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Physical activity promotion among churchgoing Latinas in San Diego, California: Does neighborhood cohesion matter?

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Abstract

This study examined the reciprocal relationship between Latinas' leisure-time physical activity (LTPA) and neighborhood cohesion (NC) following the implementation of a 6-month *promotora*-delivered pilot intervention. A one-group study design was used to promote LTPA and build NC among 143 churchgoing Latinas in San Diego, CA. Using a 3-wave autoregressive cross-lagged panel model, LTPA and NC (assessed at baseline, 3 and 6 months) were analyzed. LTPA and NC increased across time. NC at 3 months predicted LTPA at 6 months. A *promotora*-model in the context of a faith-based setting may be appropriate to promote Latinas' LTPA and make socio-environmental improvements.

Keywords

Health promotion; exercise; ethnicity; health behavior; social capital; religion; females; quantitative method; intervention

INTRODUCTION

Latinas (Latina women) continue to be the most physically inactive during leisure-time across U.S. ethno-racial groups (Crespo, Smit, Andersen, Carter-Pokras, & Ainsworth, 2000). Over 75% of Latinas of Mexican descent do not engage in sufficient levels of physical activity (PA; Neighbors, Marquez, & Marcus, 2008), and may not be reaping the benefits of PA, which include mental and physical wellbeing. The high prevalence of obesity and diabetes in this population attest to this fact (Hunt, et al., 2002). In addition, in a study of predominantly Latinas, researchers found that participants with depressive symptoms were half as likely as those without these symptoms to engage in vigorous leisure-time PA (LTPA) and that vigorous LTPA mediated the relation between hypertension and depressive symptoms (Arredondo, et al., 2011). As such, it is a public health priority to identify targets of change among Latinas to increase levels of PA.

According to social ecological frameworks, a number of factors, present in the individual, social and physical environments, impact an individual's PA behavior (Sallis & Owen, 2002). Individual-level correlates of LTPA, such as self-efficacy and perceived barriers, have been well established in the general population; and therefore generalized to Latinos as well (Eyler, et al., 2002). For this reason, modifying these factors is a primary focus of PA interventions (Sharma, 2008), yet there has been little emphasis on modifying socio-ecological factors.

Socially integrated communities (i.e., cohesive neighborhoods) of higher SES tend to experience better health outcomes compared to those communities that are less well-off (Wilkinson, 1996). Cohesive neighborhoods may be more successful in providing and maintaining community services and resources that reinforce positive health behaviors (Kawachi, Kennedy, & Glass, 1999). In addition, neighborhood cohesion (strong social bond and mutual trust in the absence of social conflict) may help shape a healthy social environment by reducing neighborhood crime to promote PA (Kawachi, et al., 1999; McNeill, Kreuter, & Subramanian, 2006), and in turn, reinforcing social norms for PA (Martinez, et al., 2012). This may be particularly true when community members share mutual health-related goals (McNeill, et al., 2006). For example, neighborhood watch programs and walking groups have evolved from studies fostering neighborhood cohesion (Fisher, Li, Michael, & Cleveland, 2004). A modest amount of research has identified neighborhood cohesion to be a relevant theme in Latino communities characterized as highly collective (Evenson, Sarmiento, Macon, Tawney, & Ammerman, 2002; Martinez, Arredondo, Perez, & Baquero, 2009; Martinez, et al., In Press). Thus, promoting a positive social environment may positively influence Latinos' health behavior.

Enhancing neighborhood cohesion may be an effective support mechanism for behavior change (McNeill, et al., 2006), yet new settings should be explored for effective PA promotion in Latinas, such as faith-based settings. Currently, more than half of U.S. Latinos identify as being Catholic (65%), with nearly 50% attending church on a weekly basis (Pew Hispanic Center and Pew Forum on Religion & Public Life, 2007). Because religion promotes spiritual well-being, faith-based settings may be a promising and culturally appropriate approach to encourage physical and mental well-being as well as foster social cohesion among Latinas.

