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The Relationship between Cardiovascular Fitness and Body Mass Index to Student Achievement in 5th Grade Hispanic Children of the Lower Rio Grande Valley of South Texas

Article History

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Abstract: The purpose of this quantitative study was to examine the relationship between cardiovascular fitness, body mass index and academic performance in 547 Hispanic children in 5th grade from a Rio Grande Valley school district. The dependent variable, academic performance, was measured by children's gain score on the STAAR Progress Measure for Reading and Math assessments. The independent variables of physical fitness were measured by scores on cardiovascular fitness and body mass index from the FITNESSGRAM assessment. The statistical and data analysis method used by this study utilized multiple regression. The results revealed that body mass index was correlated with academic performance. Body mass index accounted for a statistically significant variance in math gains while time did not explain any significant variance in math. There was no correlation between reading gains and time and body mass index. The results by weight group revealed a significant correlation between time and reading gains for the normal weight group and a significant correlation between body mass index and math gains for the obese group. These results suggest that at grade 5, consideration be given to body mass index levels of Hispanic children from low-income backgrounds.

Keywords: physical activity, physical fitness, academic achievement.

1. Introduction

The academic performance gap of Hispanic children as compared to White and Asian American children is persistent and continues to be the most complex issue surrounding American schools (Evans, 2005). Policymakers, administrators, school leaders, and teachers have responded to this academic performance gap by increasing instructional time assessed by state accountability standards. The practice of increasing academic performance in content areas has resulted in declining participation in physical education (Wittberg *et al.*, 2010). Consequently, reduced levels of physical activity have increased the risk of young children becoming overweight (Burton and VanHeest, 2007). Furthermore, overweight children become overweight adults, which lead to chronic diseases related to obesity according to Hoelscher *et al.* (2004). Physical activity has been found to influence the prevention and reduction of overweight in young children and adults (Burton and VanHeest, 2007). Moreover, physical activity has been found to enhance children's cognitive function and improve academic performance (Janak *et al.*, 2014). This quantitative study examined the relationship between physical fitness and academic performance in Hispanic children from low-income backgrounds measured by scores on the FITNESSGRAM Assessment (Cooper, 1970) and the gain scores on the State of Texas STAAR progress measure for Reading and Math achievement tests.

2. Background of the Study

A review of literature on the decline of physical activity, and the effect that social economic status and body mass index have on the relationship between physical fitness and academic performance was evident and quite provocative. While research has been conducted on this relationship there is limited information regarding the effects, if any, physical fitness has on the academic performance of Hispanic children from low-income backgrounds.

2.1. Decline of Physical Activity

Powell *et al.* (2006) found the topic of physical inactivity to be a complex cycle and an urgent issue that is currently confronting schools as prioritize student learning on reading and math Paffenbarger *et al.* (2001). The federal accountability standards demanded students must meet federal standards in both reading and math. Basch (2011) argued that the topic of decreased physical activity began gaining concern due to its high correlation with weight gain. Hence, the Texas State Legislature responded to the growing trend of decreased physical activity with implementation of Senate Bill 19 which required school children to participate in physical activity 30 minutes daily, or a total of 135 minutes weekly (Smith, 2011). Accordingly, in 2007, the legislature implemented Senate Bill 530 which required school-based physical fitness testing for every student in grades 3 to 12 Janak *et al.* (2014). Nonetheless, researchers questioned the effectiveness of both senate bills as physical activity levels in schools continued to decline (Kelder *et al.*, 2009) School leaders continue to decrease physical activity to improve academic performance despite evidence which suggests decreasing physical activity does not increase academic performance.

Basch (2011) reported that decreased levels of physical activity amongst Hispanic children are attributed to the school they attend. Efrat (2011) believes less access to physical activity has contributed to the disparities in fitness levels between Hispanic and White children that might affect the relationship between physical fitness and academic performance.

