

Pathways to Outdoor Recreation, Physical Activity, and Delinquency Among Urban Latino Adolescents

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Abstract

Background Little is known about how physical activity and various high-risk behaviors of youth are associated, particularly in disadvantaged, minority neighborhoods.

Purpose We examine whether fear, victimization, and perceived incivilities are associated with physical activity and outdoor recreation among Latino youth and whether involvement in physical activity is associated with delinquency.

Methods Path models were assessed using data collected from school-based surveys of 390 youth across 3 schools in Chicago, Illinois.

Results Fear was associated with low levels of physical activity and outdoor recreation, while incivilities were associated with reduced levels of outdoor recreation but not physical activity. Outdoor recreation exhibited a positive association with delinquency. Some effects differed by gender.

Conclusions The findings reinforce considering different interventions to encourage physical activity and outdoor recreation for girls versus boys, and thinking comprehensively about lowering the risk for delinquency when encouraging outdoor recreation.

Keywords Acculturation · Crime · Gender · Incivilities · Minority youth

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Introduction

In the last decade, progress has been made in understanding how fear of crime and community incivilities (e.g., trash, graffiti, youth hanging out, etc.) influence physical activity among adults in minority populations [1–3]. Research studies incorporating fear into ecological and environmental models of physical activity examine factors such as perceived and objective levels of incivilities, perceived risk of victimization, crime, and gang presence. Some studies using US samples have shown that fear—worry about becoming a victim of crime—and high levels of violence are barriers to physical activity for adults [4–6]. However, few studies have addressed the socio-environmental factors related to crime and violence that discourage physical activity among disadvantaged minority youth, and particularly, among Latino youth [2].

Research has shown that urban Latino neighborhoods are often characterized by crime and violence [7, 8], poor street environments [8], and limited green space [9]. Neighborhoods with higher proportions of Latino immigrants are more likely to have higher levels of violence and be perceived as unsafe by residents compared to similar neighborhoods with lower proportions of Latino immigrants [7, 10]. In addition, residence in these disadvantaged neighborhoods has been associated with high levels of obesity, inactivity, and sedentary behavior among Latino youth [11–14], as well as high rates of abuse, victimization, and delinquency [15–17]. Yet, public health and sociological research is limited in the range of high-risk behaviors (e.g., teen pregnancy, substance abuse, sedentary behavior, delinquency) considered within studies. In other words, studies usually focus solely on outcomes within one substantive domain. Eliminating this gap and moving toward a broader understanding of the interplay of health-related behaviors, delinquency, and other high-risk behaviors could have important implications for improving both health

policy and practice [18]. For instance, in disadvantaged areas where gangs, drugs, and shootings are prevalent, if adolescents involved in physical activity were found to be a protective factor for delinquency, interventions developed, and advocacy efforts implemented to improve the health of adolescents might have wider reach and greater likelihood of adoption than solutions targeted to a single outcome. A socio-ecological framework can highlight the importance of environmental risk factors and provide the foundation for theorizing about a wide range of relationships without being encumbered by testing any specific theory or theories, thus allowing for a broader assessment of possible mechanisms that could inform and support youth health promotion [19, 20].

Participation in criminal behavior and physical activity among youth may be linked in numerous ways. Exposure to incivilities and crime may lead to changes in daily routines such that youth begin to avoid outdoor spaces [21–24]. Individuals, particularly those who perceive high levels of incivilities, who are fearful, or have been victimized, may stay indoors, become more sedentary, and less physically active [25, 26]. At the same time, youth who are engaged in high levels of outdoor recreation or sport may be less likely to participate in delinquent and criminal behavior because they have little desire for delinquency [27, 28], limited exposure to and a lower likelihood of learning from delinquency peers [29], or have developed and solidified pro-social norms through club level and interscholastic sports [30, 31].

A substantively integrated ecological approach to the study of youth physical activity also draws attention to the measurement of environmental and interpersonal factors related to crime and violence and how these factors affect different subgroups. Summary reviews of ecologically based studies assessing the role of environmental factors have elucidated inconsistent findings with regard to the effect of crime and incivilities [1, 2]; the authors of the reviews highlighted issues that included poor and inconsistent measures of crime, limited use of validated instruments, and inadequate focus on the impact of incivilities. These reviews also identify as a problem the limited number of studies that assess the possibility of differential effects by gender. Gender becomes particularly important in studies assessing fear and crime-related environmental features because studies have consistently shown women are more fearful than men [32]. Furthermore, review studies frequently recommend improving the understanding of how environmental correlates influence the physical activity of population subgroups that include low socio-economic status (SES), ethnic and racial minorities, and women [3].

