Published in final edited form as:
Contemp Clin Trials. 2011 November ; 32(6): 916–923. doi:10.1016/j.cct.2011.07.008.

Health Is Power: an Ecological Theory-based Health Intervention for Women of Color

Rebecca E. Lee, Ph.D.[a,*], **Ashley V. Medina, B.S.**[a], **Scherezade K. Mama, M.P.H.**[a,b], **Jacqueline Y. Reese-Smith, Ph.D.**[a,c], **Daniel P. O'Connor, Ph.D.**[a], **Marcella Brosnan, B.A.**[d], **Catherine Cubbin, Ph.D.**[d], **Tracy McMillan, Ph.D.**[d,e], and **Paul A. Estabrooks, Ph.D.**[f]

[a]Texas Obesity Research Center, Department of Health and Human Performance, University of Houston, 3855 Holman St., Garrison Gym Rm 104, Houston, TX 77204-6015, USA

[b]University of Texas School of Public Health, 1200 Herman Pressler, Houston, TX 77030, USA

[c]Department of Health Disparities Research, M.D. Anderson Cancer Research Center, 1515 Holcombe Blvd., Houston, TX 77030, USA

[d]University of Texas at Austin, 1 University Station, Austin, TX 78712, USA

[e]PPH Partners, 7710 W. Sweetwater Trail, Flagstaff, AZ 86001, USA

[f]Virginia Polytechnic Institute and State University, Blacksburg, VA 24061, USA

Abstract

Objective—Physical inactivity and poor dietary habits plague Americans as health challenges, with women of color most vulnerable to their detrimental effects. Individually focused interventions have not demonstrated lasting success, possibly due to the lack of focus on sustainable social and physical environment factors. This manuscript describes the rationale, design and methodology of Health Is Power (HIP), a transcultural, community based, randomized controlled trial that investigated the effectiveness of a group cohesion intervention to increase physical activity and improve dietary habits in African American and Hispanic or Latina women in Houston and Austin, Texas.

Methods—The intervention development was guided by group dynamics principles anchored within an ecologic model.

Results—Women participated in three health assessments and a six month face to face intervention that included evidence-based behavioral methods—integrated into strategies to promote group cohesion—framed to account for environmental factors contributing to health disparities. Women participated in team building activities, environmental mapping exercises, and supervised walks or taste tests.

Conclusions—Neighborhood contextual and environmental measures are described to test ecologic factors that may contribute to behavioral maintenance. Theoretically guided interventions

[*]Corresponding Author: Dr. Rebecca E. Lee, Texas Obesity Research Center, Department of Health and Human Performance, University of Houston, 3855 Holman St., Garrison Gym Rm 104, Houston, TX 77204-6015; Phone: 1-713-743-9335; Fax: 1-713-743-9860; releephd@yahoo.com.

that account for multiple levels of influence in behavior initiation and maintenance stand to improve health outcomes in vulnerable populations.

Keywords

Ethnic groups; Exercise; Female; Intervention Development; Nutrition

Introduction

Although the benefits of adopting physical activity and increasing fruit and vegetable consumption are well publicized [1–3], rates of physical activity and fruit and vegetable consumption remain low [4]. Physical inactivity rates are higher among women than men, and racial and ethnic minorities report high rates of physical inactivity and low rates of fruit and vegetable consumption, even after adjusting for socioeconomic status (SES) factors [5, 6].

In response to these distressing statistics, a growing number of intervention studies have been conducted, focusing specifically on African American and Hispanic or Latina women. Interventions that have focused on individual-level mediators of behavior change such as increasing knowledge, self efficacy, and self-regulatory skills have demonstrated effectiveness [7–10]. However, maintenance of the new health behaviors has been difficult to achieve [7, 10, 11]. Further, previous studies with African American and Hispanic or Latina women yield inconsistent and unclear outcomes. It is often unclear whether results are attributed to effective culturally specific intervention strategies [12–16]. The lackluster findings from individually focused interventions has lead researchers to ecologic models that propose the importance of social and physical environmental factors (e.g., lacking access to a clean and safe physical activity resources, lacking access to fresh and affordable food or historical social injustices) that are present before, during, and after individual-level intervention strategies are implemented. Some have suggested that these environmental factors contribute to the baseline behavior of participants, and, because the environment typically persists after the intervention is completed, facilitate return to baseline behavior [17, 18]. Further, ecologic models posit that individual and environment interact to produce behavior. Yet, to date there have been few interventions that have attempted to address both environmental and individual level characteristics to improve physical activity and healthful eating in minority women.

This manuscript describes Health Is Power (HIP), a transcultural, community based, randomized controlled trial designed to investigate the effectiveness of an intervention that integrated strategies at the individual and environmental levels to increase physical activity and improve dietary habits in African American and Hispanic or Latina women in Houston and Austin, Texas. Women who participated in the study were physically inactive and between the ages of 25 and 60 years old. Our purpose is to describe the methods used for theory selection, the proposed mediators of intervention effectiveness, intervention development and matching of strategies to proposed mediators, and our process to test mediation.

