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Sub-population differences in the relationship between the neighborhood environment and Latinas' daily walking and vehicle time

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Abstract

Background—Over 60% of Latinas report not meeting moderate to vigorous physical activity (MVPA) guidelines of 150 minutes/week. Ecological models of health posit that intrapersonal and environmental factors interact with one another to influence physical activity. Understanding their interactions in relation to transportation behaviors may inform interventions to increase Latinas' physical activity.

Purpose—To 1) objectively estimate walking and vehicle time in Latinas, 2) examine the association of, and interactions between, intrapersonal (socio-demographics and weight status) and neighborhood environmental correlates with objective daily walking and vehicle time.

Methods—A subsample of Latinas (n=87) participating in a health intervention wore an accelerometer and GPS device for at least two valid wear days at baseline. The Personal Activity Location and Measurement System (PALMS) software estimated daily walking and vehicle time. Participants' anthropometrics were measured, and they completed a survey assessing socio-demographic characteristics and perceived neighborhood environment. Generalized linear mixed

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models examined main effects and interactions of four intrapersonal and five environmental factors on daily walking and vehicle time.

Results—On average, participants walked 16 min/day and spent 69 min/day in a vehicle. Overweight/obesity was negatively associated with walking time (p=.04) and positively associated with vehicle time (p=0.01). Household income was positively associated with vehicle time (p=0.02). For daily walking time, two interactions were significant: perceived access to destinations X household income (p=0.01), and perceived sidewalk maintenance X acculturation (p= 0.01). For daily vehicle time, two interactions were significant: perceived access to destinations X weight status (p<0.001), and perceived safety from crime X education (p=0.01).

Conclusion—Latinas participated in relatively low walking time and high amounts of vehicle time. Findings suggest intrapersonal sub-group differences in the association of the neighborhood environment with walking and vehicle time. Improving neighborhood environments to promote walking and reduce vehicle time may help improve Latinas' overall physical activity.

Keywords

walking; physical activity; transportation; vehicle; neighborhood environment

1. Introduction

Walking for transportation or leisure is lower in the US compared to other countries [1,2]. In a large US travel survey, non-Whites had similar walking rates as Whites but higher obesity rates [3]. Other travel behaviors like time spent in a vehicle may be contributing to this ethnic/racial disparity in obesity rates. Longer time spent in vehicles has been linked to higher rates of obesity and high blood pressure [4]. Racial/ethnic minority women report more time in a car (11.4 hours/week, on average) compared to non-Hispanic White women (9.4 hours/week, on average) [5]. These racial/ethnic disparities in car use are not observed among men. Given that Latina women report more time in vehicles, one of the highest rates of obesity of any racial/ethnic group (44.4%), and only 38.2% report meeting moderate to vigorous physical activity (MVPA) recommendations, a better understanding of their transportation-related behaviors is needed [6,7]. Few studies have assessed walking and vehicle time objectively [8,9]. Objective measures account for potential biases in self-report measures, which can impair relationships with the neighborhood environment.

Given the importance of walking time and vehicle time as contributors to overall PA and sedentary behavior, there is a need to understand the correlates of these behaviors. Ecological models of health behavior posit that factors at multiple levels of influence (e.g., individual [inter/intrapersonal], social, environment, and policy) interact with one another to influence health behaviors like walking and vehicle use.[10] Studies on self-reported walking for either leisure or transportation (i.e., to get to/from a destination) have identified several intrapersonal (e.g., socio-demographic) and neighborhood environmental factors. Among Latinos, low socioeconomic status (SES) and low acculturation are related to higher active transportation and lower leisure-time physical activity (PA) [11]. Latinas with higher acculturation levels also report less time walking than those with lower levels [12].

In terms of environmental factors, few studies have examined the association between the perceived neighborhood environment and walking in Latinas. Less favorable perceptions of neighborhood safety from crime have been linked to less walking among Latinas [13]. Older Latinas have reported greater perceived neighborhood safety from crime and having access to destinations to walk to near the home as important facilitators of walking [14].

Similarly, in previous studies, intrapersonal and environmental factors have been linked to self-reported vehicle time [15–17]. For example, higher income, full-time employment, having children, and living in the outer suburbs are significantly associated with higher reported vehicle time [15]. Urban form and neighborhood design are also important factors of self-reported vehicle time. Self-reported vehicle time has been found to be negatively related to higher land use mix, residential density, street connectivity, and overall neighborhood walkability among large US samples [16,17].

