 to 33 participants for pilot studies, and from 25 to 337 for studies not specifically identified as pilot studies. Most studies included primarily middle-aged women (27–38). Only one pilot study focused specifically on African American men (39). The most common settings for interventions were churches (27,28,30,40). Other interventions were conducted in primary care centres (34), fitness or senior centres (41,42) or home-based settings, including both private and public housing sites (37,38), a training facility, university campus (36), Internet (35), and telephone (29,32). Three studies did not specify where the intervention was conducted (31,33,39). Interventions were delivered by professional or project staff (28–31,34,36,37,40), by an automated telephone or computer system (32,33,35), by trained facilitators (27,38,39,42), and by an interdisciplinary team (41). The types of activities introduced in the interventions included walking, dancing, aerobic exercise, resistance training and the use of exercise machines.

In general, studies included in the current review presented intervention effects showing improvement in PA/fitness within randomization groups. No pilot studies reported between-group differences as all employed uncontrolled study designs. Among full trials that included comparison groups, nine showed statistically significant improvements in at least one measure of PA or fitness in the intervention compared with the comparison group (30,31,33–36,38,40,42). No negative studies (i.e. studies showing decreases in post-intervention measures of PA/fitness) were identified by this review.

The remaining results of the literature review were organized into tables that summarize: (i) characteristics of each paper included in the current review (Table 1); (ii) ratings of the individual elements and overall quality assessment score for papers in the current review (Table 2);

Table 1 Summary of characteristics of papers included in the current review of the literature

Author, year	Behavioural goal: frequency, intensity, type, time (FITT)	Subjects and inclusion criteria	Study design, study outcomes, intervention description	Behavioural sciences theory, intervention methods and cultural adaptation	Results and limitations
Pilot studies					
Hooker *et al.* 2011 (39)	F: weekly I: moderate T: not given T: 150 min	25 African American men (mean age of 54.7 + 4.8 years) Inclusion criteria: African American male; 45–66 years old; physically inactive; no musculoskeletal limitations preventing regular participation in PA	Quasi-experimental Self-reported total and moderate-to-vigorous PA, aerobic fitness; measures of social support, self-efficacy, and self-regulation of PA. Intervention length: 8 weeks Delivery method: trained facilitators Intervention setting: not specified PA measures: chair stand test, chair sit-and-reach test, Rockport Fitness (1 mile) Walking test, CHAMPS PA questionnaire for older adults Post-intervention follow-up: immediate post-test	Social cognitive theory 90-min programme sessions, twice weekly for 8 weeks Cultural adaptation: tailored cultural and gender intervention elements for African American men. Conducted in partnership with city-managed wellness centre in an all-African American neighbourhood. Teams formed to build camaraderie.	Attrition rate: 7% Across 16 sessions, participation ranged from 63 to 93% Within-group: moderate-to-vigorous intensity PA +7.3 h week^{-1} at 8 weeks (S) Overall PA +9.4 h week^{-1} at 8 weeks (S) Self-efficacy for PA +12% at 8 weeks (S) Social support for PA from family (+28%) and friends (+53%), self-regulation for planning (+33%) and goal setting (+48%) and each fitness component (+9 to +144%) (all S). Between-group: N/A Limitations: small sample size; no control group; post-intervention conducted without blind conditions
Peterson *et al.* 2011 (28)	F: not given I: not given T: not given T: not given	18 African American women (mean age = 49.61 + 7.03) Inclusion criteria: 35–65 years old, no physical limitations, not meeting the PA recommendations	Quasi-experimental design Self-reported PA; accelerometer-determined PA; social support for PA Intervention length: 6 weeks Delivery method: African American nurse practitioner with special interests and training in holistic health and wellness, PA, and yoga Intervention setting: church PA measures: 7-d PA record; RT3 accelerometer Post-intervention follow-up: immediate post-test	Social comparison theory Based on focus group analysis of the Heart and Soul Physical Activity Program, by African American church women; had one, 2-h session per week for 6 weeks (30-min group exercise). Participants used a booklet for goal setting, enlisting support, and tracking challenges and successes. Participated in group and culturally tailored activities. Cultural adaptation: sessions held in African American church, prayer to open and close sessions, Biblical messages on holistic wellness	Attrition rate: 10% Within-group: total weekly PA increased from 412 min per week at baseline to 552 min per week (S). Positive increases in intensity from 3.33 METS at baseline to 4.33 METS in 6 weeks (NS) Between-group: N/A Limitations: limited sample size, low attendance during intervention, no comparison group, limited time frame

