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The Power of P.E.: Evaluating a P.E. Program for an Urban Middle School

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The Power of P.E.:

Evaluating a P.E. Program for an Urban Middle School

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Author Note:

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Science in Behavioral Health.

Abstract

This research study was aimed at developing an evaluation survey tool to measure the effects of physical activity and physical education on middle school students' physical, mental, emotional, and social health and well-being. This study was conducted in a middle school in the challenging, underserved Tenderloin neighborhood of San Francisco, California in April to June 2018. Data for this research was obtained by questionnaires distributed electronically to students. The questionnaire, sent to the students in the month of April and June, had them select the response that best described how they felt on the days they had P.E. and days they did not. Responses were made on a 4-point Likert scale ranging from "Definitely No" to "Definitely Yes". The sample of 33 students were selected from the students who completed both no P.E. and P.E. day surveys in both April and June. The survey results suggest that the P.E. program of the school had significant, positive effects on students' responses to questions regarding their anxiety symptoms, depressive symptoms, mood, and stress. The results provide some support for the benefits of physical activity and physical education on students, particularly children and adolescents.

Keywords: *physical activity, physical education, adolescents, anxiety, depression, mood, stress*

Executive Summary

This paper discusses how an evaluation survey tool was implemented on a Physical Education program in DeMarillac Academy of San Francisco's Tenderloin neighborhood. DeMarillac Academy is a Catholic elementary-middle school that provides quality, tuition-free education and programs to the low-income youth and families of the Tenderloin neighborhood. Today, they serve 119 fourth through eighth graders, 231 alumni, and about 230 families in total. Their mission is to provide life changing, accessible Catholic educational experience for the underserved children, youth, and families of the Tenderloin and surrounding communities striving to break the cycle of poverty through education. This evaluation serves to measure and assess how they're Physical Education program affects their students' physical, mental, emotional, and social health and well-being.

The evaluation consisted of P.E. and no-P.E. day surveys in April and in June, distributed electronically via GoogleForms, to measure how students felt on a school day after having P.E. in comparison to a school day without P.E. Due to timing and attrition rate, the sample was narrowed down to 33 students who completed each of the 4 required surveys with questions regarding how they felt on that day about their academic achievement, enjoyment of physical activity, focus, anxiety symptoms, depressive symptoms, interest in the day, mood, respect for their peers, and stress.

The evaluation survey tool results suggest that the P.E. program of the school had significant, positive effects on students' responses to questions regarding their anxiety symptoms, depressive symptoms, mood, and stress. The results provide some support for the benefits of physical activity and physical education on students, particularly children and

adolescents. The findings of this research will be provided to DeMarillac Academy to modify the Physical Education program as they deem necessary.

This paper recommends increasing the amount of moderate-to-vigorous physical activity (MVPA) in the school's Physical Education program, and using the evaluation survey tool in cycles to assess how much of an increase in MVPA or other modifications affects the different student outcomes. This paper also recommends further research toward the benefits of physical activity in schools, and whether or not an increase or decrease is beneficial to children and adolescents.

Literature Review

Introduction

According to the Center for Disease Control and Prevention (CDC, 2016), “regular physical activity in childhood and adolescence improves strength and endurance, helps build healthy bones and muscles, helps control weight, reduces anxiety and stress, increases self-esteem, and may improve blood pressure and cholesterol levels”. Regular physical activity (PA) also has the potential to prevent chronic disease, as PA in childhood and adolescence has been linked to body fat levels, bone mineral density levels, cardiorespiratory fitness levels, and self-esteem in adulthood (Loprinzi, Cardinal, Loprinzi, & Lee, 2012). The CDC’s current recommendation is that children and adolescents between the ages of 6 and 17 do an hour or more of physical activity daily (CDC, 2016). However, about 50% of the youth in America currently do not meet the U.S. public health recommendations for physical activity/PA (Romero, 2005). In addition, according to Hsu et al. (2011), as children progress through adolescence, their physical activity levels decrease as their sedentary activity levels increase. These physically inactive, more sedentary youth are more at risk for developing obesity, diabetes, and other chronic illnesses (De Bourdeaudhuij et al., 2005).

Regular physical activity in childhood and adolescence doesn’t just affect youths’ physical health outcomes, but has been shown to positively affect their academics, mental health and well-being, and also their social relationships with peers and others. Physical activity also affects youths’ academics in an interesting, but reasonable way. “The mechanisms by which students may improve academic achievement as a result of increased physical activity through physical education include increased arousal and reduced boredom, which may lead to increased attention span and concentration” (Coe et al., 2006, p. 1515). Physical activity has also been shown to be

positively associated with aspects of mental health. In a study by McDowell, MacDonncha, & Herring (2017), adolescents that engaged in physical activity two days or less per week (60 minutes per day) and were categorized as the low physical activity group self-reported more anxiety, depressive, and stress symptoms compared to adolescents categorized as moderate and high physical activity (three to five days per week of PA). Furthermore, physical activity has its effects on youths' social relationships, shaping and being shaped by PA. "Involvement in PA has been found to play an important role in adolescents' friendship choices, with participants showing a preference for friends whose activity levels were similar to their own" (De La Haye, Robins, Mohr, & Wilson, 2011, p.726). Knowing the multiple benefits and effects can help different levels of society highlight and stress the importance of physical activity to children and adolescence, whether it's influence from families, communities, schools, cities, and states, physical activity should be more emphasized everywhere.

This is why it is important for all schools, especially those located in urban, low-income neighborhoods or that have a high population of ethnic minorities, to value and place importance on regular physical activity to their students. It not only has an effect on their physical health, but also their overall well-being. African American and Hispanic children are less likely to report participating or being involved in organized physical activity compared to their white peers due to multiple environmental constraints (Loprinzi et al., 2012). Adolescents, who live in low-income neighborhoods, such as the Tenderloin in San Francisco, have been found to engage in less physical activity (PA) compared to their more affluent peers due to costs and access to spaces that encourage PA, such as parks, community centers, and gyms (Romero, 2005). Increasing the physical activity levels of these youth has the potential to improve the different

aspects of their health and well-being overall, based on multiple studies' findings of the effects of PA.

Physical Health & Well-Being

One of the clear benefits of physical activity on children and adolescents is its effects on their physical health, both immediate and long-term. Physically active youth have a higher chance of a healthy adulthood, compared to their less active peers. According to the 2008 Physical Activity Guidelines for Americans (2008), regular physical activity plays a role in reducing the risks for chronic conditions and diseases such as hypertension, high blood cholesterol, heart disease, obesity, and more. It also has been found to increase physical fitness such as aerobic capacity and muscle strength and endurance and improve overall bone health in people of all ages. Physical activity improves cardiorespiratory health, which is the health of the heart, lungs, and blood vessels (U.S. Dept. of Health & Human Services, 2008). With heart disease and stroke being two of the leading causes of death in the United States, moderate to vigorous physical activity (MVPA) significantly lowers the risk of the cardiovascular diseases as regularly active people have lower blood pressure and cholesterol levels (U.S. Dept. of Health & Human Services, 2008). MVPA or regular PA similarly lowers the risk for type 2 diabetes, metabolic syndrome, and obesity as it helps people burn calories they have eaten through food and beverage whether it's in excess or the right amount and maintain a healthy body weight. Physical activity definitely has its chronic illness and disease prevention benefits in the long run, but the most important benefit for children and adolescents is that PA helps build strong and healthy bones, muscles, and joints (U.S. Dept. of Health & Human Services, 2008). Having a strong and healthy musculoskeletal system is important for youth, so that they don't have any physical limitations in their daily activities and as they age.

Academic Achievement

Several studies have examined the relationship between physical activity and academic achievement. In a study done by Coe et al. (2006), researchers sought to determine the effect that physical education class enrollment and overall physical activity had on academic achievement in about 200 middle school children in Michigan over the course of an academic year. The study's results had found that only the students who had reached or exceeded the U.S Healthy People 2010 recommendations for vigorous physical activity performed better academically compared to students who performed little to no vigorous physical activity (Coe et al., 2016). The researchers attributed the improved academic performance to the additional vigorous physical activity that students obtained outside of the regular school day and suggested that physical education classes have the potential to improve academic achievement through increasing the overall amount of vigorous activity performed in the P.E. classes (Coe et al., 2006). They also noted that a threshold of activity intensity and amount may be needed to cause significant changes that increases a child or adolescents' academic achievement, and that their study sample was predominantly white and did not account for socioeconomic status as a possible mediator. (Coe et al., 2006).

A more recent study by Owen, Parker, Astell-Burt, & Lonsdale (2018) wanted to determine if changes in moderate-vigorous physical activity (MVPA) affected educational outcomes over the course of a year in a school of about 2,000 Australian adolescents. By having their sample of students wear accelerometers for seven consecutive days and administering a national numeracy/proficiency test for baseline and follow-up data they were able to objectively measure physical activity levels and academic achievement and see any change that may have occurred. The researchers ultimately found that increases in accelerometer-assessed MVPA over

time were positively associated with improvements in academic performance in the adolescent girls, but not in the boys. They noted that a possible explanation or mediator was the fact that the boys had higher initial MVPA levels, and that increasing their MVPA may have taken time away from studying and homework. However, the study stated, "...boys who were more physically active had better educational outcomes than their less active peers, and girls who increased their regular physical activity showed improvements in academic performance" (Owen, Parker, Astell-Burt, & Lonsdale, 2018, p.340). What's interesting is that this study suggested that all students need to increase their physical activity levels for health and educational benefits, without compromising the time spent on study and homework. The researchers discussed that increasing physical activity levels in physical education classes may be the answer as it does not take away from study or homework time outside of school (Owen, Parker, Astell-Burt, & Lonsdale, 2018).

Mental Health & Well-Being

The relationship between physical activity and mental health is not often researched, especially the mental health of children and adolescents. A recent study by McDowell, MacDonncha, & Herring (2017) examined the association between physical activity, depression, and anxiety among adolescents in Ireland. The study had about 500 adolescents who self-reported their levels of physical activity and depressive and anxiety symptoms. The adolescents were categorized into three different groups: low PA, moderate PA, and high PA, based on the number of days per week they were physically active for at least 60 minutes. Their results were very telling, as the adolescents in the low PA group had significantly self-reported more anxiety and depressive symptoms than the moderate and high PA group. The study found that adolescents in the moderate PA group (3-4 days/week physically active) had 30% reduced odds

for depression and 46% reduced odds for high trait anxiety, while the high PA group (5+ days/week physically active) had 56% reduced odds for depression and 47% reduced odds for high trait anxiety (McDowell, MacDonncha, & Herring, 2017). These findings show a possible inverse relation between physical activity and anxiety and depression, and also “highlights the potential importance of other correlates of physical activity and/or anxiety and depression... which warrant future investigation” (McDowell, MacDonncha, & Herring, 2017, p.4).

