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Positive Action for Today's Health (PATH): Sex differences in walking and perceptions of the physical and social environment

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Abstract

Research indicates that people from low socioeconomic and ethnic minority backgrounds disproportionately fail to meet the weekly national recommendations for physical activity. Perceptions of environmental factors may be significant barriers to walking in communities experiencing high rates of crime and poverty and may impact women and men differently. The present study investigated sex differences in the impact of perceptions of the environment and overall neighborhood quality on walking in an underserved population. Participants were 195 African American women and 95 African American men. Baseline data indicated that women reported greater concerns about safety, poorer perceptions of aesthetics, and lower neighborhood satisfaction than men. Regression analyses showed that perceptions of access to places for walking significantly predicted walking for both women and men and that sex moderated the effect of neighborhood satisfaction. These results suggest that interventions focused on building accessibility to places for walking while also addressing social environmental concerns are needed in high crime communities.

Introduction

It is well established that regular moderate physical activity (PA), such as walking, has many health benefits (US DHHS, 2008) but that most Americans, especially low-income and ethnic minority groups, do not meet the national recommendations of 150 minutes of moderate PA per week (Haskell et al, 2007). In line with an ecological perspective of health, current theory (Alfonzo, 2005; Franzini et al., 2010; Saelens, Sallis, & Frank, 2003) and a growing body of literature indicate that environmental factors and perceptions may influence the decision to walk (see Owen, Humpel, Leslie, Bauman, & Sallis, 2004; Saelens & Handy, 2008 for reviews). Since most walking occurs outdoors in neighborhood streets (Eyler, Brownson, Bacak, & Housemann, 2003; Giles-Corti & Donovan, 2002a), environmental variables may be of particular relevance to walking versus other types of PA.

Health promotion interventions are needed, especially in African American and other minority communities which are at greater risk for physical inactivity and related illness (Miles, Kruger, Liao, Carlson, & Fulton, 2011; Pekmezi & Jennings, 2009; Wilson, 2009).

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Understanding the environmental correlates of walking may inform health promotion interventions, many of which focus on walking given its desirability, ease, and positive impact on chronic disease (Miles, Kruger, Liao, Carlson, & Fulton, 2011). Environmental approaches are particularly important for promoting physical activity in minority populations because they directly address barriers, such as access and safety, that are known to limit walking (Pekmezi & Jennings, 2009). In Addition, the American Heart Association specifically recommends that interventions in minority populations assess and address environmental barriers to behavior change (Artinian et al., 2010).

The purpose of the present study was to investigate the relationship of walking for pleasure with environmental variables consistent with an ecological framework: safety, access to places for walking, access to services, aesthetics, and neighborhood satisfaction (Alfonzo, 2005; Saelens, Sallis, & Frank, 2003). Moreover, because sex differences in environmental predictors of walking in underserved communities are not well understood, this study examined sex as a moderator of the relationship between environmental perceptions and walking. Finally, this study extends the current literature by targeting a low-income, ethnic minority sample, a population known to be at greater risk for physical inactivity and related chronic disease (Flegal, Carroll, Ogden, & Curtin, 2010; Hossain, Kavar, & El Nahas, 2007; Lloyd-Jones et al., 2010; Marshall et al., 2007).

Theoretical framework

Conceptualizations of the influence of environment on walking have generally been broad, and a lack of theory-based research has led to an abundance of descriptive data looking only at main effects of environmental factors (Nelson, Wright, Lowry, & Mutrie, 2008). Indeed, a range of variables have been studied with the most common being residential density, sidewalk and street connectivity, access to or convenience of places or facilities for walking, safety from crime, safety from traffic, access to services or destinations (related to land use mix), aesthetics, and composite indices of neighborhood quality (Owen, Humpel, Leslie, Bauman, & Sallis, 2004). Other theoretical frameworks have been more specific in defining the relationship between environmental factors and walking. In a key article, Saelens, Sallis, & Frank (2003) emphasized the use of an ecological approach, endorsing the use of measures of perceptions of the environment, the inclusion of psychosocial and demographic variables, and the examination of interactions between environmental and intrapersonal variables in empirical models. Alfonzo (2005) further built upon the ecological framework, proposing a theory that might enable an understanding and testing of the complex relationship between the built environment and walking across different populations and settings. Alfonzo suggested that the individual's perception of the satisfaction of a walking need more proximally predicts walking than objective reality. Alfonzo also suggested that perceptions are shaped by intrapersonal characteristics, such as sex. Furthermore, needs may be satisfied on different levels simultaneously, may be satisfied partially or foregone altogether before moving up the hierarchy, and may be satisfied in variable order. Socio-demographic and psychosocial characteristics moderate satisfaction thresholds and how an individual relates to the hierarchy. Together, these conceptualizations of environmental determinants of walking emphasize three important ideas: access, safety, aesthetics, and overall neighborhood quality are four key factors related to walking, intrapersonal factors

moderate the impact of environmental perceptions on walking, and perceptions, rather than objective measures, of the environment influence behavior. As such, the present study focused on perceptions of access, safety, aesthetics and overall neighborhood satisfaction as predictors of walking and sex as a moderator of these relationships.

Environmental perceptions and walking in low-income, minority communities

While it is well established, conceptually and empirically, that both objective and subjective measures of the environment are related to walking (Giles-Corti & Donovan, 2002a; Lin & Moudon, 2009; Saelens, Sallis, & Frank, 2003), attention to subjective measures is growing. Although geographical information system (GIS) data enable estimates of walkability based on density, pedestrian infrastructure, and land use diversity, these indicators miss the psychological experience of walking, an important determinant (Brown, Werner, Amburgey, & Szalay, 2007). Subjective ratings provide a richer picture of what environmental features are most salient to pedestrians (Brown, Werner, Amburgey, & Szalay, 2007). Moreover, ecological theory emphasizes an individual's phenomenological experience (Bronfenbrenner, 1979) and thus places them more proximally to intrapersonal factors and behavior (Sallis, Owen, & Fisher, 2008). Given the more proximal relationship to walking and intrapersonal determinants of walking, perceptions of the environment may interact with psychosocial or demographic variables more directly than the objective environment to impact walking behavior. Likewise, perceptions may be more relevant when examining sex differences in environmental impacts on walking.

