

## Changes in student attitude toward physical education across a unit of instruction

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### Abstract:

Purpose: The purpose of this study was to measure potential changes in student attitude toward physical education (PE) over a period of 6 weeks while students participated in physical education class that included a fitness unit. Method: Students' attitude toward PE was measured through pre- and posttests. Participants ( $N=221$ ) were from six schools and split between 6<sup>th</sup> ( $N=74$ ), 7<sup>th</sup> ( $N=63$ ), and 8<sup>th</sup> ( $N=84$ ) grades. A total of 115 boys, and 106 girls participated. Results: Students' attitudes were positive overall, yet declined by age. Although attitude did not differ significantly by gender, enjoyment showed a significant interaction for time by gender. Changes were observed in attitude sub-factors over the course of the unit. Discussion: Results showed that attitude changed differentially in boys and girls over the course of six weeks. This was the first study to measure student attitude toward PE across time (length of a unit).

**Key words:** physical activity, curriculum, middle school, education.

### Introduction

Physical education is a required subject throughout the globe (Constantinides, Montalvo & Silverman, 2013). Although a requirement in several countries and the known benefits of physical activity much improvement in its' application is needed. It is clear that countries such as the USA and many others, are in the midst of an obesity epidemic (Kohl & Cook, 2013) that has youth Physical Activity (PA) levels below recommended amounts (DHHS, 2008; Kohl & Cook, 2013; NASPE, 2012). Physical activity levels also decline with age (Sallis, 2000). Interestingly, this pattern of declining physical activity levels follows the same pattern and age range when student attitudes toward physical education have been shown to begin their decline (Bernstein, Phillips, & Silverman, 2011; Ramsey, 2012; Rikard, 2006; Subramaniam & Silverman, 2007). This study was one of the first physical education studies to examine the potential change in student attitudes across time (a unit of instruction).

Physical education has an important role in providing physical activity to children globally (World Health Organization, 2004; NASPE 2010). Much of the aim of physical education is to teach children healthy habits that will enable them to become physically active for life. Students, globally, are expected to learn skills that can be used throughout their lives in physical activity. Although physical education may have different curricula and activities in different countries, the goals of physical education are fairly consistent and physical education is provided in a similar fashion in schools across the globe. So although students may have different experiences in PE around the world, it is still present in their lives no matter where they go to school.

Attitude is often considered to be at the forefront of what controls our behavior and is a factor in just about every school subject across the curriculum. Research on attitude has been conducted across the curriculum in a variety of subjects. Some examples include: (a) examining students' attitudes toward science (Osborne, Simon, & Collins, 2003); (b) studying students' attitude toward mathematics and its' role in achievement (Ma, & Kishor, 1997); (c) looking at students' attitudes about assessment and how that plays into their approaches to learning and studying (Struyven, Dochy, Janssens, 2005) and; (d) assessing teachers attitude toward using technology as an instructional tool (Mumtaz, 2000) just to name a few. Attitude permeates all subject matter across the educational curriculum and research on attitude spans several decades. These past research studies have looked at attitude in a myriad of ways including a variety of theoretical outlooks, but this paper focuses more specifically on attitude within physical education.

Much of the attitude research in physical education is driven by Ajzen and Fishbein's theory of planned behavior (Ajzen & Fishbein, 1977). It is guided by the simple idea that attitude affects behavior. The theory revolves around the premise that the intent to perform an action or behavior is contingent on the person's attitude toward that action or behavior (Ajzen, 1991). Furthermore the subjective norm, the level of social pressure a person has to perform or not perform a behavior, can be a predictor of attitude. (Ajzen, 1991). The subjective norm is filtered through a person's knowledge. For example, a person might not necessarily enjoy the act of running but that person might know through the media or newspapers that exercise and regular activity is

beneficial to their body and choose to exercise. Conversely a person might enjoy exercise and know that it is good for her but she is in a relationship with a partner who does not enjoy it and prefers to sit on the couch and watch TV and therefore stays inactive. Finally, a person's perceived behavioral control is the third antecedent of intention and refers to the person's perceived ease or difficulty in completing the task.

