Social-ecological determinants of leisure-time physical activity among African Americans: a structural equation analysis

Kaigang Li, PhD[1], Dong-Chul Seo, PhD[2], Mohammad R. Torabi, PhD[2],
Chao-Ying J. Peng, PhD[3], Noy S. Kay, HSD[2], Lloyd J. Kolbe, PhD[2]

[1]University at Albany, School of Public Health; [2]Indiana University, School of Health, Physical Education and Recreation
[3]Indiana University, School of Education

Introduction and Purpose

The benefits of engaging in regular physical activity (PA) to reduce the risk of many detrimental health outcomes have been sufficiently documented. Although PA level was lower among African Americans than Caucasians, African Americans showed a higher level of occupational PA, yet lower LTPA, than their White counterparts in both regional and national representative samples. It is suggested that lifestyle-related PA, i.e., leisure-time physical activity (LTPA) defined as "primarily exercise or sports-related activities may be more likely than other physical activities (e.g., PA as part of regular job duties, housework, or transportation) to be the predictor of obesity among African Americans.

Beyond demographic factors such as age and gender, and psychosocial determinants of PA, the context in which behavior occurs must be recognized in order to develop appropriate interventions. Social Cognitive Theory and, more recently, Ecological Models can supplement traditional psychosocial models or predictors of PA by providing more universal frameworks that recognize intrapersonal, interpersonal, environmental and policy related factors affecting PA. But, very few studies have taken advantage of such a framework in a single study. Furthermore, few studies have adopted such a comprehensive approach to examining predictors of PA, particularly LTPA, among African Americans – a population at risk of low PA and the associated negative health outcomes.

The **purpose** of this study was to develop and test an explicative model (the hypothesized SEM model was illustrated in Figure 1) of LTPA, including 6 of its contributory factors [i.e., self-efficacy, self-regulation, social support, perceived physical environment, outcome-expectancy value (OE-V), and policy beliefs].
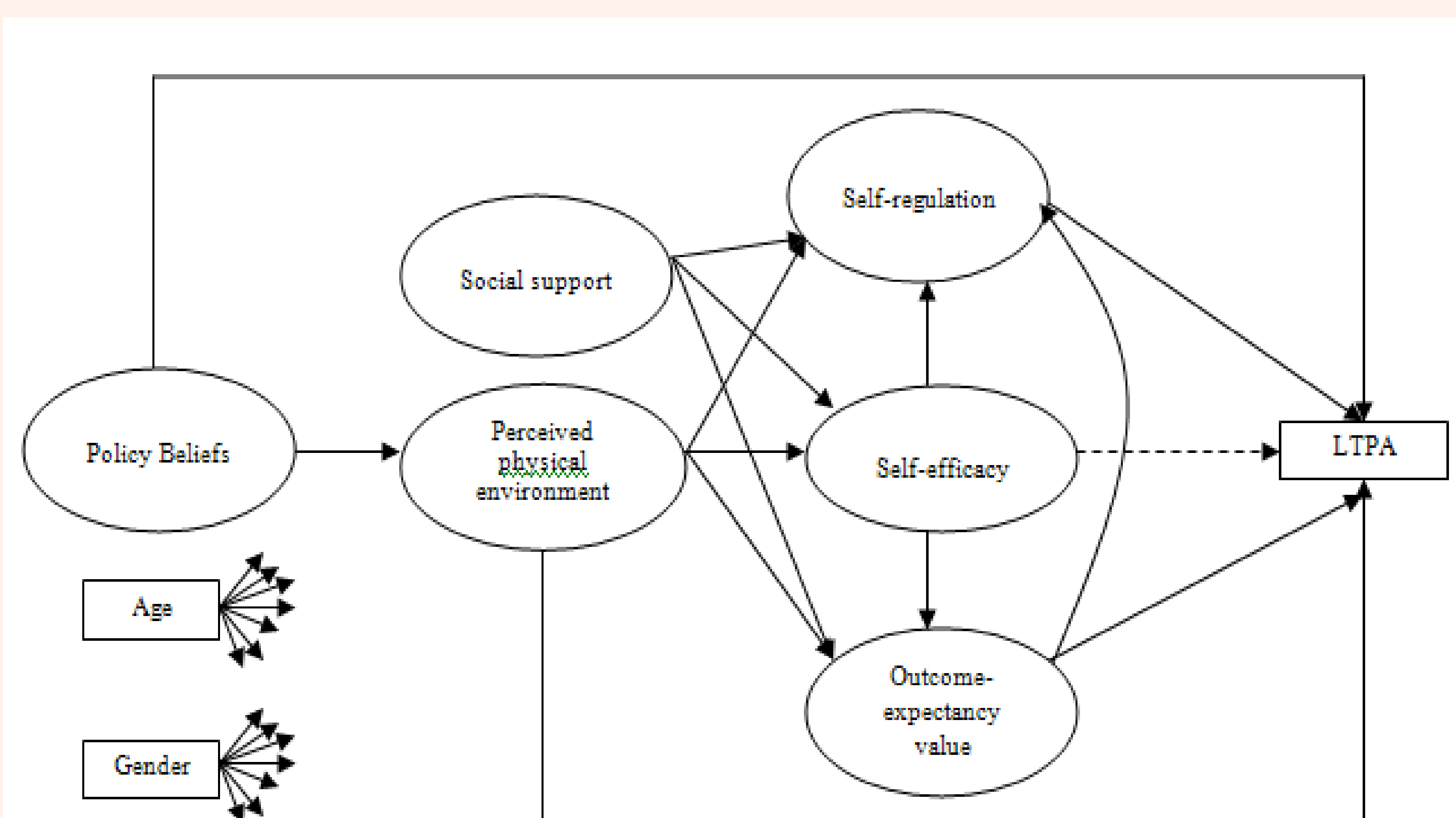
Fig. 1. Social ecological model of leisure-time physical activity. Dotted path was an alternative model. Note: The paths (not shown due to limited space) were freed between the two observed independent variables (i.e., age and gender) and all latent variables and LTPA with single-directional arrows pointing to latent variables and LTPA.