Perceptions of the environment may be particularly relevant for underserved individuals. And, the types of environmental factors that influence individuals in underserved communities may be unique. For example, low-income, ethnic minority communities tend to have similar accessibility than those of higher SES, but residents perceive less access to places for walking (Wilson, Kirtland, Ainsworth, & Addy, 2004; Giles-Corti & Donovan, 2002b). Ethnic minorities and low SES individuals tend to also have poorer perceptions of safety, comfort, and pleasurable (Boslaugh, Luke, Brownson, Naleid, & Kreuter, 2004; Franzini et al., 2010; Sallis et al., 2011). These perceptions directly impact walking behavior. Both qualitative (Gallagher, Gretebeck, Robinson, Torres, Murphy, & Martyn, 2010; Griffin et al., 2008; Hooker, Wilcox, Rheaume, Burroughs, & Friedman, 2011; Wilson, et al., in press) and quantitative (Miles, Panton, Jang, & Haymes, 2008; Scott et al., 2009; Wilson et al., 2004) studies have highlighted poor perceptions of safety, access, and aesthetics as barriers to walking in low-income and minority individuals. For example, Wilson et al. (2004) found that for low, but not high, SES individuals, having access to walking trails predicted walking for 150 minutes per week. Likewise, Scott et al. (2009) found that African American, but not Caucasian, participants' perception of safety was the strongest correlate of recreational walking. Miles and colleagues (2008) had a similar finding when comparing a low-income African American neighborhood to a middle-income African American neighborhood. Indeed, in underserved communities with high rates of poverty and violent crime, environmental perceptions may be especially important and may explain the health disparities that persist in these communities (Floyd, Taylor, & Whitt-Glover, 2009; Krieger, Rabkin, Sharify, & Song, 2009). However, the evidence base to date

is still limited with few studies specifically investigating environmental perceptions as correlates of walking in minority communities.

Sex as a moderator of perceptions of the environment and its influence on walking

While previous research suggests that men and women have different perceptions of safety, access, aesthetics, and the overall neighborhood environment, it is not clear how these perceptions may impact walking differentially by sex or whether these results generalize to low income, minority populations. In general, sex does seem to impact perceptions of safety, and safety concerns are reported as more of a barrier to walking in women than men (Bengoechea, Spence, & McGannon, 2005; Miles & Patton, 2006; Roman & Chafin, 2008; Wood et al., 2008), but their impact on walking is unclear. For example, some investigators have found that lower perceptions of safety were significantly associated with less walking in women (Foster, Hillsdon, & Thorogood, 2004; Suminski, Poston, Petosa, Stevens, & Katzenmoyer, 2005); however, others have shown the opposite pattern of results (e.g., Humpel, Owen, Iverson, Leslie, & Bauman, 2004). Results from previous studies also suggest that perceived accessibility to destinations is more important for women than men (Foster, Hillsdon, & Thorogood, 2004; Suminski et al., 2005). Similarly, Kondo et al. (2009) found that access to places for walking was related to walking for both men and women, others have shown this variable is more important for women (Humpel, Owen, Iverson, Leslie, & Bauman, 2004) or more important for men (Foster, Hillsdon, & Thorogood, 2004). Previous authors also found that aesthetics are more important for walking for men than women (Humpel, Owen, Iverson, Leslie, & Bauman, 2004; Humpel et al., 2004; Kondo et al., 2009). Finally, Bopp et al. (2006), using a composite score of environmental factors similar to neighborhood satisfaction, found that environmental perceptions predicted walking for African American men but not African American women. Overall, few of the studies of sex differences in environmental perceptions have been conducted with underserved, minority populations (Bopp et al., 2006), leaving a gap in the current literature in understanding sex differences in environmental perceptions and their impact on walking in this at-risk population.

In summary, the present study expanded on previous research by using an ecological framework to investigate sex differences in the impact of perceptions of the environment on walking in an underserved, African American population. The focus was on walking for pleasure. Previous literature suggests that walking for different purposes may have different environmental correlates (Saelens & Handy, 2008). Therefore, it is expected that walking for pleasure may have unique environmental perception correlates as well. The first aim was to determine if perceptions of access to places for walking, access to services, safety from crime, aesthetics, and overall neighborhood satisfaction influence walking for pleasure in low-income, high-crime communities. The second aim was to determine if sex differences moderated these relationships.

Methods

Participants

Participants were 290 African American adults who were enrolled in the Positive Action for Today's Health (PATH) Trial. The PATH Trial was a community-based intervention where communities were randomized to either improve access and safety for PA or to a general health education only program (Wilson et al., 2010; Coulon et al., 2012). Three high-crime, low-income African American communities in South Carolina participated in the trial. The communities were selected based on census tract data and matched based on crime statistics, which indicated higher rates of violent crime (murders, rapes, aggravated assaults) than the state, on average. Individual participants were recruited from telephone lists, through word of mouth, and through community advertisements such as church announcements and flyers (see Wilson et al., 2010 for details). Inclusion criteria included 1) African-American (three of four grandparents of African heritage), 2) age 18 years or older, 3) no plans to move in the next 2 years, 4) no medical condition that would limit participation in moderate intensity exercise including life-threatening illness (e.g., immobile, severely disabled, or bed ridden), 5) residing in the designated census tracts for each community, 6) availability to participate in the evaluations and intervention over the study period, and 7) controlled blood pressure (<180/<110) and blood sugar levels (< 300 non-fasting, !250 fasting).

Procedure

Baseline measurements were conducted simultaneously at health screenings in local community centers in the three communities to control for extraneous environmental and historical variability. The procedures were approved by the University of South Carolina IRB and all participants gave informed consent prior to data collection. Trained and certified measurement staff collected anthropometric data (height, weight, and waist circumference) and health outcome measures, administered a psychosocial questionnaire, and supplied forms for the Four Week History (FWH) interview (Richardson, Leon, Jacobs, Ainsworth, & Serfass, 1993). The FWH interviews were conducted by phone. Participants received a \$10 gift for participating in the screening and \$15 for completing the FWH call.

Measures

Dependent variable: Four Week History—The Four Week History (FWH) recall is an interviewer administered survey assessing leisure time PA patterns. It has been previously validated and was adapted from the Minnesota Leisure Time PA (LTPA) Questionnaire (Richardson et al., 1993). Participants provide data on the number of times per week for the past four weeks and the average duration per occasion for several different physical activities. This study focused on the Walking for Pleasure data. These items were focused on “walking for pleasure” only and explicitly excluded transportation or other types of walking. Using the Compendium for Physical Activities (Ainsworth et al., 2011), we found the metabolic equivalent (MET) intensity level for walking for pleasure (3.5 METs). The MET is a standardized intensity estimate defined as the ratio of work metabolic rate to resting metabolic rate; activities estimated as less than 3 METs are defined as light PA, 3–6 METs as moderate PA, and greater than 6 METs (Ainsworth et al., 2000; Ainsworth et al., 2011).

We then calculated estimates of intensity by frequency (MET*minutes/day) for walking. This type of PA estimate is commonly used in the PA literature.