Furthermore, previous studies have shown that intrapersonal factors like SES moderate the relationship between the neighborhood environment and physical activity behaviors [3,18–20]. In one study of a similar sample size, favorable aesthetics were related to higher leisure time MVPA among lower income women; additionally, better sidewalk maintenance was related to higher leisure time MVPA in higher income women [20].

Assessing objectively-measured walking by simultaneous global positioning system (GPS) and accelerometer monitoring can provide more accurate estimates of time spent walking/in a vehicle than self-report measures [21]. This approach has been used to examine the relationship between the neighborhood environment and PA among Latino children and Latina adults [9,22,23]. Objectively assessing transportation behaviors consist of a more valid approach towards examining correlates of different forms of PA and sedentary behaviors. However, no known studies have examined the association of the perceived neighborhood environment with objectively-measured walking and vehicle time among Latinas.

To better understand the correlates and moderators of walking behaviors and vehicle time among Latinas, the aims of the present study were to (1) objectively estimate walking and vehicle time among Latinas; to (2) investigate associations of five perceived neighborhood environmental (e.g., access of destinations and safety from crime) and four intrapersonal factors (e.g., weight status and acculturation) with these travel behaviors, and to (3) test interactions between intrapersonal and neighborhood environmental factors in relation to objectively-measured walking and vehicle time. We expect positive associations of favorable perceptions of the neighborhood environmental factors with daily walking time. We also expect higher perceptions of safety from traffic and safety from crime, as well as access to destinations to walk to, to be negatively associated with daily vehicle time. Finally, the test of interactions between intrapersonal and neighborhood environmental factors in relation to daily walking and vehicle time is exploratory, as there are few studies in this area. This study will add to the literature in understanding interactions of intrapersonal and neighborhood environmental factors for travel behaviors, with the potential to improve ecological models specific to Latinas.

2. Methods

2.1 Participants and Procedures

The present analyses used baseline data collected in 2012 from a sample of church-going Latinas participating in the Fe en Acción [Faith in Action] intervention to promote PA in San Diego, California [24].

The main trial included 16 Catholic churches across San Diego County. Inclusion criteria for churches were to have at least 200 Latino families, have at least one Spanish mass, and commit to participate in the study for two years. Participants were then recruited from the participating churches through fliers, word of mouth, printed announcements in church bulletins, and verbal announcements during Spanish language masses. To be eligible, participants had to be between 18 and 65 years of age, self-identify as Latina, attend the church at least four times per month, self-report low physical activity levels (<150 minutes/week of MVPA), have less than 250 minutes/week of accelerometer-assessed MVPA, and have no medical conditions that could prevent them from being physically active as assessed by the PAR-Q [25]. A full explanation for our accelerometer cut-off is reported in another study [26].

Among the full baseline sample of 436 participants, 87 women from four churches (range: 16–28 women per church) participated in a sub-study that involved simultaneous accelerometer and GPS monitoring. For the present analyses, data were collected from a sub-sample of participants from the main trial who agreed to wear a GPS device along with the accelerometer. The goal of the sub-study was to examine integrated GPS-accelerometer data using a geospatial research tool called the Personal Activity Location and Measurement System (PALMS)[27]. As such, separate power calculations for the sub-study were not performed a priori. Baseline measures were collected across two appointments at each church site by trained bilingual Research Assistants (RAs). During the first appointment, RAs assessed anthropometrics, as well as provided participants with an accelerometer and GPS device to wear for at least 12 hours/day for seven days. RAs then collected the accelerometer and GPS device during the second appointment, and administered a survey. The survey included items on demographics and perceptions of the neighborhood environment, and took approximately 60 minutes to complete. Prior to data collection, RAs obtained written informed consent from participants. Participants received $25 at the completion of both appointments. This study was approved by the Institutional Review Boards of the sponsoring institutions.

2.2 Measures

2.2.1 GPS-derived trips—Participants were asked to wear a Qstarz BT-Q1000XT Global Positioning System (GPS) travel recorder (Qstarz International Co., Taipei, Taiwan, R.O.C). Staff instructed participants to wear the device on a belt around their waist for at least 10 hours per day for seven days. Additionally, participants were asked to charge the GPS device nightly and to only take the device off while sleeping, swimming, or showering.