Table 1 *Continued*

Author, year	Behavioural goal: frequency, intensity, type, time (FITT)	Subjects and inclusion criteria	Study design, study outcomes, intervention description	Behavioural sciences theory, intervention methods and cultural adaptation	Results and limitations
Resnick *et al.* 2009 (41)	F: not given I: not given T: not given T: not given	22 women from senior housing (mean age was 76.4 + 7.6) years, and primarily female (64%) and African American (86%) Inclusion criteria: >65 years old, known history of hypertension or hyperlipidaemia and inactive lifestyle; evaluated by a primary healthcare provider	Single-group, repeated-measures design PRAISEDD (people reducing risk and improving strength through exercise, diet and drug adherence) Intervention length: 12 weeks Delivery method: interdisciplinary team Intervention setting: senior housing site PA measures: Yale Physical Activity Survey Self-reported PA, self-efficacy for exercise, blood pressure, negative outcome for exercise Post-intervention follow-up: immediate post-test	Social ecological model 60-min sessions three times per week led by a non-certified lay exercise trainer. Sessions included a combined aerobic exercise (simple marching and dance steps), resistance exercise (resistance bands) and a stretching programme with established guidelines from the National Institute of Aging Cultural adaptation: none noted	Attrition rate: 9% Within-group: no changes in time spent in moderate-level physical activity after 4 months No changes in self-efficacy for exercise, positive outcome expectations for exercise or negative outcome expectations for exercise Between-group: N/A Limitations: small sample size, self-report used for most measures, results potentially influenced by recall ability and social desirability
Rimmer *et al.* 2010 (29)	F: not given I: not given T: not given T: not given	33 severely obese African American women with mobility disabilities (53 enrolled, 33 completed) Mean age 60.1 years Inclusion criteria: >18 years old, possess an ambulatory limitation, BMI > 25 kg m^{-2}, currently receiving primary care, not meeting PA recommendations for last 6 months	Quasi-experimental design Body weight, self-reported PA, self-reported barriers to PA Intervention length: 6 months Delivery method: project staff (qualified fitness professional with a master's degree in exercise physiology and trained in motivational interviewing techniques Intervention setting: telephone PA measures: PA and disability survey Post-intervention follow-up: immediate post-test	No specific behaviour theory reported (social cognitive theory and theory of planned behaviour mentioned) Telephone-based, PA coaching intervention; weekly calls for 6 months (15–30 min) MI techniques used to assist participants in removing barriers to PA involved building a relationship with the participant; identifying important ways to increase physical activity in the home, outdoors and indoor facilities. Resources from the National Center on Physical Activity guided ideas for suggestions on eliminating key barriers to PA or exercise participation Cultural adaptation: none noted	Attrition rate: 38% Within-group: Increase in total min d^{-1} of structured exercise (S), general indoor household PA (S), and total physical activity (S) No significant changes reported in leisure physical activity or outdoor household activity (S) decrease in personal barriers to physical activity No significant changes in environmental/facility or total barriers to physical activity Between-group: N/A Limitations: self-report instrument used for assessing barriers to PA unable to capture all barriers affecting PA participation. Non-randomization; intervention period not based on a specific motivational theory

Table 1 *Continued*

Author, year	Behavioural goal: frequency, intensity, type, time (FITT)	Subjects and inclusion criteria	Study design, study outcomes, intervention description	Behavioural sciences theory, intervention methods and cultural adaptation	Results and limitations
Full trials					
Bopp *et al.* 2009 (27)	F: not given I: not given T: not given T: not given	Intervention group ($n = 72$ members recruited from three churches) Control group ($n = 74$ members from three churches) (81% female). Inclusion criteria: underactive (defined used Behavioural Risk Factor Surveillance System)	Quasi-experimental design (subset of participants from a larger trial) Self-reported PA, pedometer steps, blood pressure, BMI Intervention length: 8 weeks Delivery method: trained volunteer facilitator from each church Intervention setting: churches (AME) PA measures: CHAMPS, pedometer Post-intervention follow-up: 3 and 6 months post-intervention	Transtheoretical model of behaviour change; Social Cognitive Theory Primary goal: increase PA; secondary focus on nutrition Led by trained volunteer facilitator at each church; facilitator recruited participants, and delivered programme 20–30 min week^{-1} of PA, Biblical weekly topic, discussion questions, handouts, and homework assignments Cultural adaptation: held in church, incorporated Biblical scriptures into session content	Attrition rate: 36%(treatment group) vs. 58% (control group) Notable attrition from the intervention (36%) and the comparison group 47.1% attended weekly sessions Within-group: Not reported Between-group: No changes in PA over time Increase in social support for PA at 3 months in treatment group vs. control group (S) Limitations: Attrition, quasi-experimental design, short intervention and follow-up period, low attendance at intervention sessions, other activities being conducted in churches similar to intervention
Duru *et al.* 2010 (40)	F: Not given I: Not given T: Not given T: Not given	Treatment group: $n = 34$ (73.3 + 9.6 years) Control group: $n = 28$ (72.2 + 5.8 years) Inclusion criteria: African American, female, >60 years of age, less than 30 min of weekly PA, no adverse health conditions	randomized controlled trial Change in pedometer steps per week; change in systolic blood pressure Intervention length: 8 weeks of weekly meetings and 6 months of monthly meetings Delivery method: study research assistant Intervention setting: three Los Angeles churches PA measures: pedometer, CHAMPS Post-intervention follow-up: immediate post-test	No behaviour theory reported Treatment group: 8-week programme, twice per week, 45 min per session; faith-based curriculum; goal setting and reinforcement; pedometer competition; weekly exercise class Control group: 8-week programme, twice per week, 45 min per session; lectures on topics unrelated to PA; weekly exercise class Scripted sessions led by research assistants Cultural adaptation: sessions included scripture reading and prayer, set in churches	Attrition rate: 13% 85% of participants attended >6 of 8 weekly sessions Intervention participants: 12,727 steps per week at baseline, control: 13,089 steps per week Within-group: not reported Between-group: at 6 months: treatment group increased weekly steps by 7,457 more than control participants (S). Reported hours per week of PA was not different between-groups Limitations: short intervention duration; multiple components prevented assessments of specific activities that may be stronger determinants of behaviour change; sample chosen from a limited metropolitan area

