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Review of Intervention Studies Promoting Physical Activity in Hispanic Women

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Abstract

Purpose—The objectives of this review were to: (a) provide a comprehensive review and evaluation of intervention studies designed to promote physical activity among Hispanic women; and (b) provide recommendations for future research involving Hispanic women in physical activity intervention research.

Methods—Computer and manual searches were conducted of articles in the English-language literature from 1980 to present.

Findings—Twelve articles were evaluated, with emphasized physical activity intervention in Hispanic women. A review of current intervention research provides a starting point for determining salient approaches for intervention and evaluation, issues related to program implementation, and the strengths and limits of existing approaches.

Conclusions—Over the past 30 years, very few interventions have been conducted that examines foster physical activity among Hispanic women; those that include Hispanic women across ages support the need for interventions that build upon the strengths and address the limitations of this body of research.

Healthy People objectives (U.S. Department of Health & Human Services [USDHHS], 2000) pertaining to adults include increasing the number who participate in regular physical activity. Of the major modifiable risk factors for cardiovascular (CV) and other chronic illnesses, physical inactivity has been identified as affecting the largest segment of the population. The benefits of physical activity in improving CV health outcomes, including significant decreases in hypertension, obesity, diabetes mellitus (DM), as well as mortality rates are well documented (Bauman, 2003). However, there is evidence that Hispanic women may not share in these benefits due to low levels of physical activity and high levels of consequent health risk when compared to other populations (Crespo, Smit, Andersen, Carter-Pokras, & Ainsworth, 2000; Flegal, Carroll, Ogden, & Johnson, 2002; Hunt et al., 2003).

Hispanics continue to be the fastest growing minority group in the U.S., are expected to constitute at least 30% of the population by the year 2010 (Centers for Disease Control and Prevention, 2008). Studies that have included Hispanic women indicate that 74% report no leisure time physical activity (Crespo et al., 2000). Data from the National Health Interview Survey showed that Hispanics were 2.09 times more likely to report inadequate levels of physical activity, compared with non-Hispanic whites (McGruder, Malarcher, Antoine, Greenlund, & Croft, 2004). Older Hispanic women are classified as among the least physically active groups in the country (Brownson et al., 2000; Dergance, Mouton, Lichtenstein, & Hazuda, 2005). Hispanic women have higher rates of many CV risk factors, including hypertension, obesity, diabetes mellitus, and physical inactivity compared to non-Hispanic white women of comparable socioeconomic status (SES) (American Heart Association, 2006). Although some studies have found lower CVD mortality rates in Hispanics, particularly these of Mexican origin (Swenson et al., 2002), current studies have

found that when adjusting for age and gender, Hispanics have higher mortality rates when compared to non-Hispanic whites (Hunt et al., 2003).

The recognition that gender, racial and ethnic factors play an important role in health promotion behaviors of Hispanic women is an important one. Although review articles have been published synthesizing physical activity interventions among older adults (Conn, Valentine, & Cooper, 2002; Conn, Minor, Burks, Rantz, & Pomeroy, 2003; King, Rejeski, & Buchner, 1998; van der Bij, Laurant, & Wensing, 2002), minority populations in general (Taylor, Baranowski, & Young, 1998), and African American women (Banks-Wallace & Conn, 2002), no review article has been found examining existing intervention studies involving Hispanic women. Hispanic women have been shown to be concerned about physical activity, and to view physical activity as an important factor in maintaining their overall health and well-being (Fleury, Keller, Castro, & Rivera, in press). However, the majority of intervention programs designed to promote physical activity have reached primarily non-minority, middle-income women and men (Keller, Fleury, Castro, Ainsworth, & Perez, 2009). Specific to Hispanic women, the challenge remains to synthesize findings from physical activity intervention reports as a foundation for translation to practice, in order to create positive health outcomes among Hispanic women (Klesges, Dzewaltowski, & Christensen, 2006).

Over the last decade, there has been marked progress in research identifying relevant correlates of and mechanisms for physical activity initiation and maintenance across populations. Evaluating the existing intervention research, particularly in terms of its transferability and utility across populations and settings requires focused evaluations of the strength of the reported interventions. Conn (2007; 2008) suggests that an increase in the detail of reported intervention research would assist in clarifying gaps in the science, directing research efforts that build on prior work as well as enhance the use of the research in practice. Specific intervention components need to be included in research reports that target physical activity to direct future research. These components include the intervention content, site and delivery medium, the targeted physical activity behavior, the intervention homogeneity, social context and level (individual, family, or community), and a description of the interventionist (Conn et al., 2008).

