



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 min/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 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

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environment with walking and vehicle time. Improving neighborhood environments to promote walking and reduce vehicle time may help improve Latinas' overall physical activity.

1. Introduction

Walking for transportation or leisure is lower in the US compared to other countries (Kerr et al., 2016; Sugiyama et al., 2014). In a large US travel survey, non-Whites had similar walking rates as Whites but higher obesity rates (Frank et al., 2008). 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 (McCormack and Virk, 2014). Racial/ethnic minority women report more time in a car (11.4 h/week, on average) compared to non-Hispanic White women (9.4 h/week, on average) (Rosenberg et al., 2010). 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 (Ogden et al., 2014; Blackwell et al., 2014). Few studies have assessed walking and vehicle time objectively (Takemoto et al., 2015; Carlson et al., 2015). 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 (Sallis and Owen, 2015). 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) (Ham et al., 2007). Latinas with higher acculturation levels also report less time walking than those with lower levels (O'Brien et al., 2013).

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 (Amesty, 2003). 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 (Marquez et al., 2014).

Similarly, in previous studies, intrapersonal and environmental factors have been linked to self-reported vehicle time (Sugiyama et al., 2012; Frank et al., 2004; Kozo et al., 2012). For example, higher income, full-time employment, having children, and living in the outer suburbs are significantly associated with higher reported vehicle time (Sugiyama et al., 2012). 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 (Frank et al., 2004; Kozo et al., 2012).

Furthermore, previous studies have shown that intrapersonal factors like SES moderate the relationship between the neighborhood environment and physical activity behaviors (Frank et al., 2008; Humpel et al., 2004; Foster et al., 2004; Perez et al., 2016). 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 (Perez et al., 2016).

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 (Kelly et al., 2013). This approach has been used to examine the relationship between the neighborhood environment and PA among Latino children and Latina adults (Carlson et al., 2015; O'Connor et al., 2013; Perez et al., 2016). 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.

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