Theory Selection

Previous studies suggest minority women do increase their physical activity and improve dietary habits in response to interventions; however, the changes are modest and inconsistent [19–21]. The equivocal nature of this body of intervention literature may be due to differences in the context within which the studies were conducted, or the environments within which the interventions were delivered [18]. Although it is difficult to identify

specific environments and contexts post hoc, there are a number of social ecological frameworks that suggest possible moderating effects of environmental factors on intervention outcomes. In an effort to provide a guide for broader intervention development and environmental data collection, we identified the Ecological Model of Physical Activity (EMPA) [18] as a theoretical starting point for the HIP project [22] and present our guiding model in Figure 1.

The EMPA [18, 23] portrays physical activity initiation and maintenance as influenced by direct and indirect factors from environmental settings. These factors, in turn, interact with biological and psychological factors. The EMPA conceptualizes micro-, meso-, exo-, and macro-environmental influences on physical activity. Like other ecologic models, the EMPA recognizes physical environmental factors. Having supportive neighborhood environments that are attractive, interesting and safe are hypothesized to contribute to physical activity [24–26]. Similar to physical activity, increasing availability of fresh, high quality fruits and vegetables can contribute to improved dietary habits. A recent study of two U.S. urban areas found that supermarkets and farmers markets provide the lowest cost and highest quality access to fresh fruits and vegetables [27]. Efforts to change behavior that have used ecologic approaches have demonstrated that an intervention is more likely to be successful when multiple levels of influence are addressed at the same time [28, 29]. Thus testing ecologic frameworks to guide interventions is a promising area of inquiry.

Unlike most other ecological models, the EMPA goes further to posit dynamic physical and social linkages and processes that impact behavioral choices. Important, but possibly the least well understood, are the social and dynamic linkages that connect micro-environmental settings to facilitate or hinder behavior. Spence and Lee describe these in the EMPA as Exo- or Meso-environmental factors—the linkages and processes among environmental settings and behavioral choices. Theorists have identified similar processes as group dynamics. Group dynamics lead to increased sense of group cohesion that can contribute to adherence and participation [30–35]. The related construct of social support is consistently associated with physical activity maintenance [36–42] and likely contributes to dietary habits as well [43, 44]. In both African American and Hispanic or Latino cultures, there are rich social traditions around family, faith, religion and health [45, 46]. Family time is highly valued, and faith-based activities focus on attending faith-based services along with social events. The body is seen as an important instrument to participate in these activities; thus, maintaining physical health and abilities is vital. We proposed to integrate group dynamics principles that enhance group cohesion into evidence-based intervention strategies. This would emphasize the importance of the exo- and meso-environmental linkages that may be effective in helping to promote an increase in physical activity and healthful dietary habits. Given existing social traditions, this approach might be particularly effective among minority adults [11, 47].

The HIP intervention incorporated group dynamics strategies and techniques based on Carron's model for the development of cohesion and Paskevich's heuristic of the impact of group cohesion on social-cognitive outcomes and physical activity participation [48, 49]. These models provided the guidelines for the intervention development [32, 50] and an indication of the potential mediators of intervention effects. The HIP intervention targeted changing the group environment, structure, and processes thought to lead to enhanced cohesion. Increased perceptions of group cohesion, individual cognitions related to physical activity, and social support were hypothesized to mediate the intervention's effect. Group cohesion was defined as the participants' perceptions of individual Attractions To the Group Task (ATGT), individual Attractions To the Group Social (ATGS), Group Integration Task (GIT), and Group Integration Social (GIS) [30, 48]. Individual cognitions related to physical activity and dietary habits were defined as self-efficacy and motivational readiness.

Developing the HIP Intervention

The EMPA and Group Dynamics principles were incorporated in the intervention strategies of the HIP project. Few studies designed to increase physical activity and improve dietary habits among women of color have addressed social and environmental factors critical to both behavioral initiation and maintenance. The HIP intervention combined evidence-based individual strategies together with strategies focused on changing the social and physical environment. Table 1 highlights theoretically identified levels and mediators of behavior change and example strategies that were developed to address those mediators.

Women were screened, recruited and assessed following procedures reviewed and approved by the University of Houston's Committee for the Protection of Human Subjects. Women then attended one randomization and six subsequent intervention group sessions. The randomization session employed constructs from Motivational Interviewing to create decisional balance [51] which in previous studies reduced attrition and increased commitment to the study [52]. Women were introduced to the HIP study, and as part of a group process, identified benefits and limitations of assignment to both intervention groups. For example, participating in the physical activity group might mean increased physical activity, which could have both benefits (e.g., improved fitness and wellbeing) and limitations (e.g., less time for other things, too much sweat and grooming). In contrast, participating in the vegetables and fruit group might have benefits (e.g., improved diet quality, weight loss) and also limitations (e.g., more frequent trips to the store, increases in preparation time, and family objections to dietary changes). Women were introduced to the importance of random assignment to enhance scientific validity and given the opportunity to withdrawal if they were not willing to be assigned to either group. At the end of the randomization session, women were randomized to the physical activity or vegetable and fruit group, and instructed about future group meetings.