Novel studies are needed to demonstrate the impact of neighborhood cohesion on PA across time. Recent research has established growth trajectories of PA among children and adolescents and older adults (Duncan, Duncan, Strycker, & Chaumeton, 2007; Roesch, et al., 2009). Growth models, however, do not account for time-lagged effects. The key element of the cross-lagged autoregressive model is the regression of a variable on its earlier value in addition to cross-lagged effects between repeated measures of two observed variables (e.g., social cohesion and PA; Bollen & Curran, 2004). This innovative method can shed light on how past social perceptions can predict future perceptions or how past behavior can influence future behavior, and whether social perceptions influence PA across time, and vice versa. Furthermore, this analytic approach can advance the field of PA by identifying targets of change, which can be used to expand on the understanding of socio-environmental mechanisms as they relate to PA across time.

PURPOSE

To reduce PA disparity in Latinas, studies are needed to examine the dynamic relationship between the social environment and PA behavior. Within the context of a faith-placed and faith-based intervention, the purpose of this study was to determine the relationship between perceived neighborhood cohesion and Latinas' leisure-time physical activity (LTPA) over time, following the implementation of a 6-month walking intervention. The current study used an autoregressive cross-lagged (ARCL) panel model to examine repeated measures. We predicted increases in neighborhood cohesion and LTPA from pre- to post-intervention. In addition, we hypothesized that an increase in perceived neighborhood cohesion would positively impact LTPA.

METHODS

Design

The study design was longitudinal, with a one-group study sample, involving a *promotora* model (lay health advisor who disseminates health education to the community) to promote walking among Latina churchgoers. The *promotora* approach involves training community members (who are similar to the target population and, in some cases, known and trusted by the community) to disseminate health information/education, and advocate for policy and/or community change (Ayala, et al., 2010). *Promotora* training included how to lead daily walks at the required intensity, information on the health benefits of PA, PA recommendations for obtaining health benefits, barriers to and facilitators of PA (e.g., individual, social and physical) in the Latino community as well as strategies for motivating women to be physically active.

Setting and Participants

Latinas (18- to 65-years old) were recruited from a church setting in between April and July of 2007. Of the 202 women that were recruited, 144 were eligible and enrolled into the study. The intervention church is geographically bound by two interstate highways that are within two miles (I-5 on the west and I-805 on the east) and a regional park that is 1.5 miles south of the church and extends from the I-5 to the I-805. The church is also 6 miles north of the U.S./Mexico border in San Diego, CA; thus, the community is predominantly Latino. According to Census 2010, 70% of community members (defined by the church's zip code) were Hispanic, with 65% earning less \$45,000 (a median household income of \$39,000) and of the total community housing, 56% were single-family units (SANDAG, 2012).

Recruitment occurred through church bulletins and verbal announcements primarily during Spanish-language services and other church group functions. Women were eligible if they were parish members (parish requirement included living within the parish boundaries— an approximate 74% of parishioners lived less than 3 miles from the church) and attended church on a weekly basis. Exclusion criteria were the following: 1) being over 65 years old to avoid physical limitations often associated with entering senior years, and 2) having a physical/mental impairment that limited physical activity. Participants were screened by age

to increase the generalizability of the study's findings. Approval for the current study was obtained from the Institutional Review Board at San Diego State University.

Each participant consented to participate in a longitudinal assessment, whereupon 144 Latinas completed three self-reported surveys at baseline (T1), 3 and 6 months (T2 and T3, respectively) in their preferred language (e.g., Spanish or English). The intervention had 96% cohort maintenance at 6 months. Women reported on demographics, self-efficacy for PA, neighborhood cohesion, and LTPA.

