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Review Article

The skinny on physical activity interventions among hispanic youth

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Abstract

Background: Hispanic youth are a high-risk population that does not meet the recommended amount of physical activity for their age group. Additionally previous research indicates that as Hispanic youth grow older, physical activity significantly decreases overtime. Therefore the purpose of this article is to review physical activity components in previously conducted interventions and examine evidence-based strategies for promoting physical activity behaviors among Hispanic youth.

Methods: In March of 2012, a literature search was performed and a total of nine articles were found describing nine intervention programs that met the following inclusion criteria. The present review conducted in 2012 included previous intervention studies that were published in the English language, conducted in the United States, published between the years 2002 and 2012, and focused on Hispanic youth under 18 years of age.

Results: Most of the interventions were comprehensive and focused on physical activity, nutrition behaviors, and obesity prevention and ranged from seven weeks to three years duration. Of these interventions, most were school-based and fostered individual-level behavior change. The majority of interventions utilized a behavioral theory. A summary of each was developed, and commonly used physical activity promotion components were identified. More than half of the interventions had a significant impact on the outcomes.

Conclusions: Effective strategies and lessons learned from research regarding physical activity promotion and Hispanic youth involvement in physical activity could be more clearly discussed. Recommendations for future programming for Hispanic youth should incorporate culturally appropriate learning materials and physical activities by degree of acculturation. Additionally, family-based strategies and religious-based strategies should be further explored in future interventions to try and increase the success of promoting physical activity behaviors among the Hispanic youth population.

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INTRODUCTION

Engagement in physical activity is influenced by multiple factors including demographic, psychological, environmental, and socio-cultural factors, [1] and offers numerous physiological, psychological, and social health benefits [2]. Continuous participation in physical activity among youth contributes to healthy growing by increasing strength and endurance, weight control, reducing anxiety and stress, and assists in lowering blood pressure and cholesterol levels [3]. According to the Centers for Disease Control and Prevention (CDC) [4], only 18.4% of youth meet the recommended guidelines of 60 minutes or more of physical activity per day and of those students the least active (15.6%) are of Hispanic origin and trends continually decline as they grow older [4]. Thus, incorporating physical activities in youth programs increases the opportunity to build self-efficacy and create healthy habits which can impact long-term health by influencing physical activity behaviors in adulthood [5].

Hispanics are individuals who indicate their origin or descent as Mexican, Puerto Rican, Cuban, Central or South American, or another Hispanic origin [6]. In

2010, the Hispanic population consisted of 16.3% of U.S. population [7], and is projected to comprise 24.4% of the U.S. population in 2050 [8]. Moreover, an estimated one in three Hispanics residing in the U.S. are under 18 years of age [9]. Despite being the largest minority group in the U.S., health disparities exist among Hispanics of all age groups. Hispanic youth generally have lower physical activity levels and higher participation in sedentary behaviors than their non-Hispanic white counterparts identifying them as a high-risk population [10]. According to the 2009 Youth Risk Behavior Survey [4], less than half (40.5%) of Hispanic youth attend physical education daily in an average week at school and 15.1% Hispanic youth are considered overweight (body mass index [BMI] > 95% percentile).

Examining physical activity trends indicates that as Hispanic youth grow older, physical activity significantly decreases overtime [10]. Promotion of physical activity among Hispanics is significantly associated with degree of acculturation which is a concept based on immigrants' ability to adopt behaviors of the culture they reside in, and usually includes combined measures of origin of birth, length of residency in the country, and language preference [11]. Hispanics who are less acculturated are less likely to engage in physical activity [12] as youth from immigrant families and living in homes where English was not the primary language spoken are at increased odds for not meeting physical activity recommendations [13]. Additional barriers in promoting physical activities to Hispanic youth include lack of resilience, lack of confidence, and low self-efficacy in physical activity participation and may be related to cultural beliefs and values [14].