With regard to racial/ethnic minority populations, continued study of crime-related, and other environmental factors that encourage or discourage physical activity of Latino

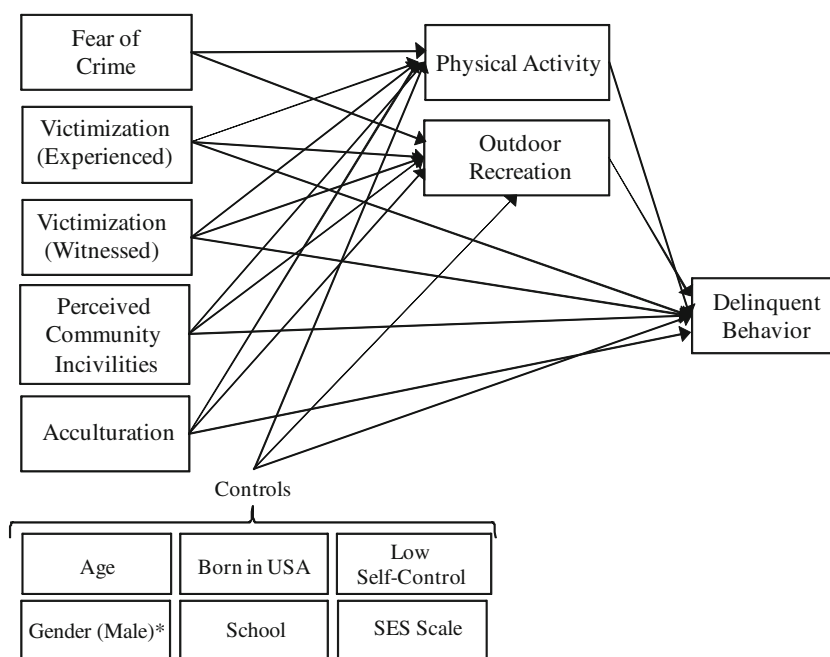
youth is of particular importance in light of findings from longitudinal research that confirmed acculturation to the USA has negative effects on physical activity among Latinos [33]. Similarly, research suggests that the longer Latino youth live in the USA, the more likely they are to participate in risky behaviors [34–37]. The phenomenon has gained general recognition as the “immigrant paradox,” named after the unexpected results of heightened resilience among less acculturated or first generation youth when compared to their more acculturated or second or third generation counterparts. Specifically, greater levels of acculturation among Latino youth have been associated with increased rates of problem behaviors, delinquency and violence [34–37].

The present study addressed the gaps described above by simultaneously examining the indirect and direct relationships among perceptions of violence and incivilities, physical activity, outdoor recreation and delinquency among Latino youth living in disadvantaged neighborhoods. Within this goal, we had several objectives. Our first objective was to examine whether Latino youth’s perceptions of safety (i.e., fear), incivilities, and victimization influence physical activity and outdoor recreation, and in turn, involvement in delinquency. Our second objective was to examine the extent to which Latino youth’s level of acculturation influenced physical activity, outdoor recreation, and delinquency. Our third objective was to determine whether the findings varied by gender. We tested the following hypotheses:

1. Latino youth with higher levels of fear, victimization, and perceptions of incivilities will have lower rates of participation in physical activity and outdoor recreation but higher levels of delinquency. Essentially, Latino youth with higher rates of participation in physical activity and outdoor recreation will be less likely to be involved in delinquency.
2. Greater acculturation to the USA will be associated with lower levels of physical activity and outdoor recreation but higher levels of delinquency.
3. The effects of fear of crime, crime victimization, and perceived incivilities on Latino adolescents’ physical activity participation and outdoor recreation will be stronger for girls than for boys.
4. The effects of physical activity and outdoor recreation on Latino adolescents’ involvement in delinquent behavior will be greater for Latino boys than girls.

The proposed model is shown in Fig. 1. We expressly sought to examine a generally homogenous ethnic minority youth population with regard to neighborhood residence, disadvantage, ethnicity, and country of origin to gain a deeper understanding of how individual-level factors might influence physical activity and delinquency among youth in high crime urban neighborhoods.

