

Intrapersonal, Behavioral, and Environmental Factors Associated With Meeting Recommended Physical Activity Among Rural Latino Youth

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This study aimed to identify intrapersonal, behavioral, and environmental factors associated with engaging in recommended levels of physical activity among rural Latino middle school youth. Data were from an anonymous survey of 773 Latino youth (51% female) about level of and barriers and motivators to physical activity, risk behaviors, and park use. Logistic regression models identified factors correlated with meeting recommended levels of physical activity (5 days or more ≥ 60 min/day). Thirty-four percent of girls and 41% of boys reported meeting this physical activity recommendation. Participation in an organized after school activity ($p < .001$) and in physical education (PE) classes 5 days a week ($p < .001$) were strongly associated with meeting recommended physical activity level. Making PE available 5 days a week and creating opportunities for organized after school physical activity programs may increase the number of rural Latino middle school youth who meet recommended physical activity level.

Maintaining health and a healthy weight during adolescence and into adulthood is a key health benefit of engaging in moderate-vigorous physical activity (47). However, the 2009 Youth Risk Behavior Surveillance Survey reported that only 37% of U.S. youth engage in the recommended level of physical activity (8),

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defined as 60 minutes of moderate-vigorous physical activity on 5 or more days per week (52). Further, only 33% of Hispanic or Latino youth meet the recommended level of physical activity for youth compared with 40% of non-Hispanic white youth (8). Latino youth living in rural areas have the added burden of fewer resources and additional barriers for physical activity (18,57). The epidemic of overweight and obesity in the U.S. disproportionately impacts Latino youth. From 2003 to 2007, obesity prevalence only increased from 12% to 13% in white youth, but rose from 19% to 23% in Latino youth (43). Prevalence of overweight remained stable at 27% in white youth while it increased from 31% to 41% among Latino youth (43). Social determinants of health, such as lower individual and community resources and limited access to healthy foods and places for physical activity, may explain this disparity in obesity (15,23). Physical activity is a key factor in the prevention of unhealthy weight gain (3); it is therefore important to understand what factors influence physical activity among Latino youth. In addition, physical activity declines precipitously during the middle school years and Latinos experience a greater percent decline compared with non-Hispanic whites (49), so it is especially critical to understand factors associated with physical activity in this age group.

Physical activity behavior is complex and requires a broad perspective that can accommodate multiple, intertwining factors. Ecological models depict reciprocal interactions among factors in multiple domains, including intrapersonal (perceptions, characteristics), behavioral (risk and health behaviors), environmental (school, built environment), and policy (funding of schools, parks and recreation) domains (39,40,45,46). Although there have been numerous published reports on determinants of youth physical activity (30,41,53), little is known about determinants for Latino middle school youth and specifically rural Latino youth. Identifying determinants across multiple domains can inform strategies to increase physical activity in this underserved population and begin to address disparities in overweight, obesity, and related health outcomes. The purpose of this study was to identify *intrapersonal* perceptions of motivators and barriers to physical activity, *behavioral* factors, and *environmental* factors of opportunities for physical activity that are associated with meeting recommended levels of physical activity among rural Latino middle school aged youth.

Methods

Design

This study was part of a larger community-based participatory research (CBPR) project aimed at physical activity promotion among rural Latino youth. In accord with CBPR, a community advisory board consisting of volunteers from varying constituencies in the community was formed (20). The community advisory board and the researchers worked collaboratively on all aspects of this project. A first step in this CBPR project was to conduct formative research and a community assessment to inform the development of an after school physical activity program targeted at youth and tailored to the community. A goal of this community assessment was to obtain data regarding youth physical activity patterns, determinants of physical activity and risk behaviors before program intervention. The study was approved by the University of Washington Institutional Review Board.

Setting

The study took place in a town of nearly 16,000 residents within a rural (average of 55 people per square mile) agricultural county of Washington State (55). The rural-urban commuting area (RUCA) code, which delineates the degree of geographic isolation of a rural area is 4.2, suggesting that many residents may commute for work to a larger rural town of 80,000 that is 32 miles away from the study area (16,36). Seventy-five percent of the town's residents are Latino, 65% speak a language other than English in the home (50), and 53% of adults have completed less than a high school education (50). In addition, 30% of families are below the federal poverty level (50) and 100% of middle school students are on the free or reduced lunch program.