Intervention

Promotoras (community health leader) led walking groups for the first six months of the intervention. The walking groups were offered morning and evening, Monday through Friday, and were open to family members and children in strollers. Sixty minute walking routes began and ended at the intervention church. During these walks, *promotoras* promoted physical and spiritual well-being in the form educational and faith-based messages and prayer. Messages such as the following were encouraged: "The body is the temple of the living God and you have to take care of your temple" and "Beloved, I pray that in all respects you may prosper and be in good health, just as your soul prospers." In addition, women were invited to engage in weekly aerobics held in the church's community room. These group activities provided participants with the opportunity to interact socially and build neighborhood cohesion. Church leaders (i.e., priest, sister) also promoted PA messages during church sermons, in newsletters, flyers and health-related seminars. The intervention was culturally appropriate, with tailored messages offered in both English and Spanish. For example, given that Latinas are central to the household, culturally tailored messages encouraged women to be active for the benefit of feeling more energetic to keep up with family responsibilities and reduce feelings of stress. Several *promotoras* advocated for changes in the built environment (surrounding the church) while promoting neighborhood cohesion. For example, *promotoras* conducted walking audits with participants to: 1) increase awareness about environmental barriers to PA and to identify existing physical and safety barriers that impeded PA behavior, and 2) empower woman with advocacy skills to make neighborhood-level improvements. A report outlining these barriers, with potential solutions was developed and presented to the city council. Other activities, such as church clean-ups, provided opportunities to enhance neighborhood cohesion.

Measures

Leisure-Time Physical Activity.—The Global Physical Activity Questionnaire (GPAQ; World Health Organization) assessed the frequency and duration of moderate- and vigorous-intensity LTPA. Participants were asked, "During the last 7 days, on how many days did you do moderate [or vigorous] physical activities in your leisure time for at least 10 minutes?" These items were followed by "how much time was usually spent on one of those days doing PA during leisure time." LTPA was calculated as the sum of reported minutes per week of moderate- to vigorous-intensity PA performed during leisure time.

Individual characteristics.—Characteristics of the population included age, marital status, employment status, education, and monthly household income. A three-item scale

was used to assess self-efficacy for PA (Sallis, Pinski, Grossman, Patterson, & Nader, 1988). Items included being able to do PA when sad/stressed, setting aside time for PA, and sticking to a PA schedule. Response options ranged from *I'm sure I cannot* (1) to *I'm sure I can* (5), with a higher score indicating greater self-efficacy for PA ($\alpha = .83$). An average score was computed and dichotomized by the mean score as high and low self-efficacy.

Neighborhood Cohesion.—An abbreviated six-item scale for adolescents ($\alpha = .95$; Seidman, et al., 1995), adapted from Buckner's (1988) 18-item neighborhood cohesion scale for adults ($\alpha = .83$), was used to assess participants' perceptions of neighborhood cohesion. Response options were *not at all true* (1), *sort of true* (2), and *very true* (3), with a higher score indicating greater sense of cohesion. Given that these measures were developed for the general population, confirmatory factor analysis (CFA) was used to identify which items explained neighborhood cohesion best among Latinas. Based on CFA, four of six items best described neighborhood cohesion in the present study (factor loadings ranged from .47-.76; CFI = .99). A summary score for these four items was constructed. The items were specific to the participant's neighborhood and included fitting in with neighbors, the importance of meaningful neighbor relations, being able to count on neighbors in an emergency, and neighbors being able to point out strangers to the neighborhood.

Statistical Analyses

Descriptive characteristics of the study participants were obtained using SPSS (Version 17; Chicago, IL). To examine the longitudinal relationships between the study variables, namely neighborhood cohesion and LTPA, we use an ARCL panel model with the three waves of data collected. We evaluated the effect of baseline values of variables on the current values and reciprocal causality using repeated measures for LTPA and neighborhood cohesion.

Chi-square test statistic assessed absolute value fit of the model to the data, and overall model fit was examined using the recommendations of Hu and Bentler (e.g., RMSEA approximating .06 and SRMR less than .08; 1999). Pathways were significant at $p < .05$ ($t > 1.96$). The parameter estimates, standard errors, p-values, and squared multiple correlations were inspected for sign and/or magnitude. Modeling was performed using *Mplus* 6.11, with the full information maximum likelihood to estimate missing data (Muthen & Muthen, 2002). A total of 93 participants had complete data at all three time points, with 49 participants missing some data and 2 participants missing data at two time points. The final analysis included 142 women.