Fig. 1 Proposed model depicting associations between fear, victimization, incivilities, acculturation, physical activity, outdoor recreation, and delinquent behavior. Note: separate models were proposed, one for each activity outcome (i.e., physical activity, outdoor recreation)



**Also tested for moderation in main effects by gender*

Methods

Participants

The sample was comprised of Latino youth from three Chicago schools, including a high school (school 1, grades 9–12), a combined middle/high school (school 2, grades 6–12), and a middle school (school 3, grades 6–8). Two of the schools had a Latino population of 98 % and one school had a student Latino population of over 91 %. Data were collected between May 2010 and May 2011. The research protocol was approved by the University of Illinois Institutional Review Board.

The neighborhood in which the schools are located and that encompasses the attendance boundaries for the schools—known as Little Village—is characterized by high poverty and crime [14, 38]. Little Village is the largest Mexican neighborhood in Chicago. In 2010, 79,228 people lived in Little Village, 82.1 % of whom was Latino [39]. The neighborhood has the youngest population of any Chicago neighborhood—the median age of its residents is under 21 years of age [39, 40].

Latino students in grades 6–12 were provided with parental consent forms (printed in both Spanish and English) to take home. Parents also were approached for consent during parent report card distribution. Between the two methods, 465 students’ parents consented to their children participating in the study. A week later, Latino students whose parents consented and who were in attendance were asked to provide written assent. All students who provided assent completed the study’s survey, which

was administered by trained research assistants in the school library and cafeteria, and took about 30 min to complete. The survey contained roughly 60 items total, including questions about delinquent and criminal behavior, victimization, and detailed questions about physical activity and where the activity took place. A total of 390 youth, ranging in age from 12 to 19, completed the survey (90 % completion rate for middle school youth and 80 % completion rate for high school youth). For the analyses presented, four cases were dropped due to missing data on gender. All respondents were Latino (96.5 % of Mexican descent), and more than three quarters (80 %) were second-generation immigrants born in the USA.

Measures

The outcome variables included two measures of youth physical activity—average physical activity and outdoor recreation—and one measure of involvement in delinquency. The items used in both physical activity measures are part of the “Active Where?” survey created by Kerr and colleagues, in consult with a panel of experts, for use with adolescents [41]. *Average physical activity* was measured as a scale (0 to 7) averaging two items: the average number of days per week that respondents reported being physically active in a typical week, and the number of days that respondents reported being physically active in the week prior to the survey. Scale reliability was high (Cronbach’s $\alpha=0.82$) and past

research has established the validity of these self-report items (separately) for use with adolescents [42]. The *outdoor recreation scale* measured the average frequency at which respondents were active in 6 different outdoor locations (yard, driveway, street, park, schoolyard, neighbor's yard/driveway) never, once a month or less, twice a month, or once a week or more. Responses were averaged. Scale reliability was good (Cronbach's $\alpha=0.77$); test re-test reliability has been established by the developers as adequate [40]. Last, the *delinquency scale*, developed for adolescents and validated in previous research [43], had a possible range of 0–30 and measured the total number of times over the last 30 days that respondents reported engaging in any of five types of delinquent behavior: stealing, sneaking into places, shoplifting, spraying graffiti, and damaging property. Responses were 0, 1–2 (coded as 1.5), 3–5 (coded as 4), and more than 5 (coded as 6).

To measure fear, we created a scale by averaging items used in past studies (though some were reworded for relevance) and that had face validity for capturing the emotional response aspect of crime concerns, distinguishable from assessments of risk [44, 45]. Respondents were provided eight statements that asked whether the statements were not true at all (coded 1), sometimes true (coded 2), or mostly true (coded 3). Statements included being worried about being physically hurt: (a) going to and from school, (b) in school, (c) after school, (d) when close to home when outdoors during the day, (e) close to home when outdoors at night, (f) in the park during the day, (g) in the park at night, and (h) by gangs. Scale reliability was high ($\alpha=0.86$).

Because extant research has shown that both witnessing victimization and being personally victimized [46, 47] can influence health—and particularly mental health (e.g., anxiety and fear), and lead to avoidance behaviors, such as remaining inside the home, we included both types of victimization as measures in the current study. Witnessing victimization was assessed using an additive scale validated in past research [48]: I have seen a relative or friend being beaten up; I have seen someone (not a relative or friend) being beaten up; I have seen a relative or a friend get stabbed or shot; I have seen someone (not relative or friend) get stabbed or shot; and I have seen a gun pulled on another person. Responses could include: never (coded as 1), at least once (coded as 2), or more than once (coded as 2). The scale ranged from 5 to 15. To measure direct victimization, a one-item measure was created based on previous research with the target population [38]: respondents were asked whether, in the last year, they had been hurt by someone in the neighborhood (no=0; yes=1).