Religious beliefs play a key role in Hispanic individuals' health, illness, and daily activities [15]. Incorporating spirituality and religiosity in physical activity interventions targeting the Hispanic population typically increase cultural appropriateness of programs [16]. Nevertheless previous research also suggests that family relatives are the most important interpersonal relationships among most Hispanics [17]. A strong association has been identified between social support and physical activity among Hispanic youth [18], and physical activity overall improves emotional wellness and increases social interaction among peers at school [19].

Recent reviews have examined the effectiveness of physical activity promotion in overweight children [20], and different methods used to combat obesity including school-based physical activity interventions [21]. Although modifying diet behaviors and promoting physical activity is efficacious in preventing obesity among general population children [2,22], there has been inconclusive results on the effectiveness of physical activity interventions among ethnic minorities [23]. In addition, limited reviews are available on the culturally appropriateness of interventions targeting Hispanic youth. Strategies to reduce sedentary behavior may be different from those of eliciting physical activity. As sedentary behavior influences health in other ways than physical activity behavior, sedentary behavior was considered a separate entity and not included in this review.

Although this high-risk population may be from different native countries, exploring Hispanic youth as a monolithic entity can help to provide health professionals with evidence-based strategies to increase physical activity. The purpose of this article is to examine evidence-based strategies for promoting physical activity behaviors among Hispanic youth. Specifically, the following questions are addressed: 1) What methods are used to promote physical activity in interventions with a physical activity component among Hispanic youth? 2) What are implications for health professionals and future health programs?

METHODS

In March of 2012, the authors conducted a search of CINAHL, Academic Search Premier, SocINDEX, MEDLINE, Cochrane Controlled Trials Register (CCTR), EMBASE, and Education Research Complete databases using the following search terms: physical activity, exercise, interventions, Hispanic, Latino, youth, adolescent, and children. The study criteria for inclusion were that articles had to: 1) be published in English language 2) be published between January 1, 2002, and January 1, 2012, 3) focus on general population studies, 4) focus primarily on Hispanic youth under 18 years of age 5) have the intervention occur in the United States. Study exclusion criteria included studies published in a language other than English, studies published before January 1, 2002, studies conducted in clinical settings, studies that did not represent Hispanic youth as more than half of participants, and studies that were conducted outside of the U.S. The research team reviewed all programs and collectively identified relevant studies based on the search criteria. A total of nine studies met the search criteria. This encompassed 5,344 students and 77 schools total in review. A summary of each intervention was developed by the research team and commonly used physical activity components were identified. In this manner, effective strategies and lessons learned from the research conducted regarding promotion of physical activity among Hispanic youth could be more evidently delineated and discussed.

RESULTS

A total of nine peer-reviewed articles met the criteria for study inclusion. Although these articles and programs varied in size, scope, and overall description, a series of key findings were identified for promoting physical activity behaviors among Hispanic youth. Overall, the results indicated three main types of physical activity interventions: 1) School-based interventions; 2) School-based interventions with parental involvement; and 3) After-school and community-based interventions. A brief summary of the programs included in this study are described in Table 1. The following literature addresses physical activity components used in comprehensive interventions.

School-Based Physical Activity Interventions

The *El Paso Coordinated Approach to Child Health* [CATCH] [24], a school-based intervention targeting 3rd grade Hispanic students consisted of physical activity lessons and activities in school and the System for Observing Fitness Instruction Time (SOFIT) which assessed the quality and quantity of physical activity. The program was conducted by trained physical education teachers, food service and school. The intervention was delivered to students in four schools (n = 423 students) and compared against students in four control schools (n= 473). Evaluation results showed that students in the program began with higher than national rates of risk for overweight/obesity and finished with lower rates. Students in the control group finished with higher than national rates. Regarding physical activity, the time spent in moderate-to-vigorous physical activity among program students doubled from 30% in the fall of the third grade to 60% in the spring of fifth grade, compared to that of control students.

