Walking and Proximity to the Urban Growth Boundary and Central Business District

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Background: Planners have relied on the urban development boundary (UDB)/urban growth boundary (UGB) and central business district (CBD) to encourage contiguous urban development and conserve infrastructure. However, no studies have specifically examined the relationship between proximity to the UDB/UGB and CBD and walking behavior.

Purpose: To examine the relationship between UDB and CBD distance and walking in a sample of recent Cuban immigrants, who report little choice in where they live after arrival to the U.S.

Methods: Data were collected in 2008–2010 from 391 healthy, recent Cuban immigrants recruited and assessed within 90 days of arrival to the U.S. who resided throughout Miami–Dade County FL. Analyses in 2012–2013 examined the relationship between UDB and CBD distances for each participant's residential address and purposive walking, controlling for key sociodemographics. Follow-up analyses examined whether Walk Score®, a built-environment walkability metric based on distance to amenities such as stores and parks, mediated the relationship between purposive walking and each of UDB and CBD distance.

Results: Each one-mile increase in distance from the UDB corresponded to an 11% increase in the number of minutes of purposive walking, whereas each one-mile increase from the CBD corresponded to a 5% decrease in the amount of purposive walking. Moreover, Walk Score mediated the relationship between walking and each of UDB and CBD distance.

Conclusions: Given the lack of walking and walkable destinations observed in proximity to the UDB/UGB boundary, a sprawl repair approach could be implemented, which strategically introduces mixed-use zoning to encourage walking throughout the boundary's zone.
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Introduction

Planners have relied on the urban development boundary, or urban growth boundary, (UDB/UGB) to encourage contiguous urban development and conserve infrastructure.[1–6] Proximity to the UGB/UDB boundary typically indicates development that is single use, sprawling, and isolated,[1,6–8] the opposite of the central business district (CBD), which is characterized by mixed-use neighborhoods with high connectivity.[9–11] If it could be shown that the proximate environment of the UGB/UDB boundary demonstrates deleterious health impacts, then policy planners using the tool of the UGB/UDB to contain growth may reconsider zoning, density, and financial incentives that encourage any development that occurs at the boundary to manifest neighborhood characteristics associated with beneficial health impacts.[12–14] However, no peer-reviewed studies have specifically examined the relationship between either proximity to a UDB or a CBD and residents' walking behavior.

Recent Cuban immigrants are a population who overwhelmingly reported little choice in their selection of built environments,[15] thus addressing selection bias, which occurs in many built-environment studies.[15–18] When these immigrants arrive in the U.S., a population generally accustomed to physical activity[19,20] is exposed to a variety

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of neighborhood walkability conditions. This study investigates the relationship between UDB and CBD distance and recent Cuban immigrants' purposive or utilitarian walking.[21–26] Walk Score®, a built-environment walkability metric assessing proximity to amenities such as parks and stores,[27] was shown to be related to purposive walking in the current sample.[15] The present study assesses whether Walk Score mediates the relationship between UDB or CBD distance and purposive walking.

Methods

Study Population

Data were collected as part of the Cuban Health Study, a population-based, prospective cohort study.[15] Analyses (2012–2013) utilized data from the baseline assessment (2008–2010).

Study Setting

Participants resided throughout Miami–Dade County FL, which encompasses diverse built environments, with Walk Scores ranging from 2 to 98 on a scale of 0–100.[15] The UDB is a zoning mechanism delimiting the extent of urban and agricultural expansion within Miami–Dade County to protect Everglades National Park (Figure 1).[1] Growth originated along the East Coast; sprawl extends to the UDB. The CBD is the cultural, financial, and commercial center of the county, which includes residences near retail and civic uses in downtown Miami (Figure 2).[28,29]

Measures

Distances to the UDB[1] and CBD[28] were calculated for participants' residential addresses using ArcGIS, version 9.3 (ESRI, Redlands CA)