A study done in Canada similarly investigated the relationship between the amount of physical activity done by about 1,500 adolescents and their symptoms of anxiety and depression. Dore, O’Laughlin, Beauchamp, Martineau, & Forneau (2016) found that the amount or volume of physical activity done by the students was inversely associated the amount of anxiety and depression symptoms they self-reported. Meaning the more that the adolescents engaged in physical activity, the less they self-reported different anxiety and depressive symptoms. Another interesting result was that after controlling for PA volume, they found that the adolescents that were involved in team sports also had less self-reported anxiety and depressive symptoms compared to those who did PA on their own (Dore, O’Laughlin, Beauchamp, Martineau, & Forneau, 2016). This suggests that context of PA may be a possible mediator in the correlation with mental health possibly due to team sports’ aspects of communication, teamwork, and sense of community, leading to the next topic of PA’s effects on social health.

Social Relationships

A lesser known correlational relationship is that of physical activity and youths’ social peer relationships. In a study with about 400 eighth graders in Australia, researchers wanted to examine the role that physical activity plays in adolescents’ friendship networks. They measured the students’ attitudes towards PA, PA self-efficacy, perceived behavioral control, and intentions

to do PA through surveys. The researchers then found that the adolescent participants tended to befriend peers who did similar amounts of physical activity, and that “sharing similar attitudes towards engaging in PA was found to be a stronger driver for friendship selection than behavioral similarities” (De La Haye, Robins, Mohr, & Wilson, 2011, p.726). They also found that their PA levels were positively associated with participation in PA with friends and perceived social support from friends. The study suggests and recommends that consistently promoting positive attitudes towards physical activity and sports can have significant effects on adolescents, as each of them peer influence and it can possibly increase positive attitudes towards PA and increase PA participation and engagement (De La Haye, Robins, Mohr, & Wilson, 2011).

Conclusion

How much physical activity children and adolescents get today can severely impact the youth as they age into adulthood. Whether it is reducing their risks for heart disease, obesity, diabetes (U.S. Dept. of Health & Human Services, 2008), or improving their academic achievement (Coe et al., 2006), mental health and well-being (McDowell, MacDonncha, & Herring, 2017), and their social relationships (De La Haye, Robins, Mohr, & Wilson, 2011), physical activity is essential for people of all ages, especially youth. Knowing that about 50% of American youth do not meet the recommended amount of PA and with a wide variety of research and evidence of the benefits of physical activity, the next step should be to educate all Americans on this problem, to help youth everywhere learn more about PA, its benefits, and also the different ways that they can engage in PA, as it can go a long way in promoting and developing healthier populations and communities nationwide.

Agency Profile Background/Target Population

DeMarillac Academy is a LaSallian Vincentian Catholic elementary-middle school for low-income students in 4th through 8th grade located in the Tenderloin neighborhood of San Francisco. DeMarillac provides quality, tuition-free education and programs to these underserved youth and families of all faiths and backgrounds in this San Francisco community, striving to break the cycle of poverty through education.

DeMarillac Academy was founded in 2001 by the Daughters of Charity and De La Salle Christian Brothers to provide tuition-free, Catholic education to low-income students in the Tenderloin. Their educational model was based on the Nativity San Miguel school movement that started in New York City to combat the lack of inner-city neighborhood schools, high costs of private schools, and poor state of public school education.

DeMarillac Academy is the only middle school in the Tenderloin neighborhood and opened with a class of nineteen 6th graders in 2001, but today serves 119 fourth through eighth graders, 231 alumni, and about 230 families total. Academically, DeMarillac consists of small classroom sizes of about 12 students per teacher. The stated mission of DeMarillac is, “Inspired by the Daughters of Charity and De La Salle Christian Brothers, DeMarillac Academy provides a life changing, accessible Catholic educational experience for the underserved children, youth, and families of the Tenderloin and surrounding communities”. The schoolwide learning expectations, based in Catholic tradition, include responsibility, compassion, gratitude, perseverance, leadership, and integrity. The student population demographics consists mainly of Latino,

Asian/Pacific Islander, and African American youth from the Tenderloin, South of Market/SOMA, Mission, and other low-income neighborhoods.

Services offered by DeMarillac include tuition-free education/academics, summer school, co-curriculars such as cooking, creative writing, computer programming, and music class, anti-bully prevention program in partnership with St. Vincent De Paul Society's Riley Center Children Program, and lastly graduate support for alumni, student and family services. Additionally, DeMarillac offers resources to actively support students and families with a holistic approach. Family engagement for each student's success is promoted with mandatory monthly family meetings, in-home visits for new and prospective students, and a Family Council to serve the families of DeMarillac Academy. The Director of Student and Family Services works with families to decrease barriers to student health and success, and the Graduate Support Program aids DeMarillac graduates in high school and college in academic support, career advising, and financial aid.

As a comparison, 82% of San Francisco Unified School District's students graduate from high school while 91% of DeMarillac Academy students graduate from high school. DeMarillac is funded primarily from private donations, corporations, and hosts an Annual Scholarship Benefit and Neighborhood Night to celebrate the DeMarillac community and fundraise for student and alumni needs. As a result, every student at DeMarillac Academy is able to receive a full scholarship of \$15,000 each year.

Methods

Having created a Program Evaluation for DeMarillac Academy's Physical Education Program through the use of a survey evaluation tool, the school will be able to assess how their current P.E. program and/or lessons affect their students' outcomes of physical, mental, emotional, and social health and well-being. DeMarillac will be able to assess the effectiveness of their P.E. program in the month of April and June, as well as any modifications to their P.E. curriculum in the month of May (and any changes they may decide to make in the future) with the use of this sustainable survey evaluation tool.

The project manager collected data through the use of online surveys sent out via Google Forms based on the simplicity and easy-to-use format for sending out the surveys and receiving responses, and also based from information that each DeMarillac Academy student has Google Chromebooks in their classrooms and are given time to use them near the end of each day by their teachers for homework and other resources. The sample was significantly narrowed down due to the number of students who completed both no-P.E. and P.E. day surveys in both April and June, and ultimately consisted of 33 seventh, sixth, and fifth graders from DeMarillac Academy. Project manager developed the data collection tool after conducting a literature review and research of different scales and items of child or adolescent stress, mental and emotional health, and social health and well-being (See Student Surveys).

<u>P.E. & No P.E. Day Student Surveys</u>	
Running	1) Today, I enjoyed running and/or playing.
Stress	2) Today, I felt stressed.
Grades	3) I believe I can get good grades in my classes.
Focus/Listening	4) Today, I was focused and listening in school.
Anxiety1	5) Today I got really worried, and my heart started to beat really fast.
Anxiety2	6) When I have a problem, I feel shaky or nervous.
Depressive1	7) Today, I felt sad and down.
Interest	8) I was not interested in doing things today.
Depressive2	9) I feel that I have a number of good qualities.
Happy	10) Today, I felt good and happy.
GreatDay	11) Today, I had a great day.
Respect	12) Today, I treated my classmates and peers with respect and care.
*EnjoyPE	13) Today, I enjoyed having P.E.
*Exercise	14) On a scale from 1 (very light) to 5 (extremely hard), how hard did you exercise in P.E. and/or Recess today?
<i>*Questions 13 & 14 included only in P.E. Day Survey</i>	
Response Options - Definitely No, Maybe No, Maybe Yes, Definitely Yes	

P.E. & No P.E. Day Student Surveys: This survey is adapted from multiple scales and items to measure students' outcomes of physical, mental, emotional, and social health and well-being.

Questions 5 and 6 from both P.E. and non-P.E. Day Student Surveys, “Today I got really worried, and my heart started to beat really fast”, and “When I have a problem, I feel shaky or nervous” were both adapted from Spence Children’s Anxiety Scale (Spence, 1998). Questions 7 and 8 from both surveys, “Today, I felt sad and down” and “I was not interested in doing things today”, were adapted from the Kutcher Adolescent Depression Scale (Brooks, 2004). Question 9 from both surveys, “I feel that I have a number of good qualities”, was adapted from the Rosenberg Self-Esteem Scale (Rosenberg, 1965). Lastly, question 14 from the P.E. Day Student Survey, “On a scale from 1 (very light) to 5 (extremely hard), how hard did you exercise in P.E. and/or Recess today?” was adapted from the Relative Perceived Exertion Scale for Children and Teens by the Ohio Kids on the Move: Physical Activity Guidelines for Afterschool Programs (Ohio Afterschool Network, 2011). Survey questions were further modified and changed with

assistance from USF Faculty to remove double-barreled questions, alter response options for better clarity with sample students, and for each question to have the same response options.

Data was collected in April 2018, with students taking P.E. day surveys on Monday or Friday and non-P.E. day surveys on Tuesday, Wednesday or Thursday. In the month of May, DeMarillac Academy decided to keep (or modify) their current P.E. program to assess its effects on their students' outcomes of physical, mental, emotional, and social health and well-being. Follow-up data was collected in June 2018, with the same surveys and same way it was collected during baseline. Students were required to participate in the Program Evaluation for DeMarillac Academy as part of their P.E. curriculum without incentive.

Through Google Forms, data was then transferred to Google Sheets (spreadsheets similar to Excel). Program manager then created codebook, translating the response options into quantitative numbers (Definitely No = 1, Maybe No = 2, Maybe Yes = 3, Definitely Yes = 4) and questions into shorter keyword for simpler interpretation (Running, Stress, Grades, Anxiety1, Anxiety2, Depression1, Depression2, etc.). Students names were also coded for anonymity according to grade and alphabetical placement in class sample (ex. Student 5_18). Paired t-tests were conducted for each survey variable to generate the mean, standard deviation, and p-value (two-tailed) comparing no P.E. and P.E. days in April, June, between female and male students, and each grade level.