RESULTS

Sample characteristics are summarized in Table 1. All women participants were of Mexican-descent, with 82% born in Mexico. On average, women were 43-years old, 67% were married/living with a partner, 54% were employed, and 57% had up to a high school education. Approximately, 42% of the sample had a monthly household income that was less than \$2000 and 70% lived within a 1-mile radius of the intervention church. On average, women were obese, with a mean body mass index of 33. MVPA during leisure time ranged from 183 (T1) to 236 minutes (T3) per week (Table 2). Perceived neighborhood cohesion also statistically significantly increased from baseline (T1) to post-intervention (T3), with

24% of women reporting that, on average, their neighborhood was very cohesive at T1 ($M = 2.3$, $SD = 0.6$) and 33% reporting a very cohesive neighborhood at T3 ($M = 2.43$, $SD = 0.6$). Self-efficacy for PA was high and remained constant across time, with women perceiving themselves as capable of engaging in PA overtime (63–66% from T1 to T3).

Autoregressive Cross-Lagged Modeling

The study variables, neighborhood cohesion and LTPA, were simultaneously examined in a parallel process using a ARCL model (Figure 1). The ARCL panel model for LTPA and neighborhood cohesion fit well according to the descriptive fit indices ($RMSEA = .08$, $SRMR = .07$). Path coefficients for both LTPA and neighborhood cohesion were consistently significant at $p < .05$. As expected for LTPA, the autoregressive regression estimates were positive and significant from T1 to T2 ($\beta = .24$, $p < .05$) and from T2 to T3 ($\beta = .24$, $p < .05$). As expected for neighborhood cohesion, the autoregressive regression estimates were positive, strong and significant T1 to T2 ($\beta = .54$) and from T2 to T3 ($\beta = .71$). The cross-lagged parameter estimate from neighborhood cohesion at T2 to LTPA at T3 was also statistically significant and positive ($\beta = .19$). All other path coefficients from neighborhood cohesion (T1) to LTPA (T2), and LTPA (T1) to neighborhood cohesion (T2 and T3) were not significant. LTPA and neighborhood cohesion had no cross-sectional associations. Self-efficacy did not make a significant contribution to the model and therefore was not included for a more parsimonious final model. The ARCL model controlled for education, marital status, income level at T1. Educational attainment showed a positive and significant association with LTPA at T1 ($\beta = .16$, $p < .05$).

DISCUSSION

The current study examined the reciprocal relationship between neighborhood cohesion and LTPA after the implementation of a 6-month church-based walking intervention among 144 churchgoing Latinas. We used an advanced ARCL panel model to examine the reciprocal effects over time and simultaneously control for T1 and T2 intervention values while controlling for covariates in the model. As such, our study advances the knowledge and understanding of the prospective relationship between LTPA and neighborhood cohesion and improves upon the design of past prospective PA research, which has been limited to testing unidirectional and longitudinal relationships.

As expected, we observed an increase in LTPA over time. Previous studies have suggested behavioral changes are achievable in ethno-racial minority and low-income populations (Grassi, Gonzalez, Tello, & He, 1999; Sternfeld, Ainsworth, & Quesenberry, 1999), which we demonstrated with repeated measures for LTPA. Our study used a *promotora*-model to promote walking among Latinas. We found an increase of 53 minutes per week in the mean value for LTPA from T1 to T3. Our findings are similar to those of a 12-month intervention in a similar Latina population (Staten, et al., 2004). Staten and colleagues found the greatest increase in PA among Latinas who received social support from a community health worker. Overall, these findings suggest that community health workers (e.g., *promotoras*) play a pivotal role in providing necessary support for modifying multi-level factors related to PA behavior. This is likely given that participants had the support of the *promotoras* through

activities such as daily walking groups, neighborhood audits, church cleanups and advocacy activities.

