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Differences in social and physical dimensions of perceived walkability in Mexican American and non-hispanic white walking environments in Tucson, Arizona

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Abstract

Introduction: Physical activity patterns within the U.S. vary greatly across ethnicity, with data generally indicating lower rates among Hispanic/Latino adults. At the same time, Hispanic/Latino pedestrians face higher rates of injury and fatalities. Despite the importance of supportive physical activity environments on both health and safety outcomes, limited attention has been paid to ethnic or cultural differences in perceptions of supportive environments for walking. To fill this gap, we explore differences in physical and social environment contributors to perceived walkability between pedestrians in predominantly (> 70%) Mexican American and predominantly non-Hispanic white areas in Tucson, Arizona.

Methods: In early 2017 the research team conducted brief on-street intercept interviews with pedestrians (N = 190) to learn about the environmental attributes associated with pedestrian perceptions of walkability. Study locations were matched for similar physical walkability metrics, income, and poverty rates. Consensus-based thematic coding identified 14 attributes of the built and social environment that contributed, positively and negatively, to perceptions of walkability.

Results: Attributes of the social environment, both positive (i.e., social interaction, social cohesion, and community identity) and negative (i.e., crime/security), were more frequently expressed as components of walkability in Mexican American study areas while physical environment attributes (i.e., infrastructure, street crossings, and aesthetics) were more frequently mentioned in non-Hispanic white areas.

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Conclusions: Contributors to perceived walkability in non-Hispanic white study areas were largely consistent with existing built environment-focused walkability metrics. Differences seen in Mexican American areas suggest a need to better understand differences across populations, expand the construct of walkability to consider social environment attributes, and account for interactions between social and physical environments. Results highlight the need for collaboration between public health and planning professionals, to evaluate walkability using culturally relevant measures that account for the social environment, particularly in Mexican American and other communities of color.

Keywords

Physical activity; Walking; Health inequalities; Built environment; Social environment

1. Introduction

Health benefits of walking and physical activity, including lower risk of heart disease, stroke, several types of cancer, type 2 diabetes, hypertension, obesity, and improved maintenance of cognitive function, are well-documented (Hardman and Stensel, 2009; Moore et al., 2016; Weuve et al., 2004; Woodcock et al., 2009). Disparities exist, however, in levels of physical activity and the associated health and safety outcomes of walking across the population. Socioeconomically disadvantaged and racial/ethnic minority populations are, for example, less likely to meet recommended levels of physical activity (USDHHS, 2015), though this varies within subgroups and by type of physical activity, including transport, leisure, and occupational (Arredondo et al., 2016). Hispanic/Latino adults are also more likely to be injured or killed while walking than higher income earners and non-Hispanic whites (CDC, 2013). Environmental factors help to explain these disparities. Of the various environmental factors linked with walking, physical activity, and related health and safety outcomes, most attention—in both practice and research—has been paid to attributes of the physical environment (Stangl, 2011). These include the presence or lack of sidewalks and other supportive infrastructure (Kärmeniemi et al., 2018), sufficient nearby destinations (King et al., 2015), transit availability (Saelens et al., 2014), proximity to parks and open space (Sugiyama et al., 2010), and inequitable distribution of infrastructure that results in fewer supports for walking in lower-income areas and communities of color (Neckerman et al., 2009; Sallis et al., 2011; Lowe, 2016).

Less attention is typically paid to aspects of the social environment. For example, a survey of 53 pedestrian plans in the United States identified 17 plan elements related to walkability (Stangl, 2011). Just two of these elements, security issues and the provision of places for socializing, were related to the social environment; these elements were found in fewer than one in three of the pedestrian plans reviewed. While the built environment is clearly a critical component of walkability, built environment-only approaches for assessing neighborhood walkability, or a failure to recognize how social and physical dimensions may interact, can result in investments that fail to address underlying barriers in a community that are preventing residents from walking. In such a situation this may lead to a disconnect between city and community priorities and, especially in areas where residents are concerned about gentrification and economic displacement, may result in a sense that

such investment is being made for future residents (Adkins et al., 2017; Danley and Weaver, 2018; Lubitow and Miller, 2013).

Socioecological models of behavior provide a useful conceptual framework for recognizing that characteristics of neighborhood physical environments are just one of many interacting factors. Other factors include characteristics and constraints related to families and households, policies, and elements of the social environment (Sallis et al., 2006). These layers of environmental influence help to explain why standard physical environment-focused measures of walkability, and their usefulness for predicting behavior, may vary across socioeconomic and sociocultural contexts (Adkins et al., 2017; Day, 2006; Frank et al., 2008; Sallis et al., 2009; Serrano et al., 2018). A review of studies from the fields of public health, planning, and transportation showed that the effect of a walkable physical environment on walking and physical activity was about half as strong for low-income, people of color, and those with lower educational attainment than for relatively socioeconomically advantaged groups (Adkins et al., 2017). Some of this discrepancy may be due to the acknowledged, yet often overlooked, role of the social environment. Better understanding these differences across socioeconomic and sociocultural contexts was one of the primary motivations behind the research presented in this paper.