2.2. Effect of Body Mass Index upon Academic Performance

Basch (2011) found that children living in poverty and low-income areas may be associated with higher risk of body mass index exceeding the 85th percentile and reduced levels of physical activity. Consequently, reduced levels of physical activity increase the risk of being overweight (Bass *et al.*, 2013). Hence, the subject of body mass index is rapidly becoming a key subject in public education due to its possible correlation with academic performance.

According to Hollar *et al.* (2010), children with body mass index equal to or greater than the 85th percentile are considered overweight and tend to have poor academic performance. Van-Dusen *et al.* (2011) found that boys with body mass index equal to or greater than the 85th percentile scored significantly lower on TAKS scores compared with boys with moderate body mass index. Furthermore, Li and O'Connell (2012) stated that children with body mass index equal to or greater than the 85th percentile had significantly lower grade point averages than children considered non-overweight. Inclusively, Castelli *et al.* (2007) found that children who begin school overweight, or become overweight in the beginning years of school have lower academic performance on standardized assessments than children of healthy body weight. The disparity in academic performance continues to be observed in the upper elementary grades in students with body mass index equal to or greater than the 85th percentile. Reed *et al.* (2013) found overweight children in grade 3 had significantly lower assessment scores in reading and math than non-overweight children in the same grade. In addition, Janak *et al.* (2014) found that the prevalence of students meeting the Texas Academic Knowledge Skills (TAKS) standard was higher for students who met the highest fitness category in body mass index and cardiovascular fitness. They explained the findings were evident regardless of grade and gender and their study included grades 3rd through 11th. Children in grade 5 are 1.74 times more likely to be overweight than kindergarten children further increasing the risk of poor academic performance (Moreno *et al.*, 2013).

Inclusively, Wright *et al.* (2016) found that 47.1% of Hispanic boys between the ages of 6-11 years had a body mass index equal to or greater than the 85th percentile, compared to White boys at 31.7%. Furthermore, Wright *et al.* (2016) found that 38.1% of Hispanic females between the ages of 6-11 years had a body mass index equal to or greater than the 85th percentile, compared to White girls at 31.5%. Likewise, Moreno *et al.* (2013) concluded that the strongest predictor of having a body mass index greater than the 85th percentile is the ethnic background of the child with Hispanic children being 1.81 times more likely to be overweight and obese than White children. Basch (2011) found that children living in poverty and low-income areas may be associated with higher risk of body mass index exceeding the 85th percentile and reduced levels of physical activity. Consequently, reduced levels of physical activity increase the risk of being overweight (Bass *et al.*, 2013). Hence, the subject of body mass index is rapidly becoming a key subject in public education due to its possible correlation with academic performance.

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Data from the Centers for Disease Control and Prevention report that approximately 17% of children between the ages of 2-19 years are obese suggesting these students are at higher risk of poor academic performance. Inclusively, Wright *et al.* (2016) found that 47.1% of Hispanic boys between the ages of 6-11 years had a body mass index equal to or greater than the 85th percentile, compared to White boys at 31.7%. Furthermore, Wright *et al.* (2016) found that 38.1% of Hispanic females between the ages of 6-11 years had a body mass index equal to or greater than the 85th percentile, compared to White girls at 31.5%. Likewise, Moreno *et al.* (2013) concluded that the strongest predictor of having a body mass index greater than the 85th percentile is the ethnic background of the child with Hispanic children being 1.81 times more likely to be overweight and obese than White children.

2.3. Benefits of Physical Activity

Today the beneficial effects of physical activity and physical fitness are well documented (Basch, 2011; Howie and Pate, 2012). Reed *et al.* (2013) found children who participate in daily physical activity reap multiple health benefits. According to Castillo (2008), one of the health benefits is enhanced physical fitness which is a measure of health. De-Greeff *et al.* (2014), describe physical fitness as the ability to perform physical activity and an important health measure and predictor of serious health issues. Torrijos-Nino *et al.* (2014) Conclude a child's physical fitness attributed to better health may enhance academic performance. Eveland-Sayers *et al.* (2009) state additional health benefits associated with physical fitness include improvement of self-confidence, motivation, recreation, and quality of life which also enhance academic performance. Higher levels of physical fitness are typically associated with enhanced overall health and better school attendance (Coe *et al.*, 2013). The benefits of being physically active are well established and because children spend more time in school than any other setting except home, the school becomes an ideal place to integrate physical activity.

