Preventive Medicine Reports 2 (2015) 57–64

Contents lists available at ScienceDirect

Preventive Medicine Reports

journal homepage: http://ees.elsevier.com/pmedr

Individual, social and environmental correlates of physical activity in overweight and obese African American and Hispanic women: A structural equation model analysis

Scherezade K. Mama [a,b,c,*], Pamela M. Diamond [b], Sheryl A. McCurdy [b], Alexandra E. Evans [d], Lorna H. McNeill [a], Rebecca E. Lee [e]

[a] Department of Health Disparities Research, The University of Texas M.D. Anderson Cancer Center, 1400 Pressler St., Unit 1440, Houston, TX 77030, USA
[b] School of Public Health, The University of Texas Health Science Center at Houston, 7000 Fannin, 26th Floor, Houston, TX 77030, USA
[c] Texas Obesity Research Center, Department of Health and Human Performance, University of Houston, 3855 Holman St., Garrison Gym Rm 104, Houston, TX, USA
[d] The University of Texas School of Public Health—Austin Regional Campus, 1616 Guadalupe, Suite 6.300, Austin, TX 78701, USA
[e] College of Nursing and Health Innovation, Arizona State University, 550 N. 3rd Street, Phoenix, AZ 85004, USA

ARTICLE INFO

Available online 10 January 2015

Keywords:
Exercise
Body image
Social environment
Environment design
Minority health
Adults

ABSTRACT

Objective. Ecologic frameworks account for multilevel factors related to physical activity (PA) and may be used to develop effective interventions for women. The purpose of this study was to examine the influence of individual, social and environmental factors on PA among African American and Hispanic women using structural equation modeling.

Methods. Overweight and obese women ($N = 164$, 65.9% African American) completed a 7-day accelerometer protocol, a physical assessment, and questionnaires on body image, self-efficacy, motivational readiness, social support, home environment for physical activity and perceived environment. Trained assessors evaluated each participant's neighborhood and collected objective measures of physical activity resources and the pedestrian environment. Assessments were completed between 2006 and 2008.

Results. Structural model fit was acceptable (RMSEA = .030). Body composition and image was negatively associated with PA, and motivational readiness had an indirect effect on PA through body composition and image. PA resources and the pedestrian environment operated through the perceived environment to positively influence neighborhood cohesion, which was positively associated with body composition and image.

Conclusion. PA is more heavily influenced by intrapersonal factors related to weight. Improving intrapersonal factors related to weight and perceptions of the environment may lead to increased PA in African American and Hispanic women.

Introduction

Physical inactivity significantly contributes to the U.S. mortality rate and burden of disease (Derby et al., 2011; Sanderson et al., 2010; U.S. Burden of Disease Collaborators, 2013; Zhao et al., 2011), yet only 20.9% of adults do enough exercise to meet physical activity guidelines (Centers for Disease Control and Prevention, 2011). Disparities in physical activity persist among women and ethnic minorities, increasing disease risk (Centers for Disease Control and Prevention, 2007).

Individually-focused programs fail to achieve sustainable increases in physical activity in ethnic minority women (Fleury and Lee, 2006; Granner et al., 2007). Ecologic frameworks account for factors beyond the individual, including intrapersonal factors, interpersonal relationships, and the physical environment, and how they influence health behaviors (Egger et al., 2003; Martinez et al., 2009; McNeill et al., 2006; Sallis and Owen, 2008). Spence and Lee broadly divided variables framed in ecologic models into two categories, intra-individual and extra-individual. Intra-individual factors related to physical activity include an individual's weight, attitude, and exercise self-efficacy (Spence and Lee, 2003). Extra-individual factors include social factors, like neighborhood cohesion and social support (Anderson et al., 2010; Lackey and Kaczynski, 2009), and environmental factors (Lee et al., 2011a; McAlexander et al., 2009), which have been shown to be important for physical activity. Each level of the ecologic model has the ability to influence physical activity directly or indirectly through one or more of the other levels (Spence and Lee, 2003).

It is important to understand the determinants of physical activity that may be unique or central to ethnic minority women and how they are related for effective behavior change. Although several studies have looked at various factors within the social and physical environment and how they relate to physical activity (McNeill et al., 2006; Sallis et al., 1997,

* Corresponding author at: Department of Health Disparities Research, The University of Texas M.D. Anderson Cancer Center, 1400 Pressler St., Unit 1440 (FCT9.6051), Houston, TX 77030-3906, USA. Fax: +1 713 792 1152.
E-mail address: skmama@mdanderson.org (S.K. Mama).

http://dx.doi.org/10.1016/j.pmedr.2015.01.001

2002a), few have explored these simultaneously using structural equation modeling (SEM), and almost none have done so exclusively in ethnic minority women. The purpose of this study was to examine the relative influence of individual, social and environmental factors on physical activity among African American and Hispanic women in the Southern U.S.