Table 1 *Continued*

Author, year	Behavioural goal: frequency, intensity, type, time (FITT)	Subjects and inclusion criteria	Study design, study outcomes, intervention description	Behavioural sciences theory, intervention methods and cultural adaptation	Results and limitations
Faridi *et al.* 2010 (30)	F: not given I: not given T: not given T: not given	Treatment group: $n = 121$; 84.8% female Control group: $n = 125$; 77.8% female 18–79 years of age, both groups Inclusion criteria: >18 years of age, African American, members of the congregation of participating churches; and have risk for diabetes	Non-randomized controlled (intervention vs. delayed-intervention control group) Changes in body weight, self-reported PA, PA self-efficacy Intervention length: 1 year Delivery method: diabetes educator Intervention setting: church PA measures: 7-d PA record Post-intervention follow-up: immediate post-test	No behaviour change theory reported Church-based intervention in two urban African American communities: New Haven, CT (intervention site, 13 churches), Bridgeport, CT (control site, six churches) Community health advisors paid for training; trained for 10 weeks (2 h per week); asked to recruit 10–15 members of their congregation Community health advisors tailored intervention methods and frequency of contact and teaching methods to participants (some did group education plus Bible study classes, others individual counselling); community health advisors also organized community outreach events to increase diabetes awareness Cultural adaptation: held in churches, education sessions plus Bible study (but did not include scriptures)	Attrition rate: 38% Within-group: Improved energy expenditure in both groups (S) No change in % of participants increasing, decreasing, or not changing PA Between-group: Improved energy expenditure in intervention compared with control group (S) No change in % of participants increasing, decreasing, or not changing PA Limitations: attrition
Hornbuckle *et al.* 2012 (31)	F: daily I: moderate-vigorous T: walking >10,000 steps T: not given	44 African American women (49 + 5.5 years old) Inclusion criteria: 39–61 years old, not engaged in resistance training and/or averaging >10,000 steps per day	Randomized trial Body weight, pedometer-determined steps per day; upper and lower body strength Intervention length: 12 weeks Delivery method: investigator Intervention setting: not given PA measures: pedometer, muscle strength Post-intervention follow-up: immediate post-test	No behaviour theory reported Walking group ($n = 25$) asked to increase daily pedometer-measured walking to >10,000 steps per day. Walking plus resistance training group ($n = 19$) was given the same walking prescription plus supervised resistance training 2 d per week Cultural adaptation: none noted	Attrition rate: 27% Within-group: both groups increased walking (walking group = 5,453 + 2,119 to 6,845 + 2,279 steps per day, walking plus resistance training group = 4,823 + 1,758 to 6,859 + 2,012 steps per day) (S). Between-group: walking plus resistance training group increased both upper and lower body strength compared with walking group (S). Limitations: limited sample size; only 4 of 18 women reached 10,000 steps per day goal

Table 1 *Continued*

Author, year	Behavioural goal: frequency, intensity, type, time (FITT)	Subjects and inclusion criteria	Study design, study outcomes, intervention description	Behavioural sciences theory, intervention methods and cultural adaptation	Results and limitations
Migneault *et al.* 2012 (32)	F: not given I: moderate T: not given T: not given	Control group: $n = 169$, 66% female Treatment group: $n = 168$, 75% female) Participants recruited from adult primary care hospital Inclusion criteria: African American; diagnosed with hypertension, currently treated for hypertension, at least one visit to physician in the previous 30 d, >35 years of age	Two-armed randomized controlled trial Body weight, energy expenditure (kcal d^{-1}), moderate-to-vigorous PA (minutes per week) Intervention length: 32 weeks Delivery method: telephone Intervention setting: computer/telephone PA measures: 7-d PA record Post-intervention follow-up: immediate and 4 months post-intervention	Social cognitive theory; transtheoretical model of behaviour Recruited into automated, multi-behaviour intervention or an education-only control. Automated, computer-based, interactive telephone counselling system. Culturally tailored. Received one call per week for 32 weeks. PA measured using 7-d PA record; 48 participants were randomly chosen to wear accelerometers to validate 7-d PA record Cultural adaptation: used pre-recorded speech from African American voice professionals to deliver messages, ethnic mapping with focus group members	Attrition rate: 18.1% Within-group: not reported Between-group: increased energy expenditure (80 kcal d^{-1}) in the intervention vs. control group (S) By 8-month follow-up, 18.1% were lost to follow-up; 77% dropped out by 4-month visit. Overall greater dropout rate in intervention group Association between intervention and improvements in energy expenditure (+80 kcal d^{-1}) (S) Limitations: high baseline values; 47% of intervention group was meeting guidelines. They were advised only to maintain current PA levels
Oh *et al.* 2010 (33)	F: 3–4 bouts $week^{-1}$ I: Moderate-vigorous T: Walking T: 20–30 min	148 African American women (minimal treatment, $n = 55$; enhanced treatment, $n = 93$) Inclusion criteria: 40–65 years of age (mean 48.2 years); no CVD; sedentary; in preparation or pre-contemplation stage of behaviour change	quasi-experimental Self-reported measure of walking adherence Intervention length: 24 weeks Delivery method: telephone system Intervention setting: not given PA measures: PA diary, heart rate monitor Post-intervention follow-up: immediate post-test	Social cognitive theory, transtheoretical model Enhanced treatment or minimal treatment behavioural intervention; 24-week intervention delivery adoption phase Cultural adaptation: none noted	Attrition rate: 11% Within-group: not reported Between-group: enhanced treatment group completed significantly more walks than minimal treatment group (43.3% [SD = 34.0] and 26.2% [SD = 28.1], respectively) (*S)* 35% in intervention group adhered to >50% of prescribed walked vs. 0.2% of control group Walking adherence not associated with any crime measures or crime-related safety ($R^2 = 0.130$–0.147). Limitations: non-population-based sample

