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Abstract

Physical Activity is an important contributor to health, both physical and cognitive. The relationship between physical activity and educational outcomes has been explored in various venues. Little research, however, has interrogated this subject longitudinally, especially for a national sample of Latinx students. To make up that gap, this paper employs data from the High School Longitudinal Study (HSLS), hierarchical regression modeling, and intersectionality theory to study and evaluate the relative impact of Extracurricular Activities, School Attitudes, and impact of demographics on Personal Health and Physical Education Grade Point Average (GPA); the participants were 1,829 Latinx high school students. The High School Longitudinal Study is a nationally representative, longitudinal study of ninth graders followed through their secondary and postsecondary years. Further, we examined the results separately for male and female Latinx students, to achieve a better understanding of physical activity and academic achievement from the female perspective. Our findings reinforce the importance of participating in sports and extracurricular activities in fostering positive educational outcomes for Latinx students, male, and female, nationally. Finally, recommendations are offered to parents, community leaders, teachers, school administrators, and policymakers regarding implementation strategies to optimize the benefits of Physical Activity to Latinx students.

Introduction

Physical activity exerts a positive influence on adolescents in the attainment of high academic achievement and healthy lifestyles (Cho, Kim, and Roh, 2017; Lakes et al., 2013). However, the positive contributions of physical activity have not benefitted all groups equally. Multiple investigators have suggested that Latinx adolescents in the United States engage less and receive fewer benefits from physical activity than their White counterparts (Álvarez-Bueno et al., 2017; Fahlman et al., 2015).

In addition to race/ethnicity, a complex interaction of factors influences the positive effects of physical activity, including socioeconomic status (SES), perception of neighborhood safety, and gender (Álvarez-Bueno et al. 2017; Hasson, 2017; Weston, Zeng, and Battle, 2020). In a recent investigation, Weston, Zeng, and Battle (2020),

suggested that physical activity demonstrated a positive relationship with academic achievement among Black adolescent students, male and female. The results also supported findings of interrelationships among physical activity, SES, safety concerns, and other demographics in relation to academic achievement. A limitation of the study was the inability to generalize these findings to other racial groups because the sample consisted exclusively of Black students. Therefore, to address these issues in the context of Latinx adolescents, this investigation focuses on the relative contributions of physical activity, as well as the factors listed above, to the physical education (Phys Ed) GPAs of school-age, male and female Latinx students.

Like Battle and Smiley, (2018), the term Latinx is employed in this investigation to describe race/ethnicity. The 'x' in Latinx erases gender, making the category inclusive of multiple sexual orientations and gender identities. Additionally, we have capitalized Latinx to maintain consistency with the terms used to describe other groups discussed in this investigation, e.g., Asian, Black, and White.

Literature Review

The literature on the influence of physical activity on academic achievement among Latinx students in the United States suggests that multiple factors affect that relationship (Gordon-Larsen et al., 2006). These factors include access to and utilization of physical activity (Office of Disease Prevention, Health Promotion, 2018), race/ethnicity (Katzmarzyk et al., 2016), SES (Owen et al., 2018b), knowledge of the potential benefits of physical activity to academic achievement (Lakes et al., 2013), access to a safe environment to engage in physical activity (Meyer, Castro-Schilo, and Aguilar-Gaxiola, 2014), residential area (Katzmarzyk et al., 2016), parental household configuration (Battle and Smiley, 2018), and gender (Hoelscher et al., 2009).

Physical Activity and Behavioral Factors

The Physical Activity Guidelines for Americans 2nd edition (Office of Disease Prevention, Health Promotion, 2018) recommends that children and adolescents between the ages of 6 - 16 engage in a minimum of 60 minutes/day of vigorous physical activity. Cognitive benefits include improved executive functioning (Lakes et al., 2013), academic self-efficacy (Cho, Kim, and Roh 2017), and academic achievement (Owen et al., 2016). The physical health benefits of vigorous physical activity include significantly better aerobic capacity, better balance, greater strength, lower body fat percentages, greater flexibility, improved bone health, improved weight status, improved cardiometabolic health, and reduced risk of depression (Office of Disease Prevention, Health Promotion, 2018; Woodward, 2009). The benefits are optimized for children and adolescents (6 – 17) when an exercise program includes 60 minutes or more of moderate or vigorous-intensity aerobic physical activity daily, a vigorous/moderate level of aerobic exercise, muscle-strengthening exercise, and bone strengthening exercise at least three days/week.

