Published in final edited form as:

Am J Prev Med. 2013 August ; 45(2): 202–206. doi:10.1016/j.amepre.2013.03.021.

Walk Score®:

Associations with Purposive Walking in Recent Cuban Immigrants

Scott C. Brown, PhD, Hilda Pantin, PhD, Joanna Lombard, MArch, Matthew Toro, MA, Shi Huang, PhD, Elizabeth Plater-Zyberk, MArch, Tatiana Perrino, PsyD, Gianna Perez-Gomez, PhD, Lloyd Barrera-Allen, and José Szapocznik, PhD

Center for Family Studies, Department of Public Health Sciences, University of Miami Miller School of Medicine (Brown, Pantin, Lombard, Toro, Huang, Plater-Zyberk, Perrino, Perez-Gomez, Barrera-Allen, Szapocznik), Miami, and the University of Miami School of Architecture (Brown, Lombard, Plater-Zyberk, Szapocznik), Coral Gables, Florida

Abstract

Background—Walk Score® is a nationally and publicly available metric of neighborhood walkability based on proximity to amenities (e.g., retail, food, schools). However, few studies have examined the relationship of Walk Score to walking behavior.

Purpose—To examine the relationship of Walk Score to walking behavior in a sample of recent Cuban immigrants, who overwhelmingly report little choice in their selection of neighborhood built environments when they arrive in the U.S.

Methods—Participants were 391 recent healthy Cuban immigrants (M age=37.1 years) recruited within 90 days of arrival in the U.S., and assessed within 4 months of arrival (M=41.0 days in the U.S.), who resided throughout Miami-Dade County FL. Data on participants' addresses, walking and sociodemographics were collected prospectively from 2008 to 2010. Analyses conducted in 2011 examined the relationship of Walk Score for each participant's residential address in the U.S. to purposive walking, controlling for age, gender, education, BMI, days in the U.S., and habitual physical activity level in Cuba.

Results—For each 10-point increase in Walk Score, adjusting for covariates, there was a significant 19% increase in the likelihood of purposive walking, a 26% increase in the likelihood of meeting physical activity recommendations by walking, and 27% more minutes walked in the previous week.

Conclusions—Results suggest that Walk Score is associated with walking in a sample of recent immigrants who initially had little choice in where they lived in the U.S. These results support existing guidelines indicating that mixed land use (such as parks and restaurants near homes) should be included when designing walkable communities.

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Address correspondence to: Scott C. Brown, PhD, Center for Family Studies, Department of Public Health Sciences, University of Miami Miller School of Medicine, 1425 NW 10th Ave., Rm. 307-E, Miami FL 33136. sbrown@med.miami.edu.

No other financial disclosures were reported by the authors of this paper.

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Introduction

Walk Score[®], a commercial, web-based walkability measurement tool (walkscore.com) measures neighborhood walkability, based on the distance from a specific address to amenities (e.g., retail, food, schools), for most U.S. locations and some international locations.¹ Walk Score has been shown to be related to locally derived built environment indices^{2–5} and BMI.⁶ However, given that only one study to date has identified an association between Walk Score and walking behavior,⁵ further studies of Walk Score's relationship to walking are warranted.

The present study investigates Walk Score's relationship to walking among recent, healthy Cuban immigrants to the U.S., a population who generally do not select their neighborhood of residence, but are likely to reside with U.S.-based relatives, or in residences selected by charitable nonprofit agencies. Given that there is limited access to automobiles in Cuba,^{7,8} when this population arrives in the U.S., an ideal natural experiment occurs in which a population generally accustomed to physical activity is exposed to a variety of neighborhood walkability conditions in the U.S. Thus, the present study investigates the relationship of Walk Score to recent Cuban immigrants' purposive walking in the U.S. (i.e., walking undertaken to reach a destination), which is a target for increasing physical activity.^{9–15} Purposive walking has been linked to walkable destinations such as stores and restaurants near homes.^{16–21} No peer-reviewed studies have examined Walk Score's relationship to walking among recent immigrants.