Women completed six content intensive intervention sessions over a 24 week [50] period, described in Table 2. The first three sessions were scheduled at two weeks intervals followed by the final three sessions, which were scheduled at approximately four week intervals. In each session, specific group dynamics teambuilding strategies were used to increase physical activity, primarily by walking, for those assigned to the physical activity group, or vegetable and fruit consumption for those assigned to the dietary habits group. In Session 1, women were encouraged to select themselves into teams of 4–7 and identify a team name to develop a sense of group distinctiveness [30, 48]. Examples of team names from previous groups were provided to encourage interaction, creativity, and promote unique choices that reflected the team's 'personality'. Groups were encouraged to identify a team captain to serve for the duration of the intervention [53], and other roles, such as co-captain, secretary and welcomer, alternated weekly. Having defined roles and responsibilities encouraged engagement and affinity to the team [34]. The team structure was used for peer problem solving and support throughout the intervention. Teams were given a weekly goal at the first session, and at each subsequent session, with slowly increasing weekly milestones to gradually meet recommended amounts of physical activity or servings of vegetables and fruit [50].

Intervention sessions included brief instructions, team-based activities, and discussion with the entire group lead by a trained health educator. Small team activities focused on personal experiences. Behavior change was introduced and discussed during intervention sessions, including well established individually focused strategies, such as personal goal setting, reducing barriers, increasing self-efficacy and social support, along with preventing relapse [54, 55]. Neighborhood environmental awareness and social justice rounded out the topics for activities and discussion [23]. Team activities were built on the religious value of

fellowship and provided the participants the opportunity to get to know one another, share experiences and strategies for success and explore their common beliefs on physical activity and vegetables and fruit.

The intervention sessions ended with the health educator leading the teams in a shared activity to directly promote either physical activity or vegetable and fruit consumption. The women assigned to the physical activity group walked for 15-minutes as a group, and women in the vegetable and fruit group sampled two new vegetables or fruits prepared by the research team. Attendance was recorded at all intervention sessions.

Goal Setting and Behavioral Milestones

In addition to the main content delivered at each session, minimum individual behavioral goals were set by the HIP health educator during the session. Goals were gradually increased during the study to achieve guidelines. The ultimate physical activity goal of 45 minutes exceeded the minimum recommended guidelines for good health (30 minutes daily or 150 minutes per week), because studies have shown that people tend to have trouble achieving stated research project physical activity goals [56, 57]. We hoped that by promoting a goal for the study that exceeded the minimum daily recommendations, participants might actually achieve them [58]. Women assigned to the vegetables and fruit group increased daily consumption of half cup servings of vegetables and fruit, starting with five servings a day, gradually building to nine servings a day.

Women in the physical activity group were encouraged to participate in moderate intensity physical activity, particularly walking, because it was easy, required little training or equipment and could be done at home or at work. Since most were overweight or obese, the investigative team encouraged women in the vegetables and fruit group to choose servings from a “HIP Approved Vegetables & Fruit” list featuring lower glycemic options. To meet guidelines, women were encouraged to eat more vegetables (5) than fruit (4) servings.

After women learned their individual behavioral goals, the group goal setting procedure began with small team discussions. Participants shared ideas for their own personal behavioral goals over the course of the project and then determined the distance for the team to walk or the total number of servings of vegetables and fruit for the team to consume as a collective goal [50]. Information was provided addressing the recommended amount of physical activity or fruit and vegetable consumption. Goal setting highlighted the necessity for each individual in the group to complete her own personal goal. The individual and team goal setting procedures enhanced perceptions of responsibility to the team task [30, 48].

Women in the physical activity group used the Check And Line Questionnaire (CALQ) to track their physical activity [22]. The CALQ measures physical activity over a seven day period and uses check boxes that can be checked or connected with a line to indicate longer duration. Each check box represented 15 minutes. Women also indicated whether their physical activity was of moderate or vigorous intensity. In the vegetables and fruit group, women recorded their servings on the Vegetable and Fruit Log (VF Log), a weekly diary style measure of vegetables and fruit consumption. Patterned after the CALQ, the VF Log uses check boxes to indicate ½ cup servings of vegetables or fruit, and check boxes can be connected with a line if more than one serving is eaten in one sitting. Participants also checked boxes that corresponded to the colors of the vegetables and fruit consumed that day, as an indication of dietary variety.

Each team reported the number of miles or servings that they had achieved since the previous session. For the physical activity group, miles were plotted on a large map posted on the wall. Teams had identified possible destinations to which they were travelling during

the project. Each session saw teams gradually progress closer and closer to their destination. Teams in the vegetable and fruit group had selected a number of grocery carts that they would fill based on their overall team goal of servings. Each week, “grocery bag” stickers were pasted in grocery carts on a large wall poster, gradually filling up during the project, based on the total servings consumed by the team during the previous weeks.

Behavior Maintenance

Specific strategies were used to enhance goal setting and achievement. Participants received incentives to aid in completing their goals. Consistent with group cohesion messages, all incentives were branded with the HIP icon, a drawing of a sun, symbolizing a brighter future. For example, participants in the physical activity group received a pedometer for use during the project to help them monitor their progress toward their walking goals. Pedometers have been used in previous physical promotion programs as a complement to the intervention [59, 60]. Women also received visors to protect their faces from the sun while walking, and whistles to enhance safety. In the vegetables and fruit group, participants received measuring cups to help understand the size of one half cup. Women in this group also received food storage containers and lunch bags to help them transport vegetables and fruit so that they were better able to meet their goals. All women in the study received HIP t-shirts and water bottles, because branded apparel and hydration were relevant for all women.