Methods

Study design

This study used baseline data from Health Is Power (HIP), which aimed to increase physical activity in African American and Hispanic women. HIP study details have been published previously (Lee et al., 2011b,c, 2012b). For the present study, individual questionnaire data were linked to participants' environmental data in Harris County, Houston and Travis County, Austin, Texas. All HIP assessments, measures and procedures were approved by the Committee for the Protection of Human Subjects at the University of Houston, and participants provided written informed consent.

Participants

Women were recruited to the study and participated in HIP from 2006 to 2008. Eligible participants were African American or Hispanic, aged 25–60 years, English or Spanish speakers, Harris or Travis County residents, not planning to move during the study, doing <90 min of physical activity per week, and free from health conditions that would be aggravated by physical activity (Thomas et al., 1992). Participants with complete individual and environmental data ($N = 164$) were included in the current study.

Procedures

Eligible participants attended a baseline health assessment, where they completed interviewer-administered questionnaires and a physical assessment and received an accelerometer. Participants' addresses were geocoded, and their neighborhoods were mapped using ArcGIS 9.1 (Esri, Redlands, CA; Parmenter et al., 2008). Neighborhood assessments were conducted by trained research team members in teams of two following established data collection and safety protocols (Heinrich et al., 2007; Lee et al., 2005).

Conceptual model

A conceptual model relating individual, social and environmental factors to physical activity was developed using the existing scientific literature. An extensive literature review was completed, focusing on studies with similar correlates as those in HIP in order to be able to test the model using existing data. The model was revised based on findings from in-depth interviews conducted with HIP participants (Mama et al., in press). Fig. 1 shows the direct effects of individual, social and environmental factors on physical activity and the indirect effects among factors. Latent constructs and the pathways included and excluded in the model were based on ecologic models of health behavior, empirical evidence derived from the literature, and findings from in-depth interviews.

Measures

Physical activity

Objective physical activity data were collected over 7 days using the ActiGraph GT1M accelerometer (ActiGraph, LLC, Pensacola, FL). Accelerometer data were collected as counts per 60 s and translated into minutes spent in moderate-vigorous physical activity (MVPA) per day for a seven day period using an individual cutpoint (Layne et al., 2011). The average number of MVPA per day was used in analyses.

Individual factors

Items assessing household income and education were drawn from the Maternal Infant Health Assessment survey (California Department of Public Health, 2010; Sarnoff and Hughes, 2005). Measures of body mass index (BMI = kg/m^2) and body fat were collected by trained personnel using established protocols (Lee et al., 2011b). Pulvers et al.'s (2004) culturally relevant body image questionnaire was used to measure perceived body image, and has shown good validity and reliability in minority populations. Participants chose a silhouette that most closely resembled them currently from a scale of figures representing BMI measures of 16 through 40 kg/m^2.

Psychosocial factors related to physical activity included self-efficacy and motivational readiness. Self-efficacy was measured using Bandura's

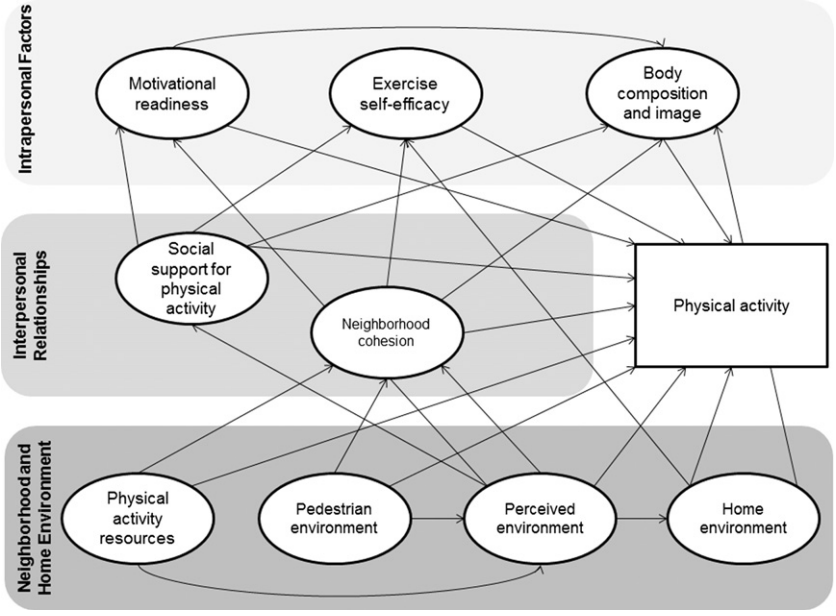

Fig. 1. Conceptual structural model of individual, social and environmental influences on physical activity.