The benefits of physical activity as a vehicle to increase school engagement have also been investigated (Carlson et al., 2008; Monnat et al., 2017). Carlson et al. (2008), used a multivariate linear regression strategy to analyze data from the Early Childhood Longitudinal Study, a study of a representative sample of the nation's kindergarten

class of 1998-1999. Participants (5,316) included White (68.4%), Black (11.4%), Latinx (13.3%, and other (7.0 %) students. Results indicated that female students (2,769) had the highest level of participation in physical education but demonstrated limited academic benefits. No association was found for male students.

Investigators suggest that high SES is consistently associated with educational achievement (Adler and Newman, 2002; Fisher, et al., 1995); access to health-related resources (Fitzgerald, 2010; Gerberding and Marks, 2004; Gordon-Larsen et al. 2006), and risk of poverty and poorer mental and physical health status (American Psychological Association's Office on Ethnic Minority Affairs, 2019). Gordon-Larsen et al. (2006) used data from the National Longitudinal Study of Adolescent Health (Wave 10) to investigate the relationship between physical activity, SES, and neighborhood physical activity facilities. After analyzing the data using a logistic regression strategy, the investigators suggested that low SES groups and census block groups with a high proportion of non-Whites were less likely to have physical activity facilities than their high SES counterparts, and those living in majority White areas.

Physical Activity and Sociodemographic Factors

Race must also be considered when evaluating the influence of physical activity on academic achievement (Bar-Anderson et al., 2017; Beaulieu et al. 2012; Hoelscher et al., 2009; Katzmarzyk et al., 2016;). Barr-Anderson et al. (2017) found that physical activity participation was not influenced by SES but was modified by race. Additionally, the self-reported number of active friends was associated with total physical activity, and the reported level of physical activity enjoyment was associated with a change in physical activity among Latinx and White students. Hoelscher et al.'s (2009) analysis of data from the 2000-2002 School Physical Activity and Nutrition (SPAN) Survey suggested that across all grades, Latinx students (38.4%) and Black (10.9%) participated in sports less than their White counterparts (50.7%). An important finding was the inclusion of non-traditional forms of physical activity, such as martial arts training, in the category of other organized physical activities. Beaulieu et al.'s (2012) investigation of elementary schools' strategies to increase physical activity indicated that schools with the highest rate of minority enrollment were less likely to use non-traditional activities to encourage physical activity. Katzmarzyk et al. (2016) evaluated the role of physical activity on school-age children and adolescents. Findings suggested that a significantly lower number of Latinx (77.2%) and Black (77%) students were identified as living in a 'safe environment' than White students (93.3%).

To best understand the relationship between physical activity and academic achievement among Latinx adolescents, the influence of gender must be examined from both the socio-political and cultural perspectives. Intersectionality theory (Browne and Battle, 2018; Crenshaw, 1989) posits that an individual can face multiple sources of oppression related to multiple elements of identity, for example, gender, race, and age. In a review of the literature on physical activity among Latinx populations, Larsen et al., (2015) noted that Latinx males and females have the highest rates of inactivity, the lowest rates of meeting the guidelines for sufficient activity, and are less active than their non–Latinx White counterparts. The investigators speculated that determining factors could include gender roles. Finally, the investigators identified a need for studies focused on and between differences in physical activity, including gender. Hoelscher et al.'s (2009) analysis of the 2000-2002 SPAN Survey identified significant differences in participation by gender. Female sports participation declined in the

4th, 8th, and 11th grades (48.1%, 45.5%, 44.7%, respectively). Their male counterparts, in contrast, increased their participation as they progressed in those grades (51.9%, 54.6, 55.3%). Katzmarzyk et al. (2016) also found gender differences related to participation in organized sport-related activities. The investigators reported that 54.0% of high school students participated on at least one sports team, with significant gender differences (59.6% of males compared to 48.5% of females). In an investigation of differences in self-reported sport participation, Pharr and Lough (2014) stratified the data by race, gender, grades, and SES. The investigators stated that Latinx students were less physically active than White students, male and female and that overall physical activity was lower among Latinx females than their White and Black counterparts. Similarly, Pate et al.'s (2009) analyzed data from the Trial of Activity for Adolescent Girls. Data consisted of accelerometer readings over a six-day period, and three days of physical activity recall data, from random cross-sectional samples of sixth-grade females (786). At a two-year follow-up, data was collected from eighth-grade females (1,545). Data from participants who fell into both data collection periods (501) were analyzed using a Repeated Measures ANOVA strategy. Results suggested that the rate of decline in physical activity was larger in Latinx and Black females than among their White counterparts. Monnat et al., (2017), analyzed the data from 48 focus groups to examine the impact of objectification on physical activity among 192 adolescents in Costa Rica. Results of the analysis indicated that females expressed decreased motivation to engage in physical activity due to concerns of being shamed and sexually objectified by their peers.

