

REVIEW

Population-based Interventions Engaging Communities of Color in Healthy Eating and Active Living: A Review

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Abstract

Introduction

The U.S. obesity epidemic is escalating, particularly among communities of color. Obesity control efforts have shifted away from individual-level approaches toward population-based approaches that address socio-cultural, political, economic, and physical environmental factors. Few data exist for ethnic minority groups. This article reviews studies of population-based interventions targeting communities of color or including sufficient samples to permit ethnic-specific analyses.

Methods

Inclusion criteria were established, an electronic database search conducted, and non-electronically catalogued studies retrieved. Findings were aggregated for earlier (early 1970s to early 1990s) and later (mid-1990s to present) interventions.

Results

The search yielded 23 ethnically inclusive intervention studies published between January 1970 and May 2003. Several characteristics of inclusive interventions were consistent with characteristics of community-level inter-

ventions among predominantly white European-American samples: use of non-interpersonal channels for information dissemination directed at broad spheres of influence (e.g., mass media), promotion of physical activity, and incorporation of social marketing principles. Ethnically inclusive studies, however, also placed greater emphasis on involving communities and building coalitions from study inception; targeting captive audiences; mobilizing social networks; and tailoring culturally specific messages and messengers. Inclusive studies also focused more on community than individual norms. Later studies used "upstream" approaches more than earlier studies. Fewer than half of the inclusive studies presented outcome evaluation data. Statistically significant effects were few and modest, but several studies demonstrated better outcomes among ethnic minority than white participants sampled.

Conclusion

The best data available speak more about how to engage and retain people of color in these interventions than about how to create and sustain weight loss, regular engagement in physical activity, or improved diet. Advocacy should be directed at increasing the visibility and budget priority of interventions, particularly at the state and local levels.

Introduction

The U.S. obesity epidemic is accelerating (1,2). Populations of color have higher levels of overweight and obesity and have experienced greater increases in overweight during the past decade compared with white populations (3,4). Statistics on prevalence of overweight are implicated in substantive ethnic disparities in chronic dis-

ease morbidity and mortality (3,4) and are rooted in less healthful physical activity and eating patterns (5,6).

Cross-sectional and prospective cohort epidemiologic studies provide estimates of the population impact of small changes in body mass index, dietary intake, and energy expenditure. For example, population decreases in dietary fat of 1% to 3% could lower first-time heart attack rates by 25% (7). In a study of working-class African Americans, Type 2 diabetes risk was 50% lower among individuals physically active at any level, and two thirds lower among those who were at least moderately active (8). Recently, results from a 6-year observation of the Nurses' Health Study cohort revealed that 30% of new cases of obesity and 43% of new cases of diabetes could be averted by adopting a relatively active lifestyle (9). The potential diabetes prevention value associated with eating a lower-fat diet and increasing physical activity was realized in the Diabetes Prevention Program randomized controlled trial. In this study, intervention participants enjoyed a 58% reduced risk of diabetes after 3 years of follow-up (10).

Few intervention studies, however, have demonstrated sustained effectiveness in preventing or controlling overweight and obesity (11-13). Studies have mainly involved either 1) highly selected, relatively affluent whites engaged in costly, individually targeted educational or behavioral interventions; or 2) somewhat more heterogeneous, predominantly white populations exposed to low-intensity mass media efforts. These studies severely limit the ability to generalize to population-based public health approaches targeting lower socioeconomic status groups or communities of color. Despite the relatively optimal clinical circumstances of the individually targeted studies, they have generally lacked sustainable success (14). This lack of long-term success in improving most risk factors has also characterized most large population-based cardiovascular disease prevention projects (with large defined as annual budgets of \$1 to \$1.5 million for 10 or more years) (15). These failures have been increasingly attributed to a modern obesogenic environment that promotes physical inactivity and excessive food consumption (16,17). Environmental obesogenicity is especially concentrated in communities of color (18). The disappointing collective experience of these studies led Winkleby to suggest that smaller, more focused studies within high-risk sub-groups such as minority and low-literacy populations are needed (19). In fact, a number of public health agencies and their academic, managed care, community health center, and

other community partners have begun to implement smaller-scale cardiovascular disease prevention projects. A good example is the 15 WISEWOMAN projects, funded by the Centers for Disease Control and Prevention (CDC), which target the low-income, predominately ethnic minority women screened by the Breast and Cervical Cancer Early Detection Program.

Thus, the purpose of this paper is three-fold: 1) to review available studies of community-level interventions targeting substantial proportions of people of color in geographically defined populations; 2) to qualitatively aggregate their findings; and 3) to explain the implications of these findings for applied research and public health practice in weight-control-related lifestyle change to prevent chronic disease. In theory, there are many ways of defining populations (20). Operationally, populations are generally comprised of individuals who self-report ethnic/cultural status and who can be communicated with through defined channels (e.g., churches, magazine subscription lists, television audiences).