Perceived incivilities were measured using a set of items validated in past ecological studies of community incivilities [49]. Respondents were asked on a three-point scale (no problem to big problem) how much of a problem in their neighborhood is/are: graffiti, trash, vacant houses/apartments, people selling drugs, people using drugs, and gangs. Responses were averaged. Scale reliability was good ($\alpha=0.74$).

Acculturation was assessed using the assimilation score of the Acculturation, Habits, and Interests Multicultural Scale for Adolescents (AHIMSA) [50]. The AHIMSA is a brief multidimensional measure specifically designed for adolescents. The AHIMSA is an eight-item scale with four response options for each question: “the U.S. (indicating assimilation),” “the country my family is from” (indicating separation), “both” (indicating integration), and “neither” (indicating marginalization). Example of statements include, “I am most comfortable being with people from ...” and “the holidays I celebrate are from...” Scores can range from 0 to 8 for each of these four orientations. Following recommendations by the scale authors [50], we summed the responses (0/1) to the US orientation to create the scale.

All models also included a number of control variables that prior research has shown to be related to physical activity and/or delinquency: age, gender, SES, and low self-control. SES was assessed using the Family Affluence Scale [51]; the scale ranged from 0 to 9, with higher scores indicating greater SES. The low self-control scale, a previously validated scale [52] widely used in the criminology literature, ranged from 1 to 3, with higher scores indicating lower self-control. We also included a dichotomous measure indicating whether the respondent was born in the USA (which was not significantly correlated with the acculturation measure), and dummy variables for school attended. Measures assessing academic performance or psychosocial characteristics were not available.

Analytic Approach

To test the research hypotheses, we employed structural equation modeling (SEM) in the *Mplus* 6.0 statistical software program [53]. Important to the study hypotheses, SEM in *Mplus* allowed us to simultaneously estimate multiple regression equations to assess the direct and indirect associations of fear of crime, victimization experiences, community incivilities, and acculturation on the dependent variables of physical activity, outdoor recreation, and delinquency, while accounting for the effects of control variables and enabling us to test for possible moderation of effects by gender. Each construct

in the estimated SEMs was measured by a single variable (most variables were in fact summative scales) and was therefore observed rather than latent. The statistical significance of model parameters was assessed by their p values, with values less than .05 indicating statistical significance. Model fit was assessed using the criterion of previous SEM researchers, with acceptable fits denoted by statistically insignificant model chi-square values [54].

To address the first research hypothesis, we estimated one path model predicting physical activity, outdoor recreation and delinquency as dependent variables; within this model, physical activity and outdoor recreation were also tested as mediating variables in the relationship between the key predictors and delinquency. We also allowed for estimation of the correlation between physical activity and outdoor recreation, which was statistically significant in all models. The primary independent variables of interest were fear of crime, crime victimization, and perceived community incivilities, all of which were hypothesized to have negative associations with physical activity and outdoor recreation, and through those associations, indirect associations with delinquency. Crime victimization and perceived community incivilities were also hypothesized to have direct associations with delinquency. The model included acculturation as a covariate, and age, gender, SES, low self-control, school of attendance, and country of birth as controls.

The test of the second research hypothesis also stemmed from estimation of this initial path model, wherein we assessed the significance of the association between level of acculturation with youth's physical activity, outdoor recreation, and delinquency. For the third and fourth research hypotheses in which we expected gender to moderate the main associations described above, we conducted chi-square difference testing of nested models. The nested models that we compared consisted of: (a) a model restricting all associations to be equivalent across the male and female Latino adolescent respondents, and (b) an unrestricted model that permitted the main associations of interest, as specified in the first and second research hypotheses, to vary by gender. By assessing the statistical significance of the difference in chi-square values obtained from these nested models, we can determine whether allowing differentiation by gender significantly improved the fit of the model to the data—in other words, whether the main associations of interest were moderated by gender. Notably, the results of this comparison subsequently led us to estimate separate SEMs for Latino adolescent males and Latina adolescent females.

Results

Descriptive Statistics

Descriptive statistics for all variables are presented in Table 1. Means, percentages, and standard deviations are provided by gender for the 206 female Latinas and 180 male Latinos who completed the survey and were not missing information on gender; statistically significant differences are noted. As shown in the table, Latino boys and girls in the study differed across all three dependent variables, with girls reporting significantly less involvement in physical activity, outdoor recreation, and delinquent behavior. Latina girls in the study also reported a somewhat lower socio-economic background than did boys.