Independent variables: Neighborhood Environment Walkability Scale—Several subscales from the Neighborhood Environment Walkability Scale (NEWS; Saelens, Sallis, Black, & Chen, 2003) were used to assess perceptions of the neighborhood environment. The NEWS has been previously validated as a multi-factor scale (Cerin, Saelens, Sallis, & Frank, 2006) and for use in ethnically diverse, urban populations (e.g., Cerin, Conway, Saelens, Frank, & Sallis, 2009). The NEWS demonstrates acceptable test-retest reliability (e.g., Saelens, Sallis, Black, & Chen, 2003) and internal consistency similar to that reported below (e.g., Adams et al., 2012). For the included subscales (see below for descriptions), participants responded on a four-point Likert-type scale ranging from “Strongly Disagree” to “Strongly Agree”, except the neighborhood satisfaction subscale for which response options ranged from “Strongly Dissatisfied” to “Strongly Satisfied” on a five-point Likert-type scale. For all subscales, items were coded so that higher scores reflected a more positive perception of the environment.

Perceptions of Safety from Crime: The NEWS subscale H was used to assess perceptions of crime and neighborhood characteristics related to crime. This is a six item scale, and example items are, “My neighborhood streets have good lighting at night” and “There is a high crime rate in my neighborhood” (reverse coded). One item, “I see and speak to other people when I am walking in my neighborhood”, was dropped from the scale to improve reliability. The remaining five items had an $\alpha = .71$.

Perceptions of Access to Places for Walking: The NEWS subscale E assessed perceptions of places and the quality of those places for walking and cycling ($\alpha = .80$). This is a five item scale, and example items are, “There are sidewalks on most of the streets in my neighborhood” and “There are bicycle or walking trails in or near my neighborhood that are easy to get to.”

Perceptions of Access to Services: Three of the seven items from the NEWS subscale C assessed perceptions of access to local places (walkable within 10–15 minutes from home) providing services such as shopping and transit. The subscale was modified to more closely match key intervention elements and concerns most relevant to the communities. The item related to parking, for example, was omitted based on the intervention’s focus on walking. Likewise, items related to hills were omitted because the terrain in these suburban areas was flat. One item, “It is easy to walk to a transit stop (bus, train) from my home,” was dropped to improve reliability. The remaining two items, “Stores are within easy walking distance of my home” and “There are many places to go within easy walking distance of my home,” had acceptable reliability ($\alpha = .73$).

Perceptions of Aesthetics: Three of the six items from the NEWS subscale F assessed perceptions of neighborhood surroundings regarding trees and litter. Again, the subscale was modified given the focus of the intervention on walking on neighborhood streets and sidewalks. The items assessing more general aesthetic qualities (e.g., “interesting things”, attractive buildings/homes”) were omitted, and items related specifically to streets and

sidewalks were used. Because it was a concern in all three communities, one item related to litter, “My neighborhood is generally free from litter,” was also used. However, this item was omitted before statistical analyses to improve reliability. The remaining two items, “There are trees along the streets in my neighborhood” and “Trees give shade for the sidewalks in my neighborhood,” demonstrated good internal consistency ($\alpha=.75$).

Neighborhood Satisfaction: The seventeen item NEWS subscale I was used to assess satisfaction with the neighborhood in general. These items included satisfaction with safety from crime, access to places for PA, access to services, aesthetics, as well as domains not measured separately such as social connectedness. The scale demonstrated good reliability ($\alpha=.80$). Example items are “How satisfied are you with the safety from threat of crime in your neighborhood” and “How satisfied are you with how easy and pleasant it is to walk in your neighborhood.”

Covariates—The measures included in this study were Body Mass Index (BMI; calculated from objectively collected height and weight), and self-reported demographic variables: sex, age, income, education, employment status, and marital status.

Statistical analyses

Analyses were conducted to test for sex differences on all demographic and baseline variables using independent t-tests and chi-square tests. It should be noted that the distribution of men and women was similar across the three communities ($\chi^2(2, N=290)=2.03, p=.36$). Therefore, the sex differences do not likely reflect community differences. Correlations of all variables were conducted to look for multicollinearity among variables. Logistic and ordinary least squares (OLS) regressions were used to estimate the relationships between daily walking levels and perceptions of the environment. Missing data were handled by listwise deletion. Because the distribution of daily walking (MET*Minutes/Day of Walking) had a positively skewed distribution typical to count data, a square root transformation was conducted. To control for community of residence, community was dummy coded and these two variables were included as covariates in the regression model. BMI and income were included as covariates because previous studies (Bryan & Katzmaryzyk, 2009; Eyler, Brownson, Bacak, & Housemann, 2003; Kruger, Ham, Berrigan, & Ballard-Barbash, 2008; Lee & Levy, 2011; Reis, Macera, Ainsworth, & Hipp, 2008; Swartz, Strath, Parker, Miller, & Ciselik, 2007; Yang & Diez-Roux, 2012) and the current study indicate they are correlates of walking, and interaction terms were included to test for sex differences. Income, an ordinal variable, was treated as a continuous variable given preceding analysis showing good model fit for income when categorized in this way (Wilson, et al., 2013) and given that the variable was normally distributed and unlikely to significantly impact parameter estimates (Cohen, Cohen, West, & Aiken, 2002). The environmental perception variables were centered before being entered into the models. In the final model, demographic covariates were entered in the first step to control for the variance associated with BMI and income (which are theoretically relevant to feasibility-see also Alfronzo, 2005) before looking at the predictors of interest. Next, sex and environmental perception variables, the key variables of interest, were entered in the second step. Within Alfonso's (2005) theoretical framework, the environmental variables contribute

over and above feasibility but no specific order can be assumed for any individual or group. Therefore, they were entered simultaneously into the model. Finally, interaction terms were entered in the third step to test for a moderation effect by sex. The assumptions of regression were tested and none were violated.

Results

Participant characteristics

Demographic, perception, and PA data are presented in Table 1. Participants were 195 women and 95 men (67% female, mean age = 53.2), were mostly non-working (62.4%), had a high school diploma or less (64.6%), and were making less than \$25,000 per year (67.2%). The majority were overweight or obese, with 54% the sample exceeding BMI of 30.0 kg/m² (mean BMI = 31.59, SD=8.53). Women had a significantly higher BMI than men, and there were significantly fewer women than men with an income greater than \$25,000.

Perceptions of the neighborhood environment and walking by sex

Measures from the NEWS confirm that women and men perceive the aspects of the environment differently. On average, women had significantly lower scores on neighborhood safety ($t(287)=-2.45, p=.015$), aesthetics ($t(287)=-2.18, p=.030$), and neighborhood satisfaction ($t(288)=-2.02, p=.045$) than men (see Table 1). In contrast, there were no significant differences between the women's and men's perceptions of access to walking places or access to services ($ps > .05$). There were no sex differences in self-reported walking.