Valid days could have no more than 480 minutes and 75% of wear time with missing GPS signal. Non-wear time was determined by the accelerometer criteria, which was set as 60

minutes of consecutive zero values. [28,29] Early during the data-cleaning phase, it was noted that participants had fewer valid wear time for GPS than accelerometer. This could have been due to non-compliance with wearing/charging the device or missing GPS signal. Because of the reduced GPS wear, for the sub-study, valid wear time was defined as at least two valid days with a minimum of eight valid hours/day of accelerometer wear and available GPS signal. When using both GPS and accelerometer devices, establishing eight hours/day or less of wear time to count as a valid day is accepted and has been used in previous studies [23,30–32].

GPS data were uploaded as 60-second epoch files and processed in the PALMS using standard protocol. PALMS is a web based software system that integrates GPS and accelerometer data and can examine other variables of interest including transportation mode such as walking, bicycling, or in a vehicle [34]. PALMS' ability to detect trip classification (walking, bicycle, and vehicle) has been validated against the SenseCam (camera worn around the neck, capturing multiple images every minute), and was shown to be valid in processing GPS data to objectively measure walking, bicycle, and vehicle measure [34].

Data were processed using the following parameters to define trips [35]: travel at ≥30 meters/min, with a minimum of 100 meters for a duration of ≥120 seconds for walking trips and ≥180 seconds for vehicle trips. The lower-bound speed cutoff for walking trips was 1 km/hr and for vehicle trips 10 km/hr.

From the file of walking and vehicle trips exported from PALMS, a day level data set was created which included summary data for walking and vehicle trips (e.g., number of trips, distance in trips, and time spent in trips) per day. For the purpose of this study, the two outcome variables were (1) daily walking time (min) and (2) daily vehicle time (min).

2.2.2 Neighborhood environment—Three perceived neighborhood environment subscales were adapted from the Abbreviated Neighborhood Environment Walkability Scale (NEWS-A) [36,37]: safety from traffic (one item), safety from crime (two items, Cronbach's α=0.70), and aesthetics (four items, Cronbach's α=0.79). To reduce participant burden, only items deemed most relevant to churchgoing Latinas in San Diego were included. Response options for each item ranged on a 5-point Likert scale (1= "Strongly disagree" to 5 = "Strongly agree"). Negative statements were reverse coded, and items were averaged to compute scores for safety from crime and aesthetics. Higher scores were indicative of favorable perceptions. Two items were taken from the US Determinants of Exercise in Women Phone Survey (Eyler et al., 1999): sidewalk maintenance (1 item only asked to those who reported having sidewalks in their immediate neighborhood; response range:1="Not at all maintained" to 4="Very well maintained") and access to destinations to walk to near the home (yes/no). All continuous perceived neighborhood environment variables were standardized to have a mean of zero and standard deviation of one.

2.2.3 Demographics—Using the 2005 Behavioral Risk Factor Surveillance System (BRFSS) questionnaire[39], participants reported on their age, education, monthly household income, number of vehicles and adults living in the household, and employment status.

Education was dichotomized by having at least a high school education (i.e., < high school education vs. ≥ high school education). Monthly household income was dichotomized by using a median split of $2,000/month (i.e., <$2,000 vs. ≥$2,000), or roughly $24,000/year. We also computed a score for vehicle access by dividing the reported number of vehicles by the number of adults in the household. Furthermore, employment status was dichotomized by being employed or not. Acculturation was assessed using the Bi-dimensional Acculturation Scale (BAS) for Hispanics, which assesses language use, linguistic proficiency, and electronic media use in two domains (Hispanic and non-Hispanic).[40] The BAS uses a four-point Likert scale based on participant agreement for language use and electronic media ranging from 1="Almost Never" to 4="Almost Always". Items on linguistic proficiency were based on a four-point Likert scale ranging from 1="Very poorly" to 4= "Very well". A mean score of ≥ 2.5 on the non-Hispanic domain was indicative of high acculturation levels [40] (Cronbach's α=0.92).

2.2.4 Body Mass Index (BMI)—Weight was measured using a digital scale (Health-o-Meter Professional, McCook, IL) that was routinely calibrated. Additionally, height was measured using a Shorr board™ (Weigh and Measure, LLC, Olney, MD). Both height and weight measurements were taken twice and averaged using standard protocol. [41] A BMI <25 kg/m^2 was used to classify underweight and normal weight participants, and ≥25 kg/m^2 for overweight or obese participants.