As an additional daily monitoring strategy, participants completed CALQs or VF Logs as described above. Log style monitoring systems have been used in previous physical activity programs as an intervention complement [44, 61–63]. All participants received a branded pencil to help them complete their logs. Participants were instructed to keep their CALQs or VF Logs where they could see them daily. Participants completed one CALQ or VF Log for each week in the intervention.

Neighborhood and Environmental Awareness

During Session 2, participants discussed social and environmental justice issues in the context of their physical neighborhood environment that discouraged and encouraged doing physical activity or eating more vegetables and fruit. Messages and content were developed based on scholarly work [23, 40, 64] and previous formative research by this team [65, 66]. Women discussed the concept of how historical social injustices contributed to current health disparities even in their own communities. Discussion centered on awareness and action to be taken both on a personal level and on a macro level. For example, women discussed how to send e-mail to local government representatives to improve local parks, trails and sidewalks for physical activity or how to talk with supermarket managers in order to request healthful options in the store.

In order to promote discussion and awareness of their community and neighborhood environments, participants received a map with their home located at the center along with streets located within one mile of their home. An example is shown in *Figure 4*. Participants surveyed their neighborhoods and highlighted areas which were favorable or poor for walking, or areas where they could or could not find HIP approved vegetables and fruit. From these maps, women increased their awareness of their neighborhoods and in some instances they gained awareness of parks in their neighborhood that were not on their direct route to home, work and/or school. These maps also provided valuable insight into participants’ neighborhoods, allowing for capture of the number and length of street segments favorable or poor for walking, and the number and density of retail food outlets with and without HIP approved vegetables and fruit.

Intervention Mediators

As depicted in Figure 1, the EMPA hypothesizes complex mechanisms and interactions influencing behavioral outcomes. For the purposes of this investigation, we included representative variables from as many ecologic domains as possible, while accounting for group cohesion constructs and other hypothesized mediators. We defined potential macro-environmental variables as the social context of the neighborhood using aggregated US Census data, including socioeconomic status, social disorganization, and ethnic concentration, that have been shown to influence health behaviors, even after adjusting for individual level indicators of these constructs [23, 67, 68].

We defined the micro-environment as participants' own neighborhoods, including detailed assessments of street scale elements, physical activity resources and goods and services. Neighborhood street scale elements, such as the quality and condition of the pedestrian environment, were assessed using the Pedestrian Environment Data Scan [69] on a sample of residential and arterial streets within 400 meters of participants' homes. As well, all physical activity resources within 800 meters of participants' homes were systematically measured using the Physical Activity Resource Assessment (PARA) [70]. All goods and services were measured using the Goods And Services Inventory (GASI).

More closely related to intervention development and success were the meso- and exo-environmental factors related to group cohesion, hypothesized to be mediated by individual cognitions. The construct of motivational readiness represents the intermingling of intention and behavior to adopt or maintain a specific behavior. Therefore we used this measure to assess whether our intervention influenced group and individual goals and motivation to attain those goals [71]. A 41-item scale was used to assess barrier self-efficacy and physical performance self-efficacy. We hypothesized that enhanced perceptions of cohesion might influence social support for walking and fruit and vegetable consumption. The Family/ Friend Support for Exercise Habits Scales adapted for use with walking and dietary habits was used to assess social support [72]. The Physical Activity Group Environment Questionnaire was used to assess group cohesion [32].

Implications

Since initiation and maintenance of physical activity and healthful dietary habits are key to the prevention and control of weight gain and numerous chronic diseases, innovative studies that investigate factors needed for participants to adopt and maintain physical behavior changes are extremely important. Maintenance of behavior change is often overlooked by researchers. Women serve as important behavioral gatekeepers, as they continue to be the primary family caretakers, and hold multiple roles in the family, workplace and community. As well, findings may suggest that emphasizing the role of existing social groups such as families may be more effective than single focus on women, men or children alone. These findings can be distributed to health promoters and researchers as a simple, effective and transcultural strategy to help improve health behaviors. Environmental factors are also associated with physical activity, and provide tangible resources and support for making short and long-term behavioral changes. Therefore, dissemination efforts of environmental data will be aimed at increasing support for urban planning and transportation that encourages walking.

We described a theoretically guided intervention, designed to capture multiple levels of influence on health behaviors, with the intention of promoting enhanced initiation and maintenance of physical activity and vegetable and fruit consumption. We integrated Group Dynamics principles into the EMPA, and adapted these to include dietary habits. The

intervention was designed to be transcultural, emphasizing common challenges of behavior change that are experienced by all women, rather than focusing on a single ethnic group. Innovative strategies and techniques were developed couched within time-tested behavioral strategies. Analytic plans accounted for factors representing all levels of the model, potentially leading to improved understanding of behavioral initiation and maintenance of healthful behaviors in women of color.