Data Collection

Students attending the two public middle schools in town during the 2008–2009 school year formed the sampling pool. The school principal mailed a letter to each parent that explained the study and described the types of questions on the survey. An opt-out form was included that parents could return to the school if they did not want their child to participate. The survey was administered by teachers during a first period class in November 2008 and completed anonymously. We obtained a waiver of written documentation of assent since surveys were completed anonymously; completion of the survey was considered assent. The surveys included a few pages of word games for students to do if they chose not to complete the survey.

Student Survey

The first part of the survey asked about use of the 13 parks and schoolyards in the town. The 6 questions regarding park use were developed in collaboration with the community advisory board for this study and included frequency (choices ranged from once a month to everyday) and duration of use (choices ranged from <20 minutes to >90 minutes), types of activities performed (students picked from a list or added an activity), mode of transport to/from the park (bike, walk, car), and with whom they go to the park (family, friends). We did not assess the reliability and validity of these 6 items. The second part of the survey asked more general questions related to physical activity engagement, and motivators and barriers to physical activity. Physical activity was assessed with the following question, "On how many of the past 7 days were you physically active for a total of at least 60 minutes per day? (Add up all the time you spent in any kind of physical activity that increases your heart rate or makes you breathe hard some of the time)." This question is intended to capture moderate-vigorous level of physical activity. The number of days a respondent went to physical education was assessed with the following question, "In an average week when you are in school, on how many days to you go to physical education (PE)?" Respondents were given a list of 9 barriers to physical activity (e.g., lack of time, lack of programs, lack of quality courts or fields in parks) and asked to check all that applied to them. Similarly they were given a list of 10 motivators for physical activity (e.g., friends, coach, parks) and school areas have good courts, fields to use) and asked to check all that applied

to them. The list of barriers and motivators were created for this study and based upon those identified in other studies with youth (22,41,42,53).

The survey also included questions related to other risk behaviors and protective factors. For example, respondents were asked if they had ever used alcohol, tobacco, and/or drugs and asked about use of each in the last 30 days. The following question was asked to ascertain level of involvement in after school activities, "During the average week, on how many days do you participate in supervised after-school activities either at school or away from school? Include activities such as sports, art, music, dance, drama, or community service, religious club activities." Participants were asked to identify their race and ethnicity (Latino or non Latino) in two separate questions. They were asked to report their age, gender, grade, weight and height.

Survey questions (except those regarding park use and physical activity barriers and motivators) were drawn from the Washington State Healthy Youth Survey (administered every other year to 6, 8, 10, and 12 grade students with moderate to high level of internal consistency (34)) or the CDC Youth Risk Behavior Surveillance (YRBS), (conducted yearly to a random sample nationwide, with test-retest reliability of between 61–100% (7)).

We also assessed the quality of park amenities in the 13 parks and schoolyards using the Environmental Assessment of Public Recreation Spaces (EAPRS) tool (38). Parks were divided into higher quality field and court parks and lower quality field and court parks based on scores from the EAPRS. An analysis of park quality and youth park use in this community is reported elsewhere (32). For this analysis, we included the variables of use of parks and use of higher quality parks as environmental-level variables.

Data Analysis

We calculated descriptive statistics and examined differences in sample demographics by gender using chi-square tests (χ^2). We dichotomized our outcome into meeting (60 minutes of moderate to vigorous physical activity 5 or more days per week) or not meeting (less than 5 days per week) recommended levels of physical activity. We developed three separate logistic regression models, guided by our ecological framework: behavioral, intrapersonal and environmental. A fourth, full model included covariates from all domains. All models controlled for age and gender. We were interested in understanding the influence of the factors in each domain in and of themselves and the net influence of the factors when variables across all domains were entered into a model. The behavioral domain model included the following independent variables: ever a member of a gang, recent alcohol use (at least once in last 30 days), past alcohol use, recent marijuana use (at least once in last 30 days). The intrapersonal domain model included perceptions of motivators and barriers for physical activity (we included the four most common motivators—friends, coach, family and team—and the two most common barriers—lack of time and lack of transportation—in the model). The environmental domain model included variables related to opportunities for physical activity: use a park, use a higher quality field and court park, attend physical education (PE), and participate in organized after school activities. These opportunities to be active are considered in the environmental domain because the presence of the organizational structure was assessed and not the level of physical activity that may have occurred in these structured

settings. The fourth model included all independent variables. We repeated this process, stratified by gender to examine differences for boys and girls. We did not include obesity as a covariate in the models due to a large proportion (40%) of missing data. All analyses were performed using SPSS 17.0 (Chicago, IL).