2.3 Analyses

The final analytical sample dropped from 87 to 72 participants due to missing data. Excluded participants were compared to the analytical sample using student t-tests or chi-square tests. There was a total of 418 days of observation. A preliminary post-hoc power analysis was ran for some of the main effect variables. When examining average daily walking time, access to destinations was powered at 0.98, safety from traffic at 0.07, safety from crime at .80, sidewalk maintenance at 0.91, and aesthetics at 0.31. When examining average daily vehicle time, access to destinations was powered at 0.80, safety from traffic at 0.22, safety from crime at 0.16, sidewalk maintenance at 0.12, and aesthetics at 0.31. However, the present study is exploratory and as such, is not dependent on this power analysis. Generalized linear mixed models were used for each outcome (walking and vehicle time), accounting for clustering effects of the days within participants, to examine associations with the intrapersonal and environmental factors. The models used negative binomial distributions due to the skewed distribution and high number of zeros in trips. Regression coefficients were exponentiated and can be interpreted as Rate Ratios. That is, results can be interpreted as the percent increase/decrease in the dependent variable (walking or vehicle time) associated with a one standard deviation (SD) increase in a continuous independent variable. For a dichotomous independent variable, the percent increase/decrease in daily walking or vehicle time is compared to the reference category of the independent variable. Models were adjusted for age, total wear time, and church.

Moderating effects were examined by testing two-way interactions between the intrapersonal and perceived neighborhood environment factors. A total of 20 interactions were tested separately for each outcome. Then, interactions with a significance level < 0.20

were tested in a full model. Using a backwards elimination approach, the least significant interactions were removed one by one until all interactions remaining in the model were significant at 0.05. This interaction analysis is exploratory, and should be interpreted with caution as multiple hypothesis testing was not adjusted for. All analyses were conducted using SAS software Version 9.4 (SAS Institute Inc, Cary, North Carolina).

3. Results

3.1 Sample Characteristics

The sample (mean age (SD) =45 (SD = 9) years) was predominantly of low SES and low acculturation (Appendix A, Table A1). Participant characteristics closely resembled those of the full study sample [24]. On average, participants engaged in 16 (SD = 21) minutes/day in walking trips and spent 69 (SD = 56) minutes/day in a vehicle.

3.2 Associations of intrapersonal and environmental factors with daily walking and vehicle time (Main Effects)

Compared to normal weight participants, overweight or obese women had 41% (95% CI = 2%, 65%) less walking time and 50% (95% CI = 11%, 103%) more vehicle time (Appendix A, Table A2). That is, overweight or obese participants walked less and spent more time in a vehicle than those of normal weight. In addition, high-income participants had significantly more vehicle time (31% [95% CI = 4%, 65%] than those of lower income. None of the perceived environmental factors were significantly related to daily walking or vehicle time.

3.3 Interactions between the intrapersonal and neighborhood environment factors in relation to daily walking and vehicle time

For walking time, two out of 20 interactions tested were statistically significant: perceived access to destinations by income ($p = 0.005$), and perceived sidewalk maintenance by acculturation ($p = 0.01$) (Appendix A, Table A3). Among participants reporting having access to destinations, those of low-income had higher walking time than those of higher income (Appendix A, Figure A1). Among those reporting favorable sidewalk maintenance, participants of low-acculturation had higher walking time than those of higher acculturation (Appendix A, Figure A2).

For daily vehicle time, two interactions were statistically significant: perceived access to destinations by weight status ($p < 0.001$), and perceived safety from crime by education ($p = 0.01$) (Appendix A, Table A3). Among those who reported having access to destinations, normal-weight participants spent more time in a vehicle than their overweight or obese peers (Appendix A, Figure A3). Among those reporting lower safety from crime, high-education participants spent more time in a vehicle than those of lower education (Appendix A, Figure A4).

4. Discussion & Conclusion

4.1.1 Main effects—This study is one of the first to examine associations of intrapersonal and perceived neighborhood environment factors with objectively-measured walking and

vehicle time among a sample of Latinas. There are few GPS studies of walking and vehicle time for comparison, but one study among older adults found that participants walked for 10 minutes and spent 15 minutes in a vehicle per day. This sample found similarly low levels of walking, and longer time spent in vehicle [8]. When examining intrapersonal factors in this study, overweight/obesity Latinas walked less and spent more time in a vehicle than those of normal weight. Additionally, higher income Latinas spent more time in a vehicle. We also found intrapersonal sub-group differences in the relationship between the perceived neighborhood environment and daily walking and vehicle time.

Those who were overweight or obese walked less compared to those of normal weight; these findings are consistent with a previous study [4], and suggest walking is an important contributor to favorable weight status. As for vehicle time, those of high-income and those who were overweight or obese spent more time in a vehicle, consistent with other studies using self-report measures for time spent in a vehicle (McCormack & Virk, 2014; Sugiyama et al., 2012a). Previous studies show that vehicle time is lower in neighborhoods with mixed land use and higher residential density [9,42], and present findings imply that reducing vehicle time could have favorable effects on reducing rates of overweight and obesity in Latinas.