Challenges that arose during data collection included the lack of participation for data collection. Although many students were able to fill out responses for P.E. days, there were not as much for non-P.E. days initially. To address this challenge, I changed my baseline data collection timeline from 2 days of sending out the surveys to the entire month of April, and also consistently talked to teachers, principal, and assistant principal about giving students time to fill

out the surveys. Another challenge that arose during data collection was the researcher's lack of experience with statistical/data programs for interpretation, but was easily addressed with the help from USF Faculty. Strength of this research was the amount of data that was collected over the course of three months, and DeMarillac Academy's willingness to be innovative to achieve their mission and vision of holistically investing in their students. A weakness of this research was that the surveys are self-report and therefore are not objectively measured.

Data was interpreted and change was shown through the use of tables, line graphs, and bar charts to visually display change in student outcomes physical, mental, emotional, and social health and well-being from the month of April to the month of June. Change can also be seen in the students' health and well-being outcomes in the month of April comparing the mean scores of the different outcomes on P.E. days to non-P.E. days.

Results

Table 1 below displays DeMarillac Academy student participants' response mean and standard deviation to each of the survey variables when students did and did not have Physical Education (P.E.) in the months of April and June (See Table 1).

Survey Variable	April				June			
	No PE Mean	(SD)	PE Mean	(SD)	No PE Mean	(SD)	PE Mean	(SD)
<i>Running</i>	3.45	0.75	*3.69	0.53	3.52	0.79	*3.39	0.70
<i>Grades</i>	3.58	0.50	3.36	0.82	3.58	0.66	3.52	0.67
<i>Focus/Listening</i>	3.58	0.71	3.69	0.47	3.49	0.67	3.58	0.56
<i>Anxiety1</i>	2.00	0.94	1.61	1.06	1.69	1.02	1.64	0.89
<i>Anxiety2</i>	*2.79	0.99	*2.36	0.99	2.42	1.06	2.39	1.14
<i>Depressive1</i>	*1.82	0.85	*1.39	0.75	*1.61	0.86	*1.24	0.44
<i>Interest</i>	2.33	0.96	1.85	1.06	2.03	0.98	2.09	1.04
<i>Depressive2</i>	3.42	0.87	3.27	0.80	3.58	0.61	3.39	0.70
<i>Happy</i>	*3.27	0.67	*3.61	0.61	3.67	0.48	3.55	0.62
<i>GreatDay</i>	3.33	0.59	3.48	0.76	3.58	0.56	3.49	0.62
<i>Respect</i>	3.82	0.39	3.73	0.52	3.73	0.45	3.64	0.55
<i>Stress</i>	*2.18	1.13	*1.61	0.83	2.15	1.12	1.79	0.99
<i>EnjoyPE</i>			3.61	0.79			3.46	0.56
<i>Exercise</i>			2.94	1.06			2.97	1.02

Note: * denotes significant two-tailed p -value < 0.05

Table 1: Means & Standard Deviations of Survey Variable Responses: April & June

April Data Collection Period I

April P.E. & Non-P.E. Day Comparison. In response to the Happy survey variable (“Today, I felt good and happy”) in April, the mean student score on no P.E. days was 3.27, while the mean student score on P.E. days was 3.61. This comparison was found to be statistically significant with a p -value (two-tailed) less than 0.05 (0.02) through a paired t-test (See Figure 1).

In response to the Stress survey variable (“Today, I felt stressed”) in April, the mean student score on no P.E. days was 2.18, while the mean student score on P.E. days was 1.61. This

comparison was found to be statistically significant with a p-value (two-tailed) less than 0.05 (0.001) through a paired t-test (See Figure 1).

In response to the Depressive1 survey variable (“Today, I felt sad and down”) in April, the mean student score on no P.E. days was 1.82, while the mean student score on P.E. days was 1.39. This comparison was found to be statistically significant with a p-value (two-tailed) less than 0.05 (0.01) through a paired t-test (See Figure 1).

In response to the Anxiety2 survey variable (“When I have a problem, I feel shaky or nervous”) in April, the mean student score on no P.E. days was 2.79, while the mean student score on P.E. days was 2.36. This comparison was found to be statistically significant with a p-value (two-tailed) less than 0.05 (0.01) through a paired t-test (See Figure 1).

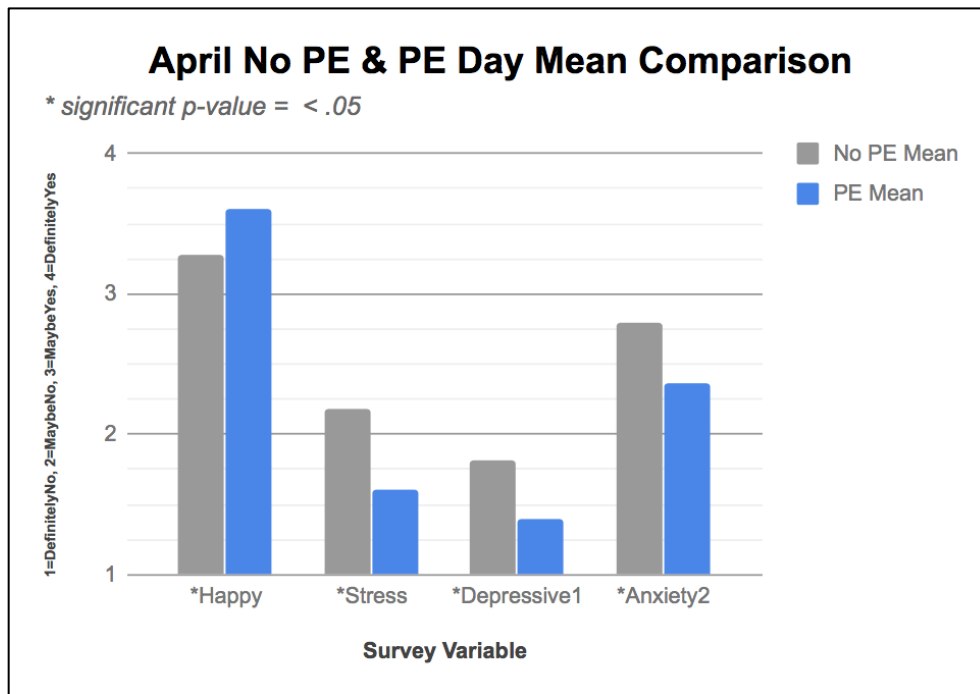


Figure 1: April No PE & PE Day: Mean Comparison. This graph compares students’ average response on no PE and PE days in the month of April to the Happy, Stress, Depressive1, and Anxiety2 survey variables.

The student responses to the Running (“Today, I enjoyed running and/or playing”), Grades (“I believe I can get good grades in my classes”), Focus/Listening (“Today, I was

focused and listening in school”), Anxiety1 (“Today I got really worried, and my heart started to beat really fast”), Interest (“I was not interested in doing things today”), Depressive2 (“I feel that I have a number of good qualities”), GreatDay (“Today, I had a great day”), and Respect (“Today, I treated my classmates and peers with respect and care”) survey variables on no P.E. and P.E. days in April were found to be non-statistically significant with p-values greater than 0.05 (See Table 1 for Means)

June Data Collection Period II

June P.E. & Non-P.E. Day Comparison. In response to the Depressive1 survey variable (“Today, I felt sad and down”) in June, the mean student score on no P.E. days was 1.61, while the mean student score on P.E. days was 1.24. This comparison was found to be statistically significant with a p-value (two-tailed) less than 0.05 (0.02) through a paired t-test. Responses to the Depressive1 survey variable on no P.E. to P.E. days were statistically significant in both the month of April and in June (See Figure 2 & 3)

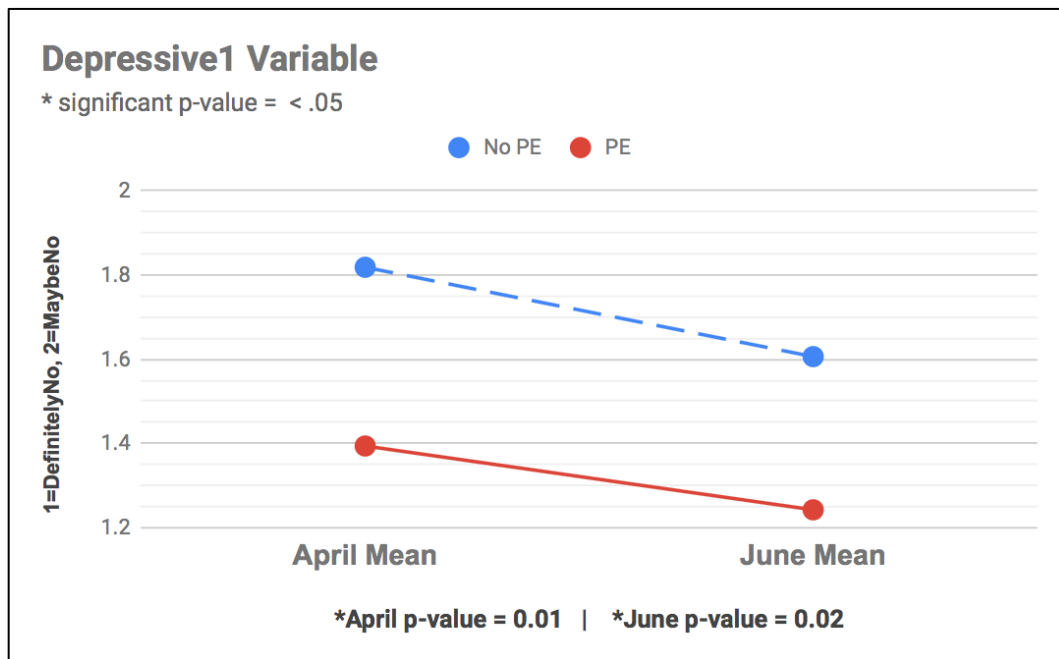


Figure 2: *Depressive1 Variable.* This graph illustrates students' average response to the Depressive1 survey variable on no PE and PE days in the month of April and June.