Ruitt and Coleman (2005) investigated the relationships among built environment variables, physical activity, and Body Mass Index in a predominantly Latinx population. Over seventy percent (71%) of the participants of this investigation were female. Results from their structural modeling strategy indicated a significant relationship between living in an urban environment and obesity, a result that was in direct contrast to the findings of similar studies. The investigators speculated that the results could have been a function of the addition of confounders in the model, such as SES.

Battle and Smiley (2018) investigated the influence of divorce on the educational attainment of a national sample of Latinx adolescents. Data were drawn from the National Center for Education Statistics' Educational Longitudinal Study, with responses from approximately 750 schools and over 15,000 students and parents. The results of the hierarchal multiple regression strategy revealed that SES demonstrated a significant positive influence on educational attainment for male and female Latinx adolescents. Additionally, parental divorce demonstrated no influence on educational attainment, and students in public schools demonstrated lower educational attainment than their private school counterparts. Finally, cultural capital demonstrated a significant influence on educational attainment for Latinx males, while parental social capital was significant for Latinx females.

Physical Activity and Attitudinal Factors

Grieser et al. (2006) investigated attitudes regarding physical activity among Black, Latinx, and White females aged 11 to 13. Using a structured interview, the investigators collected data from Latinx (14), White (27), and Black (32) females regarding positive and negative attitudes towards and preferred types of physical activities.

Data were analyzed using content analysis and descriptive statistics. Overall results suggested that race did not demonstrate a significant influence on attitudes towards physical activity. However, there was also the suggestion that adolescents shared the belief that physical activity was helpful for physical fitness and for the attainment of an active lifestyle and negative attitudes regarding injury, excessive perspiration, aggressive behavior from other participants, and exposure to low skill levels.

Multiple investigators have suggested a complex relationship between physical activity and safety in the environment (Li and Wen, 2013; Meyer, Castro-Schilo, and Aguilar-Gaxiola, 2014). Li and Wen (2013) drew data from the California Health Interview Survey (2007) to investigate the association of race/ethnicity, SES, and perceived safety to the percentage of leisure time physical activity. Results suggested that White students were more likely to meet leisure time physical activity recommendations than Black, Mexican, or Asian populations. Additionally, although Mexicans more often reported unsafe neighborhoods than their White counterparts, perceived safety did not influence racial differences regarding leisure time and physical activity. Finally, higher SES was associated with greater leisure time and physical activity. Meyer, Castro-Schilo, and Aguilar-Gaxiola, (2014) used path analysis to evaluate the effects of neighborhood safety and physical activity on mental health and self-reported health. They found that low SES was associated with increased safety concerns; safety concerns were negatively associated with physical activity; and the greater the level of concern for safety, the lower the level of self-reported health. Finally, the investigators reported that higher SES was associated with greater perception of neighborhood safety and perception of safety was associated with greater physical activity.

This study addressed the complex relationship between physical activity and academic achievement utilizing a longitudinal dataset and a hierarchical regression model to evaluate academic achievement in a national sample of Latinx students. Further, to understand gender differences more thoroughly, results were analyzed separately for male and female students and interpreted through the prism of Intersectionality Theory. The primary goal of this investigation was to determine the relative contribution of physical activity to GPA in physical education among Latinx high school students. The first null hypothesis was that there was no difference in accrued benefit to GPA in physical education from participating in physical activity in male Latinx students relative to their female counterparts. The secondary goal was to determine the relative contribution of SES, perception of safety, gender, and residential status to the physical education GPAs of school-age male and female Latinx students. The second null hypothesis was that there was no accrued benefit to GPA from these variables for either male or female Latinx students.