Coe *et al.* (2006) found that increased physical activity may increase arousal and reduce boredom which may result in increased attention span and concentration. Inclusively, single sessions of physical activity demonstrate benefits due to increased attention and task behaviors in the classroom (Mahar *et al.*, 2006) such as more attentive, exhibit better behavior, and perform better scholastically after participation in physical activity through recess or physical education. On the other hand, elementary school children in extended settings of academic instruction will exhibit decreased focus, become uneasy, and anxious (Trudeau and Shephard, 2008). Extended periods of academic instruction without pauses of physical activity may be counterproductive to academic performance according to Mahar *et al.* (2006). Coe *et al.* (2013) reported that students who are physically active tend to perform better academically as measured by grades and standardized test scores than their less active peers.

Furthermore, Crosnoe and Muller (2004) found that non-overweight children scored higher than overweight children on academic performance. Tremblay *et al.* (2000) Concluded that a physical activity routine has been determined to be a key contributor to the prevention of and reduction in overweight and obesity in children. Additionally, Gutin *et al.* (2004) found the benefits of physical activity are evident even amongst overweight children. These researchers make reference to a study in which overweight children who participated in vigorous physical activity obtained favorable effects on percent body fat and cardiovascular fitness. Furthermore, Gutin *et al.* (2004) conclude physical activity prevents excessive weight gain. They believe current inactivity rates and high levels of body mass index exceeding the 85th percentile may be hindering intellectual ability and academic performance and physical activity may improve body mass index of children.

2.4. Cardiovascular Fitness and Academic Performance

Van-Dusen *et al.* (2011) found a strong linear association between each quintile of cardiovascular fitness and TAKS scores in middle school and high school students. Their findings found direct associations with academic achievement for boys-reading, boys-math, girls-reading, and girls-math. Furthermore, the results identified peak times for the boys' mile run in order to achieve academic outcomes suggesting a threshold pattern. Van-Dusen *et al.* (2011) state that while all five FITNESSGRAM measures had a positive linear association with academic performance, cardiovascular fitness demonstrated the highest interquartile difference. In another study, De-Greeff *et al.* (2014) found that cardiovascular fitness was associated with higher scores in mathematics and a positive association between cardiovascular fitness and spelling performance in elementary school children. Likewise, Wittberg *et al.* (2010) found a significant positive relationship between PACER cardiovascular fitness scores and math performance in Caucasian 5th grade girls. They point out that cardiovascular fitness was the only variable that was present in all interactions amongst all the fitness variables in the study. These findings are consistent with Eveland-Sayers *et al.* (2009) who found higher levels of cardiovascular fitness positively related to higher scores in standardized math and reading assessments in grades 3rd through 5th girls. In addition, they found a statistically significant negative correlation between 1-mile run times and math scores concluding that students with faster times on the mile run scored higher on the math academic achievement test. Likewise, Santiago *et al.* (2013) found similar results in his study of fourth and fifth grade students in southeast Texas. Santiago *et al.* (2013) also found a small but positive significant relationship between cardiovascular fitness and overall math grades among Hispanic girls. He further writes that cardiovascular fitness is a significant predictor of math performance in girls suggesting that cardiovascular fitness is associated with higher math grades.

In addition, Wittberg *et al.* (2008) found cardiovascular fitness was associated with higher academic performance in all assessments and was a consistent variable in each of the interactions. These findings are consistent with Janak *et al.* (2014) which found that children meeting the healthy fitness zone in body mass index and cardiovascular fitness had significantly higher proportion of students meeting TAKS standards regardless of grade level or gender.