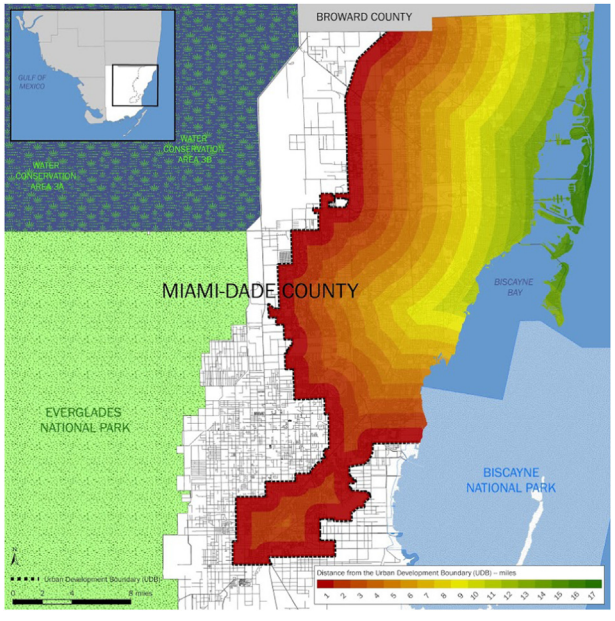

Figure 1. Distance (in miles) from the Urban Development Boundary in Miami–Dade County, Florida.

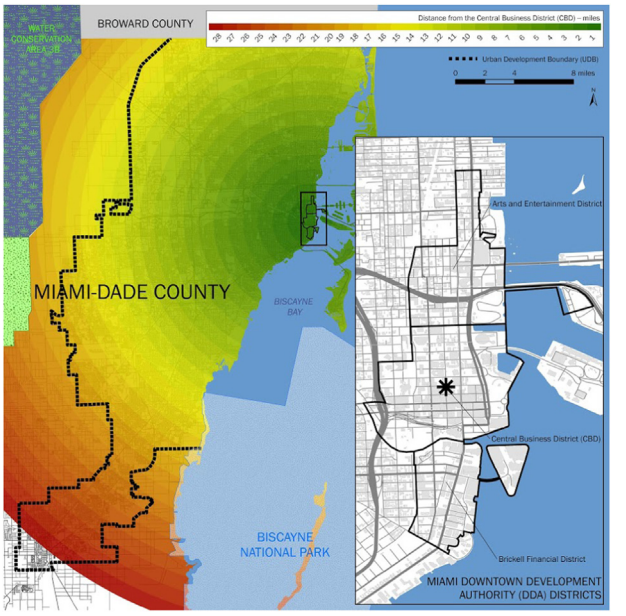

Figure 2. Distance (in miles) from the greater Miami Central Business District in Miami–Dade County, Florida.

and used as predictor variables. UDB distances for participants who lived inside the UDB (n=388) were coded as positive numbers, whereas distances beyond the UDB (n=3) were coded as negative numbers because they are hypothesized to be detrimental.

Walk Score is a measure of walkability, based on distance to amenities or walkable destinations.[27,30–32] Walk Score awards points based on distance to the nearest destination of each type (e.g., retail, recreational) using multiple data sources (e.g., Google, OpenStreetMap). Points are summed and normalized to produce a score of 0–100.[15,27,30–32] Reliability and validity are acceptable.[15,30,31,33–36] Participants' addresses were coded using walkscore.com.[15,27]

Purposive walking, used as the outcome variable, was assessed for the week prior to baseline using the International Physical Activity Questionnaire (IPAQ) "walking for transport" subscale, which assesses minutes of walking to get from place to place.[37]

Covariates were age, gender, education, BMI, days in the U.S., and habitual physical activity level (walking and cycling frequency for the last year in Cuba).[38,39]

Statistical Analyses

Regression analyses examined separately the relationship between UDB and CBD distance and the amount of purposive walking ($\log_{10}$-minutes, because of skewing), adjusting for covariates. Follow-up analyses assessed whether Walk Score mediated the relationship between the outcome of purposive walking and each of UDB and CBD distance. Mediation was tested using the asymmetrical distribution of products test,[40] which multiplies the unstandardized coefficients of the two paths that determine the mediating pathway and estimates a corresponding SE. If the 95% CI for this product does not include zero, then mediation is assumed. Analyses were conducted using SPSS/PASW Statistics, version 18 (IBM, Endicott NY) and Mplus, version 7.0 (Muthén & Muthén, Los Angeles CA).