Method

The data for this research are from the High School Longitudinal Study (HSLS), which was designed by the National Center for Educational Statistics (NCES), the primary federal entity for collecting and analyzing data related to educators in the United States. The baseline survey was administered to ninth-grade students in 2009, and the sample size included 944 schools with over 23,000 students and their parents, school counselors, administrators, and teachers. public, private, and Catholic schools were sampled, and ninth-grade students were randomly selected from within each school.

Follow-ups began in 2012 when the majority of the students would be in the 11th grade, and 2013 high school transcripts were collected. Finally, the last follow-up occurred in 2016, which for most students indicated a post-secondary education phase of three years, during which they either attended college, never attended college, and/or entered the workforce.

Dependent Variable

Phys Ed GPA is a variable indicative of a student's GPA for personal health and physical education courses. *Independent variables. Participated in Sports* is a dummy variable reflecting whether a student participated in organized sports outside of school (1=yes, 0=no) *Hours spent on extracurricular activities* is the number of hours of a typical school day that a student spends on extracurricular activities. *Feels Safe at School* is a dummy variable that investigates whether a student feels safe in school or not (1=yes, 0=no). *School Pride* is a dummy variable that indicates whether students are proud to be a part of their school (1=yes, 0=no). In the current investigation, School Pride is an indicator of social capital, a construct associated with academic achievement in female Latinx adolescents (Battle and Smiley, 2018; Garcia-Reid, 2007). *Female* is a dummy variable indicating student gender, (1=Female, 0=Male). *Phys Ed GPA* is a variable indicative of a student's GPA for personal health and physical education courses.

Independent Variables

Participated in Sports is a dummy variable reflecting whether a student participated in organized sports outside of school (1=yes, 0=no). *Hours spent on extracurricular* activities is the number of hours of a typical school day that a student spends on extracurricular activities. *Urbanicity* is recoded into a series of dummy variables that reflects school urbanicity. Individually included are City (1 for city, 0 for all else), Town (1 for town. 0 for all else), and Rural (1 for Rural and 0 for all else), with Suburban being the reference category. Babey et al. (2008) report differences in physical activity level among adolescents as a function of residential status. Moreover, place attachment has been identified as a factor that influences an adolescent's relationship with the community (Dallago et al., 2009). *South* is a dummy variable indicating whether the school's region is in the South or not (1 = South, 0 = other regions). The data suggest that there are regional differences in participation in physical activity across the country (Singh, Kogan, Siahpush, and van Dyck, 2009). Moreover, as indicated above, place attachment has been identified as a factor that influences an adolescent's relationship with his/her community (Dallago et al., 2009). SES is a standardized variable reflecting SES, which is a combination of income education, and occupational prestige. *Born in the U.S.A.* is a dummy variable that investigates whether a student was born in the U.S.A. (1=Born in U.S.A., U.S. Territory or Puerto Rico, 0=other country. *Two Parent Household* is a dummy variable indicating whether a student lives in any kind of two-parent household (1=any 2-parent configuration, 0=other).

Models

To investigate the effect of participating in sports on a student's physical education (PE) GPA, three models were

employed and analyzed for each unit of analysis. The first unit of analysis was for all students, the second unit of analysis was for male students, and the final unit of analysis was for female students. Thus, the final analysis featured nine models in total.

The first domain, Extracurricular Activities, included Participated in Sports (the main independent variable) and Hours Spent on Extracurricular Activities. The second domain is a series of school attitude variables including Feels Safe at School and School Pride. The third domain introduces demographic variables such as gender, urbanicity, region, SES, Born in the U.S.A., and Two Parent Household.

Results

First, in Table 1, we summarized the means, standard deviations, and other descriptive statistics for the dependent and independent variables. See Table 1 on the next page. Second, for analyzing the multivariate relationships, hierarchical regression modeling was employed, we analyzed nine models with three for all Latinx students, three for Latinx female students, and three for Latinx male students, details please see Table 2 on the following page:

Table 1. Means, Standard Deviations, Ranges and Description of Variables for Latinx Students