Table 1 *Continued*

Author, year	Behavioural goal: frequency, intensity, type, time (FITT)	Subjects and inclusion criteria	Study design, study outcomes, intervention description	Behavioural sciences theory, intervention methods and cultural adaptation	Results and limitations
Parra-Medina *et al.* 2011 (34)	F: not given I: not given T: not given T: not given	266 African American women (treatment group, $n = 136$; control group, $n = 130$) >35 years of age; recruited from nine community clinics Inclusion criteria: African American women, >35 years of age, no physical limitations, telephone access, baseline blood pressure <160/95 mmHg	Randomized controlled trial Body weight (BMI, central adiposity), self-reported and objective measures of PA (accelerometer) Intervention length: 12 months Delivery method: providers and nurses Intervention setting: community clinic PA measures: CHAMPS PA Survey Post-intervention follow-up: immediate post-test	Social cognitive theory; transtheoretical model Standard care intervention (provider counselling, nurse goal setting, and educational materials) vs. comprehensive intervention (standard care intervention plus 12 months of telephone counselling and tailored print materials) Cultural adaptation: used photos, common foods, and testimonials of African Americans to emphasize cultural values and norms	Attrition rate: 43% Within-group: none reported Between-group: comprehensive intervention group more likely to improve in leisure-time physical activity at 6 months (OR = 3.82; CI = 1.41, 10.3) (S). Comprehensive participants more likely than standard care participants to decrease total physical activity at 6 months (OR = 3.13, CI = 1.18–8.25) (S) Limitations: high attrition rate, data were not missing at random (analysis based on initial treatment intent not possible)
Pekmezi *et al.* 2010 (35)	F: not given I: not given T: not given T: not given	38 African Americans (92.6% female, mean age 42.58 + 9.87 years); well-educated, high-income sample. Three groups: tailored print ($n = 15$), tailored Internet ($n = 11$) standard Internet ($n = 12$) Inclusion criteria: 18–65 years old, sedentary (<90 min of weekly PA), computer access, no medical conditions	Randomized, controlled trial Self-reported PA Intervention length: 12 months Delivery method: computer system Intervention setting: home-based (Internet or print materials) PA measures: 7-d PA record Post-intervention follow-up: immediate post-test	Transtheoretical model, social cognitive theory Three groups compared: a tailored print condition, a tailored Internet condition, and a standard Internet condition. Cultural adaptation: none noted	Attrition rate: N/A (subsample analysis 70% of participants reported reading information provided by Internet mail or regular mail. Within-group: self-reported increase in PA from 17.24 min (SD = 20.72) at baseline to 139.44 min (SD = 99.20) at 6 months in all participants (S) No significant change in PA from 6 months to 12 months Between-group: N/A Limitations: reliance on community members, primarily female sample

Table 1 *Continued*

Author, year	Behavioural goal: frequency, intensity, type, time (FITT)	Subjects and inclusion criteria	Study design, study outcomes, intervention description	Behavioural sciences theory, intervention methods and cultural adaptation	Results and limitations
Stolley *et al.* 2009 (36)	F: three to four times per week I: moderate T: not given T: >30 min	*Treatment group*: $n = 100$; *control group*, $n = 98$; aged 30–65 years; BMI between 30 and 50 kg m^{-2} Inclusion criteria: African American female, 30–65 years old, overweight or obese, medical approval, ability to walk 30 min daily without assistance	Randomized controlled trial Self-reported PA; fruit and vegetable intake Intervention length: 6-month weight loss intervention with a 1-year maintenance intervention Delivery method: Investigator Intervention setting: university campus PA measures: International Physical Activity Questionnaire Post-intervention follow-up: immediate post-test (6-month follow-up results presented in the paper included in the current review)	Social cognitive theory Small groups met two times per week for 6 months and monthly motivational interviewing sessions Meetings were 60–90 min and included didactic sessions that focused on diet and PA behaviours Cultural adaptation: Focused on food, family, music, social roles and relationships, and spirituality/religion	Attrition rate: 7% Within-group: N/A Between-group: Intervention group reported more walking compared with control group (NS) Intervention group showed significant improvements in moderate ($P = 0.05$), vigorous ($P < 0.001$), and moderate-to-vigorous ($P = 0.01$) physical activity compared with control group 100 (93.5%) women in the intervention group and 98 (92.5%) women in the control group completed both the baseline and the 6-month assessment On average, participants in the intervention group attended of 53% of the intervention classes ($n = 47$ for cohort 1, $n = 46$ for cohort 2) and 53% of motivational interviewing sessions Limitations: use of BMI as primary measure of obesity; voluntary participants (higher levels of motivation)
Wilder *et al.* 2011 (37)	F: daily I: moderate T: not given T: 30 min or more in bouts >10 min	25 African American women (59 + 11 years of age) Two groups: cohort 1 ($n = 14$); cohort 2 ($n = 11$) Inclusion criteria: 30–75 years of age, no known diseases, physician clearance	Quasi-experimental; pretest/post-test design Body weight, physical fitness (treadmill time, oxygen consumption) Intervention length: 6 months Delivery method: athletic trainer/exercise specialist Intervention setting: housing authority complex PA measures: maximal graded treadmill exercise test Post-intervention follow-up: immediate post-test	No behaviour theory reported 6-month individualized exercise programme in a gym within a housing authority; cohort 1 began in 2007; cohort 2 began in 2008 Cardiorespiratory fitness assessed using dynamic, rhythmic movements (i.e. walking, stationary and recumbent cycling, elliptical walking, stair stepping, rowing). Participants encouraged to do multiple exercises with a goal of at least 30 min moderate-intensity exercise once per day either in one session or in 10-min bouts. Exercise duration or intensity, or both, increased gradually based on participant's fitness goals and comfort and published guidelines Cultural adaptation: none noted	Attrition rate: 17% Within-group: both groups illustrated an increase in walk duration and O_2 consumption after the programme (cohort 1, 17.6%, cohort 2, 21%) (S). Both groups decreased 5-min post-exercise heart rate (S) and rate pressure product (S) Between-group: N/A Limitations: non-probability sample; small sample size