The school-based obesity prevention program, *Healthier Options for Public Schoolchildren* (HOPS), was delivered to low-income elementary students between ages 6 to 13 years (N = 1197) over two years [26]. Of these students, 69.6% Hispanic students served as participants in the four intervention schools (n = 974) and 62.2% of Hispanic students served as participants in one control school (n = 199). Schools increased opportunities for physical activity during class time with a 10 to 15 minute desk side physical activity program and added structured physical activity during recess. Results indicated students in the intervention schools were significantly more likely to have stayed in the normal BMI range than students in the control group. In addition, more obese children (4.4%) in the intervention group decreased their BMI percentile than obese children (2.5%) in the control group. Fewer intervention participants within the normal BMI percentile (8.1%) and at-risk-for-overweight percentile (4.1%) gained weight compared to control group students (11.9% and 6.8% respectively).

The program *Choice, Control, and Change* [30] was designed to enhance healthy eating, weight control, and physical activity among seventh-grade students (N = 278) who attended middle schools in low-income neighborhoods, of which 70% were Hispanic. This school-based intervention consisted of a 24-session (7-8 week) curriculum taught by science teachers. Students learned decision-making skills, personal health responsibility, health knowledge, the benefits of physical activity, and how to increase self-efficacy. Students were also given pedometers to use to attain a goal of 10,000 steps per day. At posttest, students significantly improved their attitudes toward walking, behavioral intention to engage in physical activity, self-efficacy of walking and taking the stairs.

Johnston and colleagues [29] conducted an intensive weight management, school-based intervention tailored toward overweight Mexican-American children (n = 40) in 6th and 7th grades compared to a control group (n = 20) that only received a self-help condition. Overweight students were randomly assigned after baseline measurements were taken by a statistical consultant. An unbalanced randomization technique was used since there are numerous positive benefits associated with the intervention by reducing the number of participants exposed to the control condition. This technique resulted in 40 overweight students randomly assigned to the treatment group and 20 overweight students assigned to the control group. Youth participating in the intervention attended five weekly meetings for 12 weeks followed by bi-weekly sessions for another 12 weeks that focused on behavioral strategies to increase physical activity. Students received four outdoor physical activity lessons weekly for 35 to 40 minutes to help build self-efficacy in activities they could continue after the intervention ended. The control group was given a self-help 12-week parent-guided manual that included maintenance activities for improving level of physical fitness. At posttest, 3-month follow-up and 6-month follow-up, results indicated youth in the intervention group had a significant decrease in their mean BMI score compared to youth in the control group. Additionally, at 6-month follow-up youth in the intervention significantly reduced their total cholesterol and LDL cholesterol compared to youth in the control group.

School-Based Physical Activity Interventions with Parental Involvement

The *Hip-Hop to Health Jr.*, a school-based intervention with parental involvement was delivered by trained

early childhood educators to reduce BMI in Hispanic children (n = 446) [27]. A cluster randomized design was used with 12 schools randomly assigned to an intervention or control group. The intervention group received a program including 20 minutes of moderate-to-vigorous physical activity delivered three times a week for 14 weeks while the control group received a general health education intervention. Parents in the intervention group received weekly newsletters and a small monetary incentive to complete physical activity interactive assignments with their children. Results revealed no significant differences in BMI scores between intervention and control groups at one-year, two-year and three-year follow-ups.

The *Bienestar Health Program* [28] targeted weight loss among youth located in low-income, inner-city schools. This school-based intervention included fourth-grade Mexican American students (N = 200) and was compared to a control group (N = 189) over an eight month duration. Randomization of the intervention occurred on a school level, involving a cluster randomized design with nine elementary schools that were randomly assigned to either an intervention or control group. The program activities were bilingual and consisted of a parental involvement program, a classroom curriculum consisting of 16 lessons to build self-efficacy, an after-school program of 32 lessons, and a school cafeteria program. Parents and students who attended the program were offered small incentives where they could purchase merchandise with "Bienestar coupons". At posttest, results indicated there was a significant difference in physical fitness scores, calculated by duration of exercise and heart rate, as these scores increased significantly among the intervention group and decreased among the control group.