In order to promote physical activity among Hispanic women consistent with national health objectives, a greater depth of understanding regarding the structure and efficacy of existing interventions is essential. Thus, the objectives of this review were to: (a) provide a comprehensive review and evaluation of intervention studies designed to promote physical activity among Hispanic women; and (b) provide recommendations for future research involving Hispanic women in physical activity intervention research. A review of current intervention research provides a starting point for determining salient approaches for intervention and evaluation, issues related to program implementation, and the strengths and limits of existing approaches.

Methods

We recognize that the Hispanic community is diverse and includes women who have recently immigrated from North/Central/South America or the Caribbean, along with women who have lived in the US for many generations (Peragallo et al., 2005). Throughout this report we use the term Hispanic to represent individuals who are Mexican-American, and North, Central, South Americans, Cubans and Puerto-Rican subgroups that are of Hispanic ethnicity. Manual and computerized literature database searches were conducted of articles in the English-language literature from 1980 to present, consistent with the state of the research science focusing on physical activity. The following databases were used for

identification of physical activity intervention literature: Psychinfo, Medline, PubMed, Social Science Databases, CINAHL, and manual searches. Only research studies which incorporated physical activity intervention with Hispanic women were chosen for review. The following key terms were used during all searches: Hispanic women, Latina, physical activity, exercise, intervention. Article inclusion criteria were based on the following: (1) data-based publication focusing on interventions to promote physical activity in Hispanic women; (2) study outcomes delineated beyond a description of the program itself; (3) outcome variables which assessed some physical activity behavior or behaviors. An organizing framework to document all relevant variables was designed for review of these studies, consistent with the focus of describing the reports of physical activity in Hispanic women. The variables used in this analysis included *intervention site and medium, target behavior, intervention homogeneity and context, theoretical perspective, intervention outcomes, and intervention fidelity*.

Results

Twelve intervention studies met the inclusion criteria and were included in this review (Table 1). Of the seven studies, 6 were randomized controlled trials; one used participatory action research, in which priorities and PA format were determined by each community. *Intervention site and medium.* The majority of studies measured the effect of interventions targeted at sedentary, middle-aged Hispanic women (Avila & Hovell, 1994; Castro, Sallis, Hickmann, Lee, & Chen, 1999; Chen, Sallis, Castro et al; 1988; Coleman, Gonzales & Cooley, 2000; Hovell, Mulvihill, Buono, Liles, Schade et al, 2008; Keller & Trevino, 2001), who were overweight (Keller & Trevino, 2001; Keller & Gonzales-Cantu, 2008; Nader et al., 1989; Poston et al., 2001). Samples comprised from 31% to 100% Hispanic women. Reported ages ranged from 24 to 70. The interventions ranged in approach from individually focused to family and community-oriented. Keller and Gonzales (2008) specifically focused on older, obese, postmenopausal, sedentary Hispanic women. Grassi and colleagues (1999) targeted a range of Latino community members. Nader and colleagues (1989) used a family-based approach, which included both adults and children. Of the twelve studies, seven were community-based (Castro et al., 1999; Grassi et al., 1999; Hovell, Mulvihill, Buono, Liles, Schade et al, 2008; Keller & Trevino, 2001; Keller & Gonzales, 2008; Moadel, Shah, Wylie-Rosett, Harris, Patel et al, 2007; Poston et al., 2001), one took place within elementary schools (Nader et al., 1989), one took place in a primary care setting (Avila & Hovell, 1994), two were home-based (Chen, Sallis, Castro et al; 1988), and one was conducted in a university campus (Coleman, Gonzales & Cooley, 2000). Keller and Gonzales (2008) based their intervention within a community center, and incorporated identification and evaluation of the safety of neighborhood walking sites. Reported attrition rates ranged from 0% to 52%; there were no differences in attrition reported by sociodemographic characteristics. Keller and Gonzales (2008) and Keller and Trevino (2001) were pilot studies, one showing attrition 23% at 12 weeks, and 52% at 36 weeks, due to the length of the intervention. Sample size of the reviewed research ranged from 18–623; few authors provided rationale for sample size or calculation of study power to detect significant differences between intervention and control groups.