A person can have a negative attitude (e.g., despising physical activity) or a positive attitude (e.g., enjoying physical activity). The person's attitude can also be anywhere between those polar opposites. Attitude has been shown to be malleable (Eagly & Chaiken, 1993), but it is not easy to change one's attitude. Since attitude can change, understanding how it can be changed and to what extent, can provide information to teachers and researchers to enhance attitude or promote the attitude object, in this case physical activity.

There is value in attempting to change attitude toward physical education in youth. Past research has suggested that a school-based intervention may affect attitude. During a year-long study Digelidis, Papaioannou, Lapidis, and Christodoulidis (2003) found that school environment and motivational climate can have an affect on student attitude. If we can learn what impacts student attitude and how that relates to attitudes toward physical education and physical activity we will better understand how to help children develop positive attitudes that will affect their lifetime physical activity patterns.

Research on gender differences in attitude toward physical education have been mixed. Reasons for attitude decline include a lack of interest in the activities offered, mandatory clothing, and physical educators' attitudes. Although there is much discourse surrounding girls' dropout rates from physical education or their perceived disinterest in sport and physical activity many were actually involved in a range of physical activities outside of the school setting and defined themselves as active (Flintoff & Scraton, 2001). In general, researchers urge that more attention be paid to specific subgroups, such as girls, to increase their positive attitudes toward PE (Prochaska et al., 2003). Research to date shows conflicting results in tracking student attitude toward PE within gender (Subramaniam & Silverman, 2007).

Overall, student attitude toward physical education has been found to be moderate to high in various parts of the world and across a variety of curricula (Silverman, in press). However, there are various factors that can have an impact on attitude. Student attitude can be affected by the classroom environment (e.g., playgrounds, open spaces, recess, standardized PE curricula) and teacher behavior (Subramaniam & Silverman, 2007). Furthermore, students' attitudes may decline as a function of a curriculum that consists of repetitive activities or a lack of challenge leading to a boring PE experience ((Bernstein, Phillips, & Silverman, 2011; Dismore & Bailey, 2011; Subramaniam & Silverman, 2007).

Evidence from past research shows a decline in student attitude toward PE as students get older. Student attitude can change but research has not examined attitude change during the span of a unit of instruction. Since attitude often is considered to control everything we do (Silverman & Subramaniam 1999), it is crucial to monitor potential changes in attitude and first to see if attitude can change across a relatively short time frame.

Although student attitude begins its decline around the same age when PA levels drop, no study to date has examined how attitude changes across time. Therefore, it was the aim of this study to examine if student attitude indeed is malleable and fluctuates in a relatively short period such as an instructional unit. To date no other research has examined student attitude in a pretest posttest model, therefore we do not know if attitude is malleable in this short period. We hypothesized that attitude can indeed change in a short period of time and may change differentially by sex and age.

## Material & methods

### *Participants and Setting*

A total of 221 students participated (106 girls) and produced data for the study and therefore were included in the final data analysis. Initially 258 students began the study, but 37 were dropped due to insufficient readings for PA (measures used for a larger study), questionable and/or invalid scores, or the inability to understand and read English to answer the questions on the student attitude instrument. The mean age of participants was 11.96 ( $\pm 0.94$ SD). Students ranged from 6<sup>th</sup> ( $N=74$ ), 7<sup>th</sup> ( $N=63$ ), to 8<sup>th</sup> ( $N=84$ ) grade. There were 136 white and 85 non-white students in the study (31 Latino, 3 black, 42 Asian, 1 Pacific Islander, 8 mixed-race). The study consisted of 12 classes (labeled 3-14). This study gained approval through the university IRB.