Social environment elements can have both direct effects on perceptions and behavior related to walking as well as important interactions with the physical environment. These interactions include built environments that facilitate social connectedness (Kaczynski and Glover, 2012), social supports that get people to take advantage of walkable environment (Beenackers et al., 2014), and high crime rates that may keeps people from benefitting from a supportive physical environment. As Forsyth (2015) observes, some social attributes may be outcomes of places that are physically more walkable due to the activities and interactions fostered.

Elements of the social environment relevant to walking and physical activity include socioeconomic status, social support, social networks and interaction, social cohesion, social capital, community identity and belonging, racial discrimination, safety and security, and neighborhood disorder (Dadpour et al., 2016; Hystad and Carpiano, 2010; McNeill et al., 2006). Social cohesion and social networks appear to be particularly influential with regard to physical activity in low-income and ethnic/racial minority populations (Forrest and Kearns, 2001; Pabayo et al., 2014; Shelton et al., 2011). Strong community and social ties may, in part, be a response to challenges facing impoverished communities (Forrest and Kearns, 2001; Swaroop and Morenoff, 2006). In Hispanic/Latino communities, sociocultural advantages like trust, reciprocity, and large, close-knit, and proximal social and family networks may contribute to better health outcomes than would be predicted by socioeconomics and indicators of neighborhood disorder (Cagney et al., 2007; Eschbach et al., 2004; Ribble et al., 2001; Ruiz et al., 2016).

The aim of this paper is to understand the degree to which physical and social environment attributes contribute to perceptions of walkability in two different contexts: predominantly Mexican American and predominantly non-Hispanic white areas of Tucson, Arizona. The research team decided that qualitative methods (i.e. interviews and focus groups) were

best-suited to explore of this question because they allowed us to reconsider possibly biased expert assessments and established walkability metrics to instead learn from, and in the words of, pedestrians and their lived experiences in our study areas. To do this we conducted and analyzed 190 on-street interviews with pedestrians in predominantly Mexican American study locations and a comparison group of predominantly non-Hispanic white locations selected to have similar physical environment conditions.

1.1. Study setting

Tucson presents a fitting context for exploring how elements of the physical and social environment contribute to perceptions of walkability in predominantly Mexican American areas. Tucson is located about 70 miles from the U.S./Mexico border and has a population that is 42.7% Hispanic/Latino, of which 90% are of Mexican ancestry (USDHHS, 2015). Many of the predominantly Mexican American areas of the region are clustered on the south and west side of the city and in the independent City of South Tucson. The state of Arizona and Tucson consistently have among the highest pedestrian fatality rates in the U.S. (Locke, 2014; Retting, 2018). The disparity in pedestrian fatalities between high and low-income Census tracts in Tucson from 2008 to 2012 was1.6 times greater than the disparity observed nationally (Maciag, 2014). The fatality rate in Tucson's highest poverty neighborhood—which overlap with many of the regions majority Hispanic/Latino areas—was 3.4 times higher than the rate in the lowest poverty census tracts.

The historical context of Tucson is also relevant. Tucson was part of Mexico until 1854. Over the subsequent 100 years, traditionally Mexican parts of central Tucson were subject to intentional neglect and, by the 1950s and 60s, demolition and clearance through urban renewal. Leading up to this period, a city-led modernization effort in the 1930s and 1940s built sidewalks and curbs, which resulted in the removal of trees, shrubs, and informal gathering places, altering the character and "lived-in" feel of neighborhoods (Otero, 2010, p. 100). Following this imposed and largely unwanted modernization, another period of neglect and disinvestment helped to justify classification of the area as a slum and hasten its destruction through urban renewal in the 1960s. This history has not been forgotten by residents and was mentioned in several of the focus groups that preceded our on-street interviews (Ingram et al., 2017).

2. Methods

We selected seven interview sites in areas that were either predominantly (> 70%) Hispanic/Latino or non-Hispanic white. Others have used a 60 percent threshold, but given the racial/ethnic distribution of the population in Tucson we found 70 percent to be a more meaningful criterion. Other site selection criteria were: the presence of a commercial strip or other pedestrian activity generator, similar built environments (i.e., network density, sidewalk coverage, Walk Score), at least a moderate amount of pedestrian activity (based on field visits), and similar median household incomes and poverty rates (Table 1). At each study location, we identified a several block area in which interviews were conducted. Approximate study locations are shown in fig. 1.

2.1. Data collection

We developed an interview guide and protocol for conducting brief on-street intercept interviews with people walking in the study locations. This approach was informed by initial walking focus groups in adjacent neighborhoods, which suggested the need for a method that could capture the breadth of issues relevant to walkability in an open-ended manner and reach a broader cross-section of people than could attend a multi-hour focus group. Most of the analysis, including our identification of environmental attributes, presented in this paper are based on our coding of responses to the following open-ended prompts:

- What are some things you like about this area as a place for walking?
- What are some things you do not like about this area as a place for walking?

