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

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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,

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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

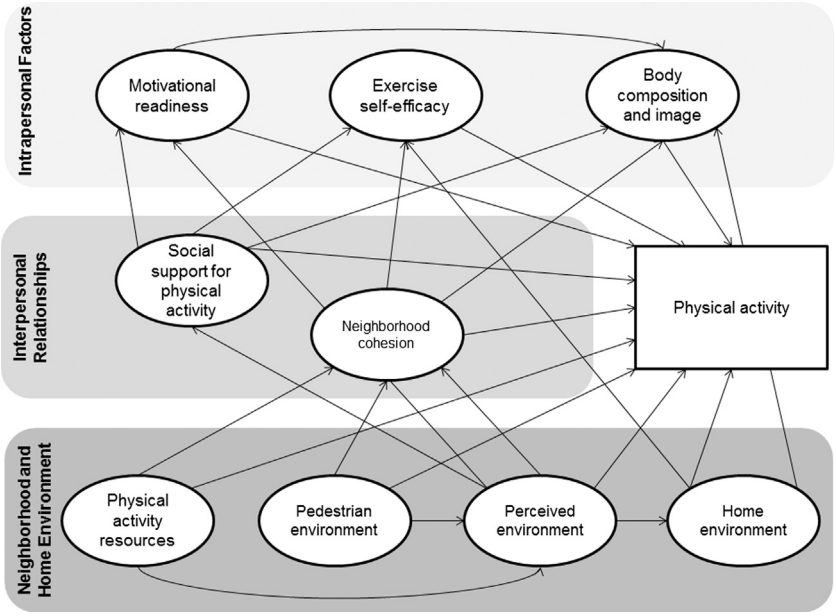

Fig. 1. Conceptual structural model of individual, social and environmental influences on physical activity.

Exercise Self-Efficacy Scale, an 18-item scale with answer choices in 10-unit intervals, ranging from 0 (cannot do) to 100 (certainly can do; Bandura, 1997), which has demonstrated high reliability in women (Shin et al., 2006). The Weight Stages of Change (WSC) short-form was used to measure weight loss intentions and readiness to engage in weight control. The WSC contains 4 items to determine stage of weight change, pre-contemplation, contemplation, action or maintenance (University of Rhode Island Cancer Prevention Research Center, 2008), and has shown similar patterns to movitational readiness for exercise for pros and cons by stage of change (Prochaska et al., 1994).

Social factors

Social support for physical activity was measured using the social support and exercise survey. The survey has five items to measure family support and five items to measure peer support and has shown high internal consistency and test re-test reliability (Sallis et al., 2002b). Neighborhood cohesion was measured using five items, which have shown high reliability as a measure of social cohesion and control at the neighborhood level (Sampson et al., 1997).

Environmental factors

The Physical Activity Resource Assessment (PARA, ©2010) was used as an objective measure of physical activity resources in participants' neighborhoods (Lee et al., 2005). Resources were audited on dimensions of presence and quality of physical activity features and amenities, and higher feature and amenity scores indicated a better quality physical activity resource (Lee et al., in press).

The Pedestrian Environmental Data Scan (PEDS) instrument was used as an objective measure of environmental features and pedestrian facilities related to walking and cycling (Clifton et al., 2007). Variables specifically used in this study were percent of segments with pedestrian facilities and the presence of buffers, path connections and lighting. These variables were selected to reduce multicollinearity with other PEDS variables and are consistent with previously reported relationships (Lee et al., 2012a).

The Physical Activity Neighborhood Environment Survey (PANES) was used to measure participants' self-reported perceptions of their neighborhood environment (Bauman et al., 2009). The PANES contains 17 items assessing perceptions of the neighborhood environment for walking and cycling and has been shown to have high reliability and content and criterion validity with respective environmental attributes for physical activity (Sallis et al., 2009, 2010).

Home factors related to physical activity were assessed using the Home Environment scale. Participants were asked to self-report supplies or pieces of equipment that can be used for physical activity in their home using a list of 15 items. The scale has demonstrated high validity for different types of exercise (Sallis et al., 1997). Only items used specifically for exercise (unmovable aerobic equipment, running

Table 1
Descriptive statistics for indicator and outcome variables.