Path Analysis

Table 2 contains the standardized coefficients from estimation of the model depicted in Fig. 1, showing direct and/or indirect associations of each variable on physical activity, outdoor recreation, and delinquency. With one degree of freedom, model fit was excellent (chi-square=0.038, $p=0.846$), and R^2 values for the equations predicting physical activity, outdoor recreation, and delinquency were 0.188, 0.190, and 0.142, respectively.

Results confirmed that Latino adolescents who expressed greater fear of crime also reported engaging in significantly less physical activity and outdoor recreation, as shown in Table 2. Neither direct nor indirect (i.e., witnessing) victimization was significantly associated with physical activity or outdoor recreation. With regard to respondents' perceptions of incivilities in their communities, those who perceived greater levels of incivilities also reported engaging in significantly less outdoor recreation, but incivilities had no significant association with physical activity levels. With regard to the direct relationships between the main independent variables and delinquency, perception of incivilities was associated with a decrease in delinquency, but witnessing victimization was significantly and positively associated with delinquency. None of the hypothesized indirect associations with delinquency was significant. Neither physical activity nor outdoor recreation was significantly and negatively related to delinquency as hypothesized. Rather, Latino adolescents who reported engaging in higher levels of outdoor recreation also reported *higher* levels of delinquency.

The level of Latino youth's acculturation was significantly associated with their level of outdoor recreation (Table 2), in that increased assimilation into US culture corresponded to a reduction in a youth's level of outdoor recreation. This association was true while holding

Table 1 Descriptive statistics by gender

| | Min | Max | Female Latinas (N=206) | | Male Latinos (N=180) | |
|---------------------------------|-----|-----|------------------------|--------------------|----------------------|--------------------|
| | | | Mean or % | Standard deviation | Mean or % | Standard deviation |
| Dependent variables | | | | | | |
| Physical activity | 0 | 7 | 3.25*** | 2.20 | 4.15 | 2.09 |
| Outdoor recreation | 0 | 3 | 1.49** | 0.88 | 1.73 | 0.81 |
| Delinquency | 0 | 24 | 1.50* | 3.15 | 2.33 | 4.58 |
| Independent variables | | | | | | |
| Acculturation | 0 | 8 | 1.80 | 2.18 | 2.23 | 2.40 |
| Age | 12 | 19 | 14.64 | 1.55 | 14.41 | 1.48 |
| Born in USA | 0 | 1 | 80.88 % | 0.39 | 77.97 % | 0.42 |
| Crime victimization—experienced | 0 | 1 | 8.74 % | 0.28 | 6.67 % | 0.25 |
| Crime victimization—witnessed | 0 | 2 | 0.57 | 0.52 | 0.67 | 0.62 |
| Fear of crime | 1 | 3 | 1.37 | 0.40 | 1.39 | 0.42 |
| Low self-control | 1 | 3 | 1.75 | 0.34 | 1.70 | 0.34 |
| Perceived incivilities | 1 | 3 | 2.36 | 0.41 | 2.31 | 0.42 |
| School 1 (high school) | 0 | 1 | 34.47 % | 0.48 | 29.44 % | 0.46 |
| School 3 (middle school) | 0 | 1 | 18.93 %** | 0.39 | 30.56 % | 0.46 |
| Socio-economic status | 0 | 9 | 4.02* | 1.95 | 4.46 | 1.89 |

Statistical significance of the difference between means for females and males is as follows: * $p < .05$; ** $p < .01$; *** $p < .001$

constant (as a control) the country in which youth were born, which notably had no significant association with either physical activity or outdoor recreation. However,

no significant relationship was found between acculturation and overall physical activity (although the relationship approached significance $p=0.07$). Nor was a

Table 2 Decomposition of effects on physical activity, outdoor recreation, and delinquency (full sample)