Participants

➤ Of the 569 participants, 69% were females

➤ Participants ranged in age from 18 to 84 years (*Mean* = 41.17 years; *SD* = 14.05 years) Age was measured as a continuous variable.

➤ Gender was dummy-coded (female = 1; male = 0).

➤ All participants declared themselves to be African Americans.

Methods

Procedures

The survey was administered to 27 out of 52 African American Churches in Indianapolis. A total of 649 participants were recruited. The final tally of the present study was 569 participants after excluding inappropriate individuals.

Outcome Variable

➤ The continuous LTPA was categorized into two groups based on the recommended LTPA for important health benefits:
< 150 minutes vs. ≥ 150 minutes moderate LTPA per week.

Social-ecological Constructs

➤ Self-efficacy. (n=11), α = .896,

➤ Self-regulation. (n=6), α = .882

➤ Social support consisting two sub-scales
  ○ Family social support (n = 5), α = .883
  ○ Friend social support (n = 6), α = .911

➤ Perceived physical environment consisting of two derived sub-scales
  ○ perceived facility accessibility (n=6) = *importance* of the access to facilities (n=6) for performing LTPA **times** the *availability* of those facilities (n=6), α = .730

  ○ perceived environment quality (n=7) = score of rating the *influence* of characteristics on your intention to perform LTPA regularly **times** the e*xistence* of those characteristics (n=7), α = .651

➤ Outcome-expectancy value (OE-V) consisting of two derived sub-scales

  ○ Positive OE-V (n=5) = outcome expectation (n=5) X *likelihood* **times** their importance (n=5), α =.815

  ○ Negative OE-V (n=5) = outcome expectation (n=5) X *likelihood* **times** the importance (n=5), α =.753

➤ Policy belief (n=4). α =.879

Statistical Analyses

➤ Structural equation modeling (SEM) was used to test both direct and indirect effects of latent constructs on the outcome variable (i.e., LTPA) simultaneously Weighted least squares estimation (WLSM) was used to test model statistics.

➤ The model fit was assessed by multiple fit indices including Chi square statistic, standardized root mean square residual, root mean square error of approximation, comparative fit index and Tucker-Lewis index.

Results

The SEM analysis results indicated this model's good fit to the data.

LTPA was influenced (1) directly and significantly by self-regulation and gender; (2) indirectly and significantly by social support, self-efficacy, perceived access to LTPA facilities, and positive OE-V; and (3) overall and significantly by self-regulation, social support, self-efficacy, gender, and negative OE-V, in descending order of the corresponding coefficients.