The research team also looked for patterns between these items and responses to a prompt about what respondents thought the most important thing the city should do to make the area a better place for walking.

We chose not to use the word “walkability” in these prompts, as this term may hold different meanings for different people, especially across sociocultural and linguistic contexts. The intent of these questions, however, was to get people talking about specific elements of the environment that contributed to an overall sense of walkability, which we define broadly as a place that it suitable for or conducive to walking.

In addition to these open-ended questions, the interview guide included items about race/ethnicity, age group, and purpose of the intercepted walking trip. We also included items asking about vehicle ownership/access, and several items asking respondents to rate various aspects of the area on five-point scales:

- How would you rate this area as a place for walking?
- How safe do you feel walking in this area during the day?
- How safe do you feel walking in this area at night?
- How satisfied are you with the selection of businesses or services that you can walk to in this area?

These scale-based rating items replaced additional open-ended items following our initial piloting of the instrument due to concerns about interview length and redundancy of responses to the first three open-ended items. Data collection protocols, instruments, and consent language were approved by the institutional review board at The University of Arizona.

The research team conducted on-street intercept interviews in English and Spanish over two months in early 2017. A team of graduate students, research faculty, and staff from a local community organization were trained to conduct interviews. Interviews in all neighborhoods were conducted by the same bilingual team of trained interviewers. Interviewers always went into the field in groups of at least two, with a fluent Spanish speaker always present. The team included fluent native Spanish speakers, non-native fluent Spanish speakers, Mexican Americans, non-Hispanic whites, and men and women.

Participants were recruited at the time of the interview using a consecutive sampling strategy. The only selection criteria was that participants had to be adults (18+) walking in public in the study area. Interviewers were trained, in order to limit selection bias, to approach the next pedestrian they saw after finishing their notes from the previous interview. Interviews were conducted at different times of day (only during daylight hours) and on weekdays and weekends. Interviewers explained the purpose of the research, read a verbal consent script, and left each respondent with a flyer that included additional information about the study and contact information. No identifiers such as name or address were collected from respondents. The research team decided against using audio recorders given the brief, on-street nature of the interviews and concerns that they could be considered intrusive or make participants uncomfortable or reluctant to participate. This meant that interviewers had to take notes during the conversation. Notes were completed (i.e. informal shorthand notations were spelled out) immediately after each interview while conversations were fresh in interviewers' minds. Whenever possible, verbatim responses were written down and identified as direct quotations. Interviewers entered their notes into a secure web-based repository, which was then exported to NVivo for analysis.

2.2. Analysis

The number of responses (n = 190) made it possible to look for both qualitative and quantitative differences in interview responses between Mexican American and non-Hispanic white study areas. Interviews were analyzed by a team of three researchers with public health and urban planning expertise using consensus-based thematic coding in NVivo 12 (Otero, 2010; Pabayo et al., 2014; Onwuegbuzie and Teddlie, 2003; Patton, 2002). Identification of themes was inductive and data driven and, as such, did not align perfectly with environmental elements identified by previous research. Each interview was coded by at least two members of the research team, which then discussed and came to a consensus on the small number of discrepancies.

For quantitative comparisons, coded themes were exported to Microsoft Excel where the number of interviews coded for each theme was calculated to determine the share of all interviews in which each theme was mentioned. Statistical tests (t-tests) were used to test differences in interviewer responses to the four five-point scale rating items.

3. Results

3.1. Description of respondents

We conducted a total of 190 interviews: 118 from Mexican American study locations and 72 from non-Hispanic white study locations. We observed an overall estimated response rate of 70% based on how many people were approached but declined to be interviewed. Because we only interviewed people who were already walking, we did not expect our sample to be entirely representative of the census block groups surrounding our study locations. However, gender and race/ethnicity in our sample mostly resembled the surrounding census block groups, with the exception of a slight over-representation of non-Hispanic white participants (28% in the sample versus 15% from surrounding block groups) and men (58% in the sample vs. 48% in surrounding block groups) in Mexican American study locations.

There was very little difference between those we spoke with in Mexican American and non-Hispanic white study locations regarding car access (50% versus 47%) or the frequency of walking in the area, with about 80% in each group walking in the area at least a few times per week. The purposes of intercepted trips were also largely similar between interviews in Mexican American and non-Hispanic white interview locations: commuting (47% vs. 49%), errands/shopping (27% vs. 28%), and to or from a bus stop (20% vs. 22%). Most intercepted trips were utilitarian (i.e. for transport to or from a destination), though participants in Mexican American interview locations were more likely to be walking for utilitarian purposes (87%) than those in non-Hispanic white locations (78%). Those we spoke with in Mexican American study sites were more likely than those in non-Hispanic white study areas to be walking to access health care or human services (8% vs. 1%).