	African American ($N = 108$) M (SD)	Hispanic or Latina ($N = 56$) M (SD)	Total ($N = 164$) M (SD)
Intrapersonal factors related to physical activity			
Motivational readiness for weight loss			
Categorical (range: 1–4)	2.9 (0.7)	3.0 (0.7)	3.0 (0.7)
Body composition and image			
BMI (kg/m^2)	34.8 (7.8)	35.1 (7.8)	34.9 (7.8)
Percent body fat	42.5 (7.0)	43.4 (6.5)	42.8 (6.8)
Perceived BMI (kg/m^2)**	28.7 (6.9)	32.6 (5.7)	30.0 (6.8)
Exercise self-efficacy*			
Scale (range: 0–100)	48.3 (20.9)	42.2 (19.1)	46.2 (20.4)
Interpersonal relationships			
Social support for physical activity			
From family (range: 0–20)	8.7 (4.3)	9.6 (4.5)	9.0 (4.3)
From peers (range: 0–20)	13.1 (3.8)	13.2 (3.3)	13.1 (3.6)
Neighborhood cohesion			
Neighbors help each other (range: 1–5)	3.7 (1.0)	3.7 (0.9)	3.7 (1.0)
Close knit neighborhood (range: 1–5)	3.3 (1.0)	3.1 (1.1)	3.3 (1.0)
Neighbors can be trusted (range: 1–5)	3.4 (0.8)	3.5 (1.0)	3.4 (0.9)
Neighbors get along (range: 1–5)	4.0 (0.9)	3.9 (0.7)	3.9 (0.8)
Neighbors share values (range: 1–5)	3.5 (1.0)	3.3 (1.1)	3.4 (1.0)
Neighborhood and home environment			
Physical activity resources			
Features (range: 0–39)	6.8 (3.7)	7.4 (4.4)	7.0 (4.0)
Amenities (range: 0–36)	11.9 (5.9)	11.0 (4.8)	11.6 (5.6)
Pedestrian environment			
Percent of segments with pedestrian facilities	72.7 (27.8)	73.3 (25.1)	72.9 (26.8)
Number of sidewalk buffers**	1.0 (0.5)	0.7 (0.4)	0.9 (0.5)
Number of path connections	3.3 (1.0)	3.0 (0.9)	3.2 (1.0)
Lighting**	1.0 (0.1)	0.8 (0.2)	0.9 (0.2)
Perceived neighborhood environment			
Scale (range: 1–5)	2.7 (0.5)	2.8 (0.4)	2.7 (0.4)
Home environment			
Percent with unmovable aerobic equipment	40.7 (44)	37.5 (21)	39.6 (65)
Percent with running shoes	92.6 (100)	87.5 (49)	90.9 (149)
Percent with weights	64.8 (70)	67.9 (38)	65.9 (108)
Percent with equipment to tone muscles	56.5 (61)	41.8 (23)	51.5 (84)
Percent with aerobic training videos**	80.6 (87)	55.4 (31)	72.0 (118)
Percent with step aerobic equipment**	36.1 (39)	12.5 (7)	28.0 (46)
Physical activity			
Accelerometer-measured (min/day)**	25.0 (21.4)	7.9 (7.8)	19.1 (19.7)

* $p < .05$.
** $p \leq .001$.

Table 2
Unstandardized (b) and standardized (β) and coefficients for measurement model.