Self-efficacy did not exert strong effect on LTPA independent of self-regulation in African Americans.
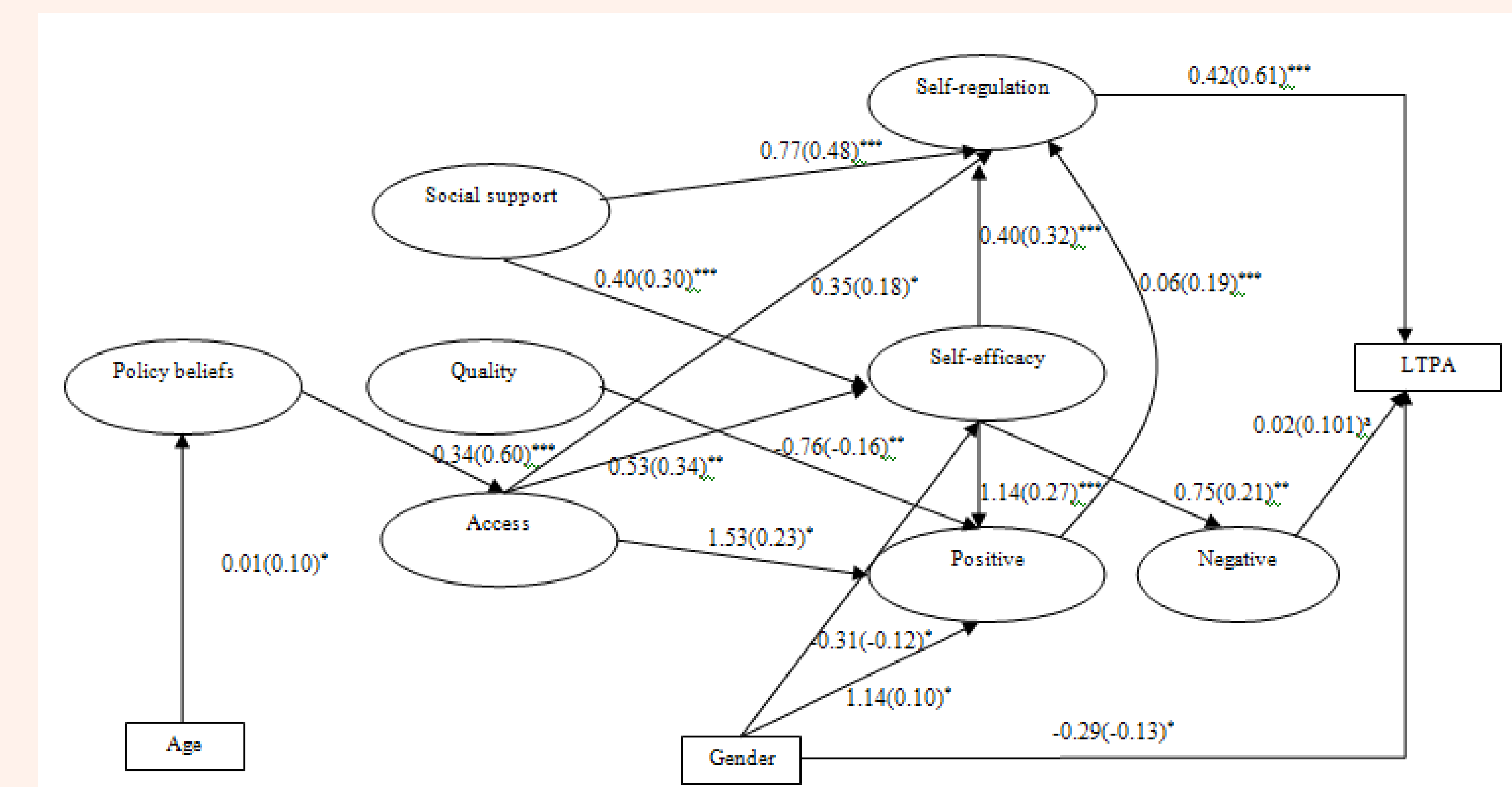
Fig 2. Structural equation analysis of the social ecological model of leisure-time physical activity (LTPA) among church-based African Americans.
Note: *p < .05. **p < .01. ***p < .001.
[a] This path was shown because the total effect of negative outcome expectancy was significant. OE-V: outcome-expectancy value. Only statistically significant paths are included in this figure. Both standardized (in parentheses) and unstandardized parameter estimates are shown.

Conclusions and Implications

Overall, the results of this study help to clarify the relationships among factors and LTPA in a multilevel social-ecological framework advocated by increasing researchers in a sample of African Americans.

(1) Although people with a high sense of efficacy may more easily accomplish a behavior change, the current findings indicate that great will and ability to perform LTPA (e.g., high level self-efficacy) alone may not help people to engage in regular PA. Only if people obtain self-regulatory strategies and skills and intend to organize their time for LTPA, high-level self-efficacy may ultimately lead to LTPA.

(2) This study also found social support from friends and family may effectively increase people's PA through enhancing self-efficacy and self-regulation behaviors. This suggests that a PA intervention may more easily succeed if the target population of the intervention includes people in their close network, so participants may improve their behavioral norms together and provide support to each other.

(3) This study suggests that building more health-promoting environments based on planned policies should lead to wide-reaching and long-lasting effects on increased PA levels in communities although future studies should provide more evidence of physical environment and policy as correlates of LTPA.

(4) These findings suggest that a PA intervention should pay more attention to female African American adults to help them overcome barriers to regular PA in both psychological and physical aspects. In sum, multilevel interventions should be applied to improve regular PA behavior, although several barriers to multilevel intervention have been indicated.