With regards to the perceived neighborhood environment, there were no significant associations with either daily walking or vehicle time. The lack of significant associations may be due to the lack of specificity as to where walking and vehicle time were occurring. Our assessment of walking and vehicle time was not specific to the participant's own neighborhood and therefore these behaviors could have occurred anywhere. Because we assessed perceptions at the neighborhood level, aligning walking and vehicle time with parameters specifically occurring in the neighborhood may have led to stronger links between the environment and outcomes. Previous studies have shown associations between objectively measured built environments and walking and vehicle time, especially when the sample was recruited to vary in these characteristics [9].

4.1.2 Significant interactions between intrapersonal and neighborhood environment factors—Among low-income women, reporting access to destinations to walk to was associated with higher walking time. These findings are supported by a qualitative study that found access to destinations to walk to as a facilitator of walking in Latinos from a low-income neighborhood [14]. Latinas of low income may be more likely to walk for transportation than those of higher income [43]. It could be that those of low income walked for transportation out of necessity, such as to get groceries and walk their children to school. Having access to destinations to walk to such as businesses or grocery stores creates more opportunities to walk for transportation.

Among Latinas with high acculturation levels, favorable sidewalk maintenance was associated with lower walking time. Although sidewalks are essential to walking of any kind, it is possible that Latinas with high acculturation levels perceived their environment less favorably than less acculturated Latinas. One multi-country study showed that Latin American countries reported less favorable environmental perceptions compared to other countries [2]. This could mean that those of high acculturation may be more sensitive to the disparities in the built and social environments of Latino communities compared to the ideal

American community. In comparison, less acculturated Latinos may come from poor quality or similar built and social environments, which could explain the more favorable perceptions of the current neighborhood environment from this group.

Having access to destinations to walk to was associated with more vehicle time only among the normal weight group. However, the perceived access to destinations questions only captures the perception that there are places to walk to not necessarily that these are places that participants actually go to. So despite high land use mix (access), if participants do not use these places, they are not likely to walk to them and will drive to other places outside their neighborhoods. Latino neighborhoods typically consist of high restaurant or fast food density and poor access to fresh foods [44]. This could mean that most of the places of access are fast-food or chain restaurants, small markets with not much produce or healthy food options, or run-down parks. Normal weight women may not use these places because they may be looking for markets with healthy food options, good quality parks, etc. Thus, they have to drive to such places outside their neighborhood.

Furthermore, greater perceived safety from crime was associated with less vehicle time among those with a high school education or higher. One study showed that higher education levels were associated with higher vehicle time [15]. Safety from crime may be critical to those of high education as they are more likely to drive than those of low education who may not have the means to drive (e.g., due to cost). For this reason, low education participants may be walking for transportation instead of using a vehicle. Additionally, those of lower education may limit their use of public transit or any type of vehicle to get to places outside of their neighborhood due to costs.

Distinguishing between choice or necessity of both walking and vehicle behaviors may help understand the mechanisms of the moderating effects of intrapersonal factors on the relationship between neighborhood environment and travel behaviors. If participants are walking or driving out of necessity, the neighborhood environment may be less relevant since they are performing either behavior out of need and not choice. Therefore, having more favorable neighborhood environment characteristics are irrelevant to these participants, but may be important to those who do have the choice to walk or drive.

4.2 Strengths and Limitations

Limitations include the potential for misclassification of walking as vehicle trips or missed walking trips due to GPS error. However, PALMS classification of trips has been validated against the SenseCam, which is a camera worn around the neck that captures multiple images every minute [34]. Additionally, less recordings of GPS data could have been due to non-compliance of wearing and/or charging the device, or missing GPS signal. Understanding participant perceptions of using the GPS device may help inform future strategies towards successfully collecting GPS data. Although we did not distinguish between indoor and outdoor walking, the walking trip was required to last at least 100 meters to be included and thus walking time likely included mostly outdoor walking. Because our walking and vehicle time measures were not specific to the neighborhood, this may have led to weakened associations with the neighborhood factors. Having a daily activity log paired with the monitoring devices, would have benefited the present study by

knowing where and for what purpose the travel behaviors were being performed. Interpretation of results could have been strengthened with this additional detail. Furthermore, this study was conducted in a small sample of Latinas in an urban environment of San Diego. Because participants were from areas around 4 churches with limited geographic variability, power to detect significant effects may have been limited and results may not be generalizable to other areas or populations. The cross-sectional nature of the study limits our ability to test cause-effect relationships. Finally, this study was exploratory and did not control for multiple hypothesis testing, which can lead to Type 1 error; more studies are needed to replicate these findings.