	b	β	SE[a]	p[a]
Intrapersonal factors related to physical activity				
Motivational readiness				
Percent trying to lose weight	1.000	0.144	0.089	.103
Percent trying not to gain weight	1.412	0.233	0.120	.052
Percent trying to reach weight goal	3.012	0.926	0.431	.032
Exercise self-efficacy (ESE)				
When feeling tired	1.000	0.649	0.034	<.001
When under pressure from work	1.272	0.720	0.029	<.001
During bad weather	1.257	0.656	0.034	<.001
After recovering from an injury	1.112	0.727	0.028	<.001
During/after experiencing personal problems	1.334	0.768	0.025	<.001
When feeling depressed	1.355	0.721	0.029	<.001
When feeling anxious	1.290	0.719	0.029	<.001
After recovering from an illness	1.120	0.722	0.028	<.001
When feeling physical discomfort	1.081	0.678	0.032	<.001
After a vacation	1.396	0.768	0.025	<.001
When there's too much work at home	1.310	0.766	0.025	<.001
When visitors are present	1.267	0.700	0.030	<.001
When there are other interesting things to do	1.320	0.754	0.026	<.001
Without reaching exercise goals	1.367	0.777	0.024	<.001
Without support from family or friends	1.302	0.719	0.029	<.001
During a vacation	1.060	0.574	0.039	<.001
When there are other time commitments	1.188	0.752	0.025	<.001
After experiencing family problems	1.418	0.782	0.024	<.001
Body composition and image				
BMI (kg/m^2)	1.000	0.939	0.047	<.001
Percent body fat	0.782	0.870	0.046	<.001
Perceived BMI (kg/m^2)	0.289	0.352	0.052	<.001
Interpersonal relationships				
Social support				
Family encouraged me to do physical activities or play sports	1.000	0.648	0.037	<.001
Family did physical activity or played sports with me	0.885	0.782	0.027	<.001
Family provided transportation to place to do physical activities or play sports	0.844	0.713	0.032	<.001
Family watched me participate in physical activities or sports	0.836	0.780	0.027	<.001
Family told me I'm doing well in physical activities or sports	0.989	0.769	0.028	<.001
Encouraged friends to do physical activities or play sports	0.384	0.282	0.055	<.001
Friends encouraged me to do physical activities or play sports	0.349	0.264	0.055	<.001
Friends did physical activities or played sports with me	0.358	0.299	0.054	<.001
Friends teased me for not being good at physical activity sports	−0.086	−0.106	0.051	0.069
Friends told me I'm doing well in physical activities or sports	0.456	0.395	0.059	<.001
Percent trying to lose weight[b]	−0.104	−0.181	0.052	.001
Neighborhood cohesion				
Neighbors help each other	1.000	0.685	0.042	<.001
Close knit neighborhood	1.156	0.756	0.038	<.001
Neighbors can be trusted	1.094	0.803	0.036	<.001
Neighbors get along	0.596	0.496	0.049	<.001
Neighbors share values	0.565	0.396	0.059	<.001
Crime makes it unsafe during day[b]	−0.367	−0.227	0.061	<.001
Neighborhood and home environment related to physical activity				
Physical activity resources				
Features	1.000	1.404	0.451	.002
Amenities	0.473	0.483	0.160	.003
Pedestrian environment				
Percent of segments with pedestrian facilities	1.000	1.001	0.032	<.001
Number of sidewalk buffers	1.356	0.712	0.034	<.001
Number of path connections	1.644	0.446	0.051	<.001
Lighting	0.145	0.226	0.067	<.001
Sidewalks on streets[b]	1.600	0.426	0.049	.001
Sidewalks are well maintained[b]	0.707	0.170	0.050	<.001
Perceived neighborhood environment				
Shops and stores nearby	1.000	0.260	0.061	<.001
Transit stop nearby	−0.415	−0.104	0.064	.103
Sidewalks on streets	0.666	0.209	0.057	<.001
Bicycle facilities nearby	1.860	0.421	0.056	<.001
Recreation facilities in neighborhood	1.512	0.466	0.053	<.001
Crime makes it unsafe at night	−1.785	−0.465	0.054	<.001
Traffic makes it difficult to walk	−1.705	−0.498	0.054	<.001
See people being physically active	1.929	0.638	0.043	<.001
Interesting things to look at	1.734	0.536	0.049	<.001
Many four-way intersections	−0.451	−0.133	0.063	.035
Sidewalks are well maintained	1.581	0.447	0.053	<.001
Bicycle facilities are well maintained	2.072	0.473	0.053	<.001
Traffic makes it difficult to bike	−1.347	−0.360	0.058	<.001
Crime makes it unsafe during day[b]	−1.186	−0.350	0.068	<.001
Many places within walking distance	1.634	0.471	0.053	<.001