Zero-order Correlations

Correlations between walking, demographics, and environmental perceptions are presented separately by sex in Table 2. For men, only BMI was negatively correlated with walking for pleasure ($r(91)=-.21, p<.05$). No environmental variables were correlated with walking for pleasure. For women, walking for pleasure was correlated with income ($r(187)=-.18, p<.05$), perceptions of access to places for walking ($r(192)=.19, p<.05$), and perceptions of access to services ($r(192)=.16, p<.05$). Age, education, and employment were not correlated with walking for pleasure and were, therefore, dropped from subsequent regression models.

Also of interest is the significant correlation between perceptions of safety from crime and neighborhood satisfaction for men ($r(92)=.56, p<.05$) and women ($r(193)=.36, p<.05$). Neighborhood satisfaction was also associated with perceptions of access to places for walking similarly for men ($r(92)=.21, p<.05$) and women ($r(193)=.21, p<.05$). Moderate correlations ranging from .28 to .47 ($ps<.05$), were also observed across sex between perceptions of aesthetics and both perceptions of access to places for walking and access to services.

Effects of environmental perceptions and sex on walking

Table 3 presents results of a hierarchical regression analysis for predicting FWH of walking for pleasure. After controlling for covariates, there was a main effect for perceptions of access to places for walking. In model 2, perceptions of access ($B=0.88, SE=0.44, p=.05$)

were significantly related to daily walking levels, accounting for 1.4% of the variance in daily walking levels. Sex and the other perception variables did not significantly contribute to the variance in the dependent variable. Overall, model 2 accounted for 7.5% of the variance in daily walking levels, $R^2 = .075$, $F(10, 260) = 2.09$, $p < .05$.

After controlling for the effects of demographic variables and main effects of the perception variables, there was a significant neighborhood satisfaction by sex interaction in model 3 ($B = -2.92$, $SE = 1.41$, $p = .04$). The sex by neighborhood satisfaction interaction was such that the relationship between neighborhood satisfaction and walking for men was positive and the relationship between neighborhood satisfaction and walking for women was negative (see Figure 1). It should be noted that this relationship between neighborhood satisfaction and walking was not observed at the zero-order level. Thus, influence of neighborhood satisfaction on walking was observed holding constant the direct effects of BMI, income, community, sex, and environmental perceptions. In other words, sex moderated the effects of neighborhood satisfaction on walking over and above the effects of demographic variables and the perception variables. Overall, model 3 accounted for 11.1% of the variance in daily walking for pleasure, $R^2 = 0.111$, $F(15, 255) = 2.12$, $p < .05$.

Discussion

This study builds on previous research by expanding our understanding of potential barriers to walking for underserved, high-crime populations and by highlighting the differences between low-income, ethnic minority men and women in perceptions of the physical and social environment and their differential impact on walking. The results indicated that women not only perceive their neighborhoods as less safe and less aesthetically pleasing than men, they are also less satisfied with their neighborhoods overall than men. Furthermore, after controlling for BMI, income, and community, perceptions of access to places for PA predicted walking for both men and women and accounted for 1.4% of the variance in daily walking levels. While this is a relatively small proportion of variance, these results are in line with previous reported research (Burton, Turrell, Oldenburg, & Sallis, 2005; De Bourdeaudhuij, Sallis, & Saelens, 2003; Duncan, Spence, & Mummery, 2005). Others also note that, although their direct influence on walking is smaller than psychosocial factors, environmental factors can influence use of facilities for PA and, thus, contribute meaningfully to walking outcomes (Giles-Corti & Donovan, 2002a; Leslie, Cerin, & Kremer, 2010). Furthermore, the small proportions of variance in walking accounted for by physical and social environmental variables can be substantial on a population-wide scale, since environmental changes can complement interventions targeting individual psychosocial variables (Duncan, Spence, & Mummery, 2005; Owen, Humpel, Leslie, Bauman, & Sallis, 2004).

After controlling for demographics and environmental perceptions, a sex by neighborhood satisfaction interaction was significantly related to walking. This interaction suggested that, over and above the effects of BMI, income, and specific environmental perceptions, sex moderated the relationship between overall neighborhood satisfaction and walking for pleasure. Specifically, among women walking for pleasure decreased with increased satisfaction while among men walking for pleasure increased with increased satisfaction.

Previous studies have found that composite neighborhood ratings are related to walking (Owen, Humpel, Leslie, Bauman, and Sallis, 2004), and few have looked at gender differences in neighborhood satisfaction. Thus, this finding adds to the literature by suggesting that overall satisfaction with the neighborhood may relate to more walking only in men. However, given that these data are cross-sectional, it could be that women who walk more have poorer overall perceptions of their neighborhoods, but men who walk more have better overall perceptions of their neighborhoods. Perceptions of safety and aesthetics have been linked to neighborhood satisfaction (Hur & Morrow-Jones, 2008; Van Dyck, Cardon, Deforche, & De Bourdeaudhuij, 2011), and neighborhood satisfaction was correlated with the perception variables in this study. Moreover, women in the current study had significantly poorer perceptions of safety and aesthetics than men. Neighborhood satisfaction also captures aspects of the social environment, which tend to affect walking in underserved women (Ainsworth, Wilcox, Thompson, Richter, & Henderson, 2003). It may be, then, that walking for women may increase awareness of the neighborhood and worsen their negative perceptions, especially of safety from crime and aesthetics, compared to men especially in underserved communities. As such, interventions targeting walking in underserved communities may benefit from social marketing or other methods for addressing women's concerns about the social environment of the neighborhood (Wilson, et al., in press).

Considering the high-crime rates in these communities, it is interesting that perceptions of safety did not predict walking. This finding is consistent with previous literature which generally suggests that the effects of safety on walking is mixed (Casagrande, Whitt-Glover, Lancaster, Odom-Young, & Gary, 2009; Gomes et al., 2011; Granner, Sharpe, Hutto, Wilcox, & Addy, 2007; Humpel, Owen, Iverson, Leslie, & Bauman, 2004; Saelens & Handy, 2008). The non-significant result could be due to the restriction of range in perceptions of safety from crime given the homogeneity of the sample. The perceptions of safety from crime in the current study were lower on average than other studies using the NEWS in low-income samples (e.g., Sallis et al., 2011).