Another school-based intervention with parental involvement was modeled after the *Health Fair Stations* which assesses the health of youth who reside in rural settings. [32]. Sixth to eighth grade students of Mexican-American heritage (n = 70) received this program that included one weekly meeting for eight weeks, a health assessment, physical activity behavior checklist, and literature distributed to parents. At posttest, there were significant improvements in number of times per week students exercised outside of school.

After-School and Community-Based Physical Activity Interventions

Hoelscher and colleagues [25] and compared the impact of a 4th grade school-based version of the national CATCH Basic Plus program in 15 elementary schools (n = 554; 61% Hispanic) and the CATCH Basic Plus program with an additional Community program in 15 elementary schools (n = 553; 69% Hispanic). Both programs included curricula to increase moderate-to-vigorous physical activity in both school and home. The program including the community component received additional physical activity breaks during class time and included after-school physical activity programs. At two-year follow up, students at risk for overweight/obesity in the CATCH Basic Plus and Community program significantly decreased compared to students in the CATCH Basic Plus Program. Results also indicated that the CATCH Basic Plus and Community program reported a significant decrease in the prevalence of at risk for overweight/obesity in Hispanic students. Both programs had significant increases in physical activity related to number of days played outside and number of days participated in some organized physical activity.

Another after-school health education intervention combined the *Bienestar* program and the *CATCH* physical activity curricula [31]. Students were randomized to the intervention group (N = 292), a spillover group (N = 251) that did not attend the after-school program and to a control group (N = 354). The study design included randomly assigning four to six classrooms per grade level in each of the six schools recruited, resulting in randomizing 44 classrooms to the intervention group and 41 classrooms. The intervention included 24 sessions taught during two weekly meetings for 12 weeks. The sessions included an educational session followed by 45 to 60 minutes of engaging in physical activity. Students were offered small incentives every second week such as footballs and pedometers to participate. Results showed that the BMI percentile decreased the most among students that participated in the after-school intervention group compared to the spillover group and control group. Intervention students also had higher aerobic capacity than did their spillover and control counterparts.

Culturally Tailored Theory-based Interventions

One important component of effective physical activity programs for Hispanic American youth is the utilization of evidence-based or theory-based interventions [33]. Most interventions in the present study used evidence-based programs including the *CATCH* school health program which has been conducted in 96 schools in four geographic areas of the US [34]. Three of the interventions implemented a culturally adapted version of the CDC's coordinated *CATCH* program that is culturally appropriate for high-risk target populations [24,25,31]. In addition to using the *CATCH* program, de Heer and colleagues [31] also successfully incorporated the evidence-based *Bienestar Health Program* that incorporated elements of social cognitive theory. This part of the intervention focused on one of the main concepts of reciprocal determinism

which states that personal factors, social factors, and behavior are interrelated and have significant influences on each other [35].

Hollar and colleagues [26] replicated strategies from the elementary evidence-based *HOPS* obesity prevention program. Furthermore, Fitzgibbon and colleagues [27] tailored an evidence-based *Hip-Hop to Health Jr.* program to become a culturally proficient nutrition and physical activity intervention for this target population. Researchers also used a modified version of the *Health Fair Stations* to assess children's health in rural areas and also employed the vulnerable populations conceptual model [32]. Contento and colleagues [30] utilized several theories in their intervention including the self-regulation theory that places emphases on goals and personal agency.

CONCLUSIONS

The findings presented in this paper highlight the different types of physical activity interventions for Hispanic youth. The present review suggests that specific behavioral, parental, cultural and school/community factors may influence physical activity among Hispanic youth. Previous research provides evidence that promoting confidence and self-efficacy is associated with increases in physical activity among youth [14]. Concerning sex differences, only one of the interventions reviewed in the present study explored sex differences in regards to physical activity. Future interventions should focus on enhancing personal physical activity behaviors by underscoring knowledge, attitudes, and exploring past physical activities as well as explore sex differences in physical activity among this high-risk population.

Few of the reviewed intervention studies considered the impact of acculturation on physical activity promotion. Future interventions should incorporate cultural competency into physical activity promotion programs and examine the role of culture on increasing physical activity behaviors. Considering environmental influences, all of the reviewed interventions were implemented in schools. Implementing interventions in schools for Hispanic youth may be beneficial since Hispanic youth report attending fewer physical education classes than non-Hispanic youth [41].