Investigators attempting to achieve ethnically diverse samples have faced major obstacles not only at the point of intervention and retention of subjects, but even earlier in the research process — at the point of outreach and recruitment (21-23). This paper will characterize the process by which inclusive studies have engaged communities and identify ways to facilitate effective outreach and recruitment. Additionally, the paper examines the extent to which ethnically inclusive interventions have focused on structural change beyond the individual level.

Background

There is a paucity of high-quality data on sustained chronic disease or obesity risk reduction from interventions targeting or including meaningful numbers of people of color or people from low-income backgrounds. This gap in the literature represents a major obstacle in developing effective policies and programs. A quantitative review of the literature on nutrition and physical activity interventions to reduce cardiovascular disease risk in health care settings (24) found 32 studies that included a substantial proportion of people of color — all but one were WISEWOMAN studies (25). Two additional reviews of the literature on inclusive, individually targeted interventions add to this picture (21, 26). The first of these 2 examined physical activity interventions targeting people of color and other "special populations" and identified only 8 ethnically

inclusive studies (26). The second identified 12 additional ethnically inclusive lifestyle-change studies focusing on weight loss and nutrition (21).

Prior to 1996, most studies had small sample sizes and targeted low-income segments of the ethnic groups studied. Study attrition was generally high, with little reliable long-term data. Of those that did provide fairly long-term (> 6 months) follow-up data, none was able to retain more than 60% of the participants (27). Recent contributions to the literature have more than doubled the number of studies, most with larger samples and more rigorous designs (21,28). However, the small effect sizes and lack of sustainable behavioral changes characterizing risk-reduction studies in affluent populations of white European Americans are also characteristic of ethnically inclusive individual-level studies (29). Data from community-level or population-based approaches to obesity and chronic disease risk reduction are needed to address broader, underlying determinants of excess risk and disease burden in communities of color.

The focus of obesity control efforts has, in fact, shifted toward interventions that address the socio-cultural, political, economic, and physical environments (14). Population-based approaches are better suited for intervening at these levels. Environmental intervention is particularly indicated in lower-income communities and communities of color in which excess environmental risk is concentrated (Table 1) (18,30-33).

Population approaches understandably lag far behind biological and behavioral strategies (17). Alcala and Bell undertook an exhaustive international review of community-level social marketing campaigns promoting healthy nutrition, physical activity, and weight control (34), and King conducted a review of major U.S. community-level physical activity interventions (35). Compared with individually targeted interventions, population approaches are characterized by a greater emphasis on the following: 1) formative research; 2) principles of social marketing; 3) promotion of a broad spectrum of physical activity that includes transport, household maintenance, and other routine activity; and 4) supplementing the use of health and/or fitness professionals with other less personal channels for information dissemination, including community agencies and organizations, policy makers, and mass media. Both reviews revealed that only 12 of the 50 campaigns identified segmented their target audiences by eth-

nicity. Neither review provided specific information about ethnically inclusive interventions.

Methods

This review included the following study criteria:

1. The study took place in the United States.
2. The target population included an entire population or a representative sample of a geographically defined community such as a tribal reservation, housing project, or rural or metropolitan area.
3. The target population was healthy, albeit high-risk. The "healthy" distinction is important because identification as a patient — particularly one with a life-threatening condition following cancer or heart attack — erases many cultural barriers to study recruitment and retention and intervention adherence (23).
4. The target population included an underserved ethnic group with a sample predominantly comprised of that group, or included a sufficient sample of such a group (African Americans, Asian Americans, Latinos, Native Americans/Alaska Natives, Native Hawaiians, Pacific Islanders) to report ethnic-specific analyses.
5. The study targeted obesity-related lifestyle changes (eating, physical activity, and/or weight control behaviors), not just knowledge, attitudes, self-efficacy, and/or behavioral intentions.
6. The study employed multiple health promotion approaches and communication channels.

We conducted a search for studies that met the criteria above on the following electronic databases: PubMed, AgriCOLA, Current Contents, and PsychInfo. We limited searches to English-language articles and to articles published between January 1970 and May 2003. The search strategy consisted of 2 steps. First, we identified population-based or community-level intervention research on diet, nutrition, physical activity, physical exercise, and/or exercise. Second, we examined each result to determine the extent of participation by communities of color. Two specific keyword phrases were used in PubMed to produce broad-based results: "population-based intervention adults United States AND (exercise OR diet)," which yielded 12 articles; and "community intervention adults United States AND (exercise OR diet)," which resulted in 111 publications. Five of the studies overlapped in these two PubMed searches, yielding 118 studies in total. We modified search phrases to exclude the limit of "United States"

for the other electronic databases because that specification was too restrictive. In the AgriCOLA database, similar keyword phrases identified 17 additional studies. Using those keyword phrases, the PsychInfo and Current Contents searches did not yield additional studies. The combined, non-overlapping electronic database searches resulted in 135 studies, 3 of which met the selection criteria. For each of these 3 studies, the PubMed option of retrieving "related articles" was also explored, resulting in 614 additional articles, only 5 of which met the inclusion criteria. Thus, a total of 8 articles was identified through the electronic database search.