These data are part of a larger study that tracked PA levels and collected qualitative data on student and teacher perceptions of physical education in 12 different physical education classes, in grades 6, 7, and 8 in the suburbs of a large city. The study consisted of students wearing accelerometers (MOVbands) over 6-weeks as well as a measurement of students' attitudes toward physical education, which are presented here. During the 6-weeks, students participated in a fitness unit whose focus was on teaching students fitness knowledge while integrating aspects of math and English language arts with the goal of the unit being to enable students to have his or her own fitness plan and understand what an active day is for them. Due to the exploratory nature of this study we chose to not utilize a control group as the goal was to monitor potential attitude change over a 6-week period, which is a typical length of a unit in PE.

The schools in this study were public schools and consisted of two K-6 elementary schools, one 6<sup>th</sup> grade only school, and three grade 7-12 schools with a combined middle and high school campus. All schools had the use of a gymnasium, outside space and sufficient materials to teach lessons that the teacher chose to

teach. Schools were located in various different socioeconomic areas around a major metropolitan city in the Northeast USA. Teachers were split evenly by gender with six males and six females. All teachers were certified physical educators with a range of teaching experience from a first year teacher to a teacher with 35 years teaching experience that resembles a realistic spread of experience in a school district.

#### *Instrumentation*

*Attitude instrument.* Student attitude was measured using the SAtPE instrument that has been shown to provide valid and reliable scores in this population (Subramaniam & Silverman, 2000). This instrument analyzes attitude as two-component view (cognitive and affective). For a detailed discussion and specific reliability and validity data of the instrument see Subramaniam & Silverman, 2000. This instrument was administered before the beginning of the study to obtain baseline measures and again after the implementation of the fitness unit. Total attitude has a maximum score of 100, the instrument is then broken down to two factors (enjoyment and usefulness) with maximums of 50 each and further broken down into 4 sub-factors worth 25 each (Enjoyment Curriculum, Enjoyment Teacher, Usefulness Curriculum, Usefulness Teacher).

*Instructional unit.* All students participated in a unit of instruction for 6 weeks. The unit consisted of a 12-lesson fitness-based unit broken into three themes. The basis behind the unit was to deliver fitness-based knowledge while integrating academic subjects into a unit of instruction and empowering students to make his or her own plan for fitness. In addition, information and data from accelerometers (MOVbands) were used in the lessons. Data were used to set goals for physical activity, monitor activity levels by teaching students how to analyze and interpret graphs as well as how to understand averages and other mathematical terms.

Throughout the unit, the teacher implemented his or her own general topic of teaching and supplemented that unit with physical activity instruction. The additional unit acted as an umbrella over the teachers regularly selected unit plan, not in place of one. This meant that the teacher was not forced to augment his or her unit plans to teach the unit. They were provided support to supplement their original lessons with fitness knowledge and the integration of technology. The main aspects of the physical activity unit were delivered in the introduction and closure of the lessons where fitness terms were introduced and class discussion was held. The middle part of each lesson followed the plans set forth by the teacher according to his or her unit planning.

The theory of Planned Behavior was integrated into the unit by attempting to educate the student about fitness principles and then put a bit of social pressure on the student through access to the MOVband database, and finally by trying to increase the students' perceived behavioral control as they developed their own plan for fitness. Once the lesson plans were complete, the unit was pilot tested with a teacher and two eight-grade classes. Changes to the lesson plans were made based on pilot testing and feedback from the teacher and university professors. Throughout the development phase there were multiple iterations of the unit.

#### *Data Analysis*

Results from the SAtPE instrument were entered into Microsoft Excel, double-checked, and then imported to SPSS for data analysis. The instrument scores were reverse coded for negative items to ensure that valid and reliable data were being entered. Questionnaires that were deemed flawed (e.g. a student simply filled in all "5" for the answers) were discarded and not included in the final analyses.

Demographic variables were summarized using SPSS for all questions on the demographic information sheet (gender, race, age, class, school, participation in outside sports). Descriptive statistics were calculated for the SAtPE instrument subscales for the entire sample, by class, and for males and females. The data were then reduced to the class level. Although individual students' scores were being recorded, the unit of analysis for inferential statistics was the class (Silverman & Solmon, 1998).