Table 1 *Continued*

Author, year	Behavioural goal: frequency, intensity, type, time (FITT)	Subjects and inclusion criteria	Study design, study outcomes, intervention description	Behavioural sciences theory, intervention methods and cultural adaptation	Results and limitations
Yan *et al.* 2009 (42)	F: not given I: not given T: not given T: not given	208 community-dwelling older adults Treatment group: $n = 151$ Control group: $n = 57$ Mean age 73 years, 82% female, 39% African American Inclusion criteria: >50 years or older; sedentary (does not meet the recommended levels of PA)	Quasi-experimental Physical fitness Intervention length: 24 weeks Delivery method: lay leaders Intervention setting: senior centres and housing facilities PA measures: 7-item battery measure of lower body flexibility, upper body flexibility and balance Post-intervention follow-up: immediate post-test	Transtheoretical stages of change First 4 weeks were active living everyday only, followed by 16 weeks of the combined active living everyday only and ExerStart programs last 4 weeks were ExerStart only Cultural adaptation: none noted	Attrition rate: 7% Within-group: African American participants showed significant improvements from pre to post in chair stand, arm curl, 2-min step, chair sit-and-reach, back scratch, and 8-ft up-and-go Similar improvements for whites and Hispanics No improvements in comparison group Between-group: not reported Limitations: no random group assignment; small sample sizes, particularly in control group
Zoellner *et al.* 2010 (38)	F: daily I: moderate T: 10,000 steps T: not given	$n = 83$, 98% African American, 94% women Average age of participants was 44 + 13 years No specific inclusion criteria documented (physician clearance required for participants with a blood pressure >160/100 mmHg	Quasi-experimental Pedometer-determined PA; body weight; blood pressure Intervention length: 6 months Delivery method: community coaches Intervention setting: community PA measures: pedometer, pedometer diary Post-intervention follow-up: immediately post-test	Social support and transtheoretical model frameworks Participants wore a pedometer, maintained a pedometer diary for the study duration, and attended monthly nutrition and PA education sessions Changes in group means for average number of daily steps during each month of the intervention also assessed An overall average physical activity category determined for each participant: total number of steps accumulated/total number of pedometer diary entries for the 6-month study Cultural adaptation: none noted	Attrition rate: 20% Within-group: Average step per day increased, with 6,665 during month 1 and increased to 9,232 steps per day during month 6 (S). Between-group: N/A Limitations: small sample; missing pedometer data

BMI, body mass index; CHAMPS, Community Health Activities Model Program for Seniors survey; CI, confidence interval; FITT, frequency, intensity, type, time; METS, metabolic equivalents; N/A, not applicable; NS, not statistically significant; OR, odds ratio; PA, physical activity; S, statistically significant finding; SD, standard deviation.

Table 2 Rating of the individual elements and overall quality assessment score for papers included in the current review

Author	Study design*	PA focus†	PA goals‡	Behavioural sciences theory§	Cultural adaptation¶	PA assessment**	Intervention length††	Follow-up length‡‡	Attrition§§	Overall score¶¶
Pilot studies										
Hooker *et al.* 2011 (39)	0	1	2	1	2	1	0	0	1	8
Peterson *et al.* 2011 (28)	0	1	0	0	2	1	0	0	1	5
Resnick *et al.* 2009 (41)	0	0	0	1	0	0	1	0	1	3
Rimmer *et al.* 2010 (29)	0	1	0	0	0	0	2	0	0	3
Full trials***										
Bopp *et al.* 2009 (27)	1	1	0	1	2	1	0	1	0	7
Duru *et al.* 2010 (40)	2	1	0	0	2	1	2	0	1	9
Faridi *et al.* 2010 (30)	1	0	0	0	1	0	2	0	0	4
Hornbuckle *et al.* 2012 (31)	1	1	2	0	0	1	1	0	0	6
Migneault *et al.* 2012 (32)	2	0	1	1	2	0	2	0	1	9
Oh *et al.* 2010 (33)	1	1	2	1	0	1	2	0	1	9
Parra-Medina *et al.* 2011 (34)	2	0	0	1	2	0	2	0	0	7
Pekmezi *et al.* 2010 (35)	2	1	0	1	0	0	2	0	1	7
Stolley *et al.* 2009 (36)	2	0	2	1	2	0	2	0	1	10
Wilder *et al.* 2011 (37)	0	1	2	0	0	1	2	1	1	8
Yan *et al.* 2009 (42)	1	1	0	1	0	1	2	0	1	7
Zoellner *et al.* 2010 (38)	1	1	2	1	0	1	2	0	0	8

*Uncontrolled = 0; non-randomized = 1; randomized = 2.

†Focused on multiple behaviours = 0; focus on physical activity/fitness = 1.

‡No goals identified = 0; physical activity/fitness goals implied but not clear = 1; physical activity/fitness goals explicitly stated = 2.

§No behavioural theory identified = 0; behavioural theory identified = 1.

¶No noted adaptation = 0; surface structure adaptation = 1; deep structure adaptation = 2.

**Subjective/self-report = 0; objective only or combination of objective and subjective/self-report = 1.

††<3 months = 0; 3–<6 months = 1; >6 months = 2.

‡‡<6 months = 0; >6 months = 1.

§§<20% for <6 months = 1; less than 30% for >6 months = 1; anything greater = 0.

¶¶Summary of individual quality assessment scores.

***Studies not specifically identified as pilot studies were listed as full trials, regardless of study design or sample size.

and (iii) study quality scores and general study findings (Table 3). Information on study findings (Tables 1 and 3) includes a description of within-group differences (i.e. within intervention or control groups) and between-group differences (i.e. comparing intervention and control groups), and is based solely on the data reported in the publications.

Overall study quality

The study quality scores summarized the extent to which each individual study met the criteria discussed earlier. In the current review, study quality scores ranged from 3 to 10 out of 13 possible points (Table 2). Among pilot studies, study quality scores ranged from 3 to 8. Among full trials, scores ranged from 6 to 10. Pilot studies tended to have lower study quality scores than full trials, mainly because of uncontrolled study designs, lack of defined PA/fitness goals, self-reported PA measures, and short intervention times with no post-intervention follow-up.