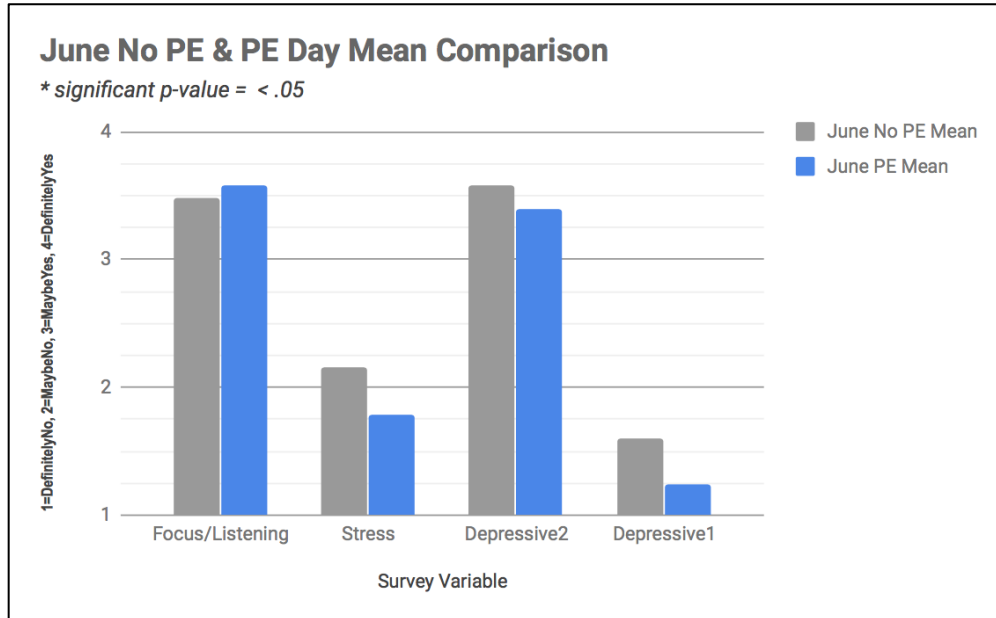


Figure 3: *June No PE & PE Day: Mean Comparison.* This graph compares students' average response on no PE and PE days in the month of June to the Focus/Listening, Stress, Depressive2, and Depressive1 survey variables.

The student responses to the Running (“Today, I enjoyed running and/or playing”), Grades (“I believe I can get good grades in my classes”), Focus/Listening (“Today, I was focused and listening in school”), Anxiety1 (“Today I got really worried, and my heart started to beat really fast”), Anxiety2 (“When I have a problem, I feel shaky or nervous”), Interest (“I was not interested in doing things today”), Depressive2 (“I feel that I have a number of good qualities”), Happy (“Today, I felt good and happy”), GreatDay (“Today, I had a great day”), and Respect (“Today, I treated my classmates and peers with respect and care”) survey variables on no P.E. and P.E. days in June were found to be non-statistically significant with p-values greater than 0.05 (See Table 1 for Means)

April & June Data Comparison

Only one survey variable was found to be statistically significant when comparing P.E. in April and P.E. in June (See Figure 4 & 5). In response to the Running survey variable (“Today, I

enjoyed running and/or playing”), the mean student score on P.E. days in April was 3.70, while the mean student score on P.E. days in June was 3.39. This comparison was found to be statistically significant with a p-value (two-tailed) less than 0.05 (0.02) through a paired t-test (See Figure 4).

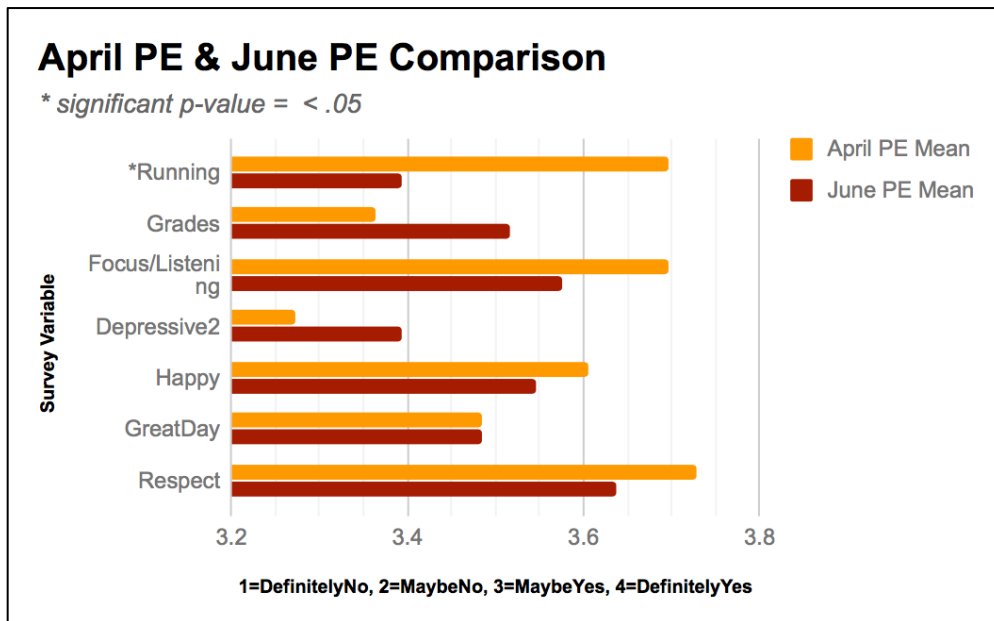


Figure 4: April PE & June PE Comparison. This graph compares students’ average response on PE days in the month of April and June to the Running, Grades, Focus/Listening, Depressive2, Happy, GreatDay, and Respect survey variables.

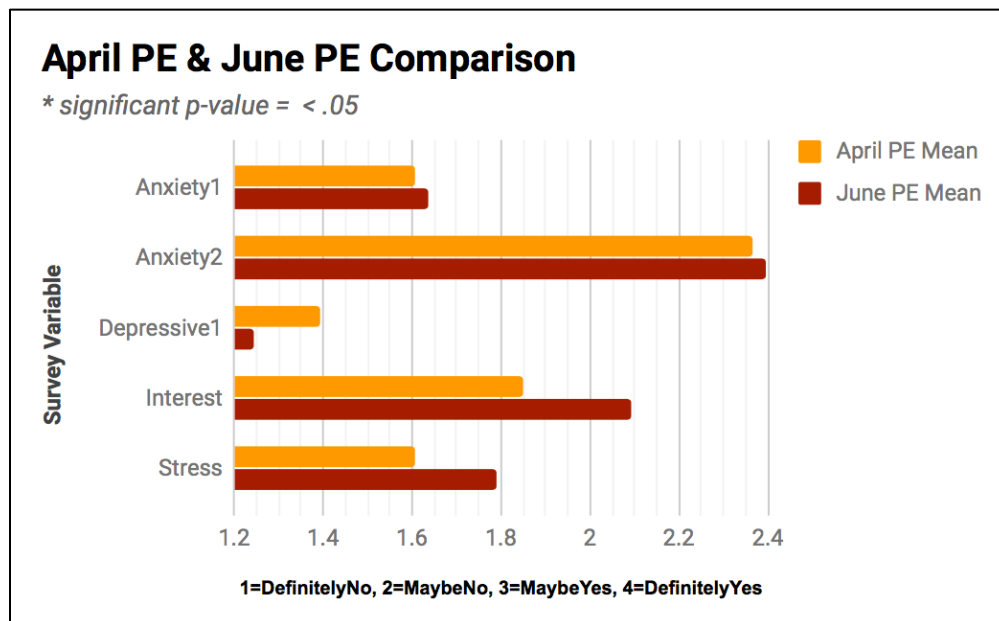


Figure 5: *April PE & June PE Comparison. This graph compares students' average response on PE days in the month of April and June to the Anxiety1, Anxiety2, Depressive1, Interest, and Stress survey variables.*

The student responses to the Grades (“I believe I can get good grades in my classes”), Focus/Listening (“Today, I was focused and listening in school”), Anxiety1 (“Today I got really worried, and my heart started to beat really fast”), Anxiety2 (“When I have a problem, I feel shaky or nervous”), Depressive1 (“Today, I felt sad and down”), Interest (“I was not interested in doing things today”), Depressive2 (“I feel that I have a number of good qualities”), Happy (“Today, I felt good and happy”), GreatDay (“Today, I had a great day”), Respect (“Today, I treated my classmates and peers with respect and care”), Stress (“Today, I felt stressed”), EnjoyPE (“Today, I enjoyed having P.E.”), and Exercise (On a scale from 1 – very light to 5 – extremely hard, how hard did you exercise in P.E. today?”) survey variables were found to be non-statistically significant with p-values greater than 0.05 (See Table 1 for Means)

Female Students & Male Students.

Survey Variable	Female Students				Male Students			
	No PE Mean	(SD)	PE Mean	(SD)	No PE Mean	(SD)	PE Mean	(SD)
<i>Running</i>	3.45	0.85	3.55	0.68	3.49	0.77	3.55	0.64
<i>Grades</i>	3.58	0.64	3.40	0.74	3.58	0.58	3.44	0.75
<i>Focus/Listening</i>	3.50	0.75	3.65	0.53	3.53	0.68	3.64	0.52
<i>Anxiety1</i>	2.05	1.04	1.80	1.09	1.85	0.98	1.62	0.97
<i>Anxiety2</i>	2.63	1.06	2.45	1.11	2.61	1.04	2.38	1.06
<i>Depressive1</i>	*1.80	0.99	*1.30	0.61	1.71	0.86	1.32	0.61
<i>Interest</i>	2.10	0.90	2.05	0.99	2.18	0.98	1.97	1.05
<i>Depressive2</i>	3.34	0.84	3.15	0.83	3.50	0.75	3.33	0.75
<i>Happy</i>	3.45	0.59	3.58	0.68	3.47	0.61	3.58	0.61
<i>GreatDay</i>	3.48	0.64	3.55	0.68	3.46	0.59	3.48	0.68
<i>Respect</i>	3.78	0.42	3.70	0.56	3.77	0.42	3.68	0.53
<i>Stress</i>	*2.40	1.11	*1.70	0.82	2.17	1.12	1.69	0.91
<i>EnjoyPE</i>			3.48	0.75			3.53	0.68
<i>Exercise</i>			2.90	1.03			2.96	1.03

Note: * denotes significant two-tailed p-value < 0.05

Table 2: Means & Standard Deviations of Survey Variable Responses: Female & Male Students

The students' responses to the survey variable, Depressive1 and Stress, when compared between no P.E. days and P.E. days was found to be statistically significant, not only in the months of April and June, but also when accounting for gender (See Table 2).