Chen L. J. *et al.* (2013) found that improvement in cardiovascular fitness is related to greater academic performance suggesting the benefits of immediate physical activity. These researchers found in their longitudinal three-year study that adolescent boys who improved cardiovascular fitness demonstrated higher intelligence scores than students with decreased cardiovascular fitness. Chen A. G. *et al.* (2014) also concluded that students with cardiovascular fitness had better academic performance at baseline and the rate of change in cardiovascular fitness was corresponding to the rate of change in academic performance. These findings are consistent with Sardinha *et al.* (2016) which found that being persistently cardiovascular fit compared to unfit increased the odds of having high levels of academic performance in student grades.

In addition, adjustments in cardiovascular fitness lead to short term and long term effects of academic performance. Chen A. G. *et al.* (2014) believe that enhanced cognitive function takes place after a single bout of physical activity suggesting the benefits of physical activity for children who are physically inactive or overweight positive relationship between physical activity and cognitive ability. The studies concluded that expanded physical activity was related to cognitive ability in academic performance, math assessments, developmental academic readiness, and perceptual skills.

3. Methodology

The methodology for this quantitative study was a correlational research design that examined the relationship between physical fitness and academic performance of Hispanic children. In this study Academic performance was measured by student gains in the State of Texas Assessments of Academic Readiness (STAAR) for grade five reading and math. Physical fitness was measured by scores on the FITNESSGRAM assessment for the measures of cardiovascular fitness and body mass index.

Fourteen elementary schools in the Lower Rio Grande Valley of South Texas classified as Title I schools with a very high percentage of Hispanic students (99.6%) were selected. The tested sample consisted of 547 Hispanic 5th grades that were between 10 to 12 years of age.

The first instrument used in this study was the Texas Student achievement exam known as the STAAR Progress Measure for 5th grade reading and mathematics. This instrument was used to assess students' academic performance, which provided information about the amount of improvement a child has made in a subject area Texas Education Agency [TEA] (2017). The Progress Measure communicates two things: whether the child demonstrated improvement from previous year to current year, and the amount of improvement the child made. The amount of growth a child made from previous year to current year is categorized in one of these ways: Limited, Expected, or Accelerated. According to the Texas Education Agency [TEA] (2017), if a child's Progress Measure is "Expected" he or she has shown expected academic improvement from the previous year to this year. If a child's progress is "Accelerated" the child has demonstrated the amount of academic growth from the previous year to current year that was much larger than expected. For this study the researcher used the Progress Measure scores which are reported on a vertical and continuous scale rather than the categorical variables. The validity and reliability of the STAAR assessment was found to be valid and reliable by the Texas Education Agency [TEA] (2016).

The second instrument used in this study was the FITNESSGRAM (Cooper, 1970), which is used to assess physical fitness of the students. The FITNESSGRAM is a criterion reference assessment that is administered every spring to all students in grades 3 to 12. According to Cooper (1970), the FITNESSGRAM assessment is the most trusted and widely used reporting instrument in the world. The reliability and validity of cardiovascular fitness, as measured by the FITNESSGRAM, has been constructed to be moderately high with 85% of children persistently classified (Hillman *et al.*, 2005). The two measures of the FITNESSGRAM used in this study were cardiovascular fitness and body mass index. The children were assessed during regular physical education and under the supervision of a certified physical education teacher. All physical education teachers received training on the administration of the assessment. Children were provided opportunities to become familiar with the different measures of the assessment before the actual test. Scoring is based on criteria established by the FITNESSGRAM Manual. Cardiovascular fitness is determined by time on the one mile run and is based on a child's age, gender, and body mass index (Castillo, 2008). Body mass index was calculated using weight and height measures. Students were measured during regular physical education and under the supervision of a registered nurse. All testing of the FITNESSGRAM took place within the school day. For the purpose of this study, only cardiovascular fitness and body mass index of the FITNESSGRAM measures were included.