3.2. General perceptions

Ratings of satisfaction and safety were generally positive and varied little between Mexican American and non-Hispanic white study locations (Fig. 2). Overall ratings of walking area satisfaction were similar with an average rating of 3.46 out of 5 for Mexican American locations and 3.82 for non-Hispanic white locations ($t = -1.07$; $p = .143$). Overall ratings of sense of safety while walking were also similar, with an average rating of 4.18 in Mexican American locations and 4.40 in non-Hispanic white locations ($t = -1.50$; $p = .067$). There was little difference in satisfaction with the selection of nearby business and responses were generally positive with 3.89 in Mexican American locations and 3.97 in non-Hispanic white locations ($t = .383$; $P = .351$). The only rating that differed significantly between Mexican American and non-Hispanic white interview locations was perceptions of safety at night, with a rating of 2.65 in Mexican American locations and 3.13 in non-Hispanic white locations ($t = -2.26$; $P = .013$).

3.3. Elements of perceived walkability

The research team identified 15 environmental elements based on our coding of responses to the open-ended questions about positives and negatives of walking environments. These were categorized into positive physical environment, negative physical environment, positive social environment, and negative social environment (Table 2). Negative aspects of the physical environment were: lack of upkeep/maintenance, lack of lighting, lack of sidewalks, lack of street crossings, and lack of shade/trees. Positive physical environment contributors were: destinations (e.g., stores, shops, restaurants, schools, parks, etc.), supportive infrastructure (e.g., sidewalks and paths), and aesthetics. There were three primary dimensions of the social environment coded as positive contributors to walkability: social interaction, community identity, and social cohesion. Elements of the negative social environment were crime/security and loose/aggressive dogs. A final positive contributor, calm and quiet, contained elements of both the physical and social environment and is therefore categorized as a hybrid.

3.4. Positive social environment

Interviews conducted in Mexican American study locations were more likely to include elements of the social environment as contributing to the location being walkable (Fig. 3). In Mexican American locations, 30% of respondents mentioned either social interaction, social

cohesion, or community identity as contributing to perceived walkability, compared with 6% of interviews in non-Hispanic white locations. Social interaction and community identity were the second and third most frequently cited positive contributors in Mexican American locations (19% and 17% of interviews, respectively). In non-Hispanic white locations, social interaction was the least mentioned positive contributor (6% of interviews), while sense of community and social support were not mentioned at all.

In addition to the stark difference between Mexican American and non-Hispanic white study locations in how frequently elements of the social environment were mentioned as contributors to a good walking environment, there were also noticeable differences in *how* they were referenced. Mentions of social interactions in non-Hispanic white study locations were generally brief and non-specific references to seeing people, "familiar faces," or neighbors being described as "considerate" or "friendly." This contrasted with more specific and enthusiastic responses in the Mexican American locations. For example, "people are friendly, everyone knows everyone" and "I enjoy the people I run into and the culture of the area, I meet my friends and new people on the street, we are Hispanic, we start to talk." Others specifically mentioned Mexican culture and its role in neighborhood history, including music, food, and a sense of shared identity. One respondent answered, "the history and Mexican culture; people have lived here for centuries."

Social cohesion was only mentioned in Mexican American study locations and was most commonly discussed in terms of neighbors looking out for each other. For example, one respondent told us: "people thank me for watching over the neighborhood and the kids … they call me the watchdog." This was echoed by others who stated that people help and look out for each other. One respondent, in Spanish, connected this to her perception of safety, saying, "it's safe here; the neighbors look after each other." Another talked about people looking out for eachother before adding, "it's a tight knit community and I feel involved."

Calm and quiet, which has elements of both the physical and social environment, was the only environmental attribute with a social connotation that was mentioned more frequently in non-Hispanic white locations than Mexican American locations (44% of interviews versus 2%). Calm and quiet was generally described with words like calm, quiet, tranquil, or peaceful.

3.5. Negative social environment

Fear of crime and concerns about security were more frequently mentioned as having a negative influence on perceived walkability among those in Mexican American study locations, with these issues being raised in about half of interviews compared to 14% of interviews in non-Hispanic/white locations. The ways people talked about crime and security were largely similar, however. The most common security-related concerns raised in multiple interviews in both Mexican American and non-Hispanic white study locations were the presence of drug users and dealers, people asking for money, concerns about prostitution, and homeless people. Most concerns were based on general perceptions or second-hand accounts, but several interviews recounted things that happened first hand or to their children. Stray, loose, or aggressive dogs were mentioned as a negative in 7% of

interviews in Mexican American locations and none of the interviews in non-Hispanic white locations.