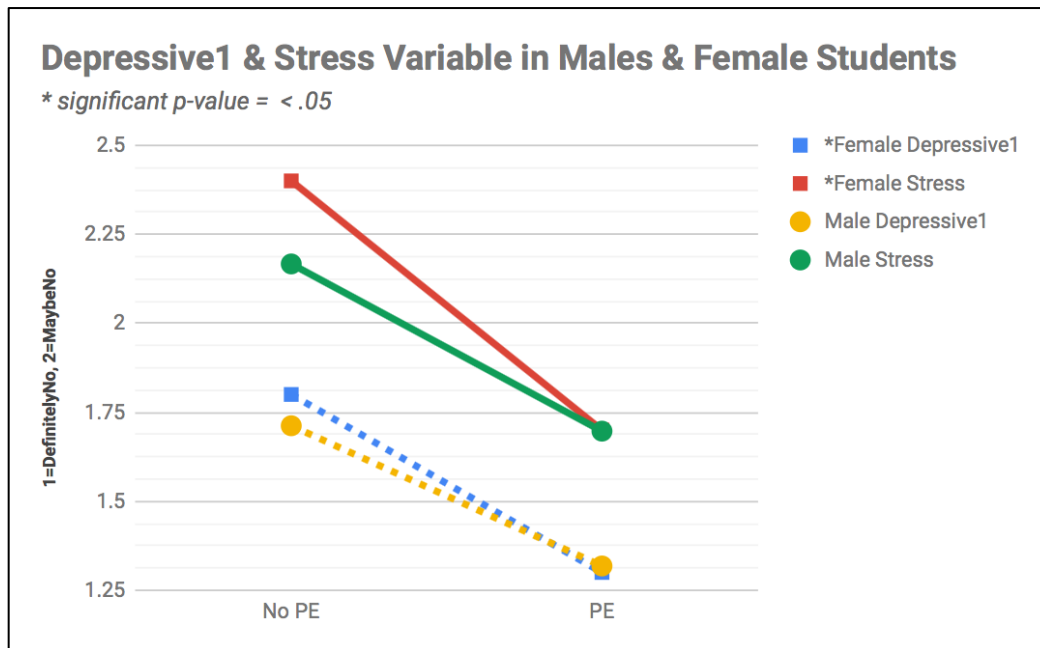


Figure 6: *Depressive1 & Stress Variable in Males & Female Students.* This graph illustrates female and male students' average response on no PE and PE days in the month of April and June to the Depressive1 and Stress survey variables.

In response to the Depressive1 survey variable, the female student mean score on no P.E. days was 1.80, while the mean score on P.E. days was 1.30. This comparison was found to be statistically significant with a p-value (two-tailed) less than 0.05 (0.02) through a paired t-test (See Figure 6). In response to the Stress survey variable, the female student mean score on no P.E. days was 2.40, while the mean score on P.E. days was 1.70. This comparison was found to be statistically significant with a p-value (two-tailed) less than 0.05 (0.01) through a paired t-test. Although not found to be statistically significant, the male student mean score in response to the Depressive1 survey variable on no P.E. days was 1.71, and 1.32 on P.E. days, a large decrease.

The male student mean score in response to the Stress survey variable on no P.E. days was 2.17, and 1.70 on P.E. days, also a large decrease but not statistically significant (See Figure 6).

Comparing 5th, 6th, and 7th Grade.

Survey Variable	5 th Grade				6 th Grade				7 th Grade			
	No PE Mean	SD	PE Mean	SD	No PE Mean	SD	PE Mean	SD	No PE Mean	SD	PE Mean	SD
<i>Running</i>	3.67	0.53	3.69	0.47	3.43	0.85	3.63	0.63	3.13	1.02	3.13	0.81
<i>Grades</i>	3.52	0.65	3.36	0.83	3.71	0.48	3.50	0.76	3.56	0.51	3.56	0.51
<i>Focus/Listening</i>	3.72	0.61	3.78	0.42	3.71	0.47	3.79	0.43	2.94	0.68	3.19	0.54
<i>Anxiety1</i>	1.58	0.97	1.53	0.91	2.21	0.80	2.29	1.27	*2.13	1.02	*1.25	0.45
<i>Anxiety2</i>	2.50	1.08	2.33	1.01	2.93	0.99	2.93	0.99	*2.56	0.96	*2.00	1.09
<i>Depressive1</i>	1.36	0.54	1.19	0.47	*2.29	1.07	*1.50	0.85	*2.00	0.89	*1.44	0.63
<i>Interest</i>	1.83	1.00	1.50	0.81	2.49	0.94	2.36	1.08	2.75	0.58	2.69	1.01
<i>Depressive2</i>	3.67	0.53	3.53	0.65	3.57	0.65	3.14	0.66	3.06	1.06	3.06	0.93
<i>Happy</i>	3.69	0.52	3.78	0.42	3.43	0.65	3.43	0.85	3.00	0.52	3.25	0.58
<i>GreatDay</i>	3.61	0.49	3.58	0.69	3.50	0.76	3.50	0.76	3.06	0.44	3.25	0.58
<i>Respect</i>	3.92	0.28	3.83	0.38	3.79	0.43	3.71	0.61	3.44	0.51	3.31	0.60
<i>Stress</i>	1.67	0.89	1.53	0.81	2.50	1.16	2.00	0.88	*3.00	0.97	*1.81	1.11
<i>EnjoyPE</i>			3.64	0.64			3.43	0.76			3.38	0.72
<i>Exercise</i>			2.81	1.06			3.29	1.07			3.00	0.89

Note: * denotes significant two-tailed p-value < 0.05

Table 3: Means & Standard Deviations of Survey Variable Responses: 5th, 6th, & 7th Grade

When accounting for grade in the comparison of no P.E. and P.E. survey responses, a number of variables were found to be significantly significant or had a decrease on P.E. days (See Table 3).

In response to the Depressive1 survey variable, the 6th grade mean score on no P.E. days was 2.29 and the 6th grade P.E. day mean score was 1.50, which was found to be significantly different with a p-value of 0.04 (See Figure 7). Though not statistically significant, the 5th grade no P.E. mean score for Depressive 1 was 1.36 and the 5th grade P.E. mean score was 1.19, still a decrease. The rest of the variables: Anxiety1, Anxiety2, and Stress, were also not statistically significant but showed a decrease from no P.E. to P.E. With the Anxiety1 variable, the 5th grade no P.E. mean score was 1.58, while their P.E. mean score 1.53, and the 6th grade no P.E mean score was 2.21, while their P.E. mean score was 2.29 (not statistically significant). With the

Anxiety2 variable, the 5th grade no P.E. mean score was 2.50, while their P.E. mean score was 2.33, and the 6th grade no P.E. mean score was 2.93, while their P.E. mean score stayed the same at 2.93. With the Stress variable, the 5th grade no P.E. mean score was 1.67 while their P.E. mean score was 1.53, and the 6th grade no P.E. mean score was 2.50 while their P.E. mean score was 2.00, a large decrease but not statistically significant.

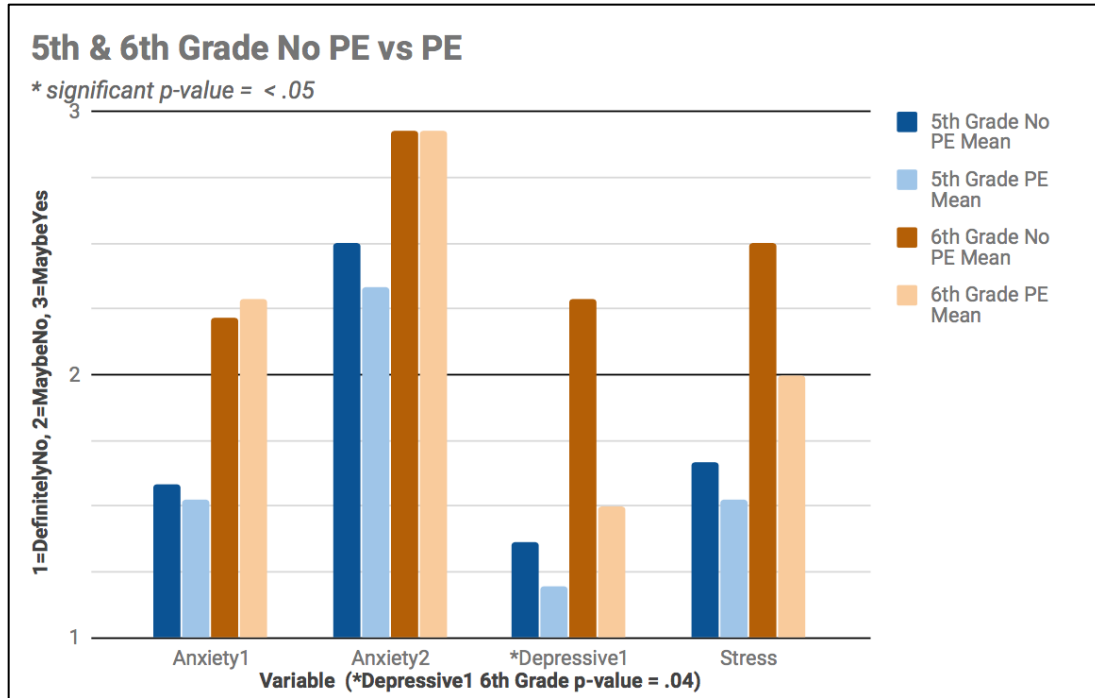


Figure 7: 5th & 6th Grade No PE vs PE. This graph compares 5th and 6th grade students' average response on no PE and PE days in the month of April and June to the Anxiety1, Anxiety2, Depressive1, and Stress survey variables.

There were many statistically significant differences in survey mean scores when comparing the 7th grade students' responses on no P.E. and P.E. days (See Table 3). For the 7th grade students, the Anxiety1 variable had a no P.E. mean score of 2.13 and a P.E. mean score of 1.25 with a p-value less than 0.05 (See Figure 8). With the Anxiety2 variable, the 7th grade students had a no P.E. mean score of 2.56 and a P.E. mean score of 2.00 with a p-value less than 0.05 (0.01). With the Depressive1 variable, the 7th grade students had no P.E. mean score of 2.00 and a P.E. mean score of 1.44 with a p-value less than 0.05 (0.01). Lastly, with the Stress

variable, the 7th grade students had a no P.E. mean score of 3.00 and a P.E. mean score of 1.80 with a p-value less than 0.05.