Results

Of the 1370 students enrolled in the two middle schools 1102 completed the survey for a response rate of 80%. Of these, 780 (80%) were completed by those who identified themselves as Latino of whom 7 had missing data for gender and were dropped from the analysis. The final sample was 773, 51% girls. More boys (41%) than girls (34%) reported meeting the recommended 60 min of moderate to vigorous physical activity on 5 or more days a week ($p < .05$). Over a third of respondents who provided weight data were either overweight or obese. The most frequently reported sources of motivation for physical activity were family (43%), friends (38%), coach (35%), and team (20%; see Table 1). A greater number of girls reported family ($p < .001$) or friends ($p < .01$) as sources of motivation for physical activity relative to boys. Fewer boys attended PE 5 days a week ($p < .05$). A greater number of girls reported lack of time as a barrier ($p < .001$).

Table 1 Independent Variables

Independent variables	Girl, N (%)	Boy, N (%)
<i>Behavioral Domain: Risk Behaviors</i>		
Used alcohol in last 30 days	79 (21%)	76 (20%)
Past use of alcohol	108 (27%)	95 (25%)
Used marijuana in last 30 days	46 (12%)	60 (16%)
Ever a member of a gang	78 (20%)	95 (26%)
<i>Intrapersonal Domain: Motivators/Barriers for Physical Activity</i>		
Family is motivator	196 (51%)***	137 (38%)
Friends are motivator	162(42%)**	119 (32%)
Coach is motivator	133 (35%)	125 (34%)
Team is motivator	79 (21%)	68 (19%)
Lack of time is barrier	120 (32%)**	79 (22%)
Lack of transportation is barrier	30 (8%)	40 (11%)
<i>Environmental Domain: Opportunities for Physical Activity</i>		
Attend PE 5 days a week	267 (69%)*	227 (61%)
Participate in an after school activity	185 (48%)	200 (54%)
Use park	344 (88%)	288 (89%)
Use higher quality field and court park	324 (82%)	320 (84%)

*= $P < .05$, **= $P < .01$, ***= $P < .001$ for difference between girls and boys determined by χ^2 ; PA= physical activity, MVPA= moderate-vigorous physical activity, PE = physical education

$N = 773$

In the model across gender, none of the behavioral domain variables was related to meeting physical activity recommendations (see Table 2). Coach and team were significantly correlated motivators with meeting the recommended levels in the intrapersonal model but not in the full model. Attending 5 days of PE and participating in an organized after school activity were consistent and strong correlates of meeting recommended levels of physical activity in the environmental domain model and were the only significant correlates in the full model.

For girls, none of the behavioral domain factors were related to meeting physical activity recommendations. Identifying family as a source of motivation for physical activity increased the odds of meeting the recommended level and this remained significant in the full model. Identifying team as a source of motivation increased the odds of meeting the recommended level of physical activity in both the intrapersonal domain and full models, as did participation in an after school activity and attending PE 5 days a week (see Table 3).

For boys, recent marijuana use was correlated with decreased odds of meeting the recommended level of physical activity and this remained significant in the full model (see Table 4). Identifying a coach as a source of motivation was associated with increased odds of meeting the recommended level in the intrapersonal model, but did not remain significant in the full model. Similar to girls, net of all the variables, participation in an after school activity and attending PE 5 days a week increased the odds of meeting the recommended level of physical activity in the environmental domain and full model.

Discussion

We used an ecological framework to organize our multivariable, multilevel examination of correlates of meeting the recommended level of physical activity among rural Latino youth. In our sample, youth participation in an organized after school activity and attendance in PE 5 days a week were most consistently and strongly associated with engaging in recommended levels of physical activity for both boys and girls; we conclude that the environmental domain may be an important target for efforts to increase Latino youth physical activity.