Strengths of the present study include the use of accelerometer and GPS devices to objectively assess daily walking and vehicle time. This study is also one of the first to examine the association between the perceived neighborhood environment and daily walking and vehicle time in a sample of low-active Latinas. Examining correlates in this population with disproportionately low levels of PA and high rates of chronic diseases may help inform efforts to promote walking and reduce vehicle time, which have been shown to have large public health implications.

4.3 Conclusion

Given the importance of walking time and vehicle time as contributors to overall PA and sedentary behavior respectively, there is a need to understand the correlates of these behaviors. Our results show that intrapersonal level characteristics are associated with walking and vehicle time and that these characteristics moderate the association of the perceived neighborhood environment with daily walking and vehicle time. Targeting the neighborhood environment may be a promising strategy to increase walking time or reduce vehicle time in low-income Latinas. The present study found intrapersonal moderators of the relationship between the neighborhood environment and travel behaviors, thereby providing support for ecological models. However, examining intrapersonal and neighborhood environment interactions may not fully explain why people engage in specific travel behaviors [45]. Qualitative research can help to understand the complexities of decisions on walking and vehicle behaviors, by examining the context of individuals' social lives. Future studies may complement GPS and accelerometer monitoring with qualitative research to better understand walking/vehicle time patterns. Prospective studies are needed examining how interventions targeting neighborhood environmental changes can promote walking and reduce vehicle use as a way to promote Latinas' overall physical activity and health.

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Appendix A

Table A1

Characteristics of Latina women (N=72 participants), *Fe en Acción*, San Diego, CA

Intrapersonal	
Age, mean (SD)	44.9 (8.9)
< High school education, %	54.2
Household income <$2,000/month, %	61.1
Vehicle access, mean (SD)	0.8 (0.4)
Overweight or obese, %	83.3
High-acculturation[a], %	36.1
GPS/accelerometer measures	

Device Wear Days, Mean (SD)	5.8 (0.9)
Average daily walking minutes, mean (SD)	15.5 (21.3)
Average daily vehicle minutes, mean (SD)	69.0 (56.0)
Perceived neighborhood environment [b]	
Safety from traffic, mean (SD)	3.7 (1.3)
Safety from crime, mean (SD)	3.8 (1.2)
Aesthetics[b], mean (SD)	3.1 (1.1)
Sidewalk maintenance, mean (SD)	3.5 (0.6)
Has access of destinations, (yes) %	78.2

[a] a mean score of ≥ 2.5 on the BAS Scale for the non-Hispanic domain

[b] Higher Scores indicative of more favorable evaluation

Table A2

Multivariate association of intrapersonal factors, perceived neighborhood environment with objective daily walking & vehicle time (N=418 days, n=72 participants)

	Walking Time			**Vehicle Time**		
	Rate Ratio[a]	**95% CI**	**P-Value**	**Rate Ratio[a]**	**95% CI**	**P-Value**
Intrapersonal factors						
Age	0.96	(0.79 – 1.18)	0.707	1.04	(0.93 – 1.17)	0.485
Vehicle access	1.06	(0.88 – 1.27)	0.554	0.98	(0.87 – 1.09)	0.658
≥ High school education	0.98	(0.64 – 1.50)	0.911	1.23	(0.97 – 1.57)	0.093
≥$2,000 (Household Income)	0.88	(0.58 – 1.33)	0.540	1.31	(1.04 – 1.65)	**0.021**
Overweight or obese	0.59	(0.35 – 0.98)	**0.042**	1.50	(1.11 – 2.03)	**0.009**
High-acculturation[b]	0.74	(0.46 – 1.18)	0.201	1.11	(0.86 – 1.44)	0.422
Perceived neighborhood environment						
Access to destinations	1.25	(0.69 to 2.25)	0.466	1.16	(0.81 – 1.65)	0.421
Safety from traffic	0.98	(0.79 to 1.22)	0.866	0.94	(0.82 – 1.07)	0.319
Safety from crime	1.16	(0.94 to 1.45)	0.171	0.95	(0.84 – 1.09)	0.470
Sidewalk maintenance	0.84	(0.68 to 1.03)	0.093	0.96	(0.85 – 1.09)	0.525
Aesthetics	1.08	(0.87 to 1.35)	0.475	1.08	(0.95 – 1.23)	0.258

Note: bold indicates a significant association at p<0.05

[a] Estimates are from generalized linear mixed models, adjusted for participant clustering effects, with negative binomial error distributions. Models are controlled for wear time and church.