Variable	**N**	**Mean**	**S.D.**	**Range**	**Description: HSLS Variable NAME and Label**
			Dependent Variable		
Phys Ed GPA	3364	3.0	0.98	0.25-4.0	X3 GPA: Physical Education
			Extracurricular Activities		
Participated in Sports	3105	.0.44	0.5	0-1	S2 F02D Participated in organized sports outside of school since fall 2009
Hours Spent on Extracurricular Activities	3337	2.33	1.44	1-6	S1 E15D Hours spent on extracurricular activities on typical schooldays
			School Attitudes		
Feels Safe at School	3462	0.32	.047	0-1	Recode of 'S1 E01A 9th grader feels safe at school' to 1=agree, 0= Disagree
School Pride	3442	0.85	0.35	0-1	Recode of 'S1 E01B 9th grader is proud to be part of his/her school' to 1=agree, 0=disagree
			Demographics		
Female	3797	0.5	.50	0-1	Recode of 'X1 Student's Sex' to 1=Female, 0=Male.
Urbanicity (Ref Suburban)	3797	0.31	0.46	0-1	X1 School locale (urbanicity)

Variable	N	Mean	S.D.	Range	Description: HSLS Variable NAME and Label
City					
Town	3797	0.09	0.29	0-1	X1 School locale (urbanicity)
Rural	3797	0.23	0.42	0-1	X1 School locale (urbanicity)
Suburban	3797	0.36	0.48	0-1	X1 School locale (urbanicity)
Socioeconomic Status	3515	-0.16	0.73	-1.93 - 2.56	X1 Socio-economic status composite
Born in U.S.A.	2523	0.82	0.38	0-1	P1 B17 Whether student was born in the U.S.
Two Parent Household	26666	0.75	0.43	0-1	Recode of 'X1 P1-P2 relationship pattern' to 1= all two parent households, 0=Other

For all Latinx students, the greater the score for Participated in Sports the higher their Phys Ed GPA (Models 1-3), and this relationship was positive and robust, i.e., the relationship was consistent for both females (Models 4-6) and male (Models 7-9) students. Additionally, for all Latinx students (Models 1-3) and for female students, (Models 4-6), Hours Spent on Extracurricular Activities demonstrated a positive influence on Phys Ed GPA. Gender differences, however, became evident in Model 7, where Hours Spent on Extracurricular Activity had no influence on Phys Ed GPA for male Latinx students (see Models 7-9). For all Latinx students (Models 2-3) and for female students (Models 5-6), Perceived Safety in the School Environment demonstrated a positive influence on Phys Ed GPA; however, for male students, this relationship held true only in the absence of demographic variables (Model 8) and disappeared when demographic variables were added (Model 9). For all Latinx students (Models 2-3) and for female students (Models 4-6), a greater School Pride score demonstrated a positive influence on Phys Ed GPA. Again, gender differences were evident, and School Pride demonstrated no influence on Phys Ed GPA for Latinx males (Models 8-9).

Table 2. OlS Regression on Physical Education Grades for Latinx Students (Standard Error in Parenthesis)

Predictor Variables	All Students (n=1829)			Female Students (n=938)			Male Students (n=891)		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Extracurricular Activities									
Participated in Sports	0.30***	0.27***	0.24***	0.23***	0.21***	0.15**	0.37***	0.35**	0.34***
	(0.04)	(0.04)	(0.04)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	((0.06)
Hours spent on Extracurricular Activities	0.07***	0.07***	0.04**	0.12***	0.12***	0.09***	(0.02)	0.02	0.00
	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)		(0.02)	(0.02)
School Attitudes									
Feels Safe in School	---	0.27***	0.21**	---	0.37***	0.32**	---	0.23*	
		(0.08)	(0.08)		(0.13)	(0.12)		(0.10)	
School Pride	---	0.25***	0.24***	---	0.38***	0.37***	---	0.06	0.04
		(0.07)	(0.06)		(0.09)	(0.08)		(0.10)	(0.09)
Demographics									
Female	---	---	0.02	---	---	---	---	---	---

Predictor Variables	All Students (n=1829)			Female Students (n=938)			Male Students (n=891)		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
			(0.04)						
Urbanicity (Ref. Suburban)									
City	---	---	0.01	---	---	0.01	---	---	0.03
			(0.05)			(0.06)			(0.07)
Town	---	---	0.13	---	---	0.13	---	---	0.15
			(0.07)			(0.10)			(0.10)
Rural	---	---	0.14**	---	---	0.13***	---	---	0.15*
			(0.05)			(0.07)			(0.07)
South	---	---	0.30***	---	---	0.28	---	---	0.31***
			(0.04)			(0.06)			(0.06)
Socioeconomic Status	---	---	0.24***	---	---	0.26***	---	---	0.22***
			(0.03)			(0.04)			(0.04)
Born in U.S.A	---	---	0.08	---	---	0.08	---	---	0.09
			(0.05)			(0.07)			(0.07)
Two Parent Household	---	---	0.15***	---	---	0.19**	---	---	0.13
			(0.05)			(0.06)			(0.07)
Constant	2.882	2.429	2.294	2.81	2.148	2.013	2.93	2.69	2.546
Adjusted R^2	0.052	0.072	0.169	0.064	0.103	0.197	0.051	0.056	0.139