| Predictors | Physical activity | | Outdoor recreation | | Delinquency | |
|--------------------------------------|-------------------|----------|--------------------|----------|-------------|----------|
| | Direct | Indirect | Direct | Indirect | Direct | Indirect |
| Physical activity | – | – | – | – | –0.051 | – |
| Outdoor recreation | – | – | – | – | 0.118* | – |
| Acculturation (>assimilation) | –0.089 | – | –0.170*** | – | 0.028 | –0.016 |
| Age | –0.104 | – | –0.173** | – | –0.060 | –0.015 |
| Born in USA | –0.019 | – | –0.044 | – | 0.026 | –0.004 |
| Crime victimization—experienced | –0.046 | – | –0.005 | – | 0.043 | 0.002 |
| Crime victimization—witnessed | 0.098 | – | 0.081 | – | 0.195*** | 0.005 |
| Fear of crime | –0.148** | – | –0.121* | – | – | –0.007 |
| Low self-control | –0.065 | – | –0.007 | – | 0.176*** | 0.002 |
| Male gender | 0.168*** | – | 0.115 | – | 0.079 | 0.005 |
| Perceived incivilities | –0.002 | – | –0.135** | – | –0.121* | –0.016 |
| School 1 | –0.234*** | – | –0.125* | – | 0.004 | –0.003 |
| School 2 (omitted, reference school) | – | – | – | – | – | – |
| School 3 | 0.024 | – | 0.103 | – | –0.065 | 0.011 |
| Socio-economic status | 0.095* | – | 0.094* | – | 0.062 | 0.006 |

Table entries are standardized coefficients in equations models estimated using *Mplus* 6.0 (Muthén and Muthén, 1998–2010). Dashes denote paths not possible according to the model. With one degree of freedom, model fit is excellent: chi-square is 0.038, $p=0.846$. R^2 values for the equations predicting physical activity, outdoor recreation, and delinquency are 0.188, 0.190, and 0.142, respectively. Residual variances in the equations predicting physical activity and outdoor recreation were correlated at 0.327***

Statistical significance levels are as follows: * $p < .05$; ** $p < .01$; *** $p < .001$

significant relationship found between acculturation and delinquency.

Differential Effects by Gender

We examined whether the full hypothesized path model differed for Latino boys ($N=180$) and Latina girls ($N=206$). We calculated the difference in model chi-square values for nested models—one of which restricted all associations in the model to be equal between male and female respondents (chi-square=49.11, degrees of freedom ($df=37$), and the second of which allowed the main paths of interest, as specified in the first and second research hypotheses, to vary by gender (chi-square=27.41, $df=27$). The difference between these chi-square values was statistically significant (chi-square_{difference}=21.703, $df_{difference}=10$, $p<.05$), indicating that there was significant gender variation in at least some of the main associations of interest.

Given this evidence that gender, overall, served as a moderating factor for the associations of interest, we conducted additional analyses to determine where the main associations of interest varied between Latino(a) boys and girls. We found three sources of significant variation. First, fear of crime was significantly and negatively associated with Latino male youth's levels of physical activity, but there was no such association among Latina females (chi-square_{difference}=5.958, $df_{difference}=1$, $p<.05$). Second, perceptions of incivilities were significantly and negatively associated with Latina female youth's participation in outdoor recreation, but there was no such association among Latino boys (chi-square_{difference}=8.274, $df_{difference}=1$, $p<.05$). Third, there was some evidence that Latino boys who participated in higher frequencies of outdoor recreation also reported engaging in more delinquent acts, whereas there was no such association among Latina girls (chi-square_{difference}=3.738, $df_{difference}=1$, $p<.10$).

The full results of the hypothesized path models, as estimated on the two subsamples of Latino adolescent boys and Latina adolescent girls, are presented in Tables 3 and 4. Despite that certain associations show up as statistically significant (i.e., non-zero) for girls but not for boys (and vice versa), the three previously described differences are the only ones that differed significantly by gender. However, it remains of substantive interest that in the path model for Latino boys, acculturation to the USA has a significant negative relationship with outdoor recreation. It is also notable that the relationship between outdoor recreation and delinquency, marginally significant in the chi-square test on differences by gender, is statistically significant at conventional levels in the path model for Latino boys ($\beta=0.212$; $p<.01$).

Discussion

This study was the first study to examine the links between physical activity and delinquency among adolescents living in disadvantaged, high crime neighborhoods. We posited that higher involvement in physical activity and outdoor recreation would have benefits that included lower delinquency levels, but we found the opposite. More specifically, we found that more frequent outdoor recreation was associated with higher levels of delinquency, and when we disaggregated the data to examine the effect by gender, the results showed that the relationship was significant only for boys. These findings are similar to the one other study we found that examined the relationship between general physical activity and delinquency [55]. The authors, who used data from a large cross-sectional survey of adolescents in Ontario, Canada, found that vigorous physical activity was positively associated with delinquent behavior, and the pattern of association was observed only among males, not females. With regard to the current study findings, it could be that the types of outdoor recreation in which the adolescents engaged, and particularly for the boys, were primarily unorganized, unstructured activities—activities more conducive to delinquent behavior (e.g., graffiti, property damage) than, for example, organized team sports. Future studies of youth physical activity, and in particular, outdoor recreation, should include measures encompassing whether activities are structured and supervised. These suggestions for future study are also important in light of the findings that heightened fear and perceptions of incivilities appeared to dampen participation in outdoor recreation. On a broader scale, more attention to systematically measuring the wide range of contexts in which youth physical activity and recreation take place will be of benefit to the field. In addition, lack of specificity in the activity measures could possibly be a reason why no indirect associations were found between the perceptual measures and delinquency.