4. Data Analysis

Demographic description of sample and descriptive characteristics of study population, descriptive characteristics of academic and physical fitness variables, and descriptive of physical fitness variables by weight group were first analyzed. SPSS 16 was utilized to conduct preliminary analysis of descriptive data (Gay *et al.*, 2009). Thereafter, bivariate correlational analysis was applied to each research question to assess the correlation between the academic performance variable and the independent performance variables. Lastly, multiple regressions was utilized to examine further if any of the physical fitness variables were related to academic performance and to determine the degree to which they were related. Additionally, multiple regressions were utilized to determine if any physical fitness variables could be used to predict academic performance.

Academic performance was measured by student gains in the State of Texas Assessments of Academic Readiness (STAAR) for grade 5 reading and math. Physical fitness was measured by scores on the FITNESSGRAM assessment for the measures of cardiovascular fitness and body mass index. The following research questions and hypotheses were formed.

1. How do cardiovascular fitness levels of 5^{th} grade Hispanic children as measured by time on FITNESSGRAM test scores correlate to academic performance as measured by children's gain score on the STAAR Progress Measure?
2. How do body mass index fitness levels of 5th grade Hispanic children as measured by FITNESSGRAM test scores correlate to academic performance as measured by children's gain score on the STAAR Progress Measure?

H_1: There is a relationship between academic performance (y) and cardiovascular fitness (x_1) and body mass index (x_2). H_1: $Ry_1x_1x_2 \neq 0$

H_0: There is no relationship between academic performance (y) and cardiovascular fitness (x_1) and body mass index (x_2). H_1: $Ry_1x_1x_2 = 0$

5. Results

Descriptive statistics on the academic performance variables and the physical fitness variables were conducted. The analysis was performed by the overall sample and then by gender.

Table 1 provides a complete summary of the data.

Table 1. Descriptive Demographic Characteristics of Academic and Physical Fitness Variables

	Overall sample			Males			Girls		
Variable	n	M	(SD)	n	M	(SD)	n	M	(SD)
Reading Gains	547	67.62	(72.12)	279	70.92	(66.85)	268	64.18	(77.20)
Math Gains	547	95.50	(71.32)	279	93.23	(71.19)	268	97.86	(71.50)
Cardiovascular Fitness	547	762.11	(213.75)	279	740.89	(222.78)	268	784.19	(201.98)
Body Mass Index	547	21.94	(5.75)	279	22.15	(5.53)	268	21.71	(5.97)

Note. Reading Gains = difference between 2015 Reading Scale score and 2016 Reading scale score. Math gains = difference between 2015 math scale score and 2016 math scale score according to Texas Education Agency, 2016. Cardiovascular Fitness = Time on mile run measured in seconds. Data are from FITNESSGRAM data (2019) from Empire ISD, pseudonym.

5.1. Descriptive of Physical Fitness Variables between Weight Groups

It was essential to examine the independent variables of cardiovascular fitness and body mass index according to weight groups. The four weight groups included the underweight group (n = 20), the normal weight group (n = 389), the overweight group (n = 95), and the obese group (n = 43). Descriptive were analyzed to explore if differences existed between the weight groups that could affect the results.

Cardiovascular fitness was measured by the time it took each child to run the mile run and was measured in total minutes and seconds. The total time was then converted and presented in total seconds to complete the mile run. Table 2 provides a complete summary of results including results of body mass index.