Table 2 (*continued*)

	b	*β*	*SE*[a]	*p*[a]
Home environment				
Unmovable aerobic equipment	1.000	0.209	0.066	.001
Running shoes	0.795	0.281	0.064	<.001
Weights	2.448	0.546	0.056	<.001
Equipment to tone muscles	3.062	0.634	0.053	<.001
Aerobic training videos	2.343	0.537	0.057	<.001
Step aerobic equipment	2.233	0.499	0.058	<.001
Physical activity	1.000	1.000		.001

[a] Standard errors and *p*-values reported for standardized estimates.
[b] Indicates cross-loading on multiple constructs.

shoes, weights, equipment to tone muscles, aerobic training videos, and step aerobic equipment) were included in analyses.

Statistical analysis

Descriptive statistics were computed for all variables by ethnicity, and *t*-tests were used to compare differences. To meet assumptions of normality, physical activity data were transformed using an exponential transformation. Objectively-measured environmental factors, including PARA and PEDS data, were aggregated to the neighborhood level. Confirmatory factor analyses were used to confirm the relationships between latent variables and indicator variables; SEM was used to determine the direct and indirect effects of individual, social and environmental factors on physical activity. Although 200 is typically the goal for SEM research, we determined our sample size of 164 was large enough to assess model fit based on the number of degrees of freedom and use of full information maximum likelihood (FIML) estimates for missing data (Little and Rubin, 2002; Loehlin, 2004; Muthén and Muthén, 1998–2012; Tanaka, 1987). All models were tested in Mplus version 7 (Muthén & Muthén, Los Angeles, CA). FIML estimates with the chi-square fit statistic, the Tucker–Lewis index (TLI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA) were used as indices of goodness of fit (Gefen et al., 2011; McDonald and Ho, 2002; Schreiber et al., 2006).

Results

Participant characteristics

Of the 164 participants included in the current study, 65.9% were African American. Women were in their mid-40s ($M = 45.6 \pm 9.3$ years), 20.9% were overweight, and 71.8% were obese (M BMI $= 34.9 \pm 7.8$ kg/m^2). Most participants completed some college (41.1%) or were college graduates (49.7%), and over half (56.9%) reported a household income greater than $82,600 (above 400% of the federal poverty level in 2007). African American women did more physical activity (25.0 versus 7.9 MVPA min/day; $t = 7.1$ $p < .001$) than Hispanic women. Therefore, we controlled for race/ethnicity in all subsequent models. Table 1 presents descriptive statistics for all variables included in the model.

Measurement model

The measurement model included nine latent constructs measured by 66 indicator variables. Correlations among indicators across constructs ($N = 201$; results available upon request) ranged from −.375 to .495, with the greatest number of correlations occurring between neighborhood cohesion and perceived environment ($n = 52$) and exercise self-efficacy and home environment ($n = 31$). The overall fit of the measurement model was acceptable based on fit indices ($X^2(1994) = 2491.6$, RMSEA = .027, RMSEA 90% CI = [.024,.031], TLI = .939, CFI = .944, SRMR = .051). Final standardized and unstandardized factor loadings for the measurement model are shown in Table 2.

Structural model

The proposed structural model fit was acceptable ($X^2(2133) = 2786.4$, RMSEA = .030, RMSEA 90% CI = [.027, .033], TLI = .923, CFI = .928). The final model with significant pathways and standardized coefficients is shown in Fig. 2, and standardized and unstandardized coefficients for indirect pathways are shown in Table 3. Body composition and image had a significant direct effect on physical activity ($\beta = -0.307$, $p = .001$) and mediated the relationship between motivational readiness and physical activity ($\beta = 0.111$, $p = .038$). Perceived environment mediated the relationship between physical activity resources and neighborhood cohesion ($\beta = 0.156$, $p = .001$) and social support for physical activity ($\beta = 0.054$, $p = .016$). Perceived environment also mediated the relationship between the pedestrian environment and neighborhood cohesion ($\beta = 0.157$, $p < .001$) and social support for physical activity ($\beta = 0.054$, $p = .011$). There was also a significant indirect association between perceived environment and body composition and image through neighborhood cohesion ($\beta = 0.082$, $p = .046$).