Previous research suggests that attitudinal changes are achievable in ethno-racial minority and low-income populations (Grassi, et al., 1999; Sternfeld, et al., 1999). As expected, we observed an increase in neighborhood cohesion across time compared with T1. This finding is supported by a study conducted by Michael and colleagues (Michael, Beard, Choi, Farquhar, & Carlson, 2006). In the current study, all participants were parishioners of the intervention church, with most living within a walkable distance of one mile and nearly all participants living within three miles. Even though 30% did not live within this walkable distance, participants had ample opportunities (e.g., walking groups, cleanup activities and environmental audits) to build neighborhood cohesion or perhaps even church community cohesion as participants became invested in their parish neighborhood and church community. Interestingly, this study aimed to increase neighborhood cohesion in Latina churchgoers of a faith-based community. However, we cannot ascertain whether we increased neighborhood cohesion or if we promoted church community cohesion or perhaps both. Given the geographical boundaries of the church neighborhood and that most participants lived within close proximity to the church suggests that these constructs overlapped. As such, by aiming to increase neighborhood cohesion in a specific faith-based community, we may have also increased church community cohesion. This is likely given that participants became invested in their church community and advocated for neighborhood improvements surrounding the periphery of the church, including renovation and clean up of a neighboring park. However, efforts to increase neighborhood cohesion also extended beyond the church community. Anecdotally, several women revealed starting up walking groups among friends in their own neighborhood because attending the intervention walking groups was inconvenient.

Nevertheless, contrary to individual-focused strategies, group activities may have been a key factor in building neighbor and/or church relations and creating friendships. The importance of multi-level interventions should be emphasized as an approach to improve the social atmosphere along with population behavior change. In this study, opportunities to socially engage with community members may have kindled neighborhood cohesion and/or church community cohesion among participants with mutual health-related goals (e.g., preserve spirituality, good health and quality of life). This is likely given that participants attended church services at least once per week, which provided them with another opportunity to interact while sharing the same faith practice.

The ARCL model provided the best available description of the direction of the relationship between LTPA and neighborhood cohesion. We expected neighborhood cohesion to have a positive impact on LTPA. After controlling for past behavior and perceptions on future respective behavior and perceptions, we found a significant cross-lagged effect from neighborhood cohesion at T2 on LTPA at T3. Similarly, Cradock et al. observed positive associations between social cohesion measured at baseline and both LTPA measured at baseline and 2-year follow up (Cradock, Kawachi, Colditz, Gortmaker, & Buka, 2009). Aarts and colleagues also observed a 1–2% increase in children's outdoor play for every unit increase in social cohesion (Aarts, Wendel-Vos, van Oers, van de Goor, & Schuit, 2010).

Authors of both studies recommended enhancing social cohesion as a promising strategy to increase levels of PA as such social-environmental characteristics may influence activity behavior for a prolonged period of time. It has also been noted that neighborhood cohesion is associated with other factors such awareness and satisfaction of physical activity community resources in a similar population (Martinez, et al., 2012). Perhaps a socially cohesive atmosphere provides individuals with a sense of belonging and friendship that encourages social interaction such as playing and leisure-time walking. In the present study, group activities and *promotoras* possibly enhanced neighborhood cohesion by encouraging the same goals for PA. Thus, it may be beneficial for interventions to capitalize on the social environment and *promotora* support to modify PA behavior.

Contrary to our findings, Michael et al. did not find an association between walking and social cohesion at 3 months and 6 months (Michael, et al., 2006). Differences in results may be explained by selection criteria of participants. Michael et al. recruited participants from 56 different neighborhoods, with only 10 participants being of the same neighborhood. Nearly all participants in the current study lived within 3-miles of the intervention church and perhaps within the parish boundaries. Targeting neighbors from the same community may be important for using neighborhood cohesion as an intervening point for behavior change.

To our knowledge, this was the first research study to simultaneously examine repeated measures of PA and neighborhood cohesion. We found positive and significant autoregressive parameters for both LTPA and neighborhood cohesion across time. In our study, we controlled for past LTPA behavior and perceptions of neighborhood cohesion on their future respective value given that the best predictor of a behavior is past behavior itself (Bollen & Curran, 2004). There are no studies to support our findings, but several studies in the literature found past intention to be physically active, behavioral control and PA were predictive of future intention, behavioral control and PA, respectively (Raudsepp, Viira, & Hannus; Rhodes, Macdonald, & McKay, 2006). Our findings suggest that an effective intervention may help to improve or maintain PA behavior over time.

Churches are a promising setting for continuing faith-placed and faith-based interventions, particularly when aiming to promote and preserve both individual and social aspects of health. Faith-based institutions are important social anchors, with communications channels for delivering health messages and programs. It is important for health professionals to collaborate with faith-based organizations to create behavior change at both individual and social levels. Spiritual, mental and physical well-being can go hand in hand.