Environmental Factors

After-School Activities. Participation in after-school activities was associated with meeting recommended levels of physical activity across all our models. Forty-eight percent of girls and 54% of boys in our sample reported participation in an after school activity. However, our survey item did not distinguish after school physical activity programs from nonphysical activity programs, such as a club. Our results support those of another study with predominantly urban Mexican American youth which found that participation in after school activities was significantly associated with vigorous physical activity (35). Although the after school programming may not necessarily be a physical activity program, participation in organized after school programming engenders positive youth development, including learning to work with others, setting goals, managing time, trying new activities, and forming meaningful relationships (12). These skills may in turn promote positive health

Table 2 Logistic Regression Results for Meeting Recommended Level of Physical Activity

Variable	Model 1:		Model 2:		Model 3:		Model 4:	
	Behavioral domain	Intrapersonal domain	Environmental domain	Environmental domain	Environmental domain	Environmental domain	Full model	Full model
Ever Gang Member	1.15 (0.77, 1.73)						1.29 (0.82, 2.05)	
Recent marijuana use	0.75 (0.41, 1.38)						0.82 (0.41, 1.63)	
Recent alcohol use	1.31 (0.77, 2.22)						1.49 (0.82, 2.70)	
Past alcohol use	1.29 (0.90, 1.85)						1.23 (0.82, 1.84)	
Family is motivator		1.17 (0.85, 1.62)					1.08 (0.76, 1.55)	
Friends are motivator		1.22 (0.88, 1.69)					1.23 (0.88, 1.79)	
Coach is motivator		1.49 (1.07, 2.07)*					1.40 (0.97, 2.01)	
Team is motivator		1.57 (1.04, 2.38)*					1.48 (0.94, 2.36)	
Lack of time		1.06 (0.75, 1.50)					0.95 (0.65, 1.39)	
Lack of transportation		0.90 (0.53, 1.53)					0.69 (0.38, 1.23)	
Participation in after school activities			1.47 (1.29, 1.67)***				1.44 (1.26, 1.65)***	
Attend PE 5 days a week				3.27 (2.28, 4.70)***			3.59 (2.43, 5.32)***	
Use park				0.98 (0.87, 1.11)			0.95 (0.84, 1.08)	
Use higher quality field and court park				1.09 (0.87, 1.36)			1.11 (0.88, 1.40)	
Age	1.04 (0.89, 1.21)				1.09 (0.93, 1.28)		1.08 (0.91, 1.28)	
Gender	1.36 (1.01, 1.84)*				1.39 (1.04, 1.91)*		1.50 (1.06, 2.11)**	

* $P < .05$, ** $P < .01$, *** $P < .001$

$N = 773$ (adjusted odds ratios and 95% CIs)

Table 3 Logistic Regression Results for Meeting Recommended Level Physical Activity: Girls

Variable	Model 1:		Model 2:		Model 3:		Model 4:	
	Behavioral domain	Intrapersonal domain	Intrapersonal domain	Environmental domain	Environmental domain	Environmental domain	Full model	Full model
Ever Gang Member	1.01 (0.576, 1.82)						1.22 (0.62, 2.40)	
Recent marijuana use	1.66 (0.61, 3.98)						2.52 (0.86, 7.43)	
Recent Alcohol Use	1.04 (0.48, 2.24)						0.95 (0.39, 2.29)	
Past Alcohol Use	1.39 (0.84, 2.31)						1.20 (0.67, 2.14)	
Family is motivator		1.64 (1.03, 2.63)*					1.70 (1.01, 2.87)*	
Friends are motivator		1.22 (0.77, 1.93)					1.41 (0.85, 2.33)	
Coach is motivator		1.33 (0.81, 2.17)					1.53 (0.89, 2.62)	
Team is motivator		1.96 (1.06, 3.61)*					2.27 (1.15, 4.50)*	
Lack of time		0.77 (0.47, 1.27)					0.69 (0.40, 1.19)	
Lack of transportation		0.86 (0.36, 2.036)					0.53 (0.21, 1.25)	
Participation in after school activities				1.35 (1.12, 1.62)**			1.30 (1.07, 1.59)**	
Attend PE 5 days a week				2.92 (1.71, 4.98)***			3.46 (1.88, 6.35)***	
Use park				0.97 (0.82, 1.14)			0.91 (0.776, 1.09)	
Use higher quality field and court park				1.01 (0.74, 1.37)			1.046(0.77, 1.48)	
Age	0.93 (0.74, 1.15)		1.00 (0.80, 1.25)		0.99 (0.79, 1.24)		1.00 (0.78, 1.29)	