*p<.05 **p<.01 ***p<.001

Students who attended rural schools demonstrated higher Physical Education (PE) GPAs than their counterparts in suburban schools, and this relationship was robust across all models (Models 3,6,9). Attendance in schools located in a city or town demonstrated no influence on the PE GPAs of all Latinx students, female students, or male students PE GPAs (Models 3, 6, 9). For all Latinx students, living in the South demonstrated a positive influence on PE GPAs as opposed to their counterparts not in the South (see model 3). This relationship held true for male Latinx students (Model 9); however, there were no regional differences for female Latinx students (Model 6). The impact of SES is positive and robust, such that the higher the SES the higher the Phys Ed GPA (Models 3, 6, 9). Conversely, being born in the United States demonstrated no influence on Phys Ed GPA (Models 3, 6, 9). Finally, while all Latinx students (Model 3) and female students (Model 6) living in a two-parent household demonstrated higher PE GPAs than their counterparts in one-parent households (Models 6, 9), the parental household configuration demonstrated no impact for Latinx male students (Model 9).

Discussion and Conclusion

The results of the current investigation indicate that physical activity (Participated in Sports) positively influenced PE GPA for both male and female Latinx adolescents. Thus, the primary null hypothesis was rejected. Additionally, attending rural schools, and SES were associated with greater academic achievement for both male and female Latinx adolescents. Gender differences were manifested in the areas of Hours Spent on Extracurricular Activities, Safety in The School Environment, School Pride, urbanicity, living in the South, and living in a two-

parent household. Thus, the second null hypothesis was also rejected. The factors that contribute to the positive association between the physical activity level of Latinx adolescents and academic achievement are discussed below.

Investigators report that SES influences multiple social and health-related outcomes, including a positive influence on PE GPA, (Lakes et al., 2013); social capital (LaVeist, 2005), access to resources (Gerberding and Marks, 2004), and cognitive functioning (Beaulieu et al., 2012). The current findings suggest that Latinx adolescents of lower SES are not accruing the academic benefits of physical activity at the same rate as their higher SES counterparts. The relationship between physical activity, SES, and academic achievement accentuates the importance of Latinx adolescents' access to physical activity facilities in public and private schools and in community-based programs. Barriers to participation among lower socioeconomic Latinx communities include financial resources (Gerberding and Marks, 2004), knowledge of the benefits of physical activity (Lakes et al., 2013), and the continued downsizing of physical education school and community programs due to budget cuts (Colorado Association for Health, Physical Education, Recreation, and Dance (2010).

Our findings also differ from those of Whitfield et al. (2019), who analyzed data from the National Health Interview Survey, 2008-2017. They suggested that despite improvements in the overall amount of physical activity by the U.S. population, only one in four urban and one in five rural adults met the combined criteria for aerobic and muscle-strengthening physical activity provided in the Physical Activity Guidelines for Americans 2020. Rural Latinx adults were identified as a population at risk in this area. The report identified possible barriers to the physical activity goals for rural residents including the absence of sidewalks and public transit. These contradictory findings can be reconciled by reviewing the findings of Pate et al. (2009) regarding the rate of decline in physical activity among adolescent female high school students. The investigators reported that the decline in physical activity between the sixth and eighth-grade averages four percent but is greater for Latinx females than their White counterparts. Factors affecting the decline in physical activity among female adolescents may include concerns regarding injury and the stigma of being labeled masculine (Grieser et al., 2006). Further research is required to determine the causes of the decline in physical activity.

Despite the findings of the benefits of physical activity for female students, national data suggest that '… female students enroll in Physical Education less often than males and participation drops significantly from the elementary to middle and high school years' (National Physical Activity Plan Alliance 2018, p. 34). The current investigation suggests that gender differences were evident in several variables. Each of these variables will be reviewed below. The amount of time spent in physical education classes is positively associated with higher Phys Ed GPA for female Latinx adolescents, but the same benefits did not accrue to male Latinx adolescents. These findings were consistent with the results of Carlson et al. (2008), who noted that the average male is more physically fit than the average female. They reported that the initiation of a program of physical exercise for females did not produce a level of physiological effects similar to those associated with increased academic achievement in males.