Strengths and Limitations

Several strengths and limitations must be addressed. First, this was a one-group study design, with no control group for comparison and therefore we cannot be sure of the intervention dose. Also, we did not examine the different sources of social support (*promotoras* vs. church leaders), which future studies could address. The current study was based on self-reported PA, which is subject to misreport. However, using the GPAQ may have minimized the underestimation of PA as it assessed domains of PA (i.e., occupational, transportation and leisure-time activities). In this way, it may have been easier for

participants to recall how much time they spent engaging in LTPA. Furthermore, although the GPAQ was developed to measure PA in developing countries, it seemed appropriate for our target population among whom diverse activities continue to be a way of life. Also, we did not account for self-efficacy (for PA) in the final model as it was not a significant correlate or predictor. A ceiling effect in self-efficacy may explain the former results. Also, it is possible that self-efficacy is not an important correlate of LTPA in Latinas given the collective nature of this population (Martinez, et al., 2012). Environmental barriers, both physical and social, may outweigh such individual factors, such as self-efficacy, which may not be as important for a population that is socioeconomically disadvantaged (Elder, et al., 2010). As previously discussed, we cannot ascertain whether we increased neighborhood cohesion and/or church community cohesion and to what extent these constructs overlapped. Future research in faith-based and neighborhood community settings should examine the correlation between neighborhood and church cohesion and identify which construct and context may be most effective for promoting PA through social engagement. Lastly, the sample population was limited to churchgoing Latinas; thus, findings are not generalizable to the entire U.S. Latina population.

Nevertheless, our study has several strengths. To our knowledge, this is the first study to use an innovative and rigorous model to prospectively examine LTPA and neighborhood cohesion following the implementation of a 6-month faith-based intervention. We used an ARCL panel model to examine reciprocal relationships, while controlling for past behaviors and perceptions on future respective behaviors and perceptions. In addition, this is one of the few studies focusing on neighborhood cohesion as an outcome and predictor of LTPA. Lastly, this is one of the first studies to use a *promotora*-model to promote PA among Latinas, while targeting multi-level factors in a faith-based setting.

Conclusion

Most studies examining predictors of LTPA do not consider the social environment, which is even truer in studies including Latino communities. In summary, this study supports that neighborhood/community cohesion plays a role in LTPA and health promotion efforts should capitalize on improving the social environment. Also, faith-based interventions using *promotora*-led activity groups may be a promising and culturally appropriate approach for enhancing neighborhood cohesion as a viable mechanism for health behavior change in Latino communities. Further randomized, controlled intervention trials are needed to replicate these findings.

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Figure 1.

Autoregressive cross-lagged model of LTPA and neighborhood cohesion across time -T1 (baseline), T2 (3 months), and T3 (6 months); RMSEA=0.08, SRMR= 0.07. Model adjusts for marital and employment statuses, and education and income levels at baseline. Paths coefficients are significant at $p<.05$.

Table 1.

Characteristics of churchgoing Latinas in San Diego, CA (N=144)

Variable	% / μ (SD)
Employed	54
High school	57
Married	67
Mexican-born	82
< \$2,000/month	42
Mean age (SD)	43 (10)
Mean # of yrs. in US (SD)	19 (14)
Mean body mass index (SD)	33 (6)

Table 2.

Estimated means and frequencies for observed variables from T1 to T3 in a sample churchgoing Latinas in San Diego, CA (N=144)

Observed Variable	Baseline (T1) ^d	3-months (T2) ^d	6 months (T3) ^d
Mean minutes LTPA(SD)	183 (232)	184 (215)	236 (261)
Mean neighborhood cohesion (SD) ^a	2.33 (.6)	2.50 (.6)	2.43 (.7)
% reporting high neighborhood cohesion ^b	25	39	41
% reporting high self-efficacy for PA ^c	63	66	66

^a A higher score indicates greater neighborhood cohesion (range 1-3), sample size ranging from 116-140

^b prevalence of reporting 'very true' on all neighborhood cohesion items

^c prevalence of reporting high self-efficacy for PA

^d T1, T2 and T3 represent baseline, 3-month and 6-month measurements, respectively.