* $P \leq .05$, ** $P \leq .01$, *** $P \leq .001$

N = 394 (adjusted odds ratios and 95% CIs)

Table 4 Logistic Regression Results for Boys Meeting Recommended Level Physical Activity: Boys

Variable	Model 1:	Model 2:	Model 3:	Model 4:
	Behavioral domain	Intrapersonal domain	Environmental domain	Full model
Ever Gang Member	1.24 (0.70, 2.19)			1.36 (0.70, 2.65)
Recent Marijuana Use	0.39 (0.17, 0.92)*			0.31 (0.11, 0.85)*
Recent Alcohol Use	1.61 (0.74, 3.47)			2.00 (0.80, 5.00)
Past Alcohol Use	1.28 (0.76, 2.14)			1.41 (0.76, 2.60)
Family is motivator		0.87 (0.55, 1.38)		0.78 (0.46, 1.33)
Friends are motivator		1.18 (0.74, 1.89)		1.24 (0.73, 2.11)
Coach is motivator		1.61 (1.02, 2.56)*		1.20 (0.70, 2.04)
Team is motivator		1.19 (0.66, 2.13)		0.91 (0.46, 1.80)
Lack of time		1.46 (0.86, 2.45)		1.43 (0.79, 2.58)
Lack of transportation		0.92 (0.46, 1.85)		0.80 (0.387, 1.76)
Participation in after school activities			1.60 (1.34, 1.92)***	1.57 (1.30, 1.91)***
Attend PE 5 days a week			3.57 (2.16, 5.89)***	3.95 (2.30, 6.77)***
Use park			1.02 (0.85, 1.23)	1.03 (0.85, 1.26)
Use higher quality field and court park			1.14 (0.82, 1.58)	1.10 (0.77, 1.57)
Age	1.17 (0.94, 1.45)	1.13 (0.91, 1.40)	1.18 (0.94, 1.48)	1.23 (0.95, 1.60)

* $P < .05$, ** $P < .01$, *** $P < .001$

$N = 379$ (adjusted odds ratios and 95% CIs)

behaviors, such as physical activity. Association with a group of peers involved in a positive behavior, such as an organized after school program, encourages youth to participate in positive behaviors to maintain acceptance with the group of peers focused on positive activities (17). Such explanations require further investigation.

Physical Education Classes. A consistent and strong correlate of achieving the recommended level of physical activity in these rural Latino youth was attending PE 5 days a week. Over 60% of the youth in this sample reported attending PE 5 days a week. Similarly, two studies found that attending PE 5 days a week was a strong predictor of higher levels of moderate-vigorous physical activity (14,48). PE is important in helping youth attain sufficient levels of physical activity. Typically students are not engaged in 60 minutes of moderate-vigorous physical activity in a PE class (26); therefore, students likely engage in physical activity outside PE to reach 60 minutes a day. Students develop an enjoyment for and confidence in physical activities through PE, which could increase the likelihood that they will engage in physical activity outside of PE (29). Yet, school districts have been reducing or eliminating PE classes (24,51). During the 2006–2007 school year, fewer than 8% of school districts in the U.S. offered daily PE to all students in all grades for the entire year (9). In the U.S. only about 33% of high school students report attending PE 5 days a week and the percentage decreases with advancing grade levels (8). State governments are responsible for setting PE requirements. In 2010, 71% of U.S. states required PE for grade 6, 61% for grade 7, and 59% for grade 8, the three grades constituting middle school (29). However, over half of these states permit students to substitute other activities such as band for PE and over half allow schools to grant waivers for religious beliefs or health issues (29). In Washington State schools are required to provide 150 minutes of PE per week in all grades; yet, this requirement is not strictly enforced and compliance is low. In the local school district for this study, students could substitute band or choir for PE and some students had been granted waivers. This represents a missed opportunity to address the low levels of physical activity in youth, perhaps specifically for rural Latino youth who may otherwise have limited access to physical activity opportunities.