Pretest attitude, and then separately posttest attitude data, were analyzed in three steps using individual level data to get overall attitude measures for baseline. First an ANOVA was performed on Total Attitude by Grade and Gender. Then a MANOVA was performed on Total Usefulness and Total Enjoyment. And third, a MANOVA was conducted on the four sub-factors of the attitude instrument. Significant MANOVAs were followed by stepwise discriminant function analysis (DFA) to identify which variables were responsible for the significant differences. An analysis of variance (ANOVA) was performed on the first variable to enter the DFA (Stevens, 2009). Repeated measures analyses were performed by gender and time (pretest, posttest). A repeated measures ANOVA was conducted for total attitude measures by Gender and Time for pretest and posttest attitude tests using class-level data. A repeated measures MANOVA was conducted with the total enjoyment and total usefulness as dependent variables. Another repeated measures MANOVA was calculated using the scores for the four sub-factors of the SAtPE instrument as dependent variables and gender and time as the independent variables. MANOVAs were followed up with pairwise comparisons with a Bonferroni adjustment.

#### **Results**

Total attitude declined significantly from the pretest to the posttest [ $t(11)=2.23$ ,  $p<.05$ ,  $\eta^2= .18$ ], however there were no significant effects by gender. Average pretest (Found in Table 1) and posttest (Found in Table 2) student attitude scores by class were positive overall. Scores ranged from a high of 91.19 (SD=10.37)

which occurred in an all-sixth grade classroom (Class 5) to a low of 64.07 (SD=14.13) which occurred in an all eighth grade classroom in the pretest and a high of 90.56 (SD=11.02) (sixth grade class) to a low of 61.08 (SD=15.26) (eighth grade class) in the posttest. Total attitude also differed significantly by grade in pretest results [ $F(2,182)=11.71, p<.001, \eta^2= .11$ ], similar patterns were noted in posttest results [ $F(2,182)=8.68, p<.001, \eta^2= .08$ ]. Follow-up Student-Newman-Kewls post hoc tests showed that all grades were significantly different ( $p<.05$ ) from each other with attitude decreasing as students got older.

Total Usefulness and Total Enjoyment had relatively large ranges of scores for different classes. Similar large ranges were found in the four sub-factors. The posttest results mirrored the pretest results and showed large ranges in Total Usefulness and Total Enjoyment. Large ranges were also found in the sub-factors by class. Detailed results can be found in Tables 1 and 2.

Table 1. Pretest Student Attitude by Gender

Gender	CU	CE	TE	TU	Total Enjoyment	Total Usefulness	Total Attitude
Male	19.58	20.51	20.11	19.4	40.62	38.85	79.23
	4.827	3.763	3.277	3.748	6.146	8.212	14.021
	107	110	105	102	104	97	92
Female	18.51	19.67	19.56	19.57	39.18	38.1	77.07
	4.454	3.576	3.727	4.469	6.711	7.952	13.744
	98	104	102	104	102	98	96
Total	19.07	20.1	19.84	19.49	39.91	38.47	78.13
	4.672	3.688	3.508	4.119	6.457	8.07	13.886
	205	214	207	206	206	195	188

Note for all tables: CU=Curriculum Usefulness, CE=Curriculum Enjoyment, TE= Teacher Enjoyment, TU=Teacher Usefulness. Scores are the mean, followed by standard deviation on the second line and N on the third line for each section.

Table 2. Posttest Student Attitude by Gender

Gender	CU	CE	TE	TU	Total Enjoyment	Total Usefulness	Total Attitude
Male	18.94	19.33	19.09	18.26	38.42	37.11	75.56
	5.245	4.683	4.081	4.913	8.299	9.701	17.76
	104	104	102	99	102	99	97
Female	18.93	19.47	19.85	18.83	39.46	37.57	77.02
	4.602	4.424	3.918	4.833	7.672	9.038	15.835
	95	98	96	96	96	93	91
Total	18.93	19.4	19.46	18.54	38.92	37.33	76.27
	4.936	4.548	4.011	4.87	7.998	9.364	16.827
	199	202	198	195	198	192	188

Scores for total attitude were similar for boys and girls at both the pretest and the posttest and were mostly positive for both genders (See Figure 1). Although overall total attitude scores declined from the pretest to the posttest for boys, the girls scores remained virtually identical as noted in the tables 1 and 2. Individual class-level pretest total attitude ranged from a high of 95.18 (SD=6.82) to a low of 62.17 (SD=12.55), while in the posttest the class-high was 94.69 (SD=7.38) and the low was 41.8 (SD=7.14). Scores for Total Usefulness and Total Enjoyment had wide ranges by gender.