References

1. Centers for Disease Control and Prevention (CDC). The Healthy People 2010 Database. 2009. Available from: http://wonder.cdc.gov/data2010/focus.htm
2. United States Department of Agriculture (USDA). Fruits and Veggies-More Matters. 2010.
3. U.S. Department of Health and Human Services. Physical activity and health: A report of the Surgeon General. Centers for Disease Control and Prevention; Atlanta: 1996.
4. Macera CA, et al. Prevalence of physical activity in the United States: Behavioral Risk Factor Surveillance System, 2001. Prev Chronic Dis. 2005; 2(2):A17. [PubMed: 15888228]
5. Centers for Disease Control and Prevention. BRFSS Prevalence and Trends Nationwide (States, DC, Territories) 2009 - Adults with 30+ minutes of moderate physical activity five or more days per week, or vigorous physical activity for 20+ minutes three or more days per week. 2009. Available from: http://apps.nccd.cdc.gov/BRFSS/display.asp?cat=PA&yr=2009&qkey=4418&state=US
6. Centers for Disease Control and Prevention. Behavioral risk factor surveillance system, prevalence and trends data, nationwide (states and DC), fruits and vegetables, adults who have consumed fruits and vegetables five or more times per day. 2009. Available from: http://apps.nccd.cdc.gov/BRFSS/display.asp?cat=FV&yr=2009&qkey=4415&state=US
7. Hovell MF, et al. Culturally tailored aerobic exercise intervention for low-income Latinas. Am J Health Promot. 2008; 22(3):155–63. [PubMed: 18251114]
8. Clarke KK, et al. Promotion of physical activity in low-income mothers using pedometers. J Am Diet Assoc. 2007; 107(6):962–7. [PubMed: 17524717]
9. Pazoki R, et al. Effects of a community-based healthy heart program on increasing healthy women's physical activity: a randomized controlled trial guided by Community-based Participatory Research (CBPR). BMC Public Health. 2007; 7:216. [PubMed: 17716376]
10. Wilbur J, et al. Outcomes of a home-based walking program for African-American women. Am J Health Promot. 2008; 22(5):307–17. [PubMed: 18517090]
11. Seo DC, Sa J. A meta-analysis of psycho-behavioral obesity interventions among US multiethnic and minority adults. Prev Med. 2008; 47(6):573–82. [PubMed: 18201758]
12. Sharp LK, Fitzgibbon ML, Schiffer L. Recruitment of obese black women into a physical activity and nutrition intervention trial. J Phys Act Health. 2008; 5(6):870–81. [PubMed: 19164821]
13. Slattery ML, et al. Physical activity patterns and obesity in Hispanic and non-Hispanic white women. Med Sci Sports Exerc. 2006; 38(1):33–41. [PubMed: 16394951]
14. Whitt-Glover MC, Kumanyika SK. Systematic review of interventions to increase physical activity and physical fitness in African-Americans. Am J Health Promot. 2009; 23(6):S33–56. [PubMed: 19601486]
15. Yancey AK, et al. Population-based interventions engaging communities of color in healthy eating and active living: a review. Prev Chronic Dis. 2004; 1(1):A09. [PubMed: 15634371]
16. Casagrande SS, et al. Built environment and health behaviors among African Americans: a systematic review. Am J Prev Med. 2009; 36(2):174–81. [PubMed: 19135908]
17. Egger G, Swinburn B. An “ecological” approach to the obesity pandemic. BMJ. 1997; 315(7106): 477–80. [PubMed: 9284671]
18. Spence JC, Lee RE. Toward a comprehensive model of physical activity. Psychol Sport Exerc. 2003; 4(1):7–24.
19. Banks-Wallace J, Conn V. Interventions to promote physical activity among African American women. Public Health Nurs. 2002; 19(5):321–35. [PubMed: 12182692]