Discussion

This study explored the influence of multilevel factors on physical activity in African American and Hispanic women using SEM. Body composition and image was the only factor directly associated with physical activity, suggesting that physical activity is most heavily influenced by individual factors related to weight. Although the complete indirect pathway from the environment to physical activity was not significant, indirect associations among individual, social and environmental factors contribute to our understanding of how multilevel correlates of physical activity are related in ethnic minority women.

In addition to the direct association between body composition and image and physical activity, we found an indirect association between motivational readiness and physical activity operating through body composition. Although previous studies have shown direct associations between individual factors and physical activity (Delahanty et al., 2006; Tavares et al., 2009), few have explored the relationship between motivational readiness for weight loss and physical activity, and none have explored body composition and image as a mediator of this relationship. Perceptions of the environment significantly mediated the relationship between neighborhood and social environments, which indirectly influenced physical activity through body composition and image. The relationship seen between the objectively measured neighborhood environment and the perceived environment is consistent with the current literature (Foster et al., 2013; McAlexander et al., 2012). Environmental perceptions have been found to be an important mediator between the built environment and physical activity and a moderator of the relationship between social support and physical activity, leading to increases in transportation-related and leisure-time walking (Van Dyck et al., 2013, 2014). There is also a known strong, persistent

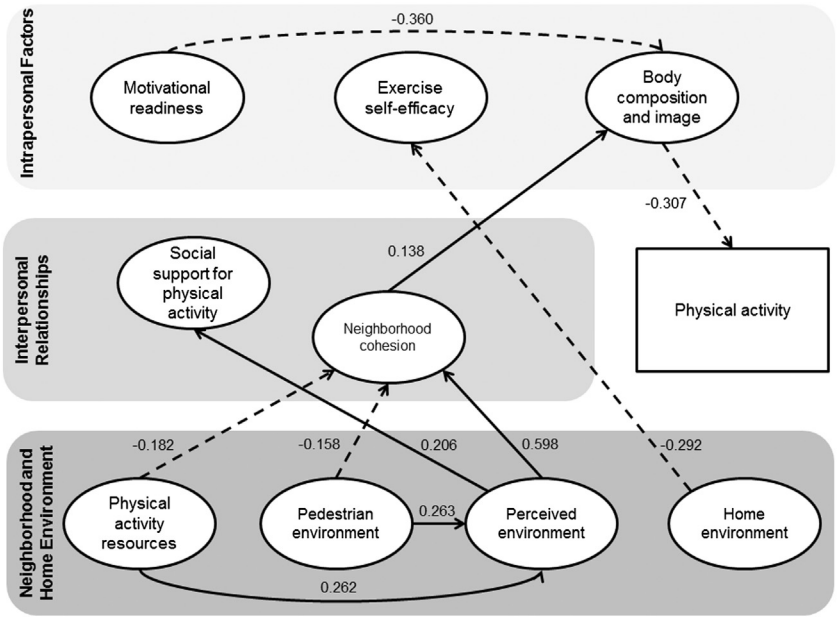

Fig. 2. Structural model with significant pathways and standardized (β) path coefficients. Note: Pathways with positive path coefficients are indicated in bold, and dashed lines indicate pathways with negative path coefficients. Pathways from the conceptual model that were not significant in the structural model are not shown.

association between physical activity and social support from neighbors, family and friends (Barber, 2013; de Farias Junior et al., 2014; Martinez et al., 2013; Poortinga, 2006). These findings, coupled with the current study's results, suggest that intervention at the environmental level may directly influence the social environment, and that the perceived environment and neighborhood cohesion play a pivotal role in the relationship between the measured built environment and body composition and image, which we found to directly influence physical activity. Thus, improving African American and Hispanic women's perceptions of their neighborhood environment and increasing neighborhood cohesion may lead to increased physical activity adoption and maintenance in this at risk population.