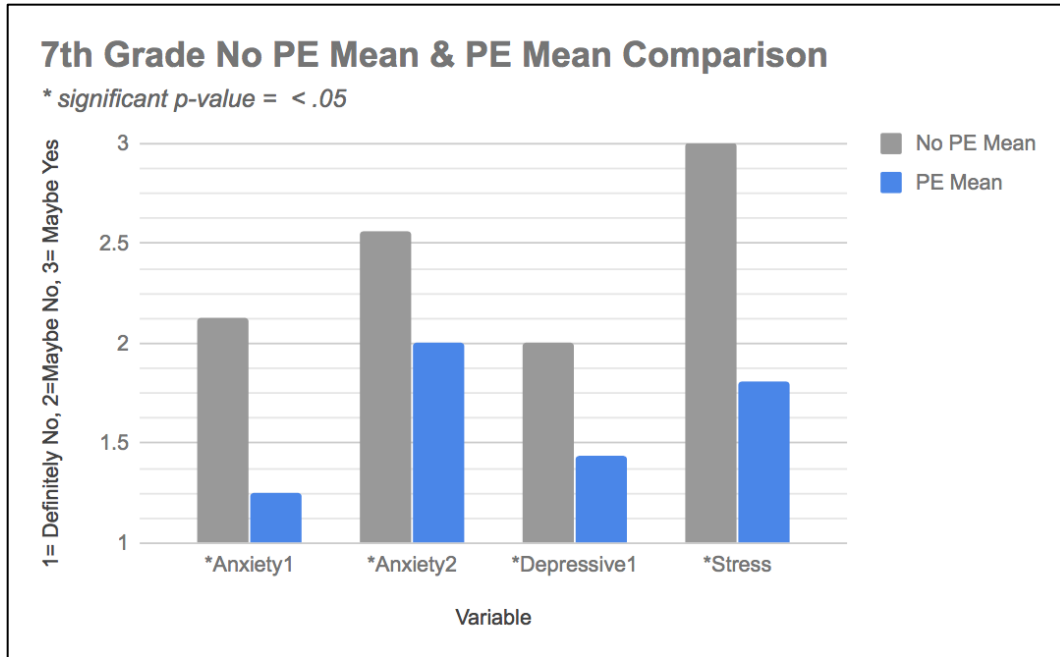


Figure 8: 7th Grade No PE & PE Mean Comparison. This graph compares 7th grade students' average response on no PE and PE days in the month of April and June to the Anxiety1, Anxiety2, Depressive1, and Stress survey variables.

Discussion

The students of DeMarillac Academy in the Tenderloin neighborhood are at a disadvantage for being active, as adolescents who live in low-income neighborhoods have been found to engage in less physical activity due to access to parks, community centers, and gyms. Less active youth have been found to be not only more at risk for developing obesity, diabetes, and other chronic illnesses (De Bourdeaudhuij et al., 2005), but also self-report more anxiety, depressive, and stress symptoms compared to more active youth (McDowell, MacDonncha, & Herring, 2017). With Physical Education, schools, especially in low-income neighborhoods, have the ability to support and develop students' physical, mental, emotional, and social health and well-being.

On days students had P.E., DeMarillac Academy's P.E. program has shown to significantly increase how happy students felt and decrease feelings of stress, depression, and anxiety (See Figures 1, 2, 6, 7, & 8). When comparing days students had P.E. and did not have P.E., the Depressive1 variable ("Today, I felt sad and down") showed a statistically significant decrease on P.E. days in the both the month of April and June, and when accounting for gender and for grade (See Tables 1, 2, & 3). These findings support past research that suggest regular physical activity in childhood and adolescence has the ability to affect mental and emotional health, specifically anxiety and depressive symptoms and stress (Doré, O'Laughlin, Beauchamp, Martineau, & Forneau, 2016).

April's P.E. days had four variables (Happy, Stress, Depressive1, & Anxiety2) that were statistically significant, in comparison to June's one (Depressive1). This could be due to June being the last month of the academic school year, but as it appears, April's P.E. was more effective for students' mental and emotional health and well-being compared to June's P.E. It

would be interesting to see what would happen if the evaluation survey tool was distributed to students in the middle of school year rather than the end.

The survey variables of Running, Interest, Grades, Focus/Listening, Interest, and Respect were not found to be statistically significant when comparing no P.E. and P.E. day responses. This could be due to multiple factors such as wording of the statement in the survey, or the current P.E. program not affecting these variables for students. However, the rest of the results of the P.E. evaluation survey tool had many interesting findings that support past research and suggest future research in the physical activity's effects on mental health in youth.

Limitations

While there were strengths to this project, there were also limitations and challenges to consider. First, there is limited research in how to assess and measure the effects that a physical education program has on middle school students. The project manager approached this obstacle, by researching multiple existing scales and items measuring children, youth, and adolescents' physical, mental, emotional, and social health and well-being. The next step taken was adapting them to middle-school students, and creating a cohesive, but short and precise survey to distribute. As always with self-report, participants' responses may not be fully accurate as well.

A second limitation was the small student sample that had the potential to be around 100 students but was narrowed down to a sample of 33 students. The sample size was smaller than expected for many reasons. There was the significant challenge of then gathering as much data as possible. Although surveys were easily distributed to each students' email accounts through Google Forms for easy completion, many students did not complete the surveys. The project manager would ask for staff and faculty to give students time to complete the surveys during the school day, but it was ultimately up to the students to complete it on their Google Chrome books

when given the time. Another challenge was that the 8th grade students, who were initially supposed to be part of the sample, had to be excluded due to the small amount of completed surveys from them.

Third, there was the requirement for students to complete both P.E. and non-P.E. day surveys in the months of April and June, totaling four surveys to be a part of the final sample. This led to many participants' completed surveys being left out due not completing one or two of the necessary four surveys. This repetitive process of completing the same surveys four times may have led to disinterest in completing them, or even answering with the same response each time.

Fourth, the number of completed surveys and the data may have been affected, particularly in the month of June, because the June P.E. and non-P.E. surveys were distributed in the last 4 weeks of the academic school year which may have led to less engagement and interest in completing the surveys.

Implications for Practice

DeMarillac Academy's holistic program invests not only in their students' educational success, but also their health and well-being. Based on the data and findings of the Physical Educational Program Evaluation survey tool, their current P.E. curriculum has had some positive effects on their student but could still benefit more with improvement, as the current CDC recommendation of physical activity for youth, ages 6 to 17, is an hour or more daily. Increasing the amount of moderate-to-vigorous physical activity (MVPA), has been shown in other studies to improve multiple and different outcomes in adolescents. Piloting an increased MVPA P.E. curriculum in each grade for a month or two during the middle of the school year, rather than the end, and using the evaluation survey tool to measure changes in students' physical, mental,

emotional, and social health and well-being could more accurately assess and determine how positive their P.E. lessons affect the students of DeMarillac Academy.

Directions for Future Research

The findings of this study suggest that future research should explore physical activity levels in the physical education classes and measure the positive effects it has not only on children and adolescents' physical health and well-being, but also their mental, emotional, and social. Developing a standardized scale to distribute, recruiting a larger and racially/ethnically diverse sample size with multiple grade levels (elementary, middle, and high school), and piloting multiple P.E. curriculums (evidence-based and new) is recommended. This research study implies that creating a way to measure Physical Education curriculum effects on students has the potential to improve children and youth's health and well-being in the school-setting by allowing schools and school districts to accurately assess P.E. modifications.

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Appendices

Appendix A.

<u>P.E. & No P.E. Day Student Surveys</u>	
Running	1) Today, I enjoyed running and/or playing.
Stress	2) Today, I felt stressed.
Grades	3) I believe I can get good grades in my classes.
Focus/Listening	4) Today, I was focused and listening in school.
Anxiety1	5) Today I got really worried, and my heart started to beat really fast.
Anxiety2	6) When I have a problem, I feel shaky or nervous.
Depressive1	7) Today, I felt sad and down.
Interest	8) I was not interested in doing things today.
Depressive2	9) I feel that I have a number of good qualities.
Happy	10) Today, I felt good and happy.
GreatDay	11) Today, I had a great day.
Respect	12) Today, I treated my classmates and peers with respect and care.
*EnjoyPE	13) Today, I enjoyed having P.E.
*Exercise	14) On a scale from 1 (very light) to 5 (extremely hard), how hard did you exercise in P.E. and/or Recess today?
<i>*Questions 13 & 14 included only in P.E. Day Survey</i>	
Response Options - Definitely No, Maybe No, Maybe Yes, Definitely Yes	

P.E. & No P.E. Day Student Surveys: This survey is adapted from multiple scales and items to measure students' outcomes of physical, mental, emotional, and social health and well-being.

Appendix B.

Survey Variable	April				June			
	No PE Mean	(SD)	PE Mean	(SD)	No PE Mean	(SD)	PE Mean	(SD)
<i>Running</i>	3.45	0.75	*3.69	0.53	3.52	0.79	*3.39	0.70
<i>Grades</i>	3.58	0.50	3.36	0.82	3.58	0.66	3.52	0.67
<i>Focus/Listening</i>	3.58	0.71	3.69	0.47	3.49	0.67	3.58	0.56
<i>Anxiety1</i>	2.00	0.94	1.61	1.06	1.69	1.02	1.64	0.89
<i>Anxiety2</i>	*2.79	0.99	*2.36	0.99	2.42	1.06	2.39	1.14
<i>Depressive1</i>	*1.82	0.85	*1.39	0.75	*1.61	0.86	*1.24	0.44
<i>Interest</i>	2.33	0.96	1.85	1.06	2.03	0.98	2.09	1.04
<i>Depressive2</i>	3.42	0.87	3.27	0.80	3.58	0.61	3.39	0.70
<i>Happy</i>	*3.27	0.67	*3.61	0.61	3.67	0.48	3.55	0.62
<i>GreatDay</i>	3.33	0.59	3.48	0.76	3.58	0.56	3.49	0.62
<i>Respect</i>	3.82	0.39	3.73	0.52	3.73	0.45	3.64	0.55
<i>Stress</i>	*2.18	1.13	*1.61	0.83	2.15	1.12	1.79	0.99
<i>EnjoyPE</i>			3.61	0.79			3.46	0.56
<i>Exercise</i>			2.94	1.06			2.97	1.02

Note: * denotes significant two-tailed p -value < 0.05

Table 1: Means & Standard Deviations of Survey Variable Responses: April & June

Appendix C.