Study design

In the current review, the full trials used a randomized controlled design ($n = 6$) (31,32,34–36,40), non-randomized controlled ($n = 1$) (30) or a quasi-experimental design ($n = 5$) (27,33,37,38,42). All four pilot studies used a pre-post single group design with no control group (28,29,39,41).

PA focus

In the current review, 11 of the 16 studies focused solely on improving PA or fitness (27–29,31,33,35,37–40,42). The other studies focused on multiple behaviours, including PA/fitness, as a way to reduce obesity (36); improve adherence to behaviours for prevention of cardiovascular disease (CVD) (41); reduce CVD risk (34), reduce the effects of diabetes (30); and improve PA, diet quality, and medication adherence (32).

PA goals

In the current review, seven studies included either structured exercise as a part of the group-based intervention (27,28,40–42) or supervised, structured exercise training under controlled laboratory or fitness centre settings (31,37). Only six studies in the current review provided participants with specific PA or fitness goals (31,33,36–39). Nine studies did not describe PA or fitness goals for participants (27–30,34,35,40–42) and one study suggested that there were PA or fitness goals, but did not clearly state what they were or whether participants knew about the goals (32).

Behavioural sciences theories

In the current review, 10 of the 16 papers listed one or more behavioural sciences theories as the basis of the intervention content (27,32–36,38,39,41,42); six papers did not provide such information (28–31,37,40). Studies that listed behavioural science theories typically incorporated components of the theory into the intervention design.

Cultural adaptation

One study in the current review identified strategies for cultural adaptation of the intervention at the surface structure level (30), and seven studies identified strategies for cultural adaptation of the intervention at the deep level (27,28,32,34,36,39,40). Examples of surface-level cultural adaptation included holding sessions in churches or locations within the African American community (30). Examples of deep structure cultural adaptation included infusion of scriptures and prayer in faith-based intervention sessions (27,28,40), and gender- and race-specific topics and testimonials (32,34,36,39). Eight studies did not specifically note any cultural adaptation related to race/ethnicity (29,31,33,35,37,38,41,42).

PA/fitness assessment

Nine studies in the current review used objective measures of PA or fitness. Most used pedometers (27,31,38,40) one used accelerometers (28) and one used a heart rate monitor (33). Four studies included cardiorespiratory fitness (CRF) as an outcome variable, all of which were objective measures, with three studies assessing submaximal aerobic capacity, strength or physical function tests (31,39,42), and one study assessing maximal aerobic capacity (37).

Several studies in the current review used self-report measures to assess PA, some as the single measure of PA/fitness and some combined with objective measures. The two most commonly used self-report measures were the Stanford Seven-Day Physical Activity Recall (28,30,32,35,36) and the Community Health Activities Model Program for Seniors (CHAMPS) survey (27,34,39,40). Other surveys used included the Yale Physical Activity Survey (YPAS) (41), the International Physical Activity Questionnaire (IPAQ) – Long Form (36), and the Physical Activity Disability Survey (29). Three studies also used PA diaries (33,38). CHAMPS (43) and YPAS (44) have been previously validated in African Americans. The IPAQ – Short Form has also been validated in African Americans (45).

Most studies that used self-report data showed statistically significant within-group differences in PA/fitness outcomes. Studies that used measures of fitness to assess study

Table 3 Summary study quality scores and study findings

Author, year	Overall quality score	Results
Pilot studies		
Hooker *et al.* 2011 (39)	8	Within-group moderate-to-vigorous PA^ ++ Total PA^ ++ Rockport 1-mile walk ++ Chair stands ++ Sit and reach ++ Between-group N/A
Peterson *et al.* 2011 (28)	5	Within-group Total PA^ ++ PA intensity + Between-group N/A
Resnick *et al.* 2009 (41)	3	Within-group Exercise behaviour^ 0 Between-group N/A
Rimmer *et al.* 2010 (29)	3	Within-group Exercise^ ++ Leisure^ ++ Indoor household^ ++ Outdoor household^ ++ Total^ ++ Between-group N/A
Full trials		
Bopp *et al.* 2009 (27)	7	Within-group Not reported Between-group PA kcal week^{-1}^ at 3 months + (I > C) PA kcal week^{-1}^ at 6 months + (I > C) Steps 0
Duru *et al.* 2010 (40)	9	Within-group Not reported Between-group Steps per week ++ (I > C) Hours per week of PA 0
Faridi *et al.* 2010 (30)	4	Within-group Energy expenditure^ ++ % increasing PA in past 3 months^ 0 % decreasing PA in past 3 months^ 0 % not changing PA in past 3 months^ 0 Between-group Energy expenditure^ ++ (I > C) % increasing PA in past 3 months^ 0 % decreasing PA in past 3 months^ 0 % not changing PA in past 3 months^ 0
Hornbuckle *et al.* 2012 (31)	6	Within-group Steps per day ++ Upper body strength ++ (WRT only) Lower body strength ++ (WRT only) Between-group Upper body strength ++ (WRT > walking) Lower body strength ++ (WRT > walking)
Migneault *et al.* 2012 (32)	9	Within-group Not reported Between-group >moderate-intensity PA^ 0 % >150 min week^{-1} in >moderate-intensity PA^ 0 Energy expenditure ++ (I > C)