20. Resnicow K, et al. Tailoring a fruit and vegetable intervention on ethnic identity: results of a randomized study. Health Psychol. 2009; 28(4):394–403. [PubMed: 19594262]
21. Walker SN, et al. Maintenance of activity and eating change after a clinical trial of tailored newsletters with older rural women. Nurs Res. 59(5):311–21. [PubMed: 20697307]
22. Lee RE, et al. Multiple Measures of Physical Activity, Dietary Habits and Weight Status in African American and Hispanic or Latina Women. J Community Health. 2011
23. Lee RE, Cubbin C. Striding toward social justice: the ecologic milieu of physical activity. Exerc Sport Sci Rev. 2009; 37(1):10–7. [PubMed: 19098519]
24. Giles-Corti B, Donovan RJ. Relative influences of individual, social environmental, and physical environmental correlates of walking. Am J Public Health. 2003; 93(9):1583–9. [PubMed: 12948984]
25. Heinrich KM, et al. Associations between the built environment and physical activity in public housing residents. Int J Behav Nutr Phys Act. 2007; 4:56. [PubMed: 17997820]
26. Lopez IA, Bryant CA, McDermott RJ. Influences on physical activity participation among Latinas: an ecological perspective. Am J Health Behav. 2008; 32(6):627–39. [PubMed: 18442342]
27. Lee RE, et al. A picture of the healthful food environment in two diverse urban cities. Environ Health Insights. 2011; 4:49–60. [PubMed: 20706621]
28. Greaney ML, et al. College students' barriers and enablers for healthful weight management: a qualitative study. J Nutr Educ Behav. 2009; 41(4):281–6. [PubMed: 19508934]
29. Thogersen-Ntoumani C. An ecological model of predictors of stages of change for physical activity in Greek older adults. Scand J Med Sci Sports. 2009; 19(2):286–96. [PubMed: 18282227]
30. Burke SM, et al. Cohesion as shared beliefs in exercise classes. Small Group research. 2005; 36(3): 267–288.
31. Estabrooks PA. Sustaining exercise participation through group cohesion. Exerc Sport Sci Rev. 2000; 28(2):1–5.
32. Estabrooks PA, Carron AV. Group cohesion in older adult exercisers: prediction and intervention effects. J Behav Med. 1999; 22(6):575–88. [PubMed: 10650537]
33. Estabrooks PA, Carron AV. Predicting scheduling self-efficacy in older adult exercisers: the role of task cohesion. Journal of Aging and Physical Activity. 2000; 8(1):41–50.
34. Estabrooks PA, et al. Participatory research to promote physical activity at congregate-meal sites. J Aging Phys Act. 2005; 13(2):121–44. [PubMed: 15995260]
35. Shapcott KM, Carron AV, Burke SM, Bradshaw MH, Estabrooks PA. Member divesity and cohesion and performance in walking groups. Small Group Research. 2006; 37:701–720.
36. Cradock AL, et al. Neighborhood social cohesion and youth participation in physical activity in Chicago. Soc Sci Med. 2009; 68(3):427–35. [PubMed: 19036490]
37. Echeverria S, et al. Associations of neighborhood problems and neighborhood social cohesion with mental health and health behaviors: the Multi-Ethnic Study of Atherosclerosis. Health Place. 2008; 14(4):853–65. [PubMed: 18328772]
38. Fleury J, Lee SM. The social ecological model and physical activity in African American women. Am J Community Psychol. 2006; 37(1–2):129–40. [PubMed: 16680541]
39. Griffin SF, et al. Physical activity influences in a disadvantaged African American community and the communities' proposed solutions. Health Promot Pract. 2008; 9(2):180–90. [PubMed: 17728204]
40. Kirchhoff AC, et al. Strategies for physical activity maintenance in African American women. Am J Health Behav. 2008; 32(5):517–24. [PubMed: 18241136]
41. Lees E, et al. Environmental changes to increase physical activity: perceptions of older urban ethnic-minority women. J Aging Phys Act. 2007; 15(4):425–38. [PubMed: 18048946]
42. Marquez DX, McAuley E. Social cognitive correlates of leisure time physical activity among Latinos. J Behav Med. 2006; 29(3):281–9. [PubMed: 16724283]
43. Hermstad AK, et al. Individual and environmental correlates of dietary fat intake in rural communities: a structural equation model analysis. Soc Sci Med. 71(1):93–101. [PubMed: 20462682]