Just one respondent mentioned police making an area better for walking, so police were not coded as a positive or negative attribute. Police were more frequently mentioned in response to our follow up question about what the city could do to make an area a better place for walking. These mentions of police were confined to Mexican American locations and mostly focused on the need for either more or better policing. The need for more police was mentioned in 19% of interviews in Mexican American locations. However, another 7% of respondents in Mexican American locations talked about police being present, but not addressing residents' concerns related to walking. For example, one stated "I never see police patrolling traffic." Others spoke of the police that were present needing to be more attentive. "Police know where the problems are, but don't do anything," complained one respondent. Another described a "high police presence already" but said that to improve walkability the city should put in blue light emergency call boxes like she had seen on university campuses. Another said, after listing several crime related issues that needed addressing, "police can't help." "More policing" and "trust in police from the neighbors" were mentioned together by another pedestrian. Two respondent mentioned police profiling or harassment as a problem in terms of perceptions of walkability.

3.6. Physical environment

The physical environment tended to be referred to in negative terms in both Mexican American and non-Hispanic white locations. But despite similar built environments, those we interviewed in non-Hispanic white locations were three times as likely to raise lack of sidewalks as a negative (58% versus 18%). This pattern of physical environment characteristics being more frequently mentioned in Non-Hispanic white locations also held true, though to a lesser extent, for deficiencies in lighting (35% versus 19%) and street crossings (30% versus 18%).

Two elements of the physical environment were more frequently mentioned in Mexican American study locations. Despite having similar Walk Scores and satisfaction with the selection of nearby businesses, and a similar distribution of trip purposes, destinations within walking distance were mentioned as a positive element of walkability by 36% of participants in Mexican American locations versus 14% in non-Hispanic white locations. Lack of upkeep and maintenance was also mentioned in twice as many interviews in Mexican American locations (30%) as non-Hispanic white locations (14%). These physical environment elements were however, often talked about as physical manifestations of positive and negative attributes of the social environment. For example, destinations, such as local restaurants and shops, were also seen as important symbols of community and maintenance and upkeep issues were seen as a reflection on the community.

We also saw evidence in Mexican American study locations that the pedestrians we spoke with may be resigned to the physical conditions of their neighborhoods and frustrated by patterns of disinvestment and neglect. When asked if there was anything the city could do to make her neighborhood better for walking, one respondent said [translated from Spanish] "No … because what one asks of them they don't do." In a different Mexican American

neighborhood, a respondent said, “The city doesn’t worry about this area … They don’t care about us here, unless it’s for their own good, for special events to make people think it looks nice all the time along the major street.” In response to the question about what the city could do, one respondent answered pointedly, “their jobs.” Others simply answered this question with responses like: “not much you can do,” “that’s a tough one,” or simply a shrug and a “no,” despite the same people having just raised numerous issues in response to the question about what they did not like about their neighborhood as a place for walking or what could be done to improve the area for walking. We did not observe a similar pattern in non-Hispanic white areas.

Aesthetic characteristics of the walking environment were mentioned as a positive contributor in 18% of interviews in the three non-Hispanic white study locations, with comments like “it’s a beautiful neighborhood,” “it’s pretty here,” and “I love looking at the houses.” Aesthetics were sometimes linked to the concept of calm and quiet, for example one man stated: “It’s beautiful here. I love the architecture, so eclectic. It’s nice and mellow.” In another neighborhood several people mentioned that they enjoyed a community-oriented public art installation. According to our interviews, aesthetics did not appear to be linked with perceptions of walkability in Mexican American study locations.

4. Discussion

This study makes a unique contribution to the growing body of research on characteristics of spaces for walking and physical activity by highlighting differences in how pedestrians in Mexican American and non-Hispanic white sociocultural contexts perceive walkability. Despite similar physical environments, economic conditions, and ratings of overall walkability and safety, key qualitative and quantitative differences emerged in how respondents talked about environmental contributors to walkability. The environmental contributors to perceptions of walkability in the non-Hispanic white interview locations were largely consistent with standard physical environment-focused definitions and measurement tools used in practice by planners and urban designers. Often overlooked elements of the social environment, both positive and negative, were more likely to contribute to perceptions of walkability in Mexican American contexts.

There are several possible explanations for the differences we found between those we talked to in Mexican American and non-Hispanic white areas. Consistent with previous research, there may be more social interaction, social cohesion, and community identity in Mexican American neighborhoods (Eschbach et al., 2004; Ruiz et al., 2016). The role of positive attributes of the social environment may help a community overcome concerns about crime/security (Forrest and Kearns, 2001). Regardless of whether these positive social environment attributes are simply more prevalent in these locations or a response to other factors, it is an important finding that respondents in Mexican American study locations were, without prompting, associating these attributes directly with perceptions of walkability. In this context, social interactions, social cohesion, and community identity are not simply outcomes of a walkable place, but appear to also play an important role in framing perceptions of walkability.

Another important pattern that emerged from the interviews is that fewer mentions of the physical environment in Mexican American study areas may be due to feelings of resignation to the status quo. Community knowledge of both current and historical neglect and disinvestment may amplify this sentiment. This suggests that deeper knowledge—such as that gained through our on-street interviews and initial focus groups—is necessary to separate expectations from preference. Many common strategies for public engagement (e.g., public meetings and community surveys) may overlook this nuance and mis-identify neighborhood priorities. The same may be true for policing where a conclusion that more police are necessary may miss the more nuanced view that police are not focusing on issues most relevant to the community.