Overall, this study is in line with current theory suggesting that access to places for PA is a fundamental environmental determinant of walking (Alfonzo, 2005) and a growing body of research supporting that physical environments that provide access to places for physical activity are positively associated with walking. Much research has indicated specifically that sidewalks support walking (Addy et al., 2004; Giles-Corti & Donovan, 2002b; Saelens & Handy, 2008; Saelens, Sallis, & Frank, 2003). Given that most walking occurs in neighborhood streets and public facilities (Foster & Giles-Corti, 2008; Saelens & Handy), fostering accessibility to and awareness of sidewalks and trails for walking may be especially valuable especially in underserved communities. On the other hand, targeting perceptions of safety and aesthetics may be less beneficial unless the more fundamental psychological need of perceived access to walking places is met (Alfonzo, 2005).

Future research should also address this study's limitations. These data are cross-sectional, therefore it is possible that walking changes perceptions of one's environment rather than perceptions causing walking. The use of self-report PA data and the exclusion of instrumental walking measures may have impacted our findings (Bassett, Mahar, Rowe, &

Morrow, 2008). Future research would benefit from objective PA measures and more comprehensive self-report PA measures that assess both instrumental and pleasure walking. While they were not completely redundant, the neighborhood satisfaction scale correlated moderately with the safety subscale and the access to places for walking subscale. Therefore, the results should be interpreted in light of this multicollinearity. Treatment status and community overlap in this study, and mixed-model analyses estimating random effects for community cannot be included in these analyses. Therefore, inferences drawn from this study are limited to the difference between the communities participating in this trial. Finally, we used perception of the physical environment rather than objective environmental measures. However, low-income, minority communities tend to have similar resources but perceive less accessibility to places for PA (Wilson, Kirtland, Ainsworth, & Addy, 2004, Giles-Corti & Donovan, 2002b), so perceptions may be particularly relevant to measure in these groups. It should also be noted that we did not control for clustering effects given the small number of communities involved in this project.

Walking is an important form of exercise for meeting PA recommendations because it can be free, easy, accessible, and a PA behavior that is easy to change (Owen, Humpel, Leslie, Bauman, & Sallis, 2004; US DHHS, 2008). Understanding environmental correlates for walking has the potential to inform interventions to increase PA that are relevant to underserved men and women. In the present study, women tended to perceive their neighborhoods as less safe and aesthetic and were less satisfied with their neighborhoods. For women, the relationship between neighborhood satisfaction and walking was negative. However, a main effect for access to places for walking suggested that walking for pleasure is important for both women and men. Despite sex differences in perceptions of safety and aesthetics, interventions to simultaneously build accessibility to places for walking and address social environmental concerns of women may be especially valuable in low-income, minority communities.

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References

- Adams MA, Sallis JF, Conway TL, Frank LD, Saelens BE, Kerr J, Cain KL, King AC. Neighborhood Environment Profiles for Physical Activity Among Older Adults. *American Journal of Health Behavior*. 2012; 36(6):757, 769. [PubMed: 23026035]
- Addy CL, Wilson DK, Kirtland KA, Ainsworth BA, Sharpe P, Kimsey D. Associations of perceived social and physical environmental supports with physical activity and walking behavior. *American Journal of Public Health*. 2004; 94(3):440–443. [PubMed: 14998810]
- Ainsworth BE, Haskell WL, Whitt MC, Irwin AM, Swartz SJ, Strath WL, Leon AS. Compendium of physical activities: an update on activity codes and MET intensities. *Medicine & Science in Sports & Exercise*. 2000; 32(9):S498–S516. [PubMed: 10993420]
- Ainsworth BE, Haskell WL, Herrmann SD, Meckes N, Bassett DR Jr, Tudor-Locke C, Greer JL, Vezina J, Whitt-Glover MC, Leon AS. 2011 Compendium of Physical Activities: a second update of codes and MET values. *Medicine and Science in Sports and Exercise*. 2011; 43(8):1575–1581. [PubMed: 21681120]

- Ainsworth BA, Wilcox S, Thompson WW, Richter DL, Henderson KA. Personal, social, and physical environmental correlates of physical activity in African-American women in South Carolina. *American Journal of Preventive Medicine*. 2003; 25(3Si):23–29. [PubMed: 14499806]
- Alfonzo MA. To walk or not to walk? The hierarchy of walking needs. *Environment and Behavior*. 2005; 37:808–836.
- Artinian NT, Fletcher GF, Mozaffarian D, Kris-Etherton P, Van Horn L, Lichenstein AH, Burke LE. Interventions to promote physical activity and dietary lifestyle changes for cardiovascular risk factor reduction in adults: A scientific statement from the American Heart Association. *Circulation*. 2010; 122:406–441. [PubMed: 20625115]
- Bassett DR Jr, Mahar MT, Rowe DA, Morrow JR Jr. Walking and measurement. *Medicine & Science in Sports & Exercise*. 2008; 40(7 Suppl):S529–36. [PubMed: 18562970]
- Bengoechea EG, Spence JC, McGannon KR. Gender difference in perceived environmental correlates of physical activity. *International Journal of Behavioral Nutrition and Physical Activity*. 2005; 2(12):1–9. [PubMed: 15771774]
- Bird SR, Radermacher H, Sims J, Feldman S, Browning C, Thomas S. Factors affecting walking activity of older people from culturally diverse groups: An Australian experience. *Journal of Science and Medicine in Sport*. 2010; 13:417–423. [PubMed: 19833556]
- Bopp M, Wilcox S, Laken M, Butler K, Carter RE, McClorin L, Yancy A. Factors associated with physical activity among African-American men and women. *American Journal of Preventive Medicine*. 2006; 30(4):340–346. [PubMed: 16530622]
- Boslaugh SE, Luke DA, Brownson RC, Naleid KS, Kreuter MW. Perceptions of neighborhood environment for physical activity: Is it “who you are” or “where you live”? *Journal of Urban Health: Bulletin of the New York Academy of Medicine*. 2004; 81(4):671–681. [PubMed: 15466848]
- Bronfenbrenner, U. *The Ecology of Human Development*. Cambridge, MA: Harvard University Press; 1979.
- Brown BB, Werner CM, Amburgey JW, Szalay C. Walkable route perceptions and physical features: Converging evidence for en route walking experiences. *Environment and Behavior*. 2007; 39(1): 34–61.
- Bryan SN, Katzmarzyk PT. Patterns and trends in walking behaviour among Canadian adults. *Canadian Journal of Public Health*. 2009; 100(4):294–298. [PubMed: 19722344]
- Burton NW, Turrell G, Oldenburg B, Sallis JF. The relative contributions of psychological, social, and environmental variables to explain participation in walking, moderate-, and vigorous-intensity leisure-time physical activity. *Journal of Physical Activity and Health*. 2005; 2(2):181–196.
- Casagrande SS, Whitt-Glover MC, Lancaster KJ, Odom-Young AM, Gary TL. Built environment and health behaviors among African Americans. *American Journal of Preventive Medicine*. 2009; 36(2):174–181. [PubMed: 19135908]
- Cerin E, Saelens BE, Sallis JF, Frank LD. Neighborhood Environment Walkability Scale: validity and development of a short form. *Medicine and Science in Sports and Exercise*. 2006; 38(9):1682–1691. [PubMed: 16960531]
- Cerin E, Conway TL, Saelens BE, Frank LD, Sallis JF. Cross-validation of the factorial structure of the Neighborhood Environment Walkability Scale (NEWS) and its abbreviated form (NEWS-A). *International Journal of Behavioral Nutrition and Physical Activity*. 2009; 6:32–42. [PubMed: 19508724]
- Cohen, J.; Cohen, P.; West, SG.; Aiken, LS. *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*. 3. Mahaw, NJ: Larence Erlbaum Associates; 2002.
- Coulon SM, Wilson DK, Griffin S, St George SM, Kugler K, Trumpeter N, Gadson B. Formative Process Evaluation for Implementing a Social Marketing Intervention to Increase Walking in African Americans in the PATH Trial. *American Journal of Public Health*. 2012; 102:2315–2321. [PubMed: 23078486]
- De Bourdeaudhuij I, Sallis JF, Saelens BE. Environmental correlates of physical activity in a sample of Belgian adults. *American Journal of Health Promotion*. 2003; 18(1):83–91. [PubMed: 13677966]