44. Spahn JM, et al. State of the evidence regarding behavior change theories and strategies in nutrition counseling to facilitate health and food behavior change. J Am Diet Assoc. 110(6):879–91. [PubMed: 20497777]
45. Dodani S, et al. Fit body and soul: a church-based behavioral lifestyle program for diabetes prevention in African Americans. Ethn Dis. 2009; 19(2):135–41. [PubMed: 19537223]
46. Whitt-Glover MC, et al. Pilot study of a faith-based physical activity program among sedentary blacks. Prev Chronic Dis. 2008; 5(2):A51. [PubMed: 18341786]
47. Sharma M. Physical activity interventions in Hispanic American girls and women. Obes Rev. 2008; 9(6):560–71. [PubMed: 18507777]
48. Carron, AV. Group dynamics in sport. London, ON: 1988.
49. Paskevich, DM., et al. Cohesion in sport and exercise. In: Singer, R.; Hausenblas, H.; Ganelle, C., editors. Handbook of Research on Sport Psychology. Macmillan; New York: 2001.
50. Estabrooks, PA. Group integration interventions in exersice: theory, practise, & future directions. In: Beauchamp, MR., editor. Group dynamics in sport and exercise psychology: contemporary themes. Routledge; New York, NY: 2008. p. 141-156.
51. Miller WR, Rollnick S. Ten things that motivational interviewing is not. Behav Cogn Psychother. 2009; 37(2):129–40. [PubMed: 19364414]
52. Goldberg JH, Kiernan M. Innovative techniques to address retention in a behavioral weight-loss trial. Health Educ Res. 2005; 20(4):439–47. [PubMed: 15598664]
53. Estabrooks PA, et al. Determining the impact of Walk Kansas: applying a team-building approach to community physical activity promotion. Ann Behav Med. 2008; 36(1):1–12. [PubMed: 18607666]
54. Bodenheimer T, Handley MA. Goal-setting for behavior change in primary care: an exploration and status report. Patient Educ Couns. 2009; 76(2):174–80. [PubMed: 19560895]
55. Lorig K, et al. Community-based peer-led diabetes self-management: a randomized trial. Diabetes Educ. 2009; 35(4):641–51. [PubMed: 19407333]
56. Buis LR, et al. Evaluating Active U: an Internet-mediated physical activity program. BMC Public Health. 2009; 9:331. [PubMed: 19744311]
57. Oldridge N, et al. Goal attainment in a randomized controlled trial of rehabilitation after myocardial infarction. J Cardiopulm Rehabil. 1999; 19(1):29–34. [PubMed: 10079418]
58. Locke EA, Latham GP. Building a practically useful theory of goal setting and task motivation. A 35-year odyssey. Am Psychol. 2002; 57(9):705–17. [PubMed: 12237980]
59. Rooney B, et al. Is knowing enough? Increasing physical activity by wearing a pedometer. WMJ. 2003; 102(4):31–6. [PubMed: 12967019]
60. Talbot LA, et al. A home-based pedometer-driven walking program to increase physical activity in older adults with osteoarthritis of the knee: a preliminary study. J Am Geriatr Soc. 2003; 51(3): 387–92. [PubMed: 12588583]
61. Aittasalo M, et al. A randomized intervention of physical activity promotion and patient self-monitoring in primary health care. Prev Med. 2006; 42(1):40–6. [PubMed: 16297442]
62. Lally P, Chipperfield A, Wardle J. Healthy habits: efficacy of simple advice on weight control based on a habit-formation model. Int J Obes (Lond). 2008; 32(4):700–7. [PubMed: 18071344]
63. Speck BJ, Looney SW. Effects of a minimal intervention to increase physical activity in women: daily activity records. Nurs Res. 2001; 50(6):374–8. [PubMed: 11725940]
64. Smiley, T. The Covenant with Black America. Chicago, IL: Third World Press; 2006.
65. Eugeni, ML.; Baxter, M.; Lee, RE. American Journal of Community Psychology. 2010. Disconnections of African American public housing residents: Connections to Physical Activity, Dietary Habits and Obesity. in press
66. Regan G, et al. Obesogenic influences in public housing: a mixed-method analysis. Am J Health Promot. 2006; 20(4):282–90. [PubMed: 16555802]
67. Ross CE. Walking exercising and smoking: Does neighborhood matter? Soc Sci Med. 2000; 51:265–274. [PubMed: 10832573]
68. Yen IH, Kaplan GA. Poverty area residence and changes in physical activity level: Evidence from the Alameda County Study. Am J Public Health. 1998; 88:1709–1712. [PubMed: 9807543]

69. Clifton KJ, Livi Smith A, Rodriguez D. The Development and Testing of an Audit for the Pedestrian Environment. Landscape and Urban Planning. 2007; 80(1–2):95–110.

70. Lee RE, et al. The Physical Activity Resource Assessment (PARA) instrument: evaluating features, amenities and incivilities of physical activity resources in urban neighborhoods. Int J Behav Nutr Phys Act. 2005; 2:13. [PubMed: 16162285]

71. Prochaska JO, DiClemente CC. Stages and processes of self-change of smoking: toward an integrative model of change. J Consult Clin Psychol. 1983; 51(3):390–5. [PubMed: 6863699]

72. Sallis JF, et al. The development of scales to measure social support for diet and exercise behaviors. Prev Med. 1987; 16(6):825–36. [PubMed: 3432232]

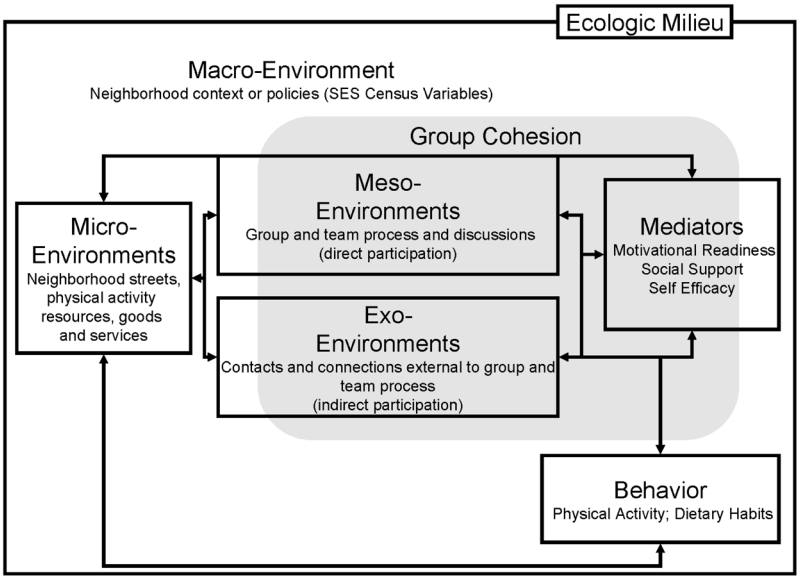

Figure 1.

Conceptual and theoretical model incorporating levels from the Ecologic Model of Physical Activity and Group Cohesion to predict health behavior.