Total Enjoyment in the pretest results also showed wide ranges with class-wide scores. The posttest results for Total Usefulness showed similar ranges for boys and girls although overall for Total Enjoyment, mean scores for boys declines whereas girls actually increase slightly from the pretest to the posttest (see figure 2). Similar trends can be found in the four sub-factors where boys declined on factors such as Curriculum Usefulness whereas girls actually rose slightly from the pretest to the posttest.

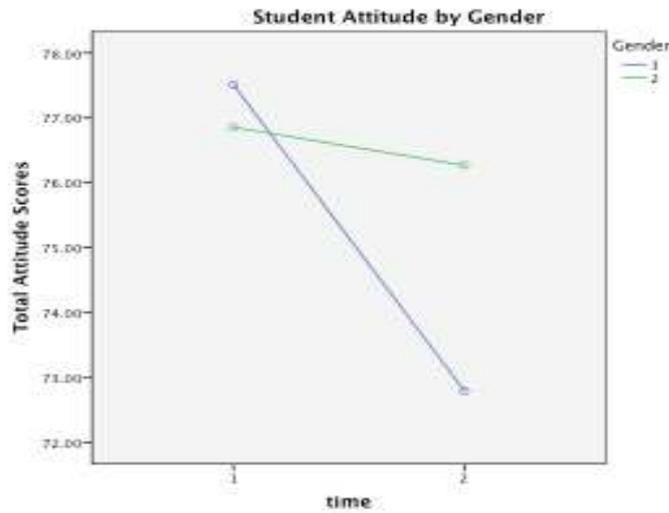


Fig. 1. Total attitude scores from pre to posttest for male and female.

Table 3. Pretest Student attitude by grade

Grade	CU	CE	TE	TU	Total Enjoyment	Total Usefulness	Total Attitude
6th	20.88	21.51	20.85	20.73	42.36	41.61	83.97
	3.47	3.164	3.57	3.38	6.14	6.28	11.94
	59	59	59	59	59	59	59
7th	19.25	19.54	20.16	19.95	39.7	39.2	78.89
	4.65	3.84	3.73	4.82	6.63	7.69	13.09
	56	56	56	56	56	56	56
8th	17.18	19.03	18.68	17.93	37.71	35.11	72.82
	5.16	3.86	3.11	3.87	6.33	8.57	14.07
	73	73	73	73	73	73	73
Total	18.93	19.4	19.46	18.54	38.92	37.33	76.27
	4.936	4.548	4.011	4.87	7.998	9.364	16.827
	199	202	198	195	198	192	188

Table 4. Posttest Student attitude by grade

Grade	CU	CE	TE	TU	Total Enjoyment	Total Usefulness	Total Attitude
6th	20.3	21.08	20.33	20.39	41.41	40.69	82.09
	4.17	3.4	3.73	4.13	6.75	7.9	14
	64	64	64	64	64	64	64
7th	19.43	19.21	19.38	18.3	38.58	37.74	76.32
	4.7	5.23	4.57	5.06	9.36	9.3	18.21
	53	53	53	53	53	53	53
8th	17.43	18	18.46	17.17	36.46	34.52	70.97
	5.32	4.45	3.77	4.65	7.59	9.21	16.56
	71	71	71	71	71	71	71
Total	18.93	19.4	19.46	18.54	38.92	37.33	76.27
	4.936	4.548	4.011	4.87	7.998	9.364	16.827
	199	202	198	195	198	192	188