A paucity of the studies incorporated parental or community-based strategies. This is surprising despite strong evidence that supports these significantly influence physical activity behaviors among the Hispanic population [12,13]. Previous research has found family-based interventions have a significant impact on physical activity behaviors among youth [41] and parental encouragement has been identified as a significant predictor of perceived barriers to Hispanic youth [38, 39]. To fully develop literature of effective methods for increasing physical activity behaviors among Hispanic youth, future programs should highlight Hispanic cultural beliefs and values as well as consider incorporating family, school, and community strategies in interventions.

In addition, no intervention included the use of faith-based initiatives to increase physical activity. Previous studies have consistently indicated that religiosity plays an important role in the Hispanic culture [15, 16]. Health programs could possibly collaborate with faith-based institutions to enhance social support towards physical activity among Hispanic youth. Moreover, applying a more comprehensive approach to promoting physical activity could provide a foundation for increasing active lifestyles and positive health behaviors for youth.

LIMITATIONS

The limitations for this review should be noted. First, quantitative measures including effect sizes, correlation coefficients could not be ascertained from this review. Thus, it is difficult to identify which specific methods are most successful among those that had a positive effect on outcomes. In addition, interventions included in this review were delimited to only those conducted in the United States published between 2002 and 2012.

RECOMMENDATIONS

Based on the literature, interventions targeting Hispanic youth with physical activity components should incorporate culturally appropriate learning materials by offering bilingual materials that are age appropriate. Culturally appropriate physical activities promoted to Hispanic youth could be dancing such as salsa, walking, regular participation in physical education classes, and organized sports. Ideal interventions should be ongoing and include periodic cues or reminders to engage in physical activity. Finally, the impact of family-based and faith-based strategies should also be explored in future interventions

Table 1. Summary of physical activity components in school-based interventions for Hispanic youth

3	Sample Size and Description	Theory or Model Used in Program	Intervention Description	Duration	PA Component	PA Measures	Evaluation Method	Major Findings
El Paso CATCH program , El Paso, Texas (Coleman et al., 2005)	896 third-grade children enrolled in 8 elementary schools located in El Paso Texas -93% were Hispanic	National CATCH program was adapted to be culturally appropriate	-School-based: third grade -Culturally tailored National CATCH materials and procedures that included ethnic variations were used. -Two members from the original CATCH program conducted training sessions for staff and physical education teachers who delivered program.	-3 academic years with 8 observations made each year. -Each school was observed for 2 nonconsecutive days in 2 nonconsecutive weeks each semester per school year	-System for Observing Fitness Instruction Time (SOFIT) assessed quantity and quality of PA in physical education classes. -CATCH Program and materials including physical education and physical activities included	-Yards run in 9 minutes -passing rates for Fitnessgram national mile standards -Moderate to vigorous PA in physical education class -Self-reported PA -Heart rate monitors -Body mass index	-4 schools received CATCH program and 4 schools served as controls. -Pretest & posttest, matched control group, quasi-experimental design -two-year follow up	-At posttest, significant decrease in risk of overweight or overweight seen among participants in El Paso CATCH program compared to control schools. -Significant increase in time spent in moderate to vigorous PA and time spent in vigorous PA.
Travis Community CATCH Project, Texas (Hoelscher et al., 2010)	-1,107 fourth grade students in 30 schools in located in 4 districts in Travis County -61% Hispanic participants in CATCH Basic Plus (BP) Program -69% Hispanic participants in CATCH BasicPlus + Community (BPC) Program	Developmentally focused intervention based on prior literature including CATCH Basic Plus program and added a community involvement component -Incorporated elements of social cognitive theory and social ecological model	-School- and community-based: 4th graders -Child obesity prevention program that included enhancing diet and PA levels of students.	First 2 years of a 3 year intervention	-Both programs included curriculum to increase moderate-to-vigorous PA in students, in school PE and activity breaks as well as at home -BPC additionally received implementation of PA breaks during class time and implementation of after-school PA programs	-Surveyed measuring School PA -Self-administered questionnaire measuring student report of teachers leading a PA break -System for Observing Fitness Instruction Time (SOFIT) method used to measure PA levels and lesson contexts in PE classes -Body Mass Index	-Pretest & Posttest -The study compared two intervention approaches of 15 schools that received the school based (BP) program and another 15 schools that received the school- and community-based (BPC) program.	-Significant decreases of children who were overweight in CATCH BPC schools compared to CATCH BP schools, including a significant difference for Hispanic youth in BPC schools -Both BP and BPC schools had significant increase in PA outcomes. -Results indicate a need for community-based obesity prevention programs