- Duncan MJ, Spence JC, Mummery WK. Perceived environment and physical activity: a meta-analysis of selected environmental characteristics. *International Journal of Behavioral Nutrition and Physical Activity*. 2005; 2(11):1–9. [PubMed: 15771774]
- Eyler AA, Brownson RC, Bacak SJ, Housemann RA. The epidemiology of walking for physical activity in the United States. *Medicine and Science in Sports and Exercise*. 2003; 35(9):1529–1536. [PubMed: 12972873]
- Flegal KM, Carroll MD, Ogden CL, Curtin LR. Prevalence and trends in obesity among US adults, 1999–2008. *Journal of the American Medical Association*. 2010; 303(3):235–41. [PubMed: 20071471]
- Floyd MF, Taylor WC, Whitt-Glover M. Measurement of park and recreation environments that support physical activity in low-income communities of color. *American Journal Preventive Medicine*. 2009; 36(4S):S156–S160.
- Foster C, Hillsdon M, Thorogood M. Environmental perceptions and walking in English adults. *Journal of Epidemiology and Community Health*. 2004; 58:924–928. [PubMed: 15483308]
- Foster S, Giles-Corti B. The built environment, neighborhood crime and constrained physical activity: An exploration of inconsistent findings. *Preventive Medicine*. 2008; 47:241–251. [PubMed: 18499242]
- Franzini L, Taylor W, Elliott MN, Cuccaro P, Tortolero SR, Gilliland MJ, Schuster MA. Neighborhood characteristics favorable to outdoor physical activity: Disparities by socioeconomic and racial/ethnic composition. *Health & Place*. 2010; 16:267–274. [PubMed: 19896408]
- Gallagher NA, Gretebeck KA, Robinson JC, Torres ER, Murphy SL, Martyn KK. Neighborhood factors relevant for walking in older, urban, African American adults. *Journal of Aging and Physical Activity*. 2010; 18(1):99–115. [PubMed: 20181997]
- Giles-Corti B, Donovan RJ. The relative influence of individual, social, and physical environment determinants of physical activity. *Social Science & Medicine*. 2002a; 54:1793–1812. [PubMed: 12113436]
- Giles-Corti B, Donovan RJ. Socioeconomic status differences in recreational physical activity levels and real and perceived access to a supportive physical activity environment. *Preventive Medicine*. 2002b; 35:601–611. [PubMed: 12460528]
- Gomes GA, Reis RS, Parra DC, Rieberio I, Hino AA, Hallal PC, Malta DC, Brownson RC. Walking for leisure among adults from three Brazilian cities and its association with perceived environment attributes and personal factors. *International Journal of Behavioral Nutrition and Physical Activity*. 2011; 8:111–118. [PubMed: 21995846]
- Granner ML, Sharpe PA, Hutto B, Wilcox S, Addy CL. Perceived individual, social, and environmental factors for physical activity and walking. *Journal of Physical Activity & Health*. 2007; 4:278–293. [PubMed: 17846457]
- Griffin SF, Wilson DK, Wilcox S, Buck J, Ainsworth BA. Physical activity influences in a disadvantaged African American community and the communities' proposed solutions. *Health Promotion Practice*. 2008; 9(2):180–190. [PubMed: 17728204]
- Haskell WL, Lee I, Pate RR, Powell KE, Blair SN, Franklin BA, Bauman A. Physical activity and health: Updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Circulation*. 2007; 116:1081–1093. [PubMed: 17671237]
- Hooker SP, Wilcox S, Rheaume CE, Burroughs EL, Friedman DB. Factors related to physical activity and recommended intervention strategies as told by midlife and older African American men. *Ethnicity and Disease*. 2011; 21(3):261–267. [PubMed: 21942156]
- Hossain P, Kavar B, El Nahas M. Obesity and diabetes in the developing world--a growing challenge. *New England Journal of Medicine*. 2007; 356(3):213–5. [PubMed: 17229948]
- Humpel N, Owen N, Iverson D, Leslie E, Bauman A. Perceived environment attributes, residential location, and walking for particular purposes. *American Journal Preventive Medicine*. 2004; 26(2): 119–125.
- Humpel N, Owen N, Leslie E, Marshall AL, Bauman A, Sallis JF. Associations of location and perceived environmental attributes with walking in neighborhoods. *American Journal of Health Promotion*. 2004; 18(3):239–242. [PubMed: 14748314]