The investigators acknowledged that social and attitudinal factors associated with increased physical activity

might also influence academic achievement in females. Intersectionality theory (Crenshaw, 1989) states that women of color face a dual level of oppression due to their gender and their race/ethnicity. This includes opposing views of women with traditional figures, such as the hourglass shape, being seen as hypersexual, while women with athletic physiques, such as the rectangle shape, being seen as masculine. Traditionally, young women have shunned physical activity to avoid this stigma (Grieser et al., 2006). However, changes in the views of the role of women may also affect attitudes toward women engaging in physical activity (Monge-Rojas, et al. 2017). Many Latinx female athletes, such as Women's Tennis Association player Sabrina Santamaria and retired Women's Basketball Association player, Rebecca Lobo, serve as models of both athleticism and femininity. We can speculate that increased levels of physical activity may be a physical expression of these changing attitudes.

Perceived Safety and School Pride also demonstrated an influence on academic achievement as a function of gender. Perceived Safety and School Pride were positively associated with greater academic achievement for female Latinx adolescents. The finding that female Latinx adolescents reported greater Perceived Safety and School Pride is consistent with the findings of Garcia-Reid (2007). These findings, however, differ from those of Dallago et al. (2009), who reported that female students in 13 countries (not including the United States) demonstrated less perceived safety and less social capital in their environments than their male counterparts. An initial analysis of male Latinx students demonstrated an association between perception of safety in the school and PE GPA. However, these effects disappeared with the addition of sociodemographic variables, including SES. Similarly, School Pride was positively associated with PE GPA for female Latinx adolescents, while no such benefits accrued for male Latinx students. These results are consistent with those of Battle and Smiley (2018), who found that Latinx male adolescents exhibited less social capital than their female counterparts, while cultural capital appeared to be more prevalent in Male Latinx adolescents.

It is helpful to view these findings as suggesting that female Latinx adolescents earned social capital through time spent in physical activity, which in turn influences school pride. The increased social capital earned by female Latinx adolescents influenced perceptions of school safety, and as suggested in the findings of Meyer, Castro-Schilo, and Aguilar-Gaxiola (2014), Perception of Safety was associated with greater physical activity, leading to a higher GPA in physical education.

The current findings that living in a Southern rural area is positively associated with greater academic achievement for male and female Latinx adolescents is partially supported by the findings of Dallago et al, (2009), who reported a significant interaction effect between country and gender in place attachment and ultimately school engagement. However, this finding is not supported by Whitfield et al., who suggest that rural Latinx adult women were at the highest risk for physical inactivity. Singh et al. (2009) reported that children living in Southern states were at increased risk of nonparticipation in vigorous physical activity. Statistical adjustment for race/ethnicity, SES, and behavioral factors increases the regional disparities by as much as 50%. Whitfield et al. (2019) reported similar findings regarding the greater level of physical inactivity for rural Latinx adults in the Southern region in comparison to their urban counterparts. In contrast, the current findings suggested that living in the South was positively associated with greater physical activity levels for male and female Latinx adolescents. This finding is particularly noteworthy given the decreasing budget for physical education across the United States, particularly

in rural regions (Public Schools First NC, 2020). Further investigations of the relationship between region and physical activity among Latinx adolescents are indicated.

Finally, the finding that female Latinx students living in a two-parent household earned higher PE GPAs than their counterparts living in a one-parent household is consistent with the findings in the literature (Amato, Patterson, and Beattie 2015). Other research (Battle and Brown, 2018; Battle and Smiley, 2018;) noted that family makeup had no effect on academic success for either male or female students. Changes in Marianismo, the Latinx women familial role, (Monge-Rojas, et al, 2017) in Latinx families may explain why family makeup does not influence Latinx male adolescent academic performance. Traditionally, Marianismo entails (a) familial and spiritual strength located in the family, (b) chastity and purity of mind and body, and (c) subordination to males. It serves as a barrier to physical activity participation for Latinx female adolescents. There is evidence, however, of a change in the interpretation of marianismo in areas including, but not limited to, attitudes toward males (Battle and Smiley, 2018), attitudes towards physical activity (Grieser et al, 2006; Monge-Rojas, et al, 2017), and the increased media exposure of women's sport and the celebrity accompanying successful sports figures (Scheadler and Wagstaff, 2018).