In addition, we retrieved non-electronically catalogued peer-reviewed, non-peer-reviewed, and unpublished studies from reference lists and materials received from expert colleagues. The decision to include such "grey literature" studies with limited distribution reflects our desire to fully represent the available evidence. The recruitment, retention, and resource generation challenges of inclusive intervention studies militate against publication in mainstream scientific journals (36,37). We contacted CDC and National Institutes of Health (NIH) staff, local and state public health professionals, and authors of published articles by telephone and electronic mail to identify "in process" and other unpublished or uncatalogued intervention efforts. We evaluated these studies using the inclusion criteria.

The process of abstracting study data was performed in 3 phases independently by 3 study co-authors: first, to produce a descriptive project narrative (Results section); second, to generate a spreadsheet of individual study data which was then aggregated in constructing Table 2; and third, to verify the information in Table 2 using a systematic abstraction process. All 12 of the characteristics that were systematically assessed in the second step across all studies are listed in Table 2. The third step was performed by the co-author who was most familiar with the articles and another co-author who had not previously seen the articles or been a part of the review process, after agreeing on the appropriate elements for the abstraction form. Discrepancies were then highlighted for discussion among study collaborators to arrive at a consensus.

The lead author developed the criteria for assessing the studies. The criteria reflect salient elements not previously presented in past reviews focusing on communities of color — specifically, the prevalence of information on the

following: 1) nutrition and obesity-related lifestyle change to prevent chronic disease; 2) facilitators of effective outreach and recruitment; and 3) outcome measures that included efforts to affect both individual, organizational and legislative/policy change. The 12 characteristics assessed systematically in each study are described below.

Ethnicity of Study Population: Each study targeted at least one racial/ethnic minority community. Categories were restricted to the Office of Management and Budget's (OMB) directive on racial and ethnicity reporting, which lists 5 races (American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, and white) and 2 ethnicities (Hispanic or Latino, or Not Hispanic or Latino). Although some studies targeted specific ethnic subgroups such as Cambodians and Mexicans, the paucity of data on communities of color in general warranted adherence to OMB standards. For studies reviewed here, ethnicity was usually determined through individual self-report (ethnic self-identification).

Setting: The type of geographical setting was evaluated by census and defined as urban, suburban, semirural, or rural. A category for interventions implemented in American Indian reservations was designated as reservation-based.

Theory: With one exception, all studies were characterized as invoking well-defined behavioral theory that fit one of the following categories: Social Learning (38); Organizational Development (39); Social Ecological (40); Stages of Change (41); Diffusion of Innovation (42); or Social Marketing (43).

Design: We evaluated studies by design type. Studies employed one of the following 5 variants of evaluation research design: 1) randomized controlled trial; 2) uncontrolled trial with pre- and post-test; 3) uncontrolled trial with pre-test only; 4) uncontrolled trial with post-test only; and 5) demonstration project. Randomized controlled trial and uncontrolled trial with pre- and post-test facilitated evaluation of intervention effect sizes. Uncontrolled trials were distinguished from demonstration projects by study instigation: if the investigators who implemented the intervention also conceptualized and evaluated the project, the project was considered an intervention trial.

Recruitment Strategy: Effective recruitment strategies engaging communities of color may differ from strate-

gies that aim to impact a mainstream population. We characterized recruitment strategies as one of the following: 1) in-person (provider, community-based organizations, or CBOs, and social networks); 2) mass media (television, radio, mainstream newspaper or magazine, billboard); or 3) targeted media (direct mail, flyer/brochure, local/ethnically targeted newspaper or magazine, distribution posters, video showings).

Sample Type: This additional study dimension was included to collect information that represented a geographically defined population, even if the study design did not fit the "gold standard" of a randomized control trial.

Attrition Rate: High attrition rates have the potential to seriously hamper study results. Studies reviewed in this paper were grouped into 3 thresholds of attrition: less than 10%, 10% to 30%, or more than 30%. A fourth category includes studies for which no attrition data was provided.

Behavior Target: Interventions generally fell into one of the following categories: diet, physical activity, and diet and physical activity combined. Where possible, a behavior target was defined as one of the following: fat; fruits and vegetables, fiber, sugar; physical activity, nutrition and physical activity, or weight monitoring. Frequent weight monitoring appeared to be a salient characteristic of long-term weight control success in the National Weight Control Registry study (44).

Outcome Measures: Central to this review is the consideration of community-level transformations, as well as individually targeted behavioral and clinical changes. We identified the following outcome measures: 1) self-reported behavior; 2) observed behavior; 3) clinical measures; 4) morbidity/mortality rates; 5) organizational practice; and 6) legislative policy.