Table 2. Descriptive of Physical Fitness Variables Between Weight Groups

	Overall Sample		Males		Females	
Variables	M	(SD)	M	(SD)	M	(SD)
Underweight						
Time	648.00	(150.12)	601.11	(207.33)	686.09	(69.87)
BMI	12.74	(3.61)	13.62	(1.85)	12.01	(4.56)
N	20		9		11	
Normal Weight						
Time	722.25	(198.78)	701.87	(209.82)	742.32	(185.62)
BMI	19.67	(2.70)	19.77	(2.86)	19.57	(2.55)
N	389		193		196	
Overweight						
Time	868.07	(201.58)	825.97	(191.00)	934.08	(202.50)
BMI	27.45	(1.50)	27.33	1.54	27.64	(1.44)
N	95		58		37	
Obese						
Time	941.65	(220.21)	943.68	(263.69)	940.04	(184.75)
BMI	34.63	(5.47)	34.72	(5.10)	34.58	(5.85)
N	43		19		24	

Note. BMI = Body Mass Index. Data are from FITNESSGRAM data (2019) from Empire ISD, pseudonym.

5.2. One Way (ANOVA)

While the descriptive statistics presented differences of time on the mile by weight category, the researcher tested the significance of the differences by performing a one way (ANOVA) to determine whether cardiovascular fitness differentiated children classified as underweight, normal weight, overweight, and obese. The results from the analysis revealed a statistically significant difference between groups as determined by a one way ANOVA, $F(3, 543) = 28.180$, $p < .01$. See Table 4 for summary of results.

Table 3. ANOVA Summary Table

Source of Variation	SS	df	Mean Square	F	Sig
Between Groups	3360837.961	3	1120279.320	28.180	.000**
Within Groups	21586489.89	543	39754.125		
Total	24947327.85	546			

*p<.05, **p<.01

Note. Data are from FITNESSGRAM data (2019) from Empire ISD, pseudonym.

5.2. Correlational Analyses

Once descriptive statistics were complete, the researcher utilized a bivariate correlational analysis to assess the relationship between the dependent variables and the independent variables. A Pearson product-moment correlation coefficient was computed to assess the relationship. All analyses were tested with an F distribution and a .05 level of significance.

5.2.1.Research Question 1

How do cardiovascular fitness levels of 5th grade Hispanic children as measured by time on FITNESSGRAM test scores correlate to academic performance as measured by children's gain score on the STAAR Progress Measure?

The results revealed a nonsignificant correlation between cardiovascular fitness and reading gains of r (545) = -.07, p > .05. There was also a nonsignificant correlation between cardiovascular fitness and math gains of r (545) = -.01, p > .05.

5.2.2.Research Question 2

How do body mass index levels of 5th grade Hispanic children as measured by FITNESSGRAM scores correlate to academic performance as measured by children's gain score on the STAAR Progress Measure.

There was a nonsignificant correlation between body mass index and reading gains of r (545) = -.02, p > .05. There was a weak, but nevertheless a positive significant correlation between body mass index and math gains, r (545) = .12, p < .01. Increases in body mass index were correlated with increases in math gains.

5.3Multiple Regression Analyses

Multiple regression analysis was calculated to predict academic performance based on cardiovascular fitness, body mass index, and gender. All predictors were entered simultaneously, and a significant regression equation was found *F* (5, 541) = 2.46, *p* = .03, with an R^2 of .01 for body mass index. The results reveal body mass index is a significant predictor of math gains.

Multiple regression coefficients between reading academic gains and time, body mass index, gender, lep status, and weight group variables were -.02, .26, -5.52, -1.96, and -2.12 (p< .05) for total sample population respectively. The multiple regression coefficients between math academic gains and time, body mass index, gender, lep status, and weight group variables were -.02, 2.61, 7.06, -4.03, and -7.65 (p < .05) for total sample population. The standardized regression coefficients, indicating which independent variable and in what amount; however, indicate the preponderance of math variance is accounted for by body mass index gains and that time, gender, lep, and weight group did not explain any significant portion of variance in math and reading gains.

These results would suggest that at grade 5, consideration be given to levels of body mass index of Hispanic children and that low-income status should also be given consideration.

Table 4 exhibits the results of multiple regressions.