Overall, the gender difference in the current investigation can best be understood by viewing the evolving construct of Marianismo through the lens of Intersectionality Theory. We speculate that the social capital accrued by female Latinx adolescents from participation in physical activity leads to an increased perspective of safety from stigma, injuries, and crime when participating in physical activity as well as an increased level of School Pride. As a result of this increased level of School Pride, there is an increase in the level of social capital (Dallago, 2009). Thus, Marianismo, which in the past may have deterred female Latinx adolescents from participating in physical activity may be evolving into a facilitator for greater levels of participation. However, why family makeup does not affect Latinx female adolescents is not immediately obvious. Further investigation of the influence of changes in traditional family makeup on Latinx adolescents is required to cast light on these gender differences.

On the other hand, Latinx males appear to have a much narrower pathway to academic achievement. In this investigation, the most robust variables for Latinx adolescent males were Physical Activity, living in a Southern, rural area, and higher SES levels. This finding underscores the need for gender specific strategies to engage Latinx adolescents in health promoting behaviors (Larsen et al., (2015))

Limitations

This investigation has limitations. First, the population of the investigation was exclusively Latinx adolescents, and the results cannot be generalized to other populations. Investigations analyzing the same data set with Black students (Weston, Zeng, and Battle 2020), and Asian students (Zeng, Weston, and Battle, 2021) reported several differences in their results. Second, the investigation utilized only quantitative analytic strategies. Efforts to understand the meaning of physical activity participation for Latinx adolescents would be well served to include qualitative strategies to present a fuller picture of the barriers to and facilitators of Latinx adolescents' participation

in physical activity. Third, the variable Participated in Sports does not specify the type of activities in which students are engaged. Future investigators are advised to include items that specify the type or types of activities engaged in daily. Finally, the analysis aggregated the adolescents into a single cluster. In reality, the Latinx population consists of multiple groups (e.g., Cuban, Dominican, Honduran, Mexican, Puerto Rican, and Venezuelan) with different cultural norms, health beliefs, and behavioral patterns (M. Furster Riveria, personal communication. April 14, 2020). Future investigations should consider stratifying Latinx populations to identify within-group differences more accurately.

Given these limitations, the results of the current investigation suggest that physical activity and the hours spent in physical activity positively influence GPA in Physical and Health Education among Latinx adolescents, and there is an interaction among multiple variables including SES, School Pride, Perception of Safety in the School, area of residence, and Two-Parent Household in achieving higher levels of academic achievement among Latinx adolescents. Moreover, the complexity of utilizing these variables to understand participation in physical activity is further complicated by gender differences within this population (Larsen et al, 2015). Our research supports the importance of gender-specific intervention interventions to increase the physical activity of Latinx adolescents. The finding of gender differences in cultural and social capital may be useful in the development of such gender specific strategies (Battle and Smiley, 2018; Garcia-Reid, 2007).

Teachers and school administrators also play a critical role in increasing physical activity among Latinx adolescents. For all school administrators, the challenge of offering meaningful physical activity programs to students in the face of the COVID-19 virus-related school closures and social distancing restrictions is a formidable task. Achievement of these goals will require the use of non-traditional school physical activities, such as martial arts training (Weston, 2019) and the development of telehealth classes (Filiz, & Konukman, 2020). School administrators must locate teachers with the skills required to develop innovative physical activity programs, and advocate for the budget to implement novel programming for students. Such programs will require that both students and the school facilities have the necessary technological infrastructure and resources to utilize such novel programming. For students, this will mean access to computers, Wi-Fi, and technical assistance. For teachers, it will mean a server with sufficient computing power to support programming and their knowledge of best online teaching practices.

Policymakers must acknowledge that students are aware that the most valued activities receive the most funding in the educational system. Defunding or drastically decreasing the funding for physical education programs sends a clear message to Latinx adolescents of the relative value of physical education. Policymakers must provide adequate funding to school administrators to hire competent, innovative teachers and support their efforts with technical assistance and resources. Finally, policymakers must ensure that students in low SES-level school districts have access to the basic tools for a successful educational experience. The COVID-19 pandemic has placed a spotlight on the inequities of the current funding system and its impact on the education provided to low-income students of all socioracial groups. A solution to these barriers must include access to quality physical activities quality for all students.

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