Methods

Study Population

Data were collected as part of a larger, population-based, prospective cohort study of recent Cuban immigrants in Miami-Dade County FL that examines environmental, behavioral and biological variables that may affect progression on metabolic syndrome indicators,²² among 391 recently arrived Cuban immigrants. This study was approved by the University of Miami and the Florida State Department of Health IRBs. Participants were recruited from the Miami-Dade Refugee Health Assessment Clinic.²³ Participants must: (1) have been born in Cuba; (2) have left Cuba in the previous 90 days; (3) be aged 30–45 years; (4) live in Miami-Dade County, and not anticipate leaving South Florida in the next year; and (5) complete a baseline interview within 4 months of arrival in the U.S. Exclusion criteria were: (1) a condition or medical problem that interfered with ability to exercise over the previous year; (2) pre-existing conditions or medications that can affect metabolic syndrome indicators; and (3) metabolic syndrome diagnosis.²²

Of 7157 individuals initially approached for potential participation, 887 refused participation and 5879 were ineligible. Reasons for exclusion were: live or plan to live outside Miami-Dade County ($n=468$); at screening, had left Cuba more than 90 days previously ($n=518$); a BMI ≥ 30 and a waist circumference ≥ 102 cm for men/ ≥ 88 cm for women, indicating both general and abdominal obesity^{22,24–26} ($n=1564$); pregnancy or recent pregnancy ($n=91$); health problem related to metabolic syndrome ($n=1969$)²²; a positive tuberculosis test ($n=905$)²⁷; being related to a study participant ($n=115$); and other criteria (e.g., age, metabolic syndrome diagnosis,²² not being Cuban; $n=249$).

These exclusion criteria resulted in a sample who were free of pre-existing conditions that can affect obesity or metabolic syndrome indicators,^{22,28} given that the larger study examines the development of obesity and metabolic syndrome in recent Cuban immigrants over time. Informed consent was obtained from all eligible participants. The 391 participants were “hypothesis-blind” regarding the potential role of the built environment in health. The

present analyses utilize data from the baseline assessment, collected from April 2008 to June 2010, and analyzed in 2011.

Study Setting

Participants resided throughout Miami-Dade County FL, a relatively large geographic area (5135 square kilometers in land area),²⁹ and the seventh-largest U.S. county by population, with 2.6 million residents.³⁰ The county encompasses a diversity of built environments from high mixed-use urban centers with many walking destinations to single-use suburban areas with few walking destinations.

Assessment of Built Environment Walkability

Walk Score¹ assessed an address' walkability based on distance to amenities or walkable destinations related to education (schools); retail (e.g., bookstores); food (e.g., restaurants); recreation (e.g., parks); and entertainment (e.g., cinemas).^{1,3,4,31} The algorithm uses a distance-decay function that awards points based on distance to the nearest destination of each type using multiple data sources including Google, Education.com, and OpenStreetMap.^{1,3,4,31} If the closest establishment of a type is within 0.25 miles (0.40 km), Walk Score assigns the maximum number of points for that type. Fewer points are assigned as the distance approaches 1 mile (1.61 km).¹ Each type of destination is given equal weight and the points for each category are totaled and normalized to produce a score from 0 to 100.^{1,3,4,31} Test-retest reliability and validity have been reported.²⁻⁵ All 391 participant addresses were manually coded in 2011 using walkscore.com.¹

Assessment of Walking Behavior in the U.S

Purposive walking in the U.S. was assessed for the week prior to baseline using the "walking for transport" subscale of the International Physical Activity Questionnaire (IPAQ) Long Form,³² which assesses whether the participant engaged in walking to get from place to place, and if so, the number of minutes walked.