Our findings are consistent with evidence that traditional definitions and measures of walkability may be biased due to their development and validation in non-Hispanic white contexts (often by non-Hispanic white researchers and decision-makers) or in ways that have controlled for, but not explored socioeconomic and sociocultural context (Adkins et al., 2017). Standard approaches to measuring walkability may, therefore, simply be more closely aligned with preferences in non-Hispanic white contexts. At least in our study locations, implementing improvements based on what we heard in one context would very likely lead to a mismatch with the perceptions and priorities in another. More research is needed to determine whether these patterns exist beyond our study locations in Tucson.

One implication of our findings that needs further study is the degree to which the social environment dimensions of walkability identified in this study persist in Mexican American areas undergoing significant economic displacement and neighborhood change. As social cohesion, existing social networks, and culturally significant destinations diminish due to displacement, so might important social environmental supports and protective factors that facilitate walking and physical activity (Fullilove, 1996; Garcia, 2018). More research using similar methods is needed in other contexts, including in other racial/ethnic minority communities and in areas in different stages of gentrification.

4.1. Limitations

By focusing on those already walking in their neighborhoods, we are limited in what we can conclude about increasing walking among those not currently walking. Our study shows, however, that learning from the lived experience of pedestrians and improving conditions based on their insights has potential to help jurisdictions improve conditions for the benefit of those currently walking. It is likely that doing so would have the co-benefit of getting more people walking.

Our relatively small sample of study locations and the imperfect nature of our matching for objective walkability, including not having a match for the one Mexican American study location with a lower Walk Score, should also be considered as a limitation. There may also be elements of the objective built environment that we were not able to capture which could be confounding our results (e.g. streetlighting lighting coverage). We also have not reported responses by the race/ethnicity of the individuals being interviewed, but rather by the racial/ethnic makeup of the study location. Future research could examine differences in

responses based on the race/ethnicity of individuals relative to the racial/ethnic makeup of the study area.

The tendency of our method to highlight topics most salient to respondents represents both a strength and a limitation of our study design. Because we collected data through brief on-street interviews, those we spoke with were likely sharing the most salient issues related to walking in their neighborhoods. Therefore, it is likely that, at least to some degree, the more frequent mentions of social environment characteristics (positive and negative) in Mexican American locations simply left less time to talk about other matters. We can clearly say that social environment characteristics appear to have greater salience or priority, relative to physical characteristics among those we talked to in Mexican American locations. However, we cannot say that, given a longer interview or specific prompts about physical and social characteristics, there would not be a more even distribution.

Finally, as in any research, there is potential for bias based on the backgrounds and perspectives of the research team. Research design, data collection, analysis, and manuscript writing were carried out by a multi-disciplinary team that included both non-Hispanic white and Mexican American faculty, students, and community organization staff, including some with family connections to neighborhoods in the study. In order to minimize the potential bias from any one perspective, care was taken to include multiple perspectives in every stage of the research presented in this paper.

5. Conclusion

In both research and practice, walkable places continue to be thought of largely from a physical environment perspective, despite a growing body of research highlighting the important role of the social environment. In the context of Mexican American areas of Tucson Arizona, we see evidence that standard approaches to improving walkability would likely not address key barriers or leverage existing community strengths. Even in places where physical improvements such as infrastructure are needed to address safety and comfort related deficiencies, such investment should be viewed in the context of the social environment and implemented as part of a more holistic approach. These findings suggest that, at least in this context, community-based transportation programs like Safe Routes to School, open streets events (e.g. ciclovia), organized neighborhood walking groups, and broader efforts aimed at non-transportation specific community development, upkeep and maintenance, and community-oriented placemaking strategies may be especially important as strategies for facilitating walking and physical activity. These more holistic approaches require cross-disciplinary and cross-sector collaboration, which the fields of public health and planning are well-equipped to facilitate.