Target behaviors

All interventions reviewed included moderate-intensity or low-intensity physical activity, primarily in the form of walking. One study (Nader et al., 1989) used aerobics as the form of physical activity, but found this to be an unrealistic format for participants. The authors concluded walking could possibly be a more appropriate form of activity for Hispanic women. In addition to moderate-intensity walking, some programs also included stretching exercises, Latin dance-merengue and salsa, and Yoga (Avila & Hovell, 1994; Poston et al.,

2001; Moadel, Shah, Wylie-Rosett, Harris, Patel et al, 2007). Keller and Gonzales (2008) compared the dose response of walking frequencies, including 3 days versus 5 days per week for 30 minutes, and found improvements in both groups related to body fat and weight, as well as trends toward improved lipid profiles. Program duration, including period of time over which the intervention is delivered and the timing of measures, can have varying effects on the outcomes of an intervention (Whittemore & Grey, 2002). Duration of interventions in the studies reviewed ranged from 6 weeks to 12 months. Limited rationale was provided to justify intervention duration. Keller and Trevino (2001) found that 24 weeks did not provide adequate time to sustain clinically meaningful fat loss in middle-aged, overweight, Hispanic women. In contrast, Keller and Gonzales-Cantu (2008) found significant differences in body mass index (BMI), primarily between baseline and 12 weeks, compared to between 12 and 36 weeks in both 3 day and 5 day walking groups. A number of studies targeted both physical activity initiation and maintenance, extending intervention duration and follow-up from 9 to 12 months (Keller & Gonzales-Cantu, 2008; Hovell, Mulvihill, Buono, Liles, Schade et al, 2008; Nader et al., 1989; Poston et al., 2001). No clear pattern was noted to support that interventions of longer duration resulted in significant effects. Time to follow-up measurement also varied, from 10 weeks to 24 months. Limited rationale was provided to support measurement time points selected.

Intervention homogeneity and context

Strategies for intervention implementation varied across studies reviewed. Individually-focused intervention strategies included the use of educational strategies targeting physical activity, dietary modification, and CV risk. Avila and Hovell (1994) included one hour of counseling by a primary care physician regarding nutrition, stretching and walking. Keller and Gonzales (2008) included monthly education sessions that addressed preparation of low-fat foods. Keller and Trevino (2001) provided education for participants on how to assess and calculate their heart rate. Poston and colleagues (2001) used verbal and written bilingual educational materials that provided rationale for diet, activity modification, and CV risk, but concluded that failure to address important barriers to activity may have led to a lack of significant changes in level of physical activity between intervention and control participants. Many of the studies reviewed cited social support as a primary intervention focus, either through forming a buddy system among participants (Avila & Hovell, 1994; Keller & Trevino, 2001; Moadel, Shah, Wylie-Rosett, Harris, Patel et al, 2007), or including family members in program participation (Grassi et al., 1999; Nader et al., 1989). Grassi and colleagues (1999) noted that extending the intervention to include family members positively affected recruitment and participation. Poston and colleagues (2001) used block randomization, to allow maintenance of preexisting social networks and support during intervention implementation. Keller and Gonzales (2008) provided an opportunity to form positive interpersonal relationships for encouragement and support, including social time and snack sharing among participants. Avila and Hovell (1994) used group sessions in a weekly format in which participants could share success and receive feedback from peers. The authors state that this strategy not only promoted social support, but also enhanced problem-solving skills among participants. Participants noted that the social aspect of group physical activity was a strong motivating factor. Motivational components to increase physical activity included goal setting (Albright, Pruitt, Castro, Gonzales, Woo et al, 2005; Castro et al., 1999; Chen, Sallis, Castro et al, 1988; Grassi et al., 1999; Keller & Trevino, 2001; Keller & Gonzales-Cantu, 2008; Nader et al., 1989), problem solving (Avila & Hovell, 1994; Castro et al., 1999; Nader et al., 1989; Poston et al., 2001), self-monitoring, relapse planning (Nader et al., 1989), and self-efficacy enhancement (Castro et al., 1999; Nader et al., 1989; Poston et al., 2001). Nader and colleagues (1989) emphasized “intrinsic rewards” for changing health behavior related to goals set; Coleman, Gonzales & Cooley (2000) described similar intrinsic rewards for choosing particular activities. Extrinsic

rewards included sports bags and visors for participants who completed self-monitoring tasks.