Understanding the interplay across outcomes can help shed light on health policies and health promotion programs that can simultaneously encourage physical activity and reduce participation in delinquency and possibly other high-risk behaviors. Because participation in delinquent behavior at high levels is often a precursor to involvement in more serious criminal behavior and increases the likelihood of victimization [56], continued attention to the overlap of delinquency and health behaviors within a public health framework may be warranted.

Another unexpected result is the finding that neither being a victim of violence nor witnessing violence was associated with physical activity or outdoor recreation. It is difficult to put this finding in context with extant studies because few studies have tested these

Table 3 Decomposition of effects on physical activity, outdoor recreation, and delinquency (girls)

| Predictors | Physical activity | | Outdoor recreation | | Delinquency | |
|--------------------------------------|-------------------|----------|--------------------|----------|-------------|----------|
| | Direct | Indirect | Direct | Indirect | Direct | Indirect |
| Physical activity | – | – | – | – | 0.024 | – |
| Outdoor recreation | – | – | – | – | 0.058 | – |
| Acculturation (>assimilation) | –0.077 | – | –0.124 | – | 0.010 | –0.009 |
| Age | –0.107 | – | –0.112 | – | 0.024 | –0.009 |
| Born in United States | –0.008 | – | –0.045 | – | 0.034 | –0.003 |
| Crime victimization—experienced | –0.079 | – | 0.015 | – | 0.028 | –0.001 |
| Crime victimization—witnessed | 0.108 | – | 0.089 | – | 0.179* | 0.008 |
| Fear of crime | –0.022 | – | –0.069 | – | – | –0.005 |
| Low self-control | –0.042 | – | 0.034 | – | 0.139* | 0.001 |
| Perceived incivilities | 0.022 | – | –0.255*** | – | –0.127 | –0.015 |
| School 1 | –0.237** | – | –0.182* | – | 0.105 | –0.016 |
| School 2 (omitted, reference school) | – | – | – | – | – | – |
| School 3 | 0.005 | – | 0.095 | – | 0.070 | 0.006 |
| Socio-economic status | 0.200** | – | 0.207*** | – | –0.025 | 0.017 |

Table entries are standardized coefficients in models estimated using *Mplus* 6.0 (Muthén and Muthén, 1998–2010). Dashes denote paths not possible according to the model. With one degree of freedom, model fit is excellent: chi-square is 0.037, $p=0.982$. R^2 values for the equations predicting physical activity, outdoor recreation, and delinquency, respectively, are as follows: 0.153, 0.231, and 0.102. Residual variances in the two equations are correlated at 0.313***. Statistical significance levels are as follows: * $p<.05$; ** $p<.01$; *** $p<.001$

associations. The null finding for direct victimization, however, may stem from the lack of variability in direct victimization, a limitation in our study. Only 8 % of sample indicated they had been hurt by someone in the neighborhood.

With regard to acculturation, the finding that greater acculturation to US culture was associated with lower levels of outdoor recreation is consistent with longitudinal research suggesting Latino children navigating the acculturation process are more likely to be sedentary

Table 4 Decomposition of effects on physical activity, outdoor recreation, and delinquency (boys)

| Predictors | Physical activity | | Outdoor recreation | | Delinquency | |
|--------------------------------------|-------------------|----------|--------------------|----------|-------------|----------|
| | Direct | Indirect | Direct | Indirect | Direct | Indirect |
| Physical activity | – | – | – | – | –0.111 | – |
| Outdoor recreation | – | – | – | – | 0.212** | – |
| Acculturation (>assimilation) | –0.094 | – | –0.226** | – | 0.047 | –0.037 |
| Age | –0.106 | – | –0.241** | – | –0.120 | –0.039 |
| Born in USA | –0.060 | – | –0.051 | – | 0.031 | –0.004 |
| Crime victimization—experienced | –0.002 | – | –0.031 | – | 0.072 | –0.006 |
| Crime victimization—witnessed | 0.086 | – | 0.085 | – | 0.181* | 0.009 |
| Fear of crime | –0.297*** | – | –0.173* | – | – | –0.004 |
| Low self-control | –0.097 | – | –0.053 | – | 0.197** | –0.001 |
| Perceived incivilities | 0.026 | – | –0.002 | – | –0.141* | –0.003 |
| School 1 | –0.281*** | – | –0.117 | – | –0.070 | 0.006 |
| School 2 (omitted, reference school) | – | – | – | – | – | – |
| School 3 | –0.001 | – | 0.061 | – | –0.169* | 0.013 |
| Socio-economic status | –0.025 | – | –0.063 | – | 0.110 | –0.011 |