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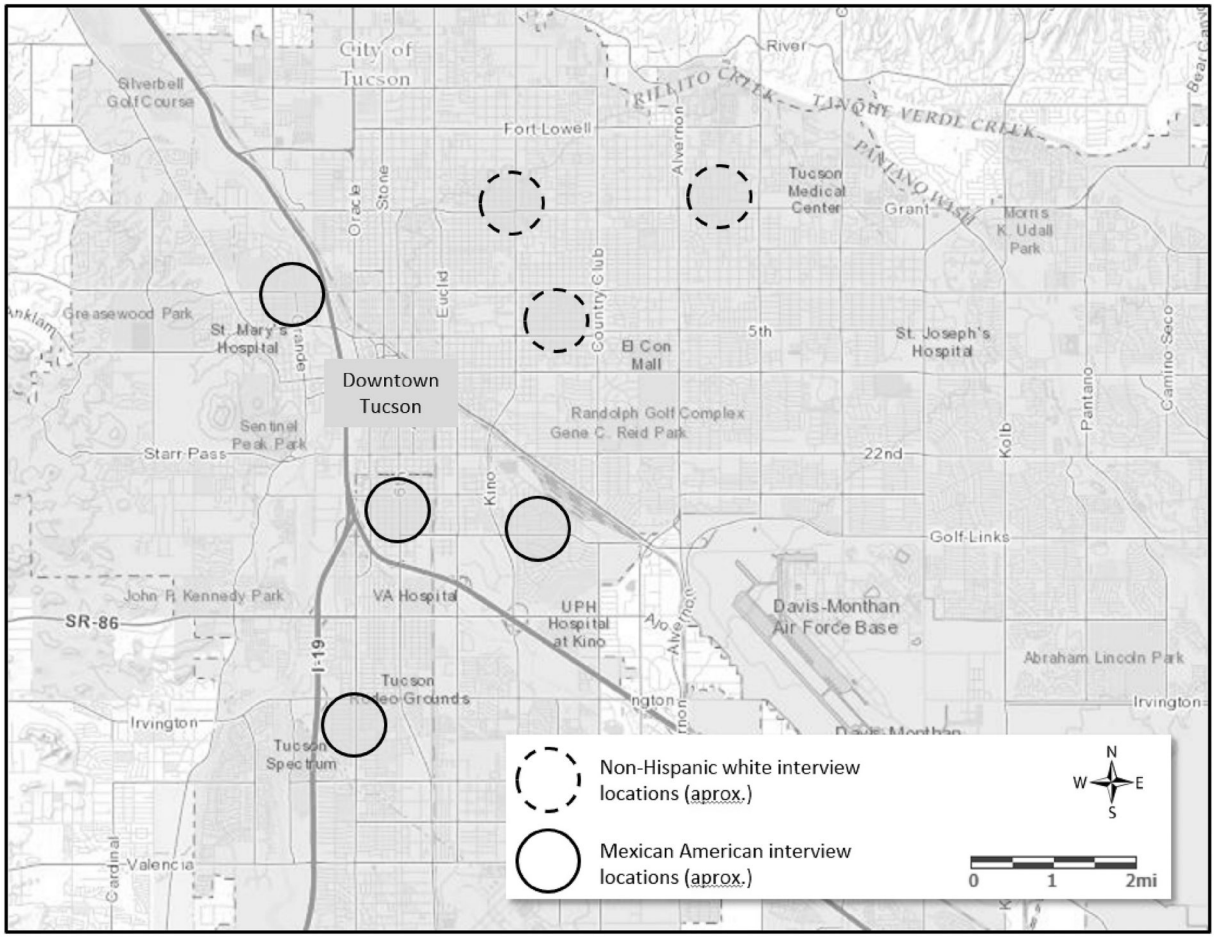

Fig. 1.
Map showing distribution of approximate study locations around Tucson.

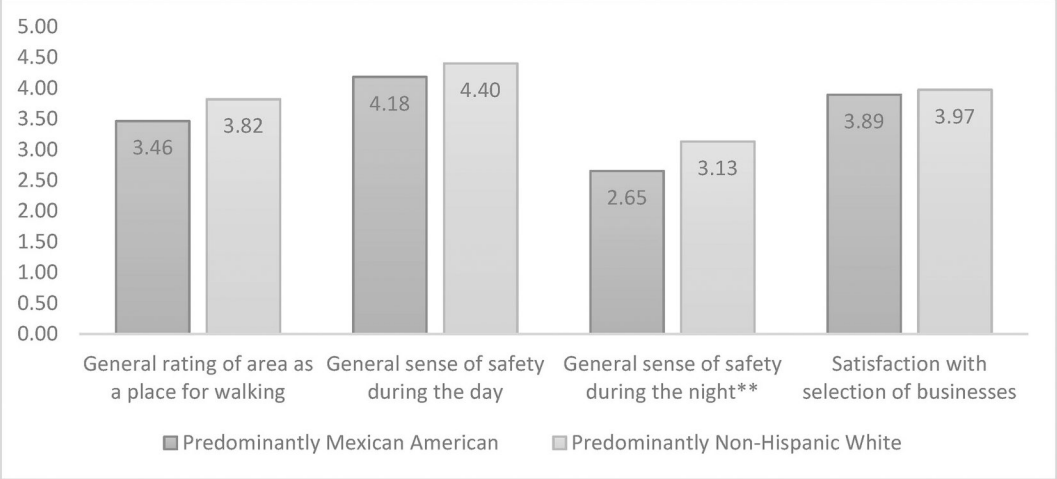

Fig. 2.

General perceptions of walking environments (** indicates sig. with p-value < .0.05).