[b] a mean score of ≥ 2.5 on the BAS Scale for the non-Hispanic domain

Table A3

Significant intrapersonal moderators of the association between the perceived neighborhood environment with objective daily walking & vehicle time (N= 418 days, n=72 participants)

	Walking Time[a]		
	Rate Ratio	**95% CI**	**p-value**
≥$2,000 (Household Income)	1.96	(1.16 – 3.32)	**0.012**
High-acculturation[b]	0.88	(0.56 – 1.38)	0.578

	Walking Time[a]		
	Rate Ratio	95% CI	p-value
Access to destinations	1.88	(1.03 – 3.46)	**0.041**
Safety from traffic	0.98	(0.80 – 1.20)	0.848
Safety from crime	1.26	(1.03 – 1.54)	**0.024**
Sidewalk maintenance	0.65	(0.50 – 0.85)	**0.002**
Aesthetics	1.14	(0.93 – 1.39)	0.207
Access to destinations X household income (<$2,000 vs. ≥$2,000 (reference))	4.67	(1.58 – 13.78)	**0.005**
Sidewalk maintenance X acculturation[c] (high vs. low(reference))	0.53	(0.32 – 0.88)	**0.014**
	Vehicle Time[a]		
≥ High school education	1.28	(1.05 – 1.55)	**0.015**
Overweight or obese	2.39	(1.66 – 3.46)	**0.000**
Access to destinations	2.03	(1.39 – 2.96)	**0.000**
Safety from traffic	0.92	(0.83 – 1.02)	0.117
Safety from crime	0.93	(0.84 – 1.04)	0.205
Sidewalk maintenance	0.98	(0.89 – 1.09)	0.765
Aesthetics	1.09	(0.97 – 1.22)	0.145
Access to destinations X weight status (overweight/obese vs. normal (reference))	0.24	(0.12 – 0.51)	**0.000**
Safety from crime X high school education(≥ degree vs. < degree(reference))	0.76	(0.62 – 0.95)	**0.013**

Notes: bold indicates a significant association at p<0.05

[a]Estimates are from a generalized linear mixed model, adjusted for participant clustering effects, with negative binomial error distributions. Models are controlled for age, church, and total wear time..

[b]a mean score of ≥ 2.5 on the BAS Scale for the non-Hispanic domain

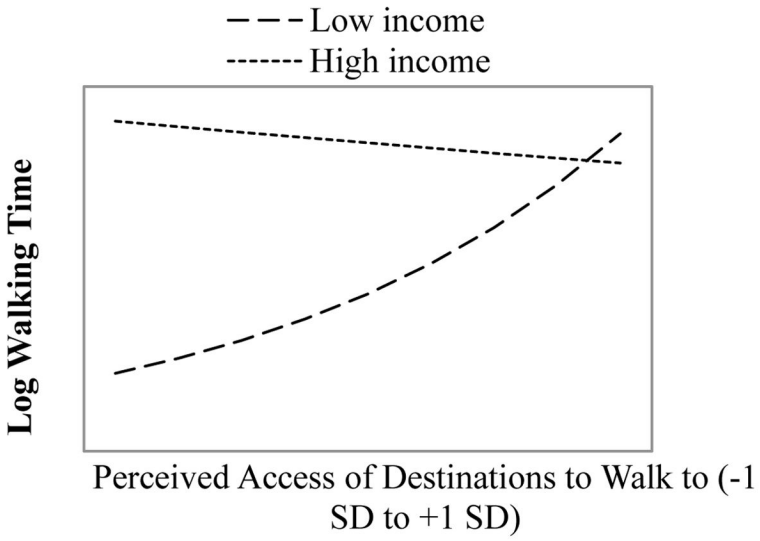

Figure A1.