Table entries are standardized coefficients in models estimated using *Mplus* 6.0 (Muthén and Muthén, 1998–2010). Dashes denote paths not possible according to the model. With one degree of freedom, model fit is excellent: chi-square is 0.037, $p=0.982$. R^2 values for the equations predicting physical activity, outdoor recreation, and delinquency, respectively, are as follows: 0.215, 0.182, and 0.220. Residual variances in the two equations are correlated at 0.319***. Statistical significance levels are as follows: * $p<.05$; ** $p<.01$; *** $p<.001$

[33]. Given the extent of findings across various fields of research that support the “immigrant paradox,” it may be important for health practitioners working with youth to develop interventions focused on preserving elements of Latino culture.

Our examination of hypotheses 3 and 4 that stated that gender would moderate some of the main associations produced interesting results. We found that fear had a significant negative relationship to physical activity for Latino boys, but not for Latina girls, yet the opposite was found for perceived incivilities with regard to outdoor recreation—incivilities mattered for girls, but not for boys. It may be that girls are more attuned to the aesthetics of their environment as some research has shown [57], in turn influencing behavior, but fear might be more palpable for boys than girls or simply reflect the environmental reality of life in high-crime neighborhoods given that boys are more likely to be victims of peer violence and to be recruited for gangs [58, 59]. Future research should consider assessing a range of social pressures and interpersonal stressors within the context of physical activity outcomes. In addition, the finding that fear had consequences for boys and not girls resonates somewhat with results from a recent study [4] that found that men became highly fearful in neighborhoods with high levels of violent crime, but women were fearful regardless of the levels of violent crime. Our findings provide support for the view that interventions to increase youth physical activity in the neighborhood, and outdoor recreation in general, may need to be tailored in different ways to Latino(a) boys and girls.

Limitations

This study has a number of limitations that should be noted. Because the data are cross-sectional, we are unable to make statements about causal relationships. Similarly, we recognize the possibility for alternative models in explaining associations between physical activity, outdoor recreation, and delinquency. It is possible that there is a reciprocal relationship between delinquency and physical activity/outdoor recreation. It is also possible that acculturation moderates the effects of fear and perceived incivilities, such that as youth become comfortable with US culture and lifestyle, they are less likely to avoid outdoor spaces and places that are associated with negative environmental cues. Although a study testing a similar relationship did not find effects of acculturation on perceived incivilities [60], longitudinal research addressing these alternative models using large samples is warranted.

The reliance on self-report data is another limitation, particularly for the physical activity measures. Although studies have indicated that 7-day recall is appropriate and has shown adequate validity with adolescents [42], and we used multiple items for each scale, we recognize that the use of objective measures would add weight to the findings. In

addition, to our knowledge the outdoor recreation scale’s criterion-related validity has not been previously tested, although the items were developed by the “Active Where” survey authors to have face validity with adolescents. Another limitation is that we did not have data to examine hypotheses on multiple levels (e.g., school or neighborhood). In particular, a study with hypotheses such as ours could benefit from a design where youth are nested within different high crime neighborhoods, and a range of neighborhood-level environmental measures could be included, such as available physical activity resources. Conceptually, it would be important to identify where certain crime-related attributes are most influential.

Regardless of the limitations, the findings have implications for the fields of physical activity and delinquency prevention. That outdoor recreation was positively linked to delinquency suggests that developing comprehensive youth prevention programs for adolescents in disadvantaged neighborhoods, and for instance, related education and training of parents and school personnel to reiterate prosocial norms and patterns of behaviors that relate to healthy and low-risk lifestyles may result in multiple beneficial outcomes. Continued research focusing on how racial/ethnic minority youth react to negative environmental stimuli will help advance both health policy and criminal justice policy, leading to better guidance on prevention programs that can instill healthy habits in youth and encourage supportive, prosocial networks that could yield lifetime benefits [56].

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