Covariates

Covariates included age, gender, education, BMI, days in the U.S., and habitual physical activity level in Cuba (assessed by the frequency of walking and cycling for the last year in Cuba).^{33,34}

Data Analysis

Regression analyses examined Walk Score's relationships to: (1) whether the participant engaged in purposive walking; (2) the amount of purposive walking (in minutes, log-transformed due to skewing); and (3) whether physical activity recommendations were met through purposive walking (i.e., 150 minutes of walking in the last week), based on CDC guidelines of engaging in moderate activity such as walking at least 2.5 hours per week.³⁵ Analyses were conducted in 2011 using SPSS/PASW Statistics, version 18.

Results

Table 1 presents descriptive statistics for the study sample. Table 2 presents the results of the regression analyses. For each 10-point increase in Walk Score, adjusting for covariates, there was a significant 19% increase in the likelihood of purposive walking, a 27% increase in the number of minutes of purposive walking (0.103 log₁₀-minutes), and a 26% increase in the likelihood of meeting physical activity recommendations through walking.

Discussion

For a sample of healthy, recent Cuban immigrants to the U.S., Walk Score¹ was associated with the likelihood of purposive walking, the amount of walking, and the likelihood of meeting physical activity recommendations through walking.³⁵ Given that Walk Score's measure of distance to walkable destinations (e.g., stores, parks) was related to purposive walking, these results add to the evidence base supporting existing guidelines for including mixed use when designing walkable communities.^{36–39}

A strength is that this is one of the first studies to find associations between Walk Score—a widely and easily available measure of walkability—and walking behavior.⁵ It does so in a recent immigrant population who overwhelmingly reported that they did not select their neighborhood based on built environment characteristics, thereby addressing selection bias, which has characterized much prior research linking walkability to walking.^{40–42} The vast majority of the study participants did not choose their initial residence; theirs was selected *for* them—either by relatives or agencies who place this population of Cubans when they arrive in the U.S. Only about 1% ($n=5$; 1.2%) of the present sample report selecting their residence in the U.S. based on built environment characteristics, whereas nearly 70% ($n=271$; 69.3%) report that the primary reason for selecting their residence was to live with, or near, relatives.

There are limitations: In focusing on distance to amenities, Walk Score omits other neighborhood environmental constructs such as sidewalks, crime, perceived safety, and the quality of destinations. These additional, unmeasured neighborhood factors may have confounded the relationship between Walk Score and purposive walking. Moreover, given the present study's focus on recent Cuban immigrants, aged 30–45 years, who were not obese or met metabolic syndrome criteria, the sample may have been particularly sensitive to the walkability of their built environment in the U.S. Future research should assess the present findings' generalizability in both similar and fundamentally different populations and communities.

Additionally, walking was assessed by a single, self-report measure (IPAQ), as compared to other methods used to assess walking (e.g., diary; pedometer) or physical activity (e.g., accelerometry; SenseCam).^{9,43} Further, the measure of purposive walking was not specific to walking in one's own neighborhood. Even stronger associations between Walk Score and walking may have been obtained if the present study assessed the amount of walking in the participant's neighborhood, which means the current analysis is a conservative test of the study hypotheses. Finally, individuals' motorized vehicle access or vehicular miles traveled were not assessed.²⁸

This is the first study to find a relationship of Walk Score to walking in a recent immigrant population, a population selected in an effort to address selection bias in prior research. Notably, the study revealed that walkability as measured by Walk Score¹ is associated with the likelihood of purposive walking (walking from place to place); the amount of walking; and the likelihood of meeting physical activity recommendations through walking.³⁵ Walk Score and other measures of built environment walkability and other walkability measures should be examined for their associations with walking in recent immigrants and other populations at risk for low levels of physical activity.^{44–48} Given the public availability of Walk Score nationally and internationally,¹ this study sets the stage for future comparative studies of the ecologic determinants of physical activity in multiple populations that could inform interventions to increase active living in the U.S. and globally.^{12,46}

Acknowledgments

The work presented in this paper was supported by a research grant from the National Institute of Diabetes and Digestive and Kidney Diseases Grant No. 1R01-DK-074687 (J. Szapocznik, PI; T. Perrino, Project Director).