- Hur M, Morrow-Jones H. Factors that influence residents' satisfaction with neighborhoods. *Environment and Behavior*. 2008; 40:619–635.
- Kondo K, Lee JS, Kawakubo K, Kataoka Y, Asami Y, Mori K, Akabayashi A. Association between daily physical activity and neighborhood environments. *Environmental Health and Preventive Medicine*. 2009; 14(3):196–206. [PubMed: 19568848]
- Kreiger J, Rabkin J, Sharify D, Song L. High Point Walking for Health: Creating built and social environments that support walking in a public housing community. *American Journal of Public Health*. 2009; 99(S3):S593–S599. [PubMed: 19890163]
- Kruger J, Ham SA, Berrigan D, Ballard-Barbash R. Prevalence of transportation and leisure walking among U.S. adults. *Preventive Medicine*. 2008; 47(3):329–334. [PubMed: 18445507]
- Leslie E, Cerin E, Kremer P. Perceived neighborhood environment and park use as mediators of the effect of area socio-economic status on walking behaviors. *Journal of Physical Activity and Health*. 2010; 7(6):802–10. [PubMed: 21088312]
- Lee Y, Levy SS. Gender and income associations in physical activity and blood pressure among older adults. *American Journal of Physical Activity and Health*. 2011; 8(1):1–9.
- Lin L, Moudon AV. Objective versus subjective measures of the built environment, which are most effective in capturing associations with walking? *Health and Place*. 2010; 16(2):339–48. [PubMed: 20004130]
- Lloyd-Jones D, Adams R, Brown T, Carnethon M, Dai S, De Simone G, Wylie-Rosett J. Heart disease and stroke statistics--2010 update. A report from the American Heart Association. *Circulation*. 2010; 121:e46–e21. [PubMed: 20019324]
- Marshall SJ, Jones DA, Ainsworth BE, Reis JP, Levy SS, Macera CA. Race/ethnicity, social class, and leisure-time physical inactivity. *Medicine and Science in Sports and Exercise*. 2007; 39:44–51. [PubMed: 17218883]
- Miles IW, Kruger J, Liao Y, Carlson SA, Fluton JE. Walking increases among African American adults following a community-based physical activity intervention: Racial and ethnic approaches to community health, 2002–2005. 2011
- Miles R, Patton L. The influence of the perceived quality of community environments on low-income women's efforts to walk more. *Journal of Community Health*. 2006; 31(5):379–392. [PubMed: 17094646]
- Miles R, Panton LB, Jang M, Haymes EM. Residential context, walking and obesity: Two African-American neighborhoods compared. *Health & Place*. 2008; 14:275–286. [PubMed: 17822941]
- Nelson NM, Wright A, Lowry RG, Mutrie N. Where is the theoretical basis for understanding and measuring the environment for physical activity? *Environmental Health Insights*. 2008; 2:111–116. [PubMed: 21572837]
- Owen N, Humpel N, Leslie E, Bauman A, Sallis JF. Understanding environmental influences on walking: Review and research agenda. *American Journal of Preventive Medicine*. 2004; 27(1):67–76. [PubMed: 15212778]
- Reis JP, Macera CA, Ainsworth BE, Hipp DA. Prevalence of total daily walking among US adults, 2002–2003. *Journal of Physical Activity and Health*. 2008; 5(3):337–346. [PubMed: 18579913]
- Richardson MT, Leon AS, Jacobs DR Jr, Ainsworth BA, Serfass R. Comprehensive evaluation of the Minnesota Leisure Time Physical Activity Questionnaire. *Journal of Clinical Epidemiology*. 1993; 47(3):271–281. [PubMed: 8138837]
- Roman CG, Chaflin A. Fear of walking outdoors: A multilevel ecological analysis of crime and disorder. *American Journal of Preventive Medicine*. 2008; 34(4):306–312. [PubMed: 18374244]
- Saelens BE, Sallis JF, Black JB, Chen D. Neighborhood-based differences in physical activity: An environment scale evaluation. *American Journal of Public Health*. 2003; 93(9):1552–1558. [PubMed: 12948979]
- Saelens BE, Sallis JF, Frank LD. Environmental correlates of walking and cycling: Findings from the transportation, urban design, and planning literatures. *Annals of Behavioral Medicine*. 2003; 25(2):80–91. [PubMed: 12704009]
- Saelens BE, Handy SL. Built environment correlates of walking: A review. *Medicine & Science in Sports & Exercise*. 2008; 40:S550–S566. [PubMed: 18562973]

- Sallis JF, Slymen DJ, Conway TL, Frank LD, Saelens BE, Cain K, Chapman JE. Income disparities in perceived neighborhood built and social environment attributes. *Health & Place*. 2011; 17(6): 1274–1283. [PubMed: 21885324]
- Sallis, JF.; Owen, N.; Fisher, EB. Ecological Models of Health Behavior. In: Glanz, K.; Rimer, B.; Viswanath, K., editors. *Health Behavior and Health Education: Theory, Research and Practice*. 4. San Francisco, CA: Jossey-Bass Publishers; 2008. p. 465-486.
- Scott MM, Dubowitz T, Cohen DA. Regional differences in walking frequency and BMI: What role does the built environment play for Blacks and Whites? *Health and Place*. 2009; 15:897–902.
- Suminski RR, Poston WSC, Petosa RL, Stevens E, Katzenmoyer LM. Features of the neighborhood environment and walking by U.S. adults. *American Journal of Preventive Medicine*. 2005; 28(2): 149–155. [PubMed: 15710269]
- Swartz A, Strath S, Parker S, Miller N, Ciseslik L. Ambulatory activity and body mass index in white and non-white older adults. *Journal of Physical Activity and Health*. 2007; 4(3):294–304. [PubMed: 17846458]
- US Department of Health and Human Services. 2008 Physical Activity Guidelines for Americans. Atlanta: Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion; 2008.
- Van Dyck D, Cardon G, Deforche B, De Bourdeaudhuij I. Do adults like living in high-walkable neighborhoods? Associations of walkability parameters with neighborhood satisfaction and possible mediators. *Health and Place*. 2011; 17(4):971–977. [PubMed: 21570333]
- Wilson DK. New perspectives on health disparities and obesity interventions in youth. *Journal of Pediatric Psychology*. 2009; 34(3):231–244. [PubMed: 19223277]
- Wilson DK, Ellerbe C, Lawson A, Kugler K, Meyers D, Coulon SM, Lawman HG. Imputational modeling of spatial context and social environmental predictors of walking in an underserved community: The PATH Trial. *Spatial and Spatio-temporal Epidemiology*. 2013; 4:15–23. [PubMed: 23481250]
- Wilson DK, Kirtland KA, Ainsworth BA, Addy CL. Socioeconomic status and perceptions of access and safety for physical activity. *Annals of Behavioral Medicine*. 2004; 28(1):20–28. [PubMed: 15249256]
- Wilson DK, StGeorge SM, Trumpeter NN, Coulon SM, Griffin SF, Wandersman A, Brown PV. The development of a social marketing campaign for increasing walking in an underserved community: The PATH Trial. *International Journal of Behavioral Nutrition and Physical Activity*. (in press).
- Wilson DK, Trumpeter NN, St George SM, Griffin S, Van Horn ML, Wandersman A, Gadson B. Positive Action for Today's Health Trial (PATH): A randomized controlled trial for promoting walking in underserved communities. *Contemporary Clinical Trials*. 2010; 31:624–633. [PubMed: 20801233]
- Wood L, Shannon T, Bulsara M, Pikora T, McCormack G, Giles-Corti B. The anatomy of the safe and social suburb: An exploratory study of the built environment, social capital, and residents' perceptions of safety. *Health & Place*. 2008; 14:15–31. [PubMed: 17576088]
- Yang Y, Diez-Roux AV. Walking distance by trip purpose and population subgroups. *American Journal of Preventive Medicine*. 2012; 43(1):11–19. [PubMed: 22704740]

Figure 1.