Results from this study highlight the ongoing need to gain a better understanding of what encourages ethnic minority women to do physical activity for health promotion at a population level. While previous quantitative and qualitative studies have emphasized the importance of the social and physical environments, the current study confirms the need to continue to address individual factors, particularly those related to weight, in physical activity interventions targeting African American and Hispanic women. Results from a recent study (Johnson et al., 2013) also support the need to incorporate body image into health behavior models, such as the transtheoretical model (Johnson et al., 2008). Further research is needed to increase understanding of how body composition and image and motivational readiness may directly and indirectly promote physical activity. Future interventions should also focus on improvements to pedestrian facilities and physical activity resources in the neighborhood environment as part of an ecologic approach and important for behavior change in ethnic minority women. Policy changes to enhance the neighborhood environment, such as increasing the presence of sidewalks, improving lighting, and increasing access to high quality physical activity resources, may lead to better perceptions of the environment and increased social support and neighborhood cohesion among residents.

Few studies have sought to explore multilevel influences on physical activity in African American and Hispanic women. We used SEM to determine direct and indirect correlates of physical activity and used an objective measure of physical activity. Models fit the data well and helped explain physical activity in a sizeable sample of African American and Hispanic women. Further research is needed to determine how results compare to non-Hispanic white populations and diverse low-income populations. Although innovative, this study is not without limitations. Due to the limited number of Hispanic women with complete individual and environmental data, we were unable to complete multi-group analyses to determine differences by ethnicity. As this is one of numerous possible models that could explain physical activity in women using these same variables, the addition or removal of proposed pathways may tell a different story and expose additional direct and indirect influences on physical activity, warranting further research. Additionally, our ability to operationalize variables in

Table 3
Unstandardized (b) and standardized (β) coefficients for indirect pathways in structural model.

	b	β	SE^a	p^a
Motivational readiness →				
Body composition and image	−26.192	−0.360	0.105	.001
Social support for physical activity →				
Motivational readiness	−0.002	−0.014	0.095	.879
Exercise self-efficacy	0.011	0.006	0.061	.927
Body composition and image	−0.532	−0.059	0.064	.353
Neighborhood cohesion →				
Exercise self-efficacy	−0.005	−0.002	0.064	.974
Body composition and image	1.590	0.138	0.067	.039
Physical activity resources →				
Neighborhood cohesion	−0.032	−0.182	0.067	.006
Perceived neighborhood environment	0.022	0.262	0.068	<.001
Pedestrian environment →				
Neighborhood cohesion	−0.389	−0.158	0.061	.010
Perceived neighborhood environment	0.307	0.263	0.060	<.001
Perceived neighborhood environment →				
Motivational readiness	0.045	0.135	0.094	.153
Social support for physical activity	0.558	0.206	0.065	.002
Neighborhood cohesion	1.258	0.598	0.066	<.001
Home environment	−0.032	−0.088	0.079	.268
Home environment →				
Exercise self-efficacy	−4.319	−0.292	0.069	<.001
Body composition and image	3.753	0.056	0.073	.443

[a] Standard errors and p-values reported for standardized estimates.

the model was limited to variables collected as part of HIP. Therefore other known barriers to physical activity, such as crime and perceived safety (Evenson et al., 2012), should be considered as part of future studies and models. Last, the women included in the current study were of high socioeconomic status in contrast to previous studies that have focused on ethnic minorities. Thus, findings from this study may not be generalizable to low socioeconomic status, non-overweight/obese African American and Hispanic women, or those residing in rural areas.

Conclusions

This study confirms the value of using an ecologic framework to understand behavior and the importance of multilevel strategies to influence physical activity. We found that body composition and image and an interplay among individual factors directly and indirectly influenced physical activity, and that neighborhood cohesion played a pivotal role in the relationship between individual and environmental variables. Findings suggest that environmental changes may have a greater impact on physical activity in ethnic minority women when coupled with individual strategies, such as improving body image perceptions and increasing motivational readiness for weight loss.

Conflict of interest

The authors declare that there are no conflicts of interest.

Acknowledgments

Funding for this study was provided by a predoctoral fellowship (NIH F31NR013349) awarded to Scherezade K. Mama by the National Institute of Nursing Research and by a research grant (NIH R01CA109403) awarded to Rebecca E. Lee by the National Cancer Institute. The authors would like to thank the many colleagues, staff, and students who assisted in the collection, processing and management of data throughout the Health Is Power study.

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