Table1 continued

Study, location, author	Sample Size and Description	Theory or Model Used in Program	Intervention Description	Duration	PA Component	PA Measures	Evaluation Method	Major Findings
HOPS Program, Osceola, Florida (Hollar et al., 2010)	-1197 students ages 6 to 13 years in 5 low-income elementary schools -69.6% Hispanic participants in intervention schools -62.2% Hispanic participants in control groups	Developmentally focused intervention based on prior literature including Healthier Options for Public Schoolchildren (HOPS)	-School-based: students in elementary schools who qualified for free or reduced-price meals through the USDA -Obesity prevention program that included dietary, curricula, and PA components on BM and academic performance	-2 year period	-HOPS emphasized healthy lifestyle management lessons including an emphasis on increased levels of PA -Amount and type of PA varied among intervention schools -Daily PA during regular classtime by using a 10- to 15- minute desk-side PA program (WISERCISE!) -Structured PA implemented during recess and lead other activities including walking clubs	-Pedometers (however were discontinued midyear in study during year 2) -OrganWise Guys tracking books to record number of steps taken each day -Body Mass Index	-Pretest & Postest, quasi-experimental design -The study compared 4 intervention schools (N= 974) to 1 control school (N = 199).	-Significantly more children who received treatment stayed in normal BMI percentile ranges both years compared to control youth
Hip-Hop to Health Jr., Chicago, Illinois (Fitzgibbon et al., 2006)	-446 children enrolled in 12 Predominantly Latino Head Start Preschool sites located in Chicago, Illinois -73% Hispanic participants in intervention group. -89.4% Hispanic participants in control group.	-Evidence-based Hip-Hop to Health Jr. was adapted to be culturally appropriate -Social cognitive theory as primary framework. -Concepts from self-determination theory were also utilized.	-School-based: Preschool -Weight control intervention including diet and PA curriculum delivered by trained early childhood educators. -Homework assignments were given to parents to increase PA.	-3 sessions per week for 14 weeks	-20 minutes of aerobic activity based on overall moderate to vigorous movement.	-Body mass index -Physical activity reported by parents of children	-RCT: Pretest & posttest -1-year follow-up -2-year follow-up -6 schools received Hip-Hop to Health Jr. program and 6 schools served as controls.	-Ineffective in reducing subsequent increases in BMI in preschool children. -No significant differences in preventing excessive weight gain in Latino children compared to the control group.