Table 1**Demographics by Sex**

	Women n=195	Men n=95	t-value/ χ^2
<i>Demographics</i>			
Age, years, mean (SD)	54.12 (16.12)	51.41 (15.95)	1.35, p=.178
BMI, mean (SD)	33.10 (8.87)	28.49 (6.86)	4.42, p=.000*
Income, N (%)			16.15, p=.001*
<\$10,000	63 (32.3)	20 (21.1)	
\$10,000–24,000	73 (37.4)	25 (26.3)	
>\$25,000	54 (27.7)	41 (43.2)	
Education, N (%)			1.47, p=.479
< HS Degree	44 (22.6)	27 (28.4)	
HS Degree	79 (40.5)	33 (34.7)	
> HS Degree	68 (34.9)	32 (33.7)	
Employment, N (%)			4.25, p=.373
Working	71 (36.4)	38 (40.0)	
Laid Off/Unemployed	30 (15.4)	20 (21.1)	
Retired	60 (30.8)	21 (22.1)	
Permanently Disabled	15 (7.7)	9 (9.5)	
Other	19 (9.7)	6 (6.3)	
<i>Environmental Perceptions**</i>			
Access to Places for Walking, mean (SD)	2.21 (0.88)	2.41 (0.83)	−1.84, p=.067
Access to Services, mean (SD)	3.05 (0.89)	3.23 (0.86)	−1.61, p=.110
Safety from Crime, mean (SD)	2.52 (0.70)	2.74 (0.72)	−2.45, p=.015*
Aesthetics (Trees), mean (SD)	2.62 (0.95)	2.88 (0.95)	−2.18, p=.030*
Neighborhood Satisfaction, mean (SD)	3.67 (0.62)	3.82 (0.62)	−2.02, p=.045*
<i>Walking for Pleasure</i>			
Walks For Pleasure, Yes, N (%)	134 (68.7)	62 (65.3)	0.35, p=.555
Min/Day, mean (SD)	15.58 (26.44)	20.13 (31.36)	−1.29, p=.199
MET* Min/Day, mean (SD)	54.53 (92.54)	70.47 (109.74)	−1.29, p=.199

Note: Sex differences were examined with a t-test for age, body mass index (BMI), the five environmental perception variables, and the walking variables. A chi-square test was used to test for sex differences for income, education, and employment.

** For the first four perception variables, values range from 1–4 and higher values indicate more positive perceptions For Neighborhood Satisfaction, values range from 1–5 and higher values indicate greater satisfaction.

* p<.05

Table 2
Correlations by Sex of Walking for Pleasure with Demographic Variables, and Environmental Perception Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. MET*Min/Day Walking for Pleasure	----	-.044	-.208*	-.074	-.001	.041	.014	-.086	.046	.107	-.037
2. Age	.005	----	.139	.124	.029	.094	-.132	.091	-.231*	-.290*	.172
3. BMI	-.118	-.062	----	.208	.108	.006	.119	.022	-.037	-.045	-.019
4. Income	-.182*	.120	-.040	----	.294*	.411*	-.130	.068	-.230*	-.114	.029
5. Education	-.122	-.135	.075	.410*	----	.308*	-.263*	.012*	-.207*	-.211*	-.069
6. Employment	-.040	.105	.170*	.286*	.147*	----	-.175	.097	.057	-.014	.016
7. Perceptions of Access to Places for Walking	.190*	-.130	-.007	-.076	-.007	-.077	----	.169	.221*	.471*	.205*
8. Perceptions of Safety from Crime	.114	.145*	-.109	.047	-.041	.014	.115	----	-.009	.073	.559*
9. Perceptions of Access to Services	.155*	-.138	.034	-.153*	-.190*	-.023	.284*	-.046	----	.464*	.159
10. Perceptions of Aesthetics	-.040	-.158*	.066	.029	.082	.041	.426*	-.073	.280*	----	.095
11. Neighborhood Satisfaction	-.043	.138	-.036	-.022	-.117	-.003	.208*	.357*	.146*	.093	----

Note: values for men are above the diagonal; values for women are below the diagonal.

Table 3

MET* Minutes/Day of Walking (Square Root) Regressed onto BMI, Income, Sex, Perceptions of Access to Places for Walking, Perceptions of Access to Services, Perceptions of Safety from Crime, Perceptions of Aesthetics, and Neighborhood Satisfaction

	Coefficient	SE	sr ²	p
<i>Model 1</i>				
Intercept	8.78	1.42		.000
BMI	-0.08	0.04		.038*
Income	-0.77	0.41		.062
Dummy Coded Community 1	0.98	0.80		.222
Dummy Coded Community 2	-0.52	0.82		.529
R²			0.040	
F (4, 266)			2.741	.029*
<i>Model 2</i>				
Intercept	9.02	1.44		.000
BMI	-0.07	0.04		.071
Income	-0.69	0.41		.104
Dummy Coded Community 1	0.74	0.83		.371
Dummy Coded Community 2	-0.80	0.83		.335
Sex	-0.59	0.77		.445
Perceptions of Access to Places for Walking	0.86	0.44	.014	.054*
Perceptions of Safety	0.43	0.54		.426
Perceptions of Access to Services	0.51	0.41		.219
Perceptions of Aesthetics	-0.14	0.40		.734
Neighborhood Satisfaction	-1.07	0.61		.078
R²			0.075	
F (10, 260)			2.094	.025*
<i>Model 3</i>				
Intercept	8.90	1.44		.000
BMI	-0.06	0.04		.124
Income	-0.73	0.42		.088

	Coefficient	SE	sr ²	p
Dummy Coded Community 1	0.78	0.83		.348
Dummy Coded Community 2	−0.83	0.82		.313
Sex	−0.79	0.77		.305
Perceptions of Access to Places for Walking	−0.40	0.85		.638
Perceptions of Safety	−1.37	1.09		.212
Perceptions of Access to Services	−0.62	0.80		.440
Perceptions of Aesthetics	0.97	0.77		.214
Neighborhood Satisfaction	1.22	1.23		.320
Sex X Perceptions of Access to Places for Walking	1.69	0.99		.089
Sex X Perceptions of Safety	2.28	1.24		.068
Sex X Perceptions of Access to Services	1.43	0.92		.122
Sex X Perceptions of Aesthetics	−1.36	0.91		.137
Sex X Neighborhood Satisfaction	−2.92	1.41	.017	.039*
R²	0.111			
F (15, 255)	2.115			.010*

Note: Sex was coded 0=males, 1=females.

* p<.05