Table 4. Summary of Multiple Regression Predicting Reading Gains and Math Gains (N = 546)

Variables	Reading Gains			Math Gains		
	B	*SE B*	*B*	*B*	*SE B*	*B*
Time	-.02	0.02	-.06	-.02	.02	-.07
BMI	.26	1.09	.02	2.61	1.07	.21*
Gender	-5.52	6.26	-.04	7.06	6.15	.05
LEP	-1.96	4.54	-.02	-4.03	4.45	-.04
BMICat	-2.12	9.29	-.02	-7.65	9.10	-.07
R^2	.01			.02		
F	(5, 541)			(5, 541)		

**p* < .01. *p* < ,05

Note. Data are from FITNESSGRAM data (2019) from Empire ISD, pseudonym.

6. Discussion/Conclusions

These findings suggest that cardiovascular fitness did not have an effect on academic performance of Hispanic children from low-income backgrounds. Results do show; however, that the sample population had differences in time to complete the mile run and differences in cardiovascular fitness levels. More specifically, males had a mean time of (M = 740.89, SD = 222.78) in the mile run which equals to 12 minutes and 20 seconds. According to the FITNESSGRAM guidelines (Cooper, 1970) the expected time for males in fifth grade to complete the mile is at or below 11 minutes. The results, according to the mean, suggest males in sample population did not meet the healthy fitness zone of cardiovascular fitness. The females had a mean time of (M = 784.19, SD = 201.98) which equals to 13 minutes 4 seconds. According to the FITNESSGRAM guidelines (Cooper, 1970) the expected time for females in fifth grade to complete the mile is at or below 12 minutes. The results, according to the mean, suggest females in sample population did not meet the healthy fitness zone of cardiovascular fitness. The results confirm previous studies by Carlson *et al.* (2014) which found Hispanic children had slower times on the mile run compared to White and Asians and these disparities might affect the relationship between physical fitness and academic performance of Hispanic children. These researchers found Hispanic schools have less access than White schools to recess, gym facilities, playground resources, parks, green spaces, and swimming pools and access to physical activity resources is linked to physical activity behavior. These disparities might affect the relationship between physical fitness and academic performance of Hispanic children from low-income backgrounds. Nevertheless, there is no correlation between cardiovascular fitness and academic performance of Hispanic children from low-income backgrounds and the null hypothesis is accepted.

Research Question 2:

How do body mass index levels of 5th grade Hispanic children as measured by FITNESSGRAM test scores correlate to academic performance as measured by children's gain score on the STAAR Progress Measure? There was a no significant correlation between body mass index and reading gains of $r(545) = -.02$, $p > .05$. There was weak, but yet positive and significant correlation between body mass index and math gains, $r(545) = .12$, $p < .01$. Increases in body mass index were correlated with increases in math gains. This finding is at odds with those of previous literature reviewed from Moreno *et al.* (2013) which suggest increases in body mass index may contribute to decreases in academic performance in children whose body mass index is equal to or greater than the 85th percentile. This could be due to differences in body mass index between those of previous literature and those of sample study population. For example, results from sample population reveal a body mass index mean of (M = 21.94, SD = 5.75) suggesting a normal weight group and a group below the 85th percentile. Results also show that 4% (n = 20) of study population was in the underweight group, 71% (n = 389) within the normal weight group, 17% (n = 95) in the overweight group, and 8% (43) in the obese group suggesting a less overweight population than those on previous studies. Based on these results, the researcher failed to reject the null *hypotheses.*

7. Implications for Practice

The results of this study may have implications for school leaders. While the correlation between physical fitness and academic performance was not significant, the positive correlation between body mass index and math gains is noteworthy. The results of this study are promising and highlight the need for researchers to explore individual and weight group differences in different regions that might explain why low-income Hispanic children may not necessarily be overweight as indicated in the literature. For example, in this study of Hispanic low-income children, 71% of population was within a normal weight and 4% were underweight which is inconsistent with current literature. This should not be viewed as justification to devalue physical fitness as research clearly suggests physical activity and physical fitness improves not only quality of life, but also academic performance (Wittberg *et al.*, 2010).

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