Study Duration: We defined the duration of a study as encompassing the following 3 phases: 1) the planning period preceding the intervention; 2) the intervention itself; and 3) post-intervention assessment. Long-term follow-up is defined here as follow-up lasting at least 12 months (45). Studies were grouped into 6 categories: less than one year, one to 2 years, 3 to 5 years, greater than 5 years, or undetermined.

Significant Findings ($P < .05$): Intervention studies

that reported significant effects ($P < .05$) of diet, physical activity, or weight control were categorized by target outcome. The "Other" category included findings that were related to indirect target behavior, such as organizational policy changes supporting physical activity or healthier food choices.

Primary Sources of Funding: Primary sources of funding may govern the adequacy and representativeness of the sample and the scope and duration of the intervention. Three distinct categories depict the studies analyzed: federal, state and/or local, and private.

We aggregated results qualitatively for several reasons. One, we anticipated and observed the absence of outcome data for many interventions. Two, less-developed evaluation design, measures, and analytic approaches were available for capturing the range of more upstream intervention effects (46). Three, we recognized that intervention effects at the individual level may be small (not statistically significant, but meaningful in terms of population benefit) and temporally distant from intervention implementation (46), decreasing the likelihood of publication or dissemination.

Results

The search yielded 23 interventions that met the selection criteria: the interventions were implemented between 1972 and 2000. The following narrative summarizes, in chronological order, the intervention methods and results for projects implemented during 2 periods: the early 1970s to early 1990s ($n=7$), and the mid-1990s to the present ($n=16$). Nine of the latter 16 were projects of a CDC-funded California Department of Health Services physical activity promotion initiative in underserved and understudied ethnic communities. Table 2 presents project data by study characteristic for early and later interventions.

Early efforts (early 1970s to early 1990s)

Several early efforts to engage communities of color in healthy eating and/or active living demonstrated modest improvements in outcomes. Within the Stanford Three Community Study, Fortmann and colleagues (47) promoted cholesterol and saturated fat restriction via mass and targeted print and electronic media in 3 semi-rural northern California towns with substantial proportions of Latinos (9% to 26% of the total population). Cross-sectional surveys captured sociodemographic and cardiovascular disease risk data at baseline and annually for 3 years. The

reductions in dietary saturated fat consumption at follow-up (versus baseline) observed in the intervention areas compared with control areas were significantly greater among Latinos, but no significant differences were observed among whites.

The Kaiser Family Foundation Community Health Promotion Grants Program was designed to improve multiple health outcomes, including cardiovascular disease and cancer, by changing community norms, environmental conditions, and individual behaviors in 11 western communities (7 randomly assigned intervention communities with 7 randomly assigned control communities, and 4 intervention communities selected on special merit with 4 matched control communities) (48). Local coalitions, with technical support from Stanford University, controlled program development. The program was stratified by community type: suburban/rural, urban, and state. In suburban and rural communities, nutrition and physical activity promotion included media campaigns and nutrition education campaigns in grocery stores. Urban community activity centered on school- and community-based nutrition education. The state component targeted worksite exercise. Only one intervention community — predominantly Latino — showed a significant positive outcome: restaurants increasingly identified low-fat choices. However, the only significant difference in self-reported dietary behaviors in that community was a *decline* in fruit and vegetable consumption.

Lewis et al (49) used coalition building in public housing communities (99% African American) in Birmingham, Ala, to reach and involve residents in group exercise instruction. Physiological measures were monitored to provide individual feedback. Cross-sectional surveys documented aggregate demographic and physical activity data at baseline, and outcomes for the first and second years were assessed outcome ecologically, with no differences demonstrated between intervention and control communities. In "organized" intervention communities with enthusiastic exercise leaders and higher class attendance, however, physical activity levels did increase significantly compared with controls.

A similar intervention (Bootheel Heart Project) worked through regional coalitions of community-based organizations to develop fitness promotion activities such as walking clubs, cooking demonstrations and classes, aerobic exercise classes, walking trails, and health fairs (50). The

study documented significant decreases in sedentary behavior within targeted regions.

A similar study (Heart To Heart Project) (15, 51) used walk-a-thons, a speaker's bureau, media messages, restaurant food labeling, and cooking seminars. A telephone survey of a random sample of Florence, SC (35% African American) residents, followed over 4 years as a cohort, demonstrated prevention of increases in weight and hypercholesterolemia (though hypertension prevalence increased), compared with a matched control town.

Other studies during this period did not report behavioral outcome data. Project Salsa (52) used community organization techniques to promote nutrition behavior changes and institutionalize intervention components in San Ysidro, Calif. This study included the following components: cooking classes, point-of-purchase education, newspaper columns, coronary heart disease risk factor screenings, and school health and cafeteria programs. Of these intervention components, only the latter 2 survived 4 years after funding ended. Two communications strategies were aimed at diabetes prevention and control by the *A Su Salud en Accion* project (53): 1) role modeling — individuals who had initiated recommended behaviors were promoted in broadcast and print media; and 2) mobilizing natural social networks — trained volunteers distributed materials and prompted and reinforced imitation of the media role models. Cross-sectional surveys were conducted in the west San Antonio, Tex target community (90% Latino), but only process data were reported during the 2-year project: 73 mass media stories appeared, 34 newsletters and one booklet were produced, and 610 community networkers were recruited and trained.