Professor Joanna Lombard is a licensed architect and public speaker on New Urbanism, and the results of this study may lead to financial benefit because she has expertise in New Urbanism, which encourages walkable community designs. Dean Elizabeth Plater-Zyberk is a founding member of the Congress for the New Urbanism and one of the principals of the Duany Plater-Zyberk (DPZ) architectural firm and therefore the results of this study may lead to financial benefit because she has expertise in New Urbanism. None of the authors has any financial interest in walkscore.com.

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Table 1

Descriptive statistics for the sample

Variable	Overall Sample		
	M (%)	(SD)	Range
<u>Demographics:</u>			
Age, years	37.11	(4.52)	30.00–45.00
Gender (% male)	(52.2)		
Education (years)	13.13	(2.52)	6.00–17.00
BMI	24.95	(2.44)	18.73–30.36
Days in U.S. at baseline assessment	40.99	(24.71)	6.00–123.00
Habitual Physical Activity in Cuba	3.13	(0.69)	1.00–5.00
<u>Predictor Variable:</u>			
Walk Score®	59.26	(16.43)	2.00–98.00
<u>Outcome Variables:</u>			
% who engaged in purposive walking in last week (in U.S.)	(56.8)		
Amount of purposive walking in last week, in minutes (in U.S.)	121.56	(251.28)	0.00–1260.00
% meeting physical activity recommendations by purposive walking (in U.S.)	(20.7)		

Table 2

Regression analyses on relationship of Walk Score® to walking-related outcomes in U.S.

Variable	Whether Engaged in Purposive Walking, Last Week				Amount of Purposive Walking ($\log_{10}min$), Last Week				Whether Met PA Recommendations by Purposive Walking, Last Week					
	Coefficient	SE	p-value	OR	(95% CI)	Coefficient	SE	p-value	β	Coefficient	SE	p-value	OR	(95% CI)
Walk Score ^a	0.170	0.065	0.009**	1.185	(1.043, 1.347)	0.103	0.033	0.002**	0.158	0.231	0.087	0.008**	1.260	(1.062, 1.495)
Age	0.025	0.024	0.282	1.026	(0.979, 1.074)	0.015	0.012	0.216	0.063	0.033	0.029	0.259	1.034	(0.976, 1.095)
Gender ^b	-0.099	0.220	0.654	0.906	(0.589, 1.394)	-0.078	0.112	0.488	-0.036	-0.105	0.272	0.700	0.900	(0.528, 1.535)
Education (years)	0.092	0.043	0.031*	1.097	(1.008, 1.192)	0.035	0.022	0.108	0.081	0.003	0.052	0.959	1.003	(0.906, 1.110)
BMI	-0.033	0.045	0.466	0.968	(0.887, 1.056)	-0.025	0.023	0.267	-0.057	-0.067	0.055	0.224	0.935	(0.839, 1.042)
Number of days in U.S.	0.002	0.004	0.575	1.002	(0.994, 1.011)	0.002	0.002	0.285	0.054	0.009	0.005	0.080	1.009	(0.999, 1.020)
Habitual PA in Cuba	0.264	0.154	0.087	1.302	(0.962, 1.761)	0.228	0.078	0.004**	0.147	0.682	0.199	0.001**	1.978	(1.339, 2.922)

Note: Boldface indicates significance. 3=standardized path coefficient; coefficient=unstandardized path coefficient.

^aFor purposes of computing ORs, Walk Score was divided by 10 (so that a 1-unit change corresponded to a 10-point change in Walk Score®)

^bGender-coded as a dichotomous variable ("1"=male; "0"=female)

* $p < 0.05$,

** $p < 0.01$

PA, physical activity