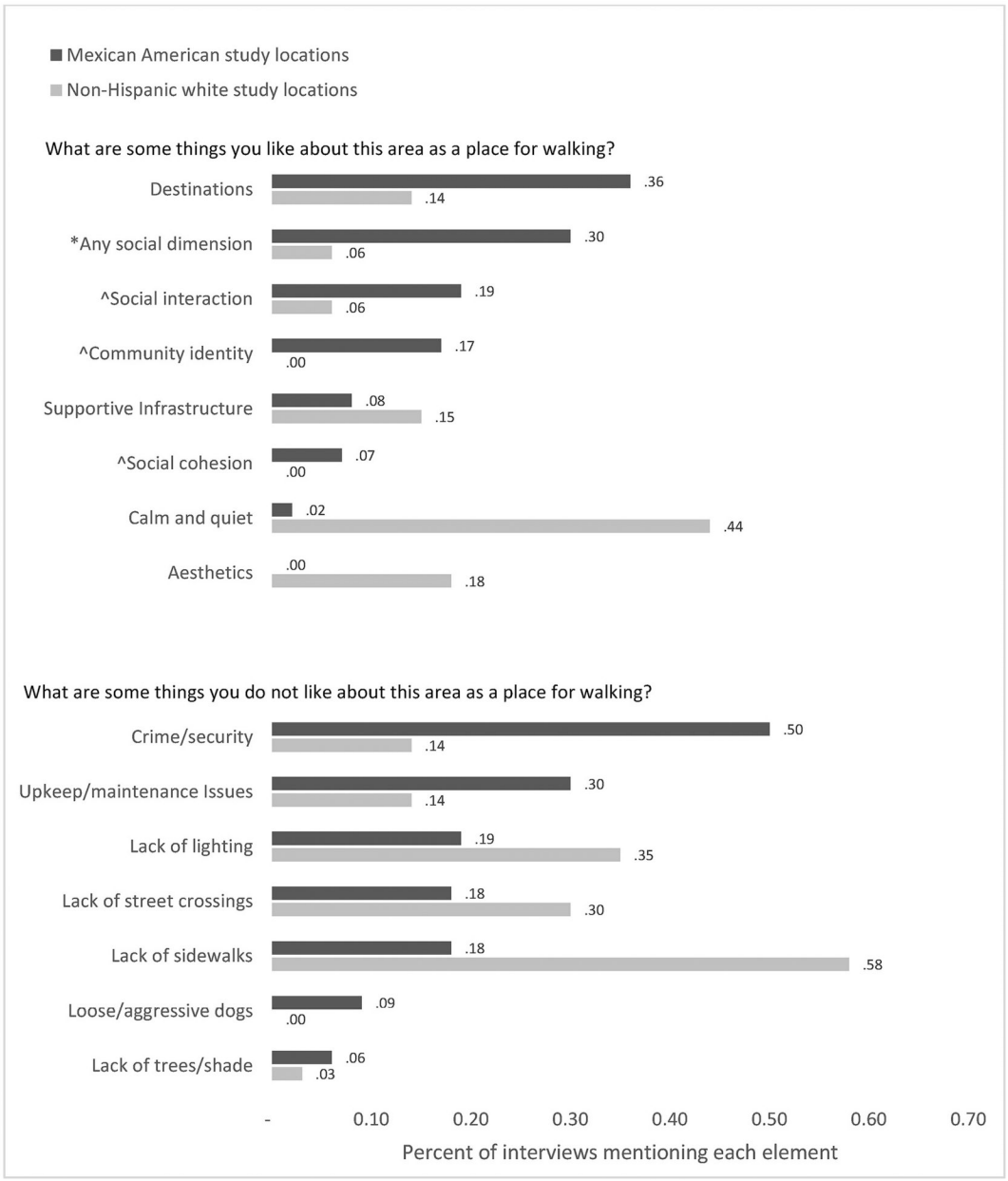

Fig. 3.

Percent of interviews coded for each element of perceived walking environment (ordered by share of interviews in Mexican American locations) Note: Any social dimension is a parent theme that includes (^) social interaction, social cohesion, or community identity, which are also displayed individually.

Table 1

Characteristics of adjacent Census Block groups.

	Median HH Income	Poverty Rate	Walk Score	Hispanic/Latino
Mexican American Locations	***$28,410***	**0.29**	**67**	**0.85**
Location 1	$32,649	0.28	44	0.79
Location 2	$21,964	0.38	75	0.83
Location 3	$31,525	0.27	78	0.88
Location 4	$27,500	0.24	70	0.88
Non-Hispanic White Locations	**$31,791**	**0.31**	**71**	**0.18**
Location 5	$31,072	0.27	77	8%
Location 6	$32,401	0.28	63	25%
Location 7	$31,900	0.39	74	22%
City of Tucson	$37,973	0.27	42	0.43

Table 2

Coded attributes of walking environments.

	Positive	**Negative**
Physical Environment	Destinations	Lack of upkeep/maintenance
	Supportive infrastructure	Lack of lighting
	Aesthetics	Lack of sidewalks
		Lack of street crossings
		Lack of shade/trees
Physical/Social Hybrid	Calm and quiet	
Social Environment	Social interaction	Crime/security
	Community identity	Loose/aggressive dogs
	Social cohesion	