Table1 continued

Study, location, author	Sample Size and Description	Theory or Model Used in Program	Intervention Description	Duration	PA Component	PA Measures	Evaluation Method	Major Findings
Bienestar Health Program, San Antonio, Texas (Trevino et al., 2005)	389 fourth-grade Mexican American students enrolled in 9 elementary schools located in low-income inner-city neighborhoods --All participants were of Mexican-American heritage	Social Cognitive Theory	-School-based: fourth grade -4 classroom activities were implemented to reduce risk factors associated with the onset of type 2 diabetes. Of these activities, 3 included PA components. -Delivered by teachers and physical education teachers. -Culturally appropriate by incorporating salsa dancing.	8 months	-Bienestar Parent program: Student dance act during which students present drawings of people exercising to parents. -Bienestar Health and Physical Education Program: 16 lessons including sections on physical activity. -Bienestar Health Club: 32 lesson plans including promoting leisure time moderate to vigorous PA through dance, physical activity.	-Modified Harvard step test -Heart rate transmitter -Physical fitness score was calculated by dividing the total time of exercise in seconds by the sum of three heart rate values -Body mass index	-RCT: - Pretest & posttest -5 schools received Bienestar Health program and 4 schools served as controls.	At posttest, a significant increase in physical fitness scores among participants in the intervention was found compared to control schools.
Weight Loss Program, Houston, Texas (Johnston et al., 2007)	-40 overweight sixth and seventh graders from ages 10 to 14 years in treatment and 20 control students -All participants were Hispanic.	-None	-School-based: sixth and seventh grade -Overweight weight loss program for Mexican American students	-5 weekly meetings for 12 weeks followed by 12 weeks of bi-weekly sessions.	-4 outdoor physical activity lessons weekly lasting for 35 to 40 minutes. -control group received self-help Trim Kids book that consisted of maintenance activities for improving level of physical fitness	-Body Mass Index	-RCT: Pretest & posttest -3 month follow-up -6 month follow-up	-Intervention had significantly reduced BMI of youth compared with youth in the control group.

Table1 continued

Study, location, author	Sample Size and Description	Theory or Model Used in Program	Intervention Description	Duration	PA Component	PA Measures	Evaluation Method	Major Findings
Choice, Control, and Change (C3), New York, New York (Contento et al., 2007)	-278 seventh-grade students enrolled in 5 schools in low-income neighborhoods -70% Hispanic participants (mostly Dominican and Puerto Rican)	-Extended theory of planned behavior as primary framework that proposes behavior intentions are translated into behaviors through development of implementation -Components of Self-regulation theory also employed	-School-based: seventh grade -Choice, Control, and Change program enhancing healthful eating, PA, and a healthy weight through enhancing agency and competence.	-24-session curriculum taught over a period of about 7 to 8 weeks	-EatWalk survey including self-reported measures of frequency of walking or taking the stairs the past week for various reasons including exercise -Curriculum included pedometers to work towards goal of 10,000 steps a day -Lecture on PA benefits on the body	-Pedometers to collect data on daily activity -Self-reported physical activity choices 5 items) -Self-reported behavioral intentions (2 items) -Outcome expectations and attitudes toward PA behaviors (two items) -Self-efficacy for PA (two items)	-Pretest & posttest	-Significant increases in key eating, but not the key PA behaviors of walking and stair-climbing.
After-School Health Promotion Program, El Paso, Texas (de Heer et al., 2011)	-901 third through fifth graders in 6 schools (intervention = 292/ control = 354/ spillover group = 251) -Participants were predominantly of Mexican-American heritage	-Used Bienestar health education curriculum that is grounded in social cognitive theory -Used CATCH program for PA component	-After-school health education and physical activity program	-24-session curriculum taught during 2 weekly meetings for 12 weeks	-20 to 30 minute health education component including modules on exercise followed by 45 to 60 minutes of PA in which curriculum was adapted from CATCH	-Body Mass Index -Aerobic capacity measured by using Progressive Aerobic Cardiovascular Endurance Run (PACER) test which requires participants to run up and down a 20-meter court	-RCT: Pretest & Posttest -4 month follow-up	-At posttest, higher proportion of after-school participants was associated with lower body mass index and higher aerobic capacity
Rural School-Based Health Intervention, Greensboro, North Carolina (Villalba et al., 2011)	-70 sixth to eighth graders in a rural middle school -All participants were of Mexican-American heritage from ages 11 to 15 years	-Vulnerable populations conceptual model -Modified version of Health Fair Stations	-School-based: sixth to eighth graders -Health Education Promotion program to determine unmet health needs and increase health awareness of youth in rural areas	1 weekly meeting for 8 weeks	-Health assessment and behaviors checklist including PA behaviors -Health literature shared with parents of participants on PA	-Body Mass Index -Behaviors checklist including times per week exercising outside of school	-Pretest & posttest	-At posttest, significant increase in number of times per week exercising outside of school

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