**Total attitude by gender pretest to posttest (Class-level data)**

A repeated measures ANOVA was conducted with Gender and Time (pretest, posttest) as independent variables and Total Attitude scores as dependent variables. Class-level data were used on these analyses. Results showed there was a significant main effect of time [ $F(1,19)=7.82, p<.05, \eta^2= .29$ ]. There was also a time by gender interaction [ $F(1,19)=4.75, p<.05, \eta^2= .20$ ] (See Figure 1). There was no significant main effect of gender on total attitude [ $F(1,19)=.11, p>.05$ ]. Pairwise comparisons with a Bonferroni adjustment showed that girls and boys did differ in their scores from the pretest to the posttest with both dropping over time but boys (77.51 (SD=10.40) to 72.79 (SD=13.10)) declining more rapidly ( $p<.05$ ) compared to girls (76.85 (SD=7.27) to 76.26 (SD=8.46)).

**Enjoyment and usefulness by gender pretest to posttest**

A repeated measures MANOVA test was performed for Total Enjoyment and Total Usefulness with Gender and Time as independent variables and scores for Enjoyment and Usefulness as dependent variables. Results showed a significant main effect of time [Wilk's Lambda=.69,  $F(2,18)=4.02, p<.05, \eta^2= .31$ ] and a significant time by gender interaction [Wilk's Lambda=.70,  $F(2,18)=3.84, p<.05, \eta^2= .30$ ]. Follow-up pairwise

comparisons with a Bonferroni adjustment were significant. Univariate tests on the significant main effect of time showed that both Enjoyment [ $F(1,19)=6.18$ ,  $p<.05$ ,  $\eta^2=0.25$ ] and Usefulness [ $F(1,19)=6.44$ ,  $p<.05$ ,  $\eta^2=.25$ ] were significantly different. Total Usefulness declined in boys (pre=37.71 (SD=5.83); post=35.52 (SD=6.95)) and girls (pre=37.99 (SD=4.46); post=37.25 (SD=4.88)) from the pretest to the posttest. The time by gender interaction showed that boys dropped significantly [ $F(1,19)=8.07$ ,  $p<.05$ ,  $\eta^2=.29$ ] on Total Enjoyment (see Figure 2) whereas girls stayed virtually identical from the pretest to the posttest on that measure, thus accounting for the interaction. Boys' Enjoyment scores declined from the pretest (40.12 (SD=4.19)) to the posttest (37.15 (SD=6.25)) whereas girls' scores (38.88 (SD=3.13)) barely changed from pretest to the posttest (39.08 (SD=4.22)).

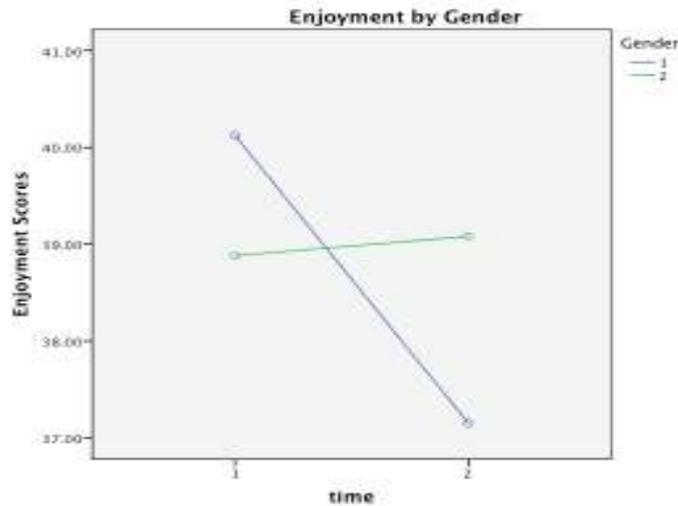


Fig. 2. Total enjoyment scores for male and female for pretest and posttest.