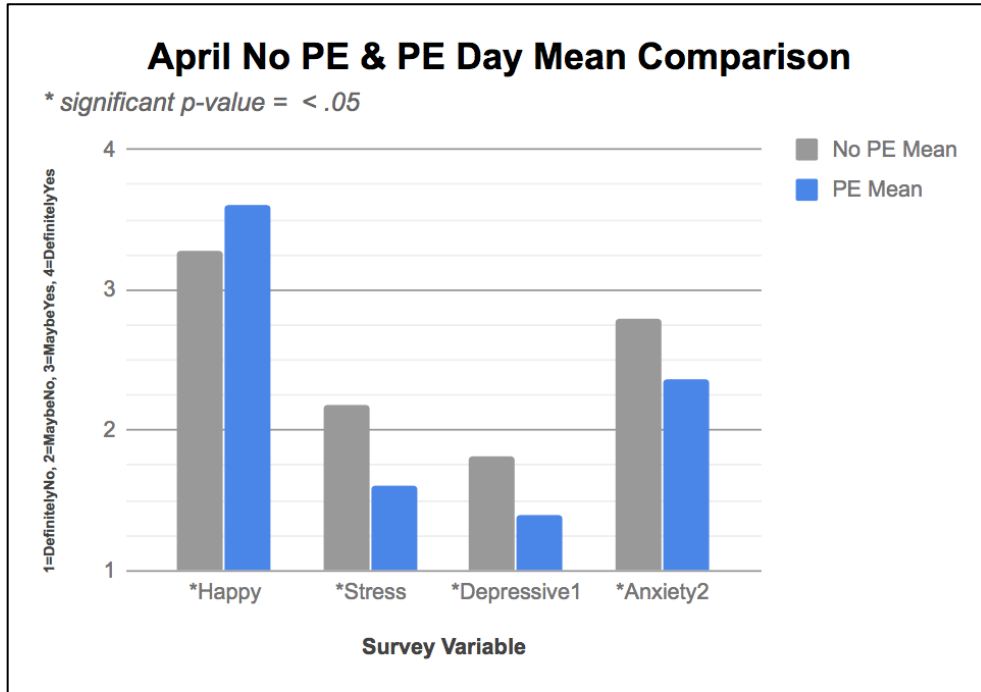


Figure 1: April No PE & PE Day: Mean Comparison. This graph compares students' average response on no PE and PE days in the month of April to the Happy, Stress, Depressive1, and Anxiety2 survey variables.

Appendix D.

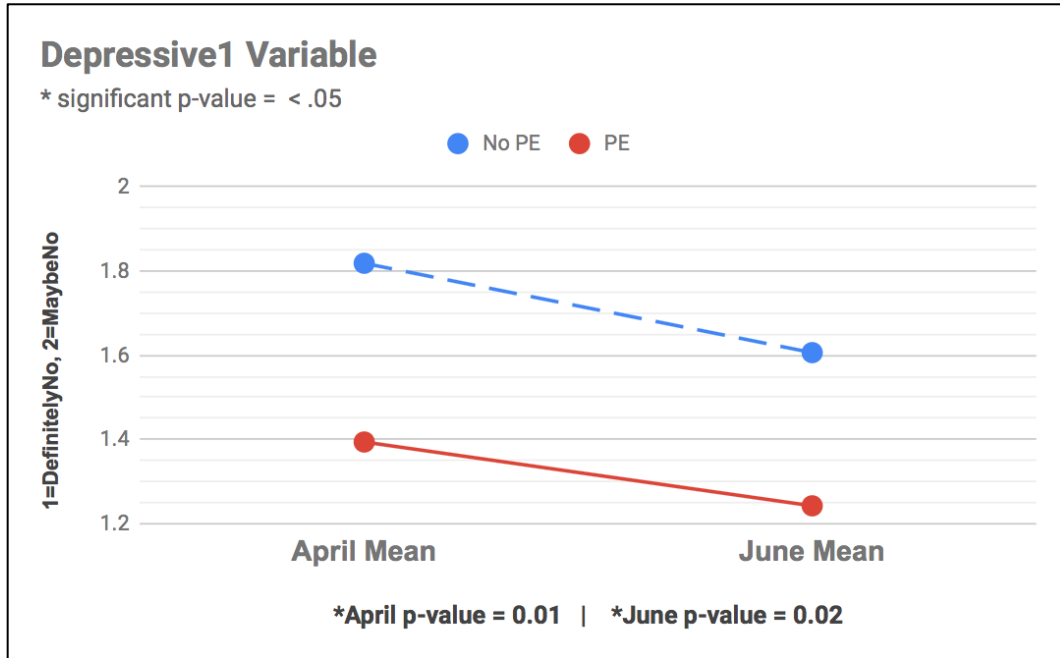


Figure 2: *Depressive1 Variable.* This graph illustrates students' average response to the *Depressive1* survey variable on no PE and PE days in the month of April and June.

Appendix E.

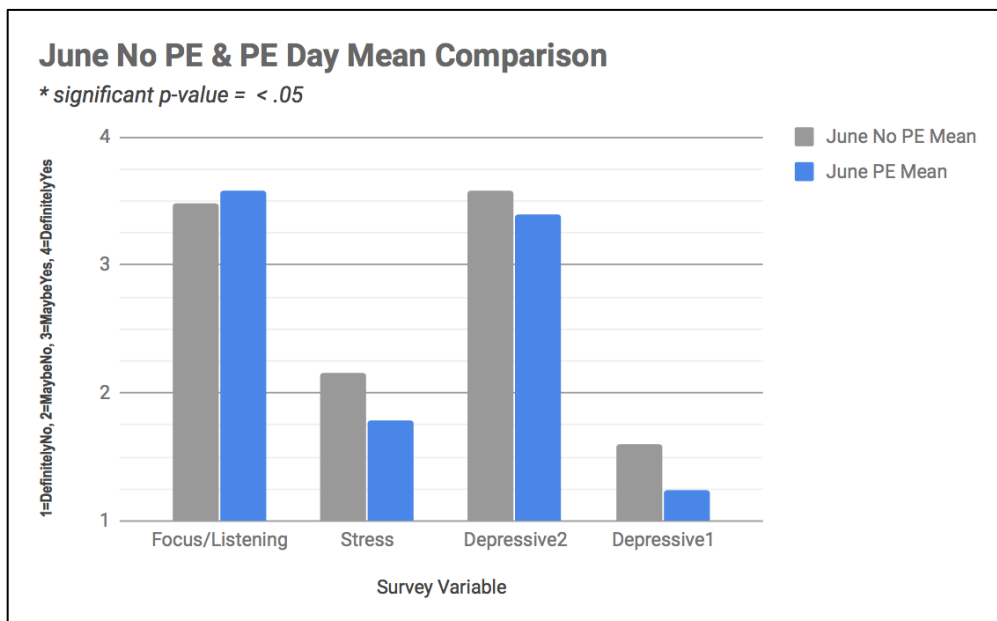


Figure 3: *June No PE & PE Day: Mean Comparison.* This graph compares students' average response on no PE and PE days in the month of June to the *Focus/Listening*, *Stress*, *Depressive2*, and *Depressive1* survey variables.

Appendix F.

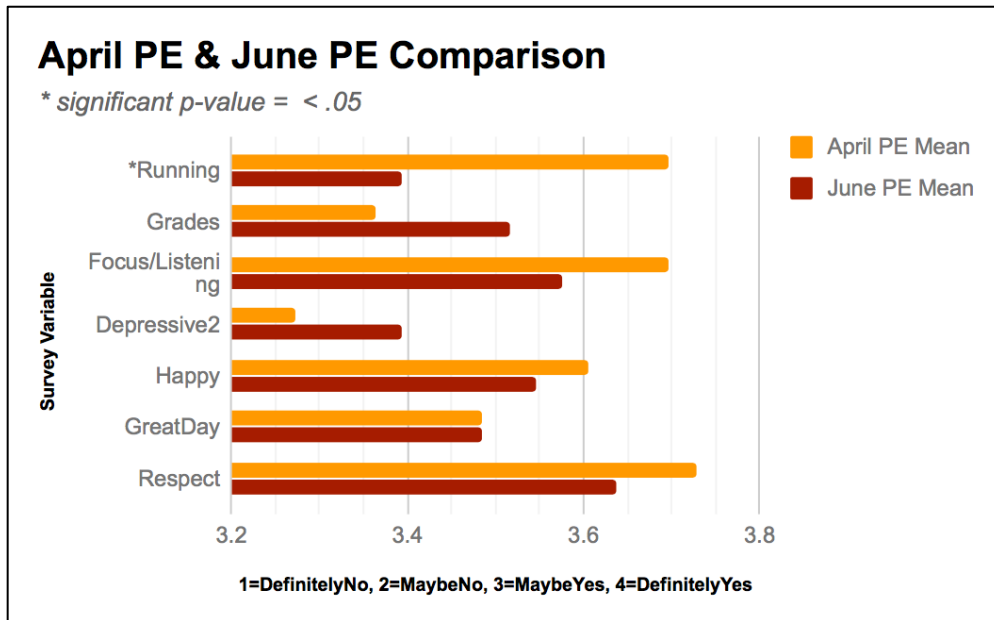


Figure 4: April PE & June PE Comparison. This graph compares students' average response on PE days in the month of April and June to the Running, Grades, Focus/Listening, Depressive2, Happy, GreatDay, and Respect survey variables.

Appendix G.