Several interventions incorporated culturally relevant intervention strategies such as the use of Spanish-language educational materials (Avila & Hovell, 1994; Hovell, Mulvihill, Buono, Liles, Schade et al, 2008; Grassi et al., 1999; Poston et al., 2001), bilingual classes and instructors (Grassi et al., 1999; Keller & Gonzales-Cantu, 2008; Nader et al., 1989; Poston et al., 2001), and social activities that included sharing culturally relevant snacks (Grassi et al., 1999; Keller & Gonzales-Cantu, 2008; Nader et al., 1989; Poston et al., 2001). Grassi and colleagues (1999) formed a community advisory group to develop a culturally relevant intervention which addressed community priorities, and addressed barriers such as program cost, activity intensity, and the need for support. Keller and Gonzales-Cantu (2008) employed a *Promotora*, or lay health worker, in their formative study to conduct weekly walking sessions and assess safe and acceptable community walking routes for participants. Hovell, Mulvihill, Buono, Liles, Schade et al, (2008) describe an effective culturally tailored intervention of Latin dance-merengue and salsa, showing improved aerobic capacity in participants.

Theoretical Perspective

Three of the seven studies reviewed stated a theoretical perspective guiding intervention implementation and evaluation, including Social Learning Theory (Nader et al., 1989), Social Cognitive Theory (Poston et al., 2001), Behavioral Economics (predicated on behavioral economic theory) (Coleman, Gonzales & Cooley, 2000) and the Self-Management Model (Castro et al., 1999). While intervention strategies were consistent with the theoretical perspective guiding the study, strategies were not well defined as a basis for replication. Despite the use of a theoretical perspective, few of the theory-based studies demonstrated significant differences in physical activity. Predicated on behavioral economic theory, Coleman, et al (2000) showed the reinforcing value of exercise in relation to sedentary alternatives. Castro and colleagues (1999) noted significant increases in social support in the intervention group, while Nader and colleagues noted significant increases in knowledge.

Intervention Outcomes

Across studies reviewed, the achievement of significant changes in physical activity varied. Avila and Hovell (1994) noted significant increases in moderate-intensity physical activity among intervention participants in an 8-week intervention; Albright, Pruitt, Castro, Gonzales, Woo et al, (2005) showed that women receiving telephone counseling plus mail increased total estimated energy expenditure ($p < .05$), and maintained for 10 months. Hovell, Mulvihill, Buono, Liles, Schade et al, 2008 showed that Experimental group increased vigorous ex and walking and aerobic dance increased VO₂max; no other study reported significant findings related to physical activity as an outcome. In a number of studies evaluated, physical activity levels were determined using self-report measures (Castro et al., 1999; Grassi et al., 1999; Nader et al., 1989; Poston et al., 2001). Nader and colleagues (1989) did include an objective measure of energy expenditure, Avila and Hovell (1994) and Albright, Pruitt, Castro, Gonzales, Woo et al, (2005) showed that women receiving telephone counseling plus mail increased total estimated energy expenditure, and both Keller and Gonzales (2008) and Keller and Trevino (2001) included pedometer data. None of the studies provided effect sizes for physical activity as an outcome. Among the 3 studies reviewed that provided data adequate to approximate the magnitude of intervention effects on physical activity, effects ranged from .21 to 1.4.

A number of the studies reviewed reported significant findings on physiologic outcomes, including decreases in body mass index (Avila & Hovell, 1994; Keller & Gonzales, in press), percent body fat (Keller & Gonzales-Cantu, 2008), waist-hip ratio (Avila & Hovell, 1994), skin fold sums (Keller & Trevino, 2001) and total serum cholesterol (Avila & Hovell, 1994; Keller & Trevino, 2001). Significant differences were also noted in related variables including knowledge (Avila & Hovell, 1994; Nader et al., 1989), self-efficacy (Avila & Hovell, 1994), social support (Castro et al., 1999; Keller & Gonzales-Cantu, 2008; Moadel, Shah, Wylie-Rosett, Harris, Patel et al, 2007), and perceived barriers to physical activity (Grassi et al., 1999).