**Four sub-factors by gender pretest to posttest.** A repeated measures MANOVA was performed on the four sub-factors of the attitude instrument with gender and time as the independent variables and the scores for the four sub-factors as dependent variables. Results did not show a significant main effect of gender [Wilk's Lambda=.93,  $F(4,16)=.31$ ,  $p>.05$ ,  $\eta^2=.07$ ] nor was there a significant main effect of time [Wilk's Lambda=.65,  $F(4,16)=2.12$ ,  $p>.05$ ,  $\eta^2=.35$ ]. There was, however, a time by gender interaction [Wilk's Lambda=.56,  $F(1,19)=3.18$ ,  $p<.05$ ,  $\eta^2=.44$ ]. Univariate tests on the interaction showed Curriculum Usefulness (CU) [ $F(1,19)=5.04$ ,  $p<.05$ ,  $\eta^2=.21$ ] and Teacher Enjoyment (TE) [ $F(1,19)=9.65$ ,  $p<.01$ ,  $\eta^2=.34$ ] differ significantly from each other and follow the same trend where boys scores declined for CU (pretest=18.90 (SD=3.47) to posttest=17.95 (SD=3.60)) and for TE (pre=19.99 (SD=1.89), post=18.52 (SD=2.70)) while girls scores rose from pretest to posttest for CU (pretest=18.51 (SD=2.55), posttest=18.90 (SD=2.50)) and TE (pretest=19.30 (SD=1.55), posttest=19.64 (SD=2.13)).

## Discussion

The purpose of this study was to measure student attitude toward PE and potential changes that occur in student attitude over the course of 6 weeks, which is the length of a typical unit of instruction. Some of the results confirm prior research, such as attitude declining as students got older (Subramaniam & Silverman, 2007; Van Wersch et al., 1992). Other results added to the inconclusive research on gender and student attitude showing that students did not differ in attitude by gender overall (Subramaniam & Silverman, 2007). Attitude factors, however, did vary differently from the pretest to the posttest by gender in this study. Other sub-factors such as enjoyment declined for boys from the pretest to the posttest whereas girls' scores on enjoyment held steady to the end of the unit.

Using a pretest-posttest study design, in this case, had its benefits as it was able to shed more light on the effects of time on gender and attitude. Prior to this study, no other research utilizing a pretest-posttest study design had been implemented to measure changes in student attitude toward physical education. By analyzing various aspects of student attitude, we hoped to gain insight into the student experience in physical education. Overall the results of total attitude scores throughout this study show that, although class-wide scores varied widely (i.e., a standard deviation of 16.82 for posttest total attitude), students in this study, had overall positive attitudes toward physical education at this age. Total attitude scores were higher overall than previous research reporting scores on a similar age group and population using a larger study that showed a low of 70.28 (SD=16.99) and a high of 71.26 (SD=16.38) (Subramaniam & Silverman, 2007) and urban African-American middle school girls 58.20 (SD=8.10) and a high of 61.70 (SD=8.60) (Ramsey, 2012). The scores overall, appear similar due to the large standard deviations present in this and the other studies.

Moderate to high attitudes have also been found in similar populations around the globe. For instance, high attitudes were found in a group of Indian students (Kannan, 2011) and moderate to high attitudes were found in Turkish students (Koca & Demirhan, 2004). So, it seems that although countries have different traditions, games, and various levels of national curricula students have moderately high attitudes toward physical education in the countries where research has been completed. This specific study looked at attitude change over the course of an instructional unit in the U.S.A. It would be interesting to see if similar attitude change occurred in different parts of the world.

Results from this study show that total attitude scores decline as students get older, both in the pretest and posttest, but are not different by gender. Curriculum usefulness and curriculum enjoyment were the strongest predictors of the difference in attitude decline by age in the pretest and the posttest, respectively. Teachers and curriculum planners should consider the cumulative effect of curriculum and aim to make instructional units meaningful and relevant to students each year and avoid repetitive activities that students may find boring or useless (Bernstein, Phillips & Silverman, 2011; Subramaniam & Silverman, 2002). These data extend prior research on this topic (Dismore & Bailey, 2011; Subramaniam & Silverman, 2007) and document the decline in student attitude as age