Mid-1990s to Current Efforts

In 1994, the California Department of Health Services partnered with 9 ethnically underserved communities to implement physical activity promotion projects as a part of its CDC-funded *ON THE MOVE!* Initiative. The 9 projects were the following: African American Hypertension Risk Reduction (54); Cultural Health & Mobilization Project/CHAMP (55); Families in Good Health Program (56); Fitness Funatics (57); *La Vida Buena* Project (58); *La Vida Caminando* (59); Pittsburg Active Living Project/ALP (60); Walk for Health (61); and Work Out to Lower Fat/WOLF (62,63). A special journal supplement documented these efforts (54-63), so they will not be chronicled here. The projects are, however, included in Tables 2 and 3.

Other inclusive community-level interventions initiated in the mid- to late-90s built on earlier efforts. In a replication and expansion of the *ON THE MOVE!* Fitness Funatics project (57), *ROCK! Richmond*, a fitness promotion initiative in Richmond, Va, reflected the city manager's recognition that the local health department needed to address contemporary as well as traditional sources of morbidity and mortality. The primary direct service component was a free fitness instruction at community sites in underserved areas of the city, complemented by a social marketing campaign using ethnically relevant role models to attack norms supporting sedentary behavior and high-fat/low-fiber eating and to support individuals already living actively and making healthy food choices. *ROCK! Richmond* recruited disproportionately overweight, sedentary, older, African American women, and individuals with family histories of chronic disease (64). However, less formally educated and unemployed city residents were relatively underrepresented among program participants, and outcome data were not provided.

Many similarities may be seen between *ROCK! Richmond's* media component and Alcalay and colleagues' *Salud Para Su Corazon* cardiovascular disease prevention community intervention in Washington, DC (65). Its multimedia bilingual communication campaign included TV telenovela-format public service announcements, radio programs, brochures, recipe booklets, *charlas*, a *promotores* training manual, and motivational videos. Pre-post intervention intercept surveys (344 and 328, respectively) conducted in churches and grocery stores in 3 Washington, DC, geographic areas with high concentrations of Latinos of varying nationality demonstrated increases in awareness but no behavioral changes.

Another similar obesity prevention intervention, *Sisters Together: Move More, Eat Better*, targeted young African American women in 3 inner-city communities of Boston, Mass (66). Strategies included social marketing and community building efforts and extensive formative research, which was aimed at forging partnerships and developing coalitions to institutionalize the campaign. Demonstrations provided role models who offered illustrations on how to implement campaign messages and activities to practice or prompt action. Activities included developing a local cable television show featuring local chefs who prepared healthy menu items available in their restaurants. This study provided no outcome data.

Project DIRECT (Diabetes Intervention Reaching and Educating Communities Together), a CDC-funded joint project of the local (Wake County, NC) and state health departments, was designed to decrease the burden of diabetes in an African American community (7 census tracts, 17,000 adults) located in southeast Raleigh, NC (67). The study identified a comparison community with similar sociodemographic and health-care resource profiles. A community coalition, with oversight from an executive committee comprised of community and agency representatives, directed project activities. The health promotion component included primary prevention strategies aimed at increasing participation in regular physical activity and decreasing dietary fat intake. The study described plans for a multi-faceted process and outcome evaluation; it did not present outcome data.

The Uniontown Community Health Project, also federally funded, was a Women's Health Initiative project that developed, implemented and evaluated a Community Health Advisor (CHA)-based intervention to reduce cardiovascular disease in peri-menopausal African American women (68, 69). Uniontown, Ala, a rural, underserved intervention community (67% African American), was matched sociodemographically with a nearby control community. A coalition of community leaders guided CHA-led social marketing activities and structured programs for healthy nutrition and physical activity promotion. The planned process and outcome evaluation described individual- and community-level change variables.

Recent inclusive interventions reflect a new emphasis on environmental change strategies in obesity prevention and healthy nutrition and physical promotion. In a replication of an earlier effort by the Center for Science in the Public Interest in West Virginia (70), Spanish-language "1% or less" milk campaigns were implemented in predominantly Latino communities, Santa Paula (in 1999) and East Los Angeles (in 2000), by the California Adolescent Nutrition and Fitness Program (Arnell Hinkle, personal communications, December 22, 2000, and May 13, 2003). Campaign elements included paid radio and print ads, point-of-purchase advertising, milk taste tests, community presentations, public relations, and a school-based program. After the 6-week campaign, sales of 1% and fat-free milk rose 60% in Santa Paula. A follow-up survey of retailers at 6 months found that 25% of this growth in sales was sustained.