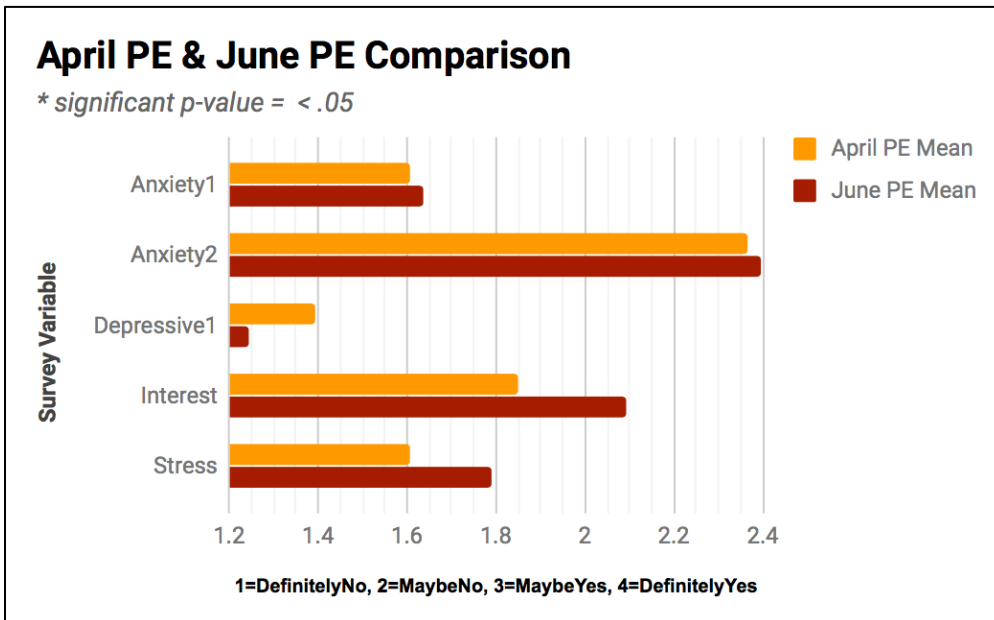


Figure 5: April PE & June PE Comparison. This graph compares students' average response on PE days in the month of April and June to the Anxiety1, Anxiety2, Depressive1, Interest, and Stress survey variables.

Appendix H.

Survey Variable	Female Students				Male Students			
	No PE Mean	(SD)	PE Mean	(SD)	No PE Mean	(SD)	PE Mean	(SD)
<i>Running</i>	3.45	0.85	3.55	0.68	3.49	0.77	3.55	0.64
<i>Grades</i>	3.58	0.64	3.40	0.74	3.58	0.58	3.44	0.75
Focus/Listening	3.50	0.75	3.65	0.53	3.53	0.68	3.64	0.52
<i>Anxiety1</i>	2.05	1.04	1.80	1.09	1.85	0.98	1.62	0.97
<i>Anxiety2</i>	2.63	1.06	2.45	1.11	2.61	1.04	2.38	1.06
<i>Depressive1</i>	*1.80	0.99	*1.30	0.61	1.71	0.86	1.32	0.61
<i>Interest</i>	2.10	0.90	2.05	0.99	2.18	0.98	1.97	1.05
<i>Depressive2</i>	3.34	0.84	3.15	0.83	3.50	0.75	3.33	0.75
<i>Happy</i>	3.45	0.59	3.58	0.68	3.47	0.61	3.58	0.61
<i>GreatDay</i>	3.48	0.64	3.55	0.68	3.46	0.59	3.48	0.68
<i>Respect</i>	3.78	0.42	3.70	0.56	3.77	0.42	3.68	0.53
<i>Stress</i>	*2.40	1.11	*1.70	0.82	2.17	1.12	1.69	0.91
<i>EnjoyPE</i>			3.48	0.75			3.53	0.68
<i>Exercise</i>			2.90	1.03			2.96	1.03

Note: * denotes significant two-tailed p-value < 0.05

Table 2: Means & Standard Deviations of Survey Variable Responses: Female & Male Students

Appendix I.

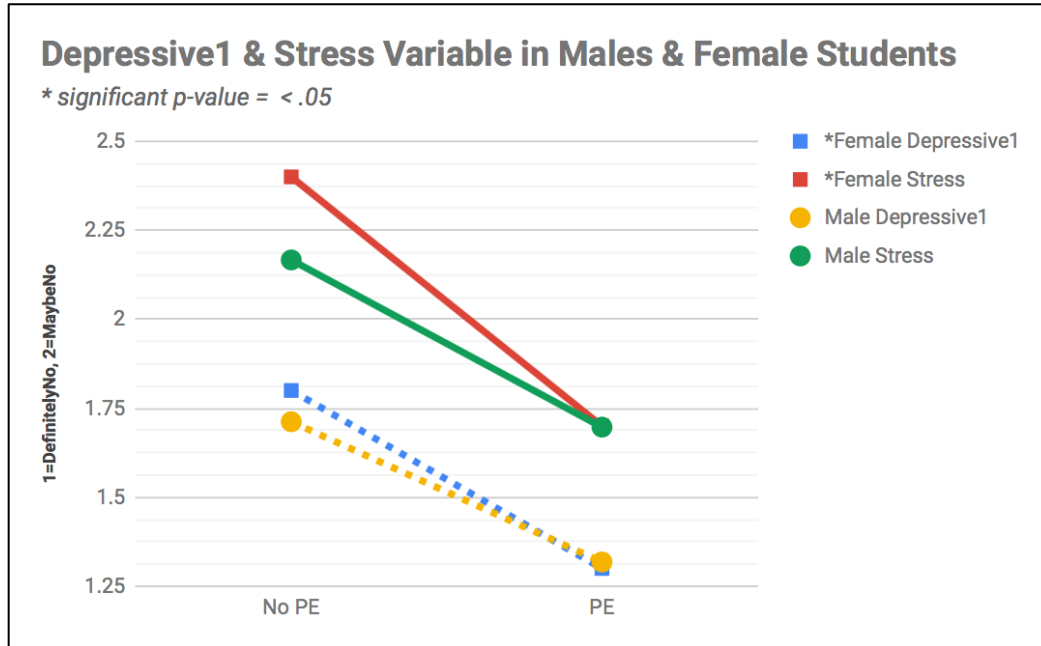


Figure 6: *Depressive1 & Stress Variable in Males & Female Students.* This graph illustrates female and male students' average response on no PE and PE days in the month of April and June to the Depressive1 and Stress survey variables.

Appendix J.

Survey Variable	5 th Grade				6 th Grade				7 th Grade			
	No PE Mean	SD	PE Mean	SD	No PE Mean	SD	PE Mean	SD	No PE Mean	SD	PE Mean	SD
Running	3.67	0.53	3.69	0.47	3.43	0.85	3.63	0.63	3.13	1.02	3.13	0.81
Grades	3.52	0.65	3.36	0.83	3.71	0.48	3.50	0.76	3.56	0.51	3.56	0.51
Focus/Listening	3.72	0.61	3.78	0.42	3.71	0.47	3.79	0.43	2.94	0.68	3.19	0.54
Anxiety1	1.58	0.97	1.53	0.91	2.21	0.80	2.29	1.27	*2.13	1.02	*1.25	0.45
Anxiety2	2.50	1.08	2.33	1.01	2.93	0.99	2.93	0.99	*2.56	0.96	*2.00	1.09
Depressive1	1.36	0.54	1.19	0.47	*2.29	1.07	*1.50	0.85	*2.00	0.89	*1.44	0.63
Interest	1.83	1.00	1.50	0.81	2.49	0.94	2.36	1.08	2.75	0.58	2.69	1.01
Depressive2	3.67	0.53	3.53	0.65	3.57	0.65	3.14	0.66	3.06	1.06	3.06	0.93
Happy	3.69	0.52	3.78	0.42	3.43	0.65	3.43	0.85	3.00	0.52	3.25	0.58
GreatDay	3.61	0.49	3.58	0.69	3.50	0.76	3.50	0.76	3.06	0.44	3.25	0.58
Respect	3.92	0.28	3.83	0.38	3.79	0.43	3.71	0.61	3.44	0.51	3.31	0.60
Stress	1.67	0.89	1.53	0.81	2.50	1.16	2.00	0.88	*3.00	0.97	*1.81	1.11
EnjoyPE			3.64	0.64			3.43	0.76			3.38	0.72
Exercise			2.81	1.06			3.29	1.07			3.00	0.89

Note: * denotes significant two-tailed p-value < 0.05

Table 3: *Means & Standard Deviations of Survey Variable Responses: 5th, 6th, & 7th Grade*

Appendix K.

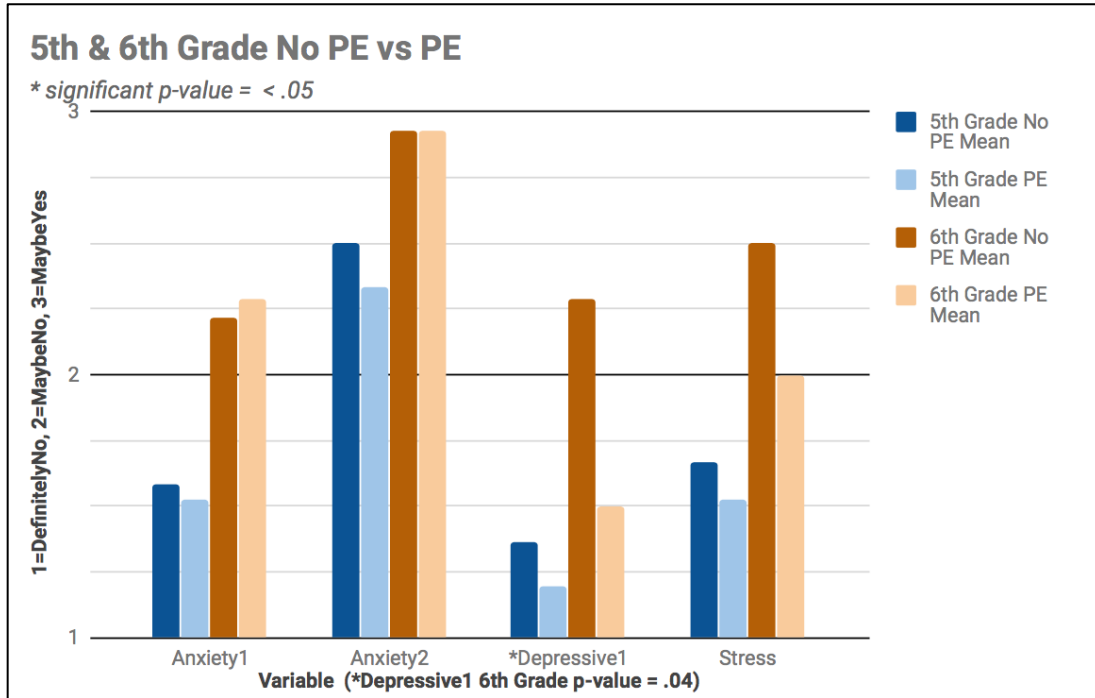


Figure 7: 5th & 6th Grade No PE vs PE. This graph compares 5th and 6th grade students' average response on no PE and PE days in the month of April and June to the Anxiety1, Anxiety2, Depressive1, and Stress survey variables.