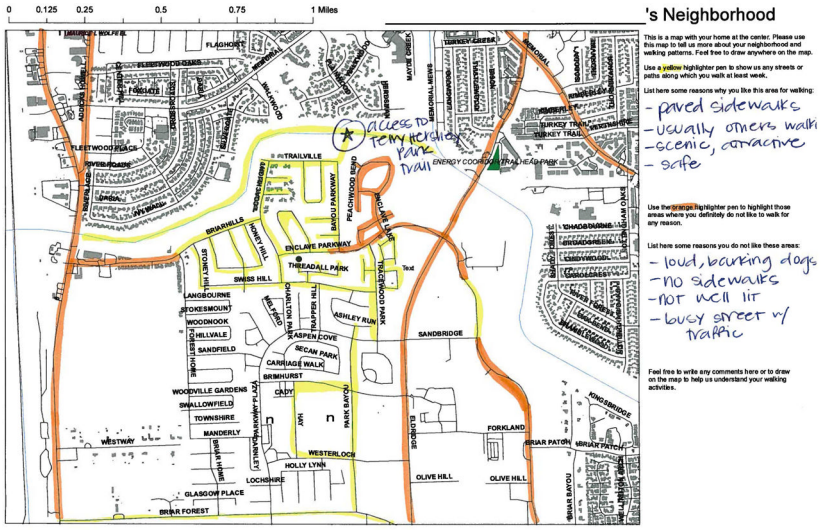

Figure 2.
Example of a physical activity group participant's map for the intervention mapping exercise.

Table 1

Underlying mediators of the Health is Power intervention and example strategies addressing the mediators

Ecological Level	Mediator	Example Strategies	
Meso	Group Cohesion-ATGT	**1**	Identified a group name that was attractive to the participants in the HIP program.
			Example: Divas Walking, The HIP Sistas, The Fabulous Blackberries
		2	Provided opportunities for group interaction around health behaviors
			Example: Incorporated group walk and taste testing vegetables and fruit
Meso	Group Cohesion-ATGS	**1**	Small groups to allow for participant social interactions.
			Example: Identified small teams within each session and provided the opportunity for social interactions.
		2	Developed strategies that enhanced group norms for appropriate social activities during class.
			Example: Celebrated individual group members' birthdays or other special occasions.
Exo	Group Cohesion-GIT	**1**	Developed group roles for class participants that keep them linked to HIP when in other settings.
			Example: Team captain, Telephone tree.
		2	Develop strategies that involve the group working together outside of HIP to achieve a common goal in HIP.
			Example: Set a group goal for amount of physical activity/fruits and veggies
Exo	Group Cohesion-GIS	**1**	Encourage structured social interactions with participants both within and outside of the formal class time
			Example: Promote walking or eating with team mates outside of HIP sessions to encourage social belongingness.
		2	Provide opportunities for participants to share challenges and complete problem solving activities to feel a sense of collective similarity and support.
			Example: Used small groups to identify underlying motives, interactions and barriers to living a healthful lifestyle that are external to HIP

Table 2

Sessions by session group dynamics strategies used during Health Is Power

	Strategies	
Session 1	**1**	Name Tags (used for first few sessions)
	2	Define social cohesion
	3	Bouncing ball icebreaker for participant sharing of motives for joining program
	4	Establish teams, team name and team roles
	5	Discuss physical activity or fruit and vegetable goals
	6	Group walk or food demonstration
Session 2	**1**	Discuss setting challenging yet attainable goals, barriers, and neighborhood factors that influence physical activity and dietary habits
	2	Teams complete Strategies to Achieve Goal, Barriers and Solutions, and Our Neighborhood and PA/VF worksheets
	3	Participants given a mapping exercise to complete at home
	4	Review teams' progress towards shared physical activity or fruit and vegetable goals
	5	Discuss physical activity or fruit and vegetable goals
	6	Group walk or food demonstration
Session 3	**1**	Discuss social support for physical activity or dietary habits.
	2	Teams complete Encouragement and Support and Social Support Advantages worksheets
	3	Group discusses importance of team roles, i.e. team caller fosters support
	4	Participants discuss mapping exercise outcomes
	5	Review teams' progress towards shared physical activity or fruit and vegetable goals
	6	Discuss physical activity or fruit and vegetable goals
	7	Group walk or food demonstration
Session 4	**1**	Discuss benefits of physical activity and good dietary habits and self-efficacy and physical activity or dietary habits
	2	Teams complete Benefits of PA/VF, Confidence and Self-Efficacy, and Challenging Goals worksheets
	3	Participants discuss team worksheet activities in their teams
	4	Review teams' progress towards physical activity or fruit and vegetable goals
	5	Discuss physical activity or fruit and vegetable goals
	6	Group walk or food demonstration
Session 5	**1**	Discuss relapse prevention and setting long term goals
	2	Teams identify high risk situations for lapse or relapse and landmark walks they can take to avoid relapse
	3	Review team's progress towards shared goals
	4	Discuss new physical activity or fruit and vegetable goals
	5	Group walk or food demonstration
Session 6	**1**	Review recommendations for physical activity and dietary habits
	2	Teams discuss how they will stay active or health after the project
	3	Group completes Big Box activity to show working with a group can help accomplish things you cannot do individually
	4	Review progress toward shared goals and maintenance
	5	Team award ceremony

	Strategies
6	Group walk or food demonstration