Fuel Up/Lift Off! LA/Sabor y Energia! (18,71,72) is a Los Angeles County Department of Health Services social marketing campaign targeted at obesity control in predominantly African American and Latino areas. Primary interventions include demonstrations of and staff training in strategies to integrate physical activity and healthy food choices in routine business activities. Examples of such activities include incorporating activity breaks with music into lengthy meetings, offering healthy food choices when refreshments are served, and hosting walking meetings. The campaign targets both internal (county) and external cultures. External audiences include CBO subcontractors, incorporated cities, or CBOs participating in a local CDC-funded REACH project, which utilizes the county training curriculum and audiovisual materials. A randomized, controlled trial testing the effects of physical activity breaks incorporated into lengthy meetings demonstrated the feasibility of engaging more than 90% of a sample of predominantly middle-aged and older women of color in 10 minutes of moderate physical activity (one third of the federally recommended daily allowance of physical activity) during the workday, regardless of their physical activity levels or overweight status.

Table 3 presents multiple examples of intervention approaches from each of the 23 studies. Examples are grouped into levels of prevention as defined by the ecological model Spectrum of Prevention (62,73). This model is similar to other hierarchical social ecological models that provide a structure for intervening at multiple and progressively more upstream levels of influence: individual, interpersonal, institutional, community, and policy (40). Many of the same examples were represented in more than one study, but each example is cited only once. The table also indicates the proportion of early versus later studies intervening at each level.

Discussion

Consistent with review findings (34,35) for community-level interventions targeting general audiences, most of the inclusive community-level studies reviewed here used non-interpersonal channels for information dissemination directed at broad spheres of influence (e.g., mass media), promoted a wide spectrum of physical activities, and incorporated social marketing principles. Distributions of theories referenced or implied and behaviors targeted are similar to earlier review findings, with social learning theory, community organization, and ecological models predomi-

inating. However, a greater emphasis on the processes of intervening is evident in this review, paralleling processes observed in individual-level interventions targeting underserved and understudied groups. These processes include the following: involving communities and coalition building from inception; targeting captive audiences; mobilizing social networks, particularly using lay health advisors, community health workers or *promotores*; cultural tailoring of messages and messengers (ethnically relevant role models in positions of power) (53,64,66) or charismatic leadership of key staff (49); and implementing strategies consistent with social marketing principles and social learning theory (21-23,63,74,75). In fact, the reluctance of people of color to participate in research, stemming from their history of exploitation, blurs the boundary between individual-level and community-level intervention more than in mainstream culture because of the considerable community engagement and support necessary to successfully mount even individual-level interventions (23, 76-78).

Given the presentation of outcome data in fewer than half of the studies, and the few significant effects and modest effect sizes, the best data available speak only to what it takes to engage and retain people of color, not what it takes to create and sustain weight loss, engagement in regular physical activity, or improved dietary quality. However, in 2 studies, outcomes for populations of color were the only significant positive outcomes demonstrated (47,48). The contribution of cultural adaptations to outcomes is unclear, although an effect of these adaptations on recruitment and retention may be inferred from the availability of these data on ethnic groups largely absent from other studies.

One salient observation is that population-based approaches must not automatically be construed as upstream. Compared with the findings of Alcala and Bell (34), the studies reviewed here focus less on the individual level (65% [studies reviewed here] versus 92% [Alcala and Bell]) and more on community norms and activities (100% [studies reviewed here] versus 56% [Alcala and Bell]). Also compared to Alcala and Bell, the studies reviewed here focus less on influencing policy and legislation (13% [studies reviewed here] versus 92% [Alcala and Bell]). The 13%, however, represents an increase from 0% of the earlier studies to 19% of the later ones. Overall, a clear progression toward using upstream approaches is apparent in later studies compared with earlier studies; the increasing use of ecological models also reflects the

greater use of upstream approaches. The uniform program requirements (community coalition formation and governance, for example) of the 9 *ON THE MOVE!* projects created some skewing of results.

Only 2 out of 23 projects were funded by state and/or local health departments. This demonstrates the importance of leadership within local government and within communities of color to set priorities and direct local resources toward chronic disease risk reduction. It also has implications for project sustainability: federal and foundation funding are generally limited to specific grant or contract periods of up to 5 years, while local funds may continue substantially longer, subject to political support and regional economic stability (i.e., tax base preservation). Fourteen projects were funded primarily through federal sources (CDC, NIH, Indian Health Services and the Food and Drug Administration). Most federal support was — not surprisingly — from the CDC, given its applied and community improvement focus.

It is sobering to note that, as of 2001, fewer than 5000 participants in individual-level interventions had been studied (and reviewed elsewhere) (21) and fewer than 14,000 participants in population-based interventions had been studied (and reviewed here) to control obesity and reduce chronic disease risk among 100 million persons of color — more than one third of Americans. This is especially sobering when one considers that ethnic minority groups are heterogeneous culturally, both within and between racial/ethnic categories, and that many of these groups are known to have significantly elevated obesity and chronic disease risk and burden. As an added challenge, data derived from ethnically inclusive studies are not widely disseminated, with only about one third of the studies reviewed here identified through electronic database searches.