Intervention Fidelity

Some attention was taken by researchers to evaluate fidelity in intervention delivery, although none addressed all of the criteria outlined by Bellg and colleagues (2004). Fidelity assessment in the studies reviewed was broadly stated. The majority of studies used trained interventionists to deliver key intervention components (Albright, Pruitt, Castro, Gonzales, Woo et al, 2005; Avila & Hovell, 1994; Castro et al., 1999; Chen, Sallis, Castro et al, 1988; Hovell, Mulvihill, Buono, Liles, Schade et al, 2008; Keller & Trevino, 2001; Moadel, Shah, Wylie-Rosett, Harris, Patel et al, 2007; Nader et al., 1989; Poston et al., 2001). Keller and Gonzales (2008) and Keller and Trevino (2001) monitored participant adherence to a dose-specific intervention protocol through the use of physical activity logs. Studies reported the use of standardized protocols to guide intervention delivery (Castro et al., 1999; Nader et al., 1989). Albright, Pruitt, Castro, Gonzales, Woo et al, 2005 employed return post cards to monitor adherence. Few of the studies reported specific measures or evaluation procedures to monitor and document the degree of program implementation and the frequency and duration of specified activities, as a basis for quantifying intervention fidelity (Bellg et al., 2004).

Discussion

Given the changing demographic composition of the United States, which is projected to have increasing proportions of ethnic minorities (Centers for Disease Control and Prevention, 2008), effective and sustainable interventions to increase physical activity and decrease cardiovascular risk is essential. Recommendations for research on physical activity include identifying relevant and practical interventions that can be built upon to extend the science and readied for application to practice (Conn et al., 2008; Estabrooks, Lee, & Gyurcsik, 2003).

While few studies documented positive changes in physical activity, significant changes were noted in health outcomes and related outcomes including knowledge, self-efficacy, and perceived support. However, the majority of physical activity measures were self-report, and lacked standardization, raising questions about the validity and maintenance of effects.

One area of concern within the studies reviewed is the lack of follow-up to evaluate the long-term impact of interventions. Hovell, Mulvihill, Buono, Liles, Schade et al, (2008) obtained 12 mo follow-up, indicating that physical activity was sustained over time, at a lower level. With some interventions implemented for only several weeks, and an overall limited time to follow-up, the lasting impact of interventions on physical activity maintenance and cardiovascular risk reduction is difficult to evaluate. With any health promotion intervention or program, one of the greatest challenges is the sustainability of resources and outcomes generated during the intervention. Many interventions within this review implemented comprehensive programs, but did not necessarily plan for, facilitate, or evaluate continuation of program activities or development of sustainable resources following program implementation. In developing physical activity interventions for

Hispanic women, additional programs are needed which address both maintenance and sustainability issues relative to development and continuation of resources and lasting changes in physical activity behavior.

Few studies reviewed used a theoretical perspective to guide program implementation and evaluation. Of those that included theoretical frameworks, often insufficient detail was provided to permit understanding of the operationalization of the major concepts in the intervention, particularly from a culturally relevant perspective. Among studies that have achieved intervention effects, the mechanisms underlying treatment were not always clear, limiting the applicability of existing intervention findings to practice. While the majority of interventions included social support, motivational factors, goal setting, and education, it is not clear from the published literature what factors were critical for efficacious interventions among Hispanic women. General statements about intervention content and delivery methods limit evaluation of the relationship between physical activity and intervention delivery, including which component of multiple interventions may be responsible for an effect. Thus, greater attention is needed to intervention specification, and related quantification of intervention fidelity to the planned protocol.

In spite of the finding that the interventions reviewed in this report were limited in the use of theoretical approaches and consideration of contextual effects impacting intervention design and delivery, data to support such approaches are available. A significant number of research reports that used inductive methods and focused on Hispanic women and physical activity health promotion were noted in the research literature (Gonzales & Keller, 2004; Juarbe, 1998; Juarbe, Turok, & Perez-Stable, 2002; Kieffer, Willis, Arellano, & Guzman, 2002; Melillo et al., 2001; Ramirez, Chalela, Gallion, & Velez, 2007; Van Duyn et al., 2007). Using primarily focus groups and content analysis procedures, the culturally relevant factors that motivate Hispanic women to engage in physical activity, and the accompanying barriers and facilitators for such activity are delineated, with remarkable consensus. Among Hispanic women, extending time to focus on their own needs, including physical activity is not possible; family needs come first. Safety in physical activity locales is exceptionally important to Hispanic women, as well as support that is gleaned from friends and families who value health promoting and physical activity behavior. Such contextual factors that have been apparent in reported research for several years needs to be incorporated into the design and implementation of future research on physical activity in Hispanic women. Failure of current research to adequately address social and contextual factors may contribute to the lack of success in developing theory-based interventions designed to promote physical activity among underserved and minority populations. Indeed, Glass and McAtee (2006) have called for contextualized frameworks to guide theory generation and research efforts, which acknowledge the social context in which health behaviors occur, as well as how these behaviors can be changed.