Interaction between income status and access to destinations on objectively measured vehicle time. *Fe en Accion*, 2012, San Diego, CA

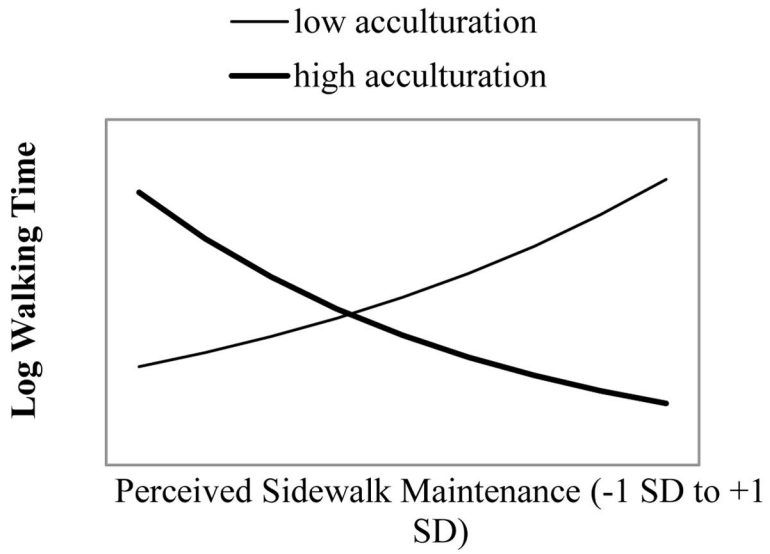

Figure A2.
Interaction between acculturation status and sidewalk maintenance on objectively measured walking time. *Fe en Accion*, 2012, San Diego, CA

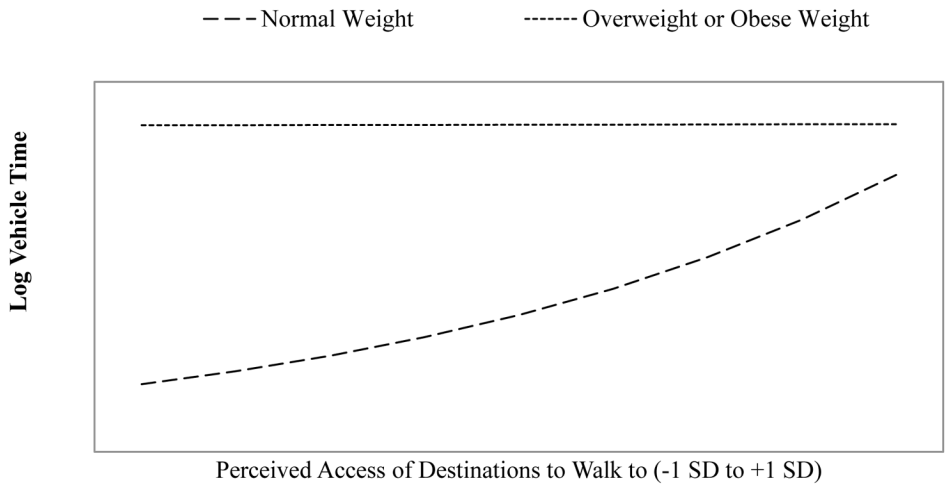

Figure A3.
Interaction between weight status and access to destinations on objectively measured vehicle time. *Fe en Accion*, 2012, San Diego, CA

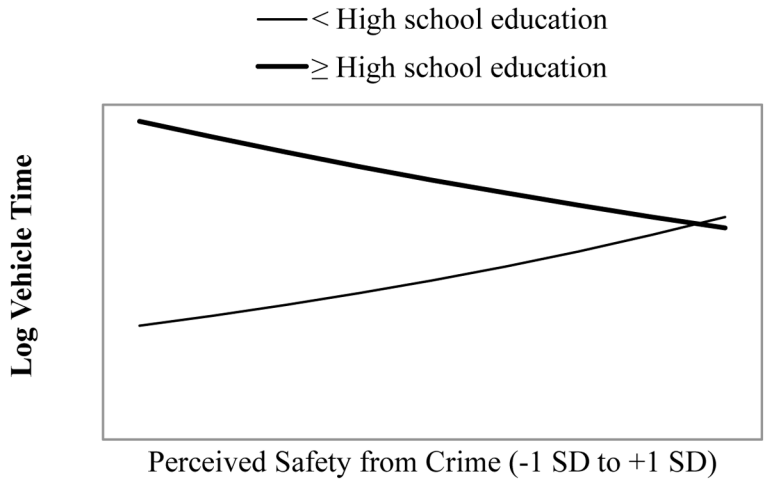

Figure A4.
Interaction between education status and perceived safety from crime on objectively measured vehicle time. *Fe en Accion*, 2012, San Diego, CA

Highlights

- Latinas participate in low levels of walking and high amounts of vehicle time.
- Overweight/obese Latinas had lower amounts of walking time and higher vehicle time.
- Latinas of higher income had higher amounts of vehicle time.
- Interaction findings can help improve ecological models specific to Latinas.