Table 3 *Continued*

Author, year	Overall quality score	Results
Oh *et al.* 2010 (33)	9	Within-group Not reported Between-group % completing prescribed walks^ ++ (I > C)
Parra-Medina *et al.* 2011 (34)	7	Within-group Not reported Between-group Improve total PA at 6 months^ 0 Improve total PA at 12 months^ 0 Decline total PA at 6 months^ ++ (comp > standard care) Decline total PA at 12 months^ 0 Improve LTPA at 6 months^ ++ (comp > standard care) Improve LTPA at 12 months^ 0 Decline LTPA at 6 months^ 0 Decline LTPA at 12 months^ 0
Pekmezi *et al.* 2010 (35)	7	Within-group PA baseline to 6 months^ ++ PA 6 months to 12 months^ 0 Between-group N/A
Stolley *et al.* 2009 (36)	10	Within-group Not reported Between-group Walking^ + (I > C) Moderate PA^ ++ (I > C) Vigorous PA^ ++ (I > C) Moderate-to-vigorous PA^ ++ (I > C)
Wilder *et al.* 2011 (37)	8	Within-group Walk duration ++ Oxygen consumption ++ Post exercise heart rate ++ Rate pressure product ++ Between-group N/A
Yan *et al.* 2009 (42)	7	Within-group (specifically among African Americans) Chair stand ++ Arm curl ++ 2-min step test ++ Chair sit and reach ++ Back scratch ++ 8-ft up-and-go ++ Between-group Not reported
Zoellner *et al.* 2010 (38)	8	Within-group Steps per day ++ Between-group N/A

^ = self-reported data; 0 = no impact of intervention on outcome(s) of interest; + = association in expected direction (e.g. improvement in outcome(s) of interest), but not statistically significant; ++ = association in expected direction and statistically significant.
C, control; I, intervention; LTPA, leisure-time physical activity; N/A, not applicable; PA,physical activity; WRT, weight resistance training.

outcomes also tended to show statistically significant improvements in outcomes of interest (31,37,42). When objective measures of PA were used, only two studies (38,40) showed statistically significant within-group differences, and only one study (32) showed statistically significant between-group differences. Given the limitations of self-reported data, previous literature reviews suggested that future intervention strategies be evaluated using objective measures or, at minimum, subjective measures previously validated in African American populations.

Intervention length and follow-up period

In the current review, three interventions lasted <3 months (27,28,39), two interventions lasted 3–<6 months (31,41) and 11 interventions lasted >6 months (29,30,32–38,40,42). Among papers identified for the current review, only two studies included a follow-up period in addition to immediate post-intervention follow-up (27,32).

Attrition

High attrition, defined as >20% for studies lasting <6 months or >30% for studies lasting longer than 6 months, was observed in six studies (27,29–31,34,38).

Table 3 gives study quality scores, combined with study results, to elucidate whether overall quality scores impacted study findings. Although not included in Table 3, we also reviewed individual elements within the overall quality score to determine if any quality elements clearly impacted study findings. None of the study quality ratings (individual component scores or the summary quality score) appeared to impact whether the study found statistically significant within- or between-group changes in study outcomes.

Discussion

We identified 16 interventions, published between January 2009 and August 2013 that focused on increasing PA or fitness in African American adults or reported independent results for African Americans. Most papers included in the current review identified statistically significant within- and between-group differences in the expected direction (improvement over time and intervention group improving more than control group) for at least one PA/fitness outcome, suggesting that intervention strategies to increase PA or fitness in African American adults in the current review have promise.

Recommendations from previous reviews of the literature regarding PA interventions in African Americans appeared to be taken into account in the papers included in the current review. For example, previous literature reviews recommended more rigorous study designs (e.g. randomized, controlled trials), the use of theoretically based strategies to improve specific elements of interventions linked with behaviour change, and cultural adaptation for intervention materials. Most studies included in the current review included those elements. Several theoretical frameworks were used to develop the interventions included in the current review; because the frameworks used varied greatly, the extent to which the frameworks truly shaped intervention strategies and the extent to which framework elements were truly relevant to African Americans is not clear. None of the evidence from the current review points to a specific theory that can assist with understanding why a particular intervention strategy might or might not be effective. Many studies included in the current review reported cultural adaptations in their intervention strategies. Most studies incorporated deep structure adaptations by infusing elements of African American culture into intervention content and strategies. However, given the generally positive findings presented in all studies, it is not clear the extent to which cultural adaptation impacted study implementation or outcomes.

Previous reviews highlighted the importance of using objective tools to assess PA/fitness, and nine of the studies in the current review did so. While there are many benefits to using objective measures of PA, such devices can be costly (e.g. accelerometers can range in price from ~$100 to $450 per unit), making them unaffordable for small studies. Pedometers are less expensive (~$15–50), which could explain why studies with objective measures of PA primarily used them. Other studies included in the current review using a self-report measure as the only measure of PA/fitness or in addition to an objective measure. More studies in the current review used similar self-report measures, increasing opportunities to easily compare findings across studies. Almost all studies in the current review that used self-report measures identified improvement in at least one aspect of PA, regardless of the self-report measure used; however, given limitations with self-report measures, these findings should be confirmed in additional studies that use objective measures to assess study outcomes.

Findings from studies in the current review could have been more definitive had more of them followed recommendations from earlier reviews regarding ways to improve study quality. For example, previous reviews suggested the use of structured programmes that clearly outlined PA goals for participants as a strategy for effectively increasing PA in African Americans. Yet, in the current set of papers, fewer than half of the studies included structured programmes or clearly outlined goals for PA/fitness. Structured exercise/exercise training might improve behaviour by allowing participants an opportunity to 'practice' newly learned behaviours, which could indirectly increase self-efficacy. This notion is supported by a recent review of the literature that evaluated the most effective strategies for changing PA self-efficacy (46).

Self-efficacy, a component of social cognitive theory is, loosely defined, a person's belief that he or she can successfully perform a desired action (47,48). Self-efficacy has been associated with PA participation among African American women (49–51), possibly because women who are more confident in their abilities are more likely to engage in PA. Increasing self-efficacy may be effective for helping individuals achieve goals by increasing their confidence that they can perform the action. In the current review, studies that included some structured exercise component, particularly those with enough structured exercise for participants to achieve the specific PA/fitness goals of the intervention, were more likely to achieve statistically significant findings than studies with no structured exercise or studies without a stated PA/fitness goal.