The majority of studies focused on individual-level variables as primary outcomes. While important, these do not provide a full understanding of the potential for community mobilization and change. Evaluation of community-level indicators of intervention effects are needed, to demonstrate changes in community capacity, resource identification, and environmental change. Recommendations include use of qualitative methods to develop interventions during a formative phase before implementation (Krummel et al., 2001). Such formative research may lead to the development of needed theory-based interventions that target specific populations, acknowledging social and contextual resources, and cultural values as a basis for practice (Belza et al., 2004; Glasgow, Strycker, Toobert, & Eakin, 2000).

Socioeconomic status has been demonstrated to exert significant influence on physical activity in Hispanic women. For example, among Puerto Rican women living in Connecticut, acculturation was positively associated with physical activity, but socioeconomic status was not (Fitzgerald et al., 2006). In 793 Spanish women, socioeconomic status was significantly related to lower levels of leisure-time physical activity (Schroder, Rohlf, Schmelz, Marrugat, & REGICOR investigators, 2004). One survey showed that marital status (an indicator of socioeconomic status) was the most salient predictor of physical activity in Mexican-American women (Ransdell & Wells, 1998). The physical activity of women who are poor is strongly influenced by their neighborhood environments. Access to safe, affordable facilities is an important factor in physical activity participation, particularly among minority women. Yen & Kaplan (1998) noted for example in the Alameda County study, that poverty area residence was associated with a decline in physical activity. Further, the availability of recreational and exercise resources is shown to have a significant impact on participation in physical activity (Diez Roux et al., 2007; Powell, Slater, Chaloupka, & Harper, 2006). Women who live in neighborhoods and situations that preclude outdoor physical activity due to safety, disrepair, or neighborhoods without sidewalks and parks are likely to walk outdoors less. However, the *differential* effect of socioeconomic status was not examined in the research reports in this review. One intervention (Albright, Pruitt, Castro, Gonzales, Woo et al, (2005) targeted only low-income women (75% study group was Hispanic) showing intervention effectiveness.

Hovell, Mulvihill, Buono, Liles, Schade et al, (2008) described an intervention that included discussion of ‘cultural attitudes’ with “myths debunked”; with a 91 % adherence and 60% participation, in depth description of cultural attitudes and debunking processes would add to the literature. Other investigator (Cousins, Rubovits, Dunn, Reeves, Ramirez et al (1992) employed a family intervention thought to be more culturally specific than individual level interventions for weight management in Latinas. Albright, Pruitt, Castro, Gonzales, Woo et al, 2005, with 72 Latinas, implemented “deep structure” in their intervention, and this included encouraging women to be physically active while respecting their core values related to family responsibilities. It was unclear how much impact this cultural tailoring had on the intervention efficacy, and retention.

To reduce disparity in health between Hispanic women and the general population and to provide a basis for the development of relevant interventions, research efforts must better reflect the needs of Hispanic communities (USDHHS, 2000). Although interventions targeting Hispanic women have focused on counseling and health education, they may not adequately address the unique cultural needs of Hispanic women (Soto et al., 2000; Staten et al., 2004). Because ethnicity acts to moderate many health behaviors, and influences health, health beliefs and behavior (Gonzalez-Castro & Alarcon-Hernandez, 2002), culturally tailored interventions are needed to increase their effectiveness in this changing environment (Chao & Moon, 2005).

Summary

Interventions targeting physical activity in Hispanic women were found to result in variable outcomes. Drawing from the studies reviewed, best practices for physical activity interventions with Hispanic women would include: (a) Involvement of Hispanic women in formative research exploring community concerns, strengths and resources; Hispanic women can provide meaningful input during data analysis, evaluation of program feasibility, and determination of program institutionalization in the community. (b) Development of a clear understanding of how intervention strategies are operationalized, to strengthen internal validity and rule out alternative explanations for intervention effect. (c) Consistent operationalization and testing of theoretical frameworks for physical activity interventions.