Parks. We found that use of parks and in particular higher quality field and court parks was not associated with engaging in the recommended level of physical activity in our sample; this finding was unexpected. Although 88% of youth reported using a park at least once a month, 62% reported being active in the park. In another study with a predominately (76%) Mexican American sample, access to recreation areas (including parks and community centers) was not associated with vigorous physical activity (35). In a study among white youth and youth of all race/ethnicities living in an urban area, park access was found to be associated with physical activity but not among youth living in rural areas or among Latino youth (1). Thus, for Latino youth, specifically rural Latino youth, having access to and frequently using parks does not necessarily translate into sufficient physical activity. In a rural community, youth are spread out across great distances; it is possible that a sufficient number of youth do not or cannot go to a park at the same time to allow for impromptu physical activity, such as basketball (18). Whereas in an urban setting, a greater concentration of youth within walking distance make impromptu games more likely to occur. In addition, youth may not have the needed equipment (e.g., a ball) to engage in a physical activity. Consistent with our findings, offering

organized physical activity programs at the parks might encourage physical activity in these settings, as it appears to do for PE and after school programs.

Intrapersonal Factors

Motivators for Physical Activity. Stratified models revealed differences by gender. Identifying team as a source of motivation was positively associated with achieving the recommended level of physical activity in girls. Twenty percent of girls identified team as a source of motivation for physical activity. Most likely girls who identified team as a source of motivation are involved in team sports. The team as a group may provide an avenue for social interaction and support (56). The social interaction and companionship experienced by participating in a group-based activity can enhance enjoyment, support, and commitment to the group and the activity, such as physical activity (6). In addition, participation in a team sport likely involves group activities and possibly it is the social aspect and influence in these group-based activities that influence physical activity rather than other inherent characteristics of the activity (e.g., physical activity seen as a health benefit).

Among boys, identifying a coach as a source of motivation was significantly associated with engaging in the recommended amount of physical activity. Thirty-four percent of boys identified coach as a source of motivation for physical activity. The boys who identified coach as a motivator were most likely involved in team sports. However, it appears that for the boys the group interaction inherent with a team was not as influential as the leadership of the coach. Other studies have found that participation in recreational/school sports, which would involve a team and a coach, was associated with greater amounts of moderate-vigorous physical activity for both boys and girls (25,30,41,53). However, middle school girls and boys have reported different motivations for participation in sports; for boys the competitive aspect was a motivator and for girls the social opportunities were motivators (44). Our findings are consistent with this literature.

Another difference by gender was identification of family as a motivator for physical activity. For girls identifying family as a source of motivation was positively associated with engaging in the recommended level of physical activity net of all factors. For boys there was not a significant relationship. In another sample of middle school girls, family support was associated with physical activity among Latinas (22). Other studies have examined relationship between youth physical activity and parental support and findings have been inconclusive with parental support not associated with physical activity in one (11), associated with self-report physical activity but not objectively measured physical activity in another (33) and associated with physical activity in both boys and girls in another (42). In these three studies Latinos made up less than 10% of the sample. It is possible that parental and family support have differential influences on youth physical activity.

Behavioral Factors

Among boys, net of variables in all the domains, recent marijuana use (use in last 30 days) was inversely related to achieving the recommended level of physical activity. This relationship did not exist among girls in our sample. Participation in sports has been shown to be inversely associated with marijuana use in both high

school aged boys and girls (31). In another study, physical activity was inversely associated with marijuana use in U.S. boys and Canadian girls (19). However, in both of these studies the number or proportion of respondents who were Latino was not reported and separate analyses by ethnicity were not performed. We were not able to locate a study that looked at this relationship among Latinos. More research is needed to understand the relationship between marijuana use and physical activity, particularly among Latinos and rural youth.