Previous reviews recommended that future studies include longer-term post-intervention follow-up, not just immediately post-intervention, to understand intervention sustainability. However, only two papers in the current review evaluated the impact of interventions at least 6 months post-intervention. Marcus and colleagues highlighted the need for attention to long-term maintenance of behaviour after interventions, as ongoing participation in positive health-related behaviours is critical for sustaining health benefits (52). Publications describing long-term intervention follow-up related to the studies identified for this review may still be forthcoming, and future reviews may capture studies that provide long-term follow-up data.

A few new recommendations emerged from the current review. About one-third of the studies in the current review included a measure of fitness as an outcome variable. Increased CRF reduces the risk of all-cause cardiovascular mortality and morbidity (53–55), and provides additional, significant clinical assessment value beyond traditional assessment methodologies (e.g. blood pressure and blood sugar levels) (53–55). There is a well-established relationship between CRF and morbidity/mortality in white populations (53,54,56–58), but the evidence is weak for African Americans (59,60). One reason may be the paucity of studies developed to define the relationship between CRF and morbidity among African Americans. In addition, data from the National Health and Nutrition Examination Survey (NHANES) suggest that African Americans have lower CRF than most other racial/ethnic groups (61). Given the numerous health benefits seen from increased fitness, it may be important for future interventions in African American populations to target and evaluate fitness as a major outcome variable.

Published research supports the tenet that the built environment in which people live likely influences their PA participation (62–65) primarily by impacting ability to engage in PA because of access to and quality of PA resources (64,66,67). The social environment also impacts decisions to engage in PA through knowledge, attitudes and beliefs (68–73). Within the current literature review, no studies specifically targeted policies to improve PA or fitness, although one study directly altered the environment in a public housing community (37). Understanding how the built and social environment influences PA, and how to most effectively intervene on these environments, could be useful for developing successful PA intervention strategies among African Americans. Such interventions might include strategies, at the individual level, to help individuals navigate their own environments. Interventions at the environmental level could include improvements to the built environment (e.g. improvements in sidewalks, public transportation and/or mixed land use to increase access to safe options for PA).

The current review of the literature has several strengths, including using established approaches to systematic reviews. The current review adds to the literature by focusing on interventions published since 2009, and attempts to assess the impact of adopting recommendations from previous reviews. The current review also has some limitations that should be taken into consideration when interpreting its findings. For example, this review may have been influenced by positive paper or publication bias, which suggests that papers with null or negative findings are less likely to be published than those with positive findings or findings in the expected direction. In addition, although we developed a quality score rating using factors included in quality score ratings from similar published reviews to provide a numeric measure of paper quality, the score had some limitations. The quality score was based on data included within the paper; all data may not have been reported. No attempt was made to contact authors of the papers to obtain additional information for the quality score. Finally, the inclusion/exclusion criteria employed in many studies (i.e. comorbid conditions) would limit the generalizability of the intervention to most African American populations, especially given the high prevalence of comorbid conditions among African Americans (74).

While the progress within this area of research shows promise, more work is needed to (i) further support the findings of existing studies; (ii) address the dearth of PA and physical fitness research involving African American adults with comorbid conditions; and (iii) address issues related to the built environment. This review revealed information from existing research that could further inform intervention strategies for African American adults. Updated recommendations gleaned from the current review could continue to improve PA and physical fitness interventions among African Americans, and might also apply to PA research in general. These recommendations include:

1. Use of rigorous experimental designs and behavioural sciences theories to inform intervention strategies, while incorporating broader theoretical perspectives that address historical and social context influences, and interactions with the built environment.

2. Explicit statement of behavioural goals in interventions.

3. Evaluation of the long-term impact (e.g. >6 months post-intervention) of interventions on PA behaviours and effective strategies for maintaining long-term behaviour change.

4. Use of community-based interventions; utilizing resources within the community may increase sustainability compared with laboratory-based interventions.

5. Increased efforts to recruit and retain African American men into intervention studies.

6. Additional research to better understand best practices for increasing adherence during and after interventions.

7. Studies of the impact of policy, systems and environmental changes on PA behaviours in African American communities, which can shape an individual's decisions about and ability to be active.

AACORN has proposed a paradigm that calls for '. . . a broader interdisciplinary and contextualized approach . . .' to designing interventions that impact PA, nutrition, and weight (75). Within the paradigm, AACORN encourages researchers to consider three knowledge domains – cultural and psychosocial processes, historical and social contexts, and physical and economic environments – to develop more effective interventions targeted towards African Americans. Although not the only framework in existence, the AACORN paradigm may be particularly useful for guiding researchers and practitioners in interventions/programmes designed to impact weight and related behaviours in African Americans.

Summary

Given the consistent evidence of low levels of PA among African American adults and the high prevalence of poor health outcomes associated with low levels of PA, it will be important to identify and implement interventions most likely to increase PA. However, additional research is needed to determine which strategies are most appropriate for this 'at-risk' population that result in sustained improvements in PA. These strategies will need to be rigorously evaluated using the strongest, most appropriate study designs and assessment methods, and with attention to external validity and sustainability. Moreover, targeting factors in the physical and social environment that shape PA behaviours are essential to improving the overall health of African American adults.

Conflict of interest statement

No conflict of interest was declared.

Acknowledgement

This research was supported in part by a Robert Wood Johnson Foundation Grant to the African American Collaborative Obesity Research Network (AACORN). The content is the responsibility of the authors and does not necessarily represent the views of the Robert Wood Johnson Foundation.

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