Insufficient evidence exists for drawing conclusions about the effectiveness of individual-level versus community-level approaches targeting underserved racial/ethnic groups. We view these approaches as complementary and possibly synergistic. Further investigation is needed on many fronts. The environmental context must be addressed for obesity epidemic control at the population level, but the environmental context may be too limiting for the more intensive, behavioral (downstream) approaches necessary for weight management in individuals at highest risk — those already obese, hypertensive, and/or

hyperlipidemic, and living or working in socioeconomically challenged circumstances. None of the studies reviewed here offered a significant beneficial solution to weight management. The best approaches in each category deserve rigorous trials (including study design and level of resources) in multi-ethnic and ethnic-specific settings. The studies reviewed here also point to the critical need for government investment in greater surveillance at local (neighborhood and census tract) levels. Federal support would allow under-resourced and overextended community providers and organizations to focus on the service delivery that best reflects their competencies and missions, relieving them of some of the burden of evaluation. Also, the relative lack of outcome data and significant findings underscores the need for evaluation methods that are more effective at capturing upstream effects and small or delayed individual effects (46,79).

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Tables

Table 1.
Excess Environmental Risk in Communities of Color*

	Food	Activity
Physical Environment	Targeted marketing Excess fast food outlets Few supermarkets Limited shelf choices in groceries Availability of high-fat food (home, church) Less private transportation Poorer public transportation	Distance to private fitness facilities Few worksite fitness opportunities Few or deteriorating neighborhood recreation facilities High neighborhood crime rates Less private transportation Poorer public transportation
Economic Environment	Low neighborhood demand for low cal/low fat foods Low family incomes and cash flow Other household expenses Little home-grown food Financial incentives offered to under-resourced schools by commercial cafeteria vendors	Limited investment in parks/recreation facilities Fees at fitness facilities Cost of exercise equipment Less stable employment patterns Fewer trained school physical education (PE) instructors/large PE classes Poorly equipped school facilities/fewer PE options Lesser availability of parent/adult volunteers to assist school staff in after-school sports/recreation programs
Sociocultural Environment	Traditional cuisine Fasting-feasting Extant food insecurity Prevalent obesity Body image Female roles Context responsiveness	Cultural attitudes about physical activity and importance of rest Activity lifestyles Fears about safety Cultural reverence for cars, particularly among males Over-reliance on TV for engaging children after school hours

*Adapted with permission from Kumanyika SK (21).

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Table 2.
Characteristics of Community-level Healthy Eating or Activity Interventions Implemented Among Ethnic/Minority Communities, Aggregated to Early 1970s to Mid-1990s and Mid-1990s to Mid-2003

Characteristic*	Early 1970s to mid-1990s N = 7	Mid-1990s to Mid-2003 N = 16
Ethnicity of Study Population		
African American	3	6
Asian	0	4
Latino or Hispanic	4	5
American Indian or Alaskan Native	0	2
Pacific Islander	0	0
Setting		
Urban	4	9
Suburban	0	2
Semirural	2	1
Reservation	0	2
Rural	1	3
Theory		
Social learning	7	10
Organizational development	6	11
Social ecological	3	13
Stages of Change	0	2
Diffusion of Innovation	2	2
Social Marketing	1	4
Other	1	1
Study Design		
Randomized control trial	4	1 [†]
Uncontrolled trial, pre- and post-test	1	4
Uncontrolled trial, pre-test only	1	1
Uncontrolled trial, post-test only	1	0
Demonstration project	1	10
Recruitment Strategy		
In-person	6	13
Mass media	5	5
Targeted media	6	5
Not applicable	0	1

Characteristic*	Early 1970s to mid-1990s N = 7	Mid-1990s to Mid-2003 N = 16
Sample Type		
Convenience	1	14
Representative	6	2
Study Attrition		
< 10%	1	1
10%-30%	2	0
30%	1	0
Not determined	0	0
No data provided	3	15
Behavior Target		
Fat	5	9
Fruits and Vegetables	2	8
Fiber	0	1
Sugar	1	0
Physical Activity	4	15
Nutrition and Physical Activity	3	10
Weight Monitoring	1	1
Outcome Measures		
Self-reported behavior	5	8
Observed behavior	1	7
Clinical measure	1	0
Morbidity/mortality rates	0	0
Organizational practice	1	9
Legislative policy	0	2
Duration (years)		
< 1	0	2
1-2	2	2
> 2 but < 3	1	9
> 3 but < 5	2	0
>5	2	1
Not determined	0	2

(continued next page)

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Characteristic*	Early 1970s to mid-1990s N = 7	Mid-1990s to Mid-2003 N = 16
Significant Findings (P < .05)		
Individual-level dietary change	6	1
Individual-level physical activity change	3	1
Individual-level weight change	1	0
Organizational practice or policy change	1	0
Legislative policy change	0	0
Other	0	5
None	1	9
Primary Funding Source		
Federal	4	14
State or local health departments	0	2
Private foundation or disease-specific nonprofit organization	3	1

*A single study can include more than one characteristic within a category.
†Post-test only.