Demographic Factors

Gender was significantly associated with meeting the recommended level of physical activity in all our models with boys more likely to engage in the recommended levels. Age was not related to meeting recommended levels. In other samples, the association between gender and age and physical activity has been mixed, with male gender being associated with greater physical activity (41,53), younger age associated with greater physical activity (21,28,41), age associated with physical activity for girls only (5). In a recent review age was not associated with physical activity in young children and the association between age and physical activity was inconclusive in adolescents (53). These studies did not report associations of age and gender with physical activity separately by race/ethnicity, but rather reported on overall physical activity differences by race/ethnicity. In studies comparing physical activity between youth race/ethnicity, three studies found non-Latino whites as being more active (28,41,53) and in one study Latino males were more active than non-Hispanic males (5). We were not able to locate another study that examined correlates of physical activity in rural Latino middle school aged youth.

In our sample, participation in after school activities and motivation by team (for girls) and motivation by coach (for boys) were significantly associated with meeting the recommended level of physical activity. We conclude that organized after school physical activity programming may increase the likelihood of rural Latino youth engaging in physical activity. Since there are large distances between homes and the center of town, youth are less likely to be able to spontaneously form a group of similar aged youth to engage in an informal group physical activity, such as kick ball. An organized after school program addresses this issue. Organized physical activity programs, which focus on skill building and deemphasize competition, will afford students the opportunity to learn new skills and build confidence, which will enhance enjoyment and motivation to continue engagement in physical activity (13,37). After school physical activity programs have had success in promoting physical activity in youth (2). Offering the program at the school would be ideal; however, in the case of limited space at a school, partnering with the local park and recreation department is an option and may enhance the places for organized programming to be offered (27).

Our results should be interpreted with the following limitations in mind. We relied on self-report measures for independent and dependent variables. Limited resource precluded collecting objective measures of our outcome or key correlates. Although self-report is not as reliable as objective measures, it is an acceptable alternative. Self-report of youth risk and health behaviors have been found to be reliable with questions from the Youth Risk Behavior Survey (YRBS) and we

used questions from the YRBS in our survey (4). Self-report height and weight in Mexican American youth is highly correlated with measured height (0.86 for boys and girls) and weight (0.95 for boys and 0.93 for girls) (10). Second, we were not able to include obesity as a covariate in our models due to missing data. Obesity is likely to be correlated with our outcome and its omission might have introduced bias. A study examining physical activity correlates in overweight and nonoverweight middle school girls found that the relationship between the variables did not change with weight status when the level of physical activity was controlled (54). This finding suggests that the level of physical activity rather than weight status is the paramount factor (54). Third, our models are not a comprehensive evaluation of all known factors associated with youth physical activity. We were interested in examining the relationship of intrapersonal motivators, behaviors, and environmental factors on physical activity in which our community partners were interested. Cognizant of participant burden we examined a limited number of variables in each of these domains. Fourth, our data may be subject to recall and/or social desirability bias. However, surveys were completed anonymously; this may diminish the effects of social desirability bias. However, reporting that one attends PE frequently may lead one to report being more active consistently to appear to be internally consistent. Finally, our cross sectional study design limits causal inference and our results may not generalize beyond our sample and study area. We believe that this study's strengths—focusing on rural Latino youth, a hard to reach population historically overlooked in research, and our ecological framework—provide valuable information on correlates of rural Latino youth physical activity and outweigh study limitations.

We know of no other study that presents a multivariable, multilevel approach to identifying correlates of physical activity among rural Latino youth. Our ecological framework allowed us to examine the intrapersonal, behavioral, and environmental factors that may influence physical activity. Understanding key correlates of physical activity among rural Latino youth can inform the development of interventions to promote physical activity in this population.

Conclusion

Participation in organized after school activities and attending PE 5 days a week were consistent and strong correlates of engaging in the recommended level of physical activity in this sample of rural Latino youth. Making PE available 5 days a week and creating opportunities for youth to be involved in organized after school physical activity programs or organized sports teams may increase the number of rural Latino middle school aged youth who engage in the recommended 60 minutes of moderate-to-vigorous physical activity on at least 5 days a week. In the context of organized sports, physical activity motivators may differ by gender; girls may be more motivated by social interactions on teams and boys by a team coach. Our findings suggest that schoolyards or parks may be necessary but not sufficient for youth to meet recommended level of physical activity. However, using schoolyards or parks to offer organized programming has the potential to positively influence youth physical activity levels. Our findings can be used to inform targeted interventions to encourage physical activity among rural Latino youth.

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