(d) Evaluation of objective measures of physical activity as an outcome. (e) Attention to intervention impact on resource development, utilization, and community capacity. (f) Extended follow-up of interventions, to clarify the sustainability of intervention effects and a cost-benefit evaluation of physical activity interventions and health outcomes. This review provides a beginning understanding of relevant findings and considerations for physical activity interventions among Hispanic women, as a basis for guiding and strengthening future research.

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Table 1

Physical Activity Intervention Studies in Hispanic Women

Authors & Purpose	Sample, Setting	Design, Duration Theoretical Perspective, Intervention Critical Inputs	Outcome Variables	Major Findings Evaluation of Fidelity
Albright, Pruitt, Castro, Gonzales, Woo et al, 2005 One year follow-up of IMPACT: Increasing Motivation for Physical Activity)	73% Latina of a total of 72 participants) 18–65 Mail only m=31.8 years; ph + mail +32.5 years	2 months of weekly 1 hour classes, then random assignment to 10 months of either home-based telephone counseling and newsletters or mailed letters only. Included motivational strategies and stages of change movement strategies	PAR- Stanford 7 day recall Acculturation BMI Proportion of participants reaching PA goals at 12 months	Women receiving telephone counseling plus mail increased total estimated energy expenditure ($p < .05$), and maintained for 10 months.
Avila & Hovell (1994) Exercise and diet modification for weight loss	Latina aged 40–44 Experimental (N = 21) Control (N = 18) Attrition: 11%	Randomized controlled trial (RCT) Group/individualized PA and diet Cancer screening education Duration: 1 session per wk for 8 wk Theoretical Perspective: Not Reported Critical Inputs: Education Self-monitoring Problem solving Social support	Outcomes: Attitudes, Beliefs, Knowledge, Moderate/intense PA, Fitness, BP, BMI, WHR, Total cholesterol, Nonfasting glucose	10 weeks: Knowledge ($P \leq 0.001$) Self-efficacy ($P \leq 0.01$) Moderate-intensity PA ($P \leq 0.001$) BMI ($P \leq 0.05$) WHR ($P \leq 0.001$) Total serum cholesterol ($P \leq 0.001$) Fitness level ($P \leq 0.05$) Evaluation of Fidelity: Not Reported
Castro, Sallis, Hickmann, Lee, & Chen (1999) Efficacy of PA intervention	45.3% Hispanic (N = 53), aged 24–55 Experimental (N = 65) Control (N = 63) Attrition: 18%	RCT Walking program Information control Duration: 1 session per wk for 6 wk Theoretical Perspective: Self-management Model Critical Inputs: Education Social support Motivation Problem solving Self-efficacy	Outcomes: PA minutes/ wk, Barriers, Enjoyment, Self-efficacy, Social support	5 months: PA (NS) Barriers (NS) Enjoyment (NS) Self efficacy (NS) Social support ($P < .001$) Evaluation of Fidelity: Not Reported
Chen, Sallis, Castro et al (1988) Efficacy of PA intervention		Home-based behavioral intervention to promote walking in ethnic minority women Project WALK		
Coleman, Gonzales & Cooley, 2000 Measured Behavioral Choice	22 Hispanic, 16 Anglo women (all but 5 were faculty and staff from Univ of TZ at El Paso); 18–45 years	Using computer 'slot' games, worked for points that gave access to either vigorous (magazines or videos) or sedentary (stair stepper) activity. Predicated on behavioral economic theory. Assessed the reinforcing value of exercise in relation to sedentary alternatives.	Socioeconomic status and acculturation assessed for role in choices; two sessions of measuring choices.	Hispanic women showed two times the number of points for exercise alternatives than Anglos, regardless of BMI or SES Regardless of acculturation, Hispanic women with higher SES and lower BMI earned more points than Hispanic women of lower SES and higher BMI.
Grassi, Gonzalez, Tello, & He (1999) Efficacy of PA intervention	72% Latino 4 intervention communities (Cohort of 202) Attrition	Participatory Action Research Walking clubs Duration: 4 sessions over 3 mo	Outcomes: Program participation, PA min/ wk, PA barriers	12 months: PA (NS) PA barriers ($P < .05$) Evaluation of Fidelity: Not Reported