Table 3.
Examples of Obesity Prevention Efforts Used by Studies Reviewed, Categorized by Level of Prevention Within the Spectrum of Prevention Model*

<p>Level of Prevention: Strengthening individual knowledge and skills Definition of Level: Enhancing an individual's capability of preventing illness/injury and promoting health % Studies Intervening at this Level: Early 71; Later 62</p>
Walking club orientation ⁵⁹
Culturally congruent exercise classes ⁵⁸
Cooking/nutrition classes ⁴⁸
Field trips ⁵⁶
Home visits/instruction ⁵³
Risk factor screening ⁵²
Home-based education (e.g., cookbooks, videos) ⁵⁷
Peri-natal breastfeeding classes ⁵²

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<p>Level of Prevention: Promoting community education Definition of Level: Reaching groups of people with information and resources to promote health % Studies Intervening at this Level: Early 100; Later 100</p>
Community walkathon ⁵⁹
Cooking demonstrations ⁶⁷
Exercise demonstrations ⁶⁶
Mass media campaign ⁴⁷
Targeted media campaign ⁶⁵
Worksite programs ¹⁵
Interdenominational or intertribal sports leagues ⁶³
Community fitness events and campaigns ¹⁵
Point-of-purchase education ⁵²
Community policy advocate training ⁵⁶
Community networker training ⁵³
Promotore/community health advisor training ⁶⁸
Neighborhood canvas for healthy meal options ⁷²
Community gardens ⁶²
Culturally tailored community bulletins ⁶¹
Resource guides ⁶⁶
Government access channel broadcast of locally produced exercise/nutrition video twice daily ⁶⁴
Development of cable TV show featuring local chefs preparing healthy recipes ⁶⁶
Sponsoring book signing for healthy ethnic cookbook ⁶⁶

<p>Level of Prevention: Educating service providers Definition of Level: Informing providers who will transmit skills and knowledge to others % Studies Intervening at this Level: Early 0; Later 52</p>
Education for MD screening and referrals ⁵⁸
Engaging and educating journalists ⁶⁴
Walking leadership education for community-based organization staff ⁶⁶
Physical activity training of public health nurses, certified health educators ⁷¹

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<p>Level of Prevention: Fostering coalitions and networks Definition of Level: Bringing together groups and individuals for broader goals and greater impact % Studies Intervening at this Level: Early 86; Later 100</p>
Local project coalitions and advisory committees ⁶⁰
Healthy Cities coalitions ⁶⁰
Regional (e.g., intertribal elders, councils) ⁵⁵
Governor's Councils on Physical Fitness & Sports ⁶⁴
Advocacy work to establish supermarket in underserved area ⁶⁶

<p>Level of Prevention: Changing organizational practice Definition of Level: Adopting regulations and shaping norms to improve health % Studies Intervening at this Level: Early 43; Later 62</p>
Protocols for MD assessment, sliding fees, counseling, and referral ⁶⁷
Physical activity promotion within crime prevention street canvassing activities ⁵⁴
Worksite and CBO practices (e.g., movement breaks, walking meetings, prompting stair usage, including healthy refreshments, modeling attire and hairstyles conducive to lifestyle integration of physical activity) ⁷²
Stair signage ⁷²
Walking/fitness trail construction/signage ⁵⁰
Urban walking route maps/signage ⁵⁴
Public housing fitness programs ⁴⁹
Bilingual/bicultural staff at Y's ⁵⁶
Park/recreation department safety-related maintenance improvements ⁵⁸
Church kitchen committee recipe modification ⁶⁷
Healthier foods served at meetings/functions of elected/appointed local officials ⁶⁴
Restaurant menus with low-fat items ⁴⁸
Supermarket stocking and promotion of low-fat foods ⁸⁰
Discounted fitness facility memberships ⁶⁶

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Level of Prevention: Influencing policy and legislation

Definition of Level: Developing strategies to change laws and policies to improve health outcomes and enhance community well-being

% Studies Intervening at this Level: Early 0; Later 19

Land use policy established for community gardens⁵⁶

Tribal government policy changes institutionalizing community events⁵⁵

Stable funding for Indian Health Service clinics for physical activity/nutrition promotion services⁵⁵

City eligibility requirement policy changes to allow low-income residents access to recreation classes⁶⁰

"Healthy/fit workplace" memoranda of understanding, City Council agenda bills, contract language modeled on federal smoke-free workplace mandates of grantee organizations⁷¹

* Adapted from Cassady D et al (62) and Swift M (73).

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