Authors & Purpose	Sample, Setting	Design, Duration Theoretical Perspective, Intervention Critical Inputs	Outcome Variables	Major Findings Evaluation of Fidelity
	Not Reported	Theoretical Perspective: Not Reported Critical Inputs: Education Social support		
Hovell, Mulvihill, Buono, Liles, Schade et al, 2008 Efficacy of Aerobic dance on CVD outcomes	151 Latinas (138 final sample); 18–55; 70% overweight; 29% public assistance (low income); 60% participation at 18 week measures	3 sessions/week for 6 months; controls receive safety education over 6 months Low impact aerobic dance- meringue or salsa, starting at 10" bouts increasing to 40 minutes 3 times/week	HDL/LDL; 7 skinfold, BMI, Vo2max with treadmill	Experimental group increased vigorous ex and walking (p=.005); aerobic dance increased VO2max (p=.001); no change in BMI; no change at 12 month follow up.
Keller, & Gonzales (2008) Efficacy of PA intervention Determine variables affecting PA adherence	Mexican- American women (N = 18) aged 45–70, postmenopausal, obese, BMI > 30, sedentary Attrition: 52%	RCT 3 days/wk walk 5 days/wk walk Duration: 36 wk Theoretical Perspective: Not Reported Critical Inputs: Education Social support PA dose	Outcomes: PA min/wk, BMI Thigh girth WHR Body fat Blood lipids Environment Social support	36 weeks: BMI (P=.001) Body fat (P<.05) Thigh girth WHR Blood lipids (NS) Environment (NS) Social support (P=.04) Evaluation of Fidelity: Activity log
Keller, & Trevino (2001) Influence of exercise frequency on CV risk factors	Mexican- American women (N = 36) Overweight (BMI > 25) Premenopausal Attrition: 3 days/wk (0%) 5 days/wk (12%)	RCT 3 days/wk walk 5 days/wk walk Control Duration: 24 wk Theoretical Perspective: Not Reported Critical Inputs: Education Social support PA dose	Outcomes: BMI, Skin-fold sums, Circumference, Blood lipids	24 weeks: BMI (NS) Skin-fold sums (P=.04) Cholesterol (P=.0008) Circumference (NS) Evaluation of Fidelity: Activity log
Moadel, Shah, Wylie-Rosett, Harris, Patel et al, 2007 Evaluation of yoga on quality of life	128 women, 31% Hispanic breast cancer patients		Outcomes: Quality of life measured by Functional Assessment of Cancer Therapy; Functional Assessment of Chronic Illness Therapy-fatigue	Improvement in overall QOL (p< .008); emotional well-being (p< .015); social well-being (p<.004); spiritual well-being (p< .009), and distressed mood (p<.031). Study arm was a significant predictor of change in social well-being (p< .018)
Nader, Sallis, Paterson, Abramson, Rupp, et al. (1989) Efficacy of diet and PA intervention	Mexican- American and Non-Hispanic white families (N = 623) What % are Hispanic?? Attrition: 11%	RCT Family CV risk reduction, Control Duration: 1 session per wk for 3 mo; then monthly and bimonthly for 9 mo Theoretical Basis: Social Learning Theory Critical Inputs: Education Social support Problem solving Goal setting Self-monitoring Self-efficacy Relapse planning	Outcomes: Diet, PA Aerobic power BP BMI Serum cholesterol Knowledge Social support	Mexican American Families 24 months: Diet (P=.049) Knowledge (P≤.008) PA (NS) Aerobic power (NS) BP (NS) BMI (NS) Serum cholesterol (NS) Social support (NS) Evaluation of Fidelity: Not Reported
Poston, Haddock, Olvera, Suminski, Reeves, et al. (2001)	Mexican American women aged 39.2 (SD 10.6) (N=269)	RCT Lifestyle PA intervention, Wait-list control Duration: 1 session per wk	Outcomes: PA BMI WHR	12 months: PA (NS) BMI (NS) Blood lipids (NS)

Authors & Purpose	Sample, Setting	Design, Duration Theoretical Perspective, Intervention Critical Inputs	Outcome Variables	Major Findings Evaluation of Fidelity
Effectiveness of PA intervention	Obese (BMI 25–40) Attrition: 47% Intervention 28% Control	for 12 mo Theoretical Basis: Social Cognitive Theory Critical Inputs: Education Social support Negative influences Restructure environment	Blood lipids BP Social support Health locus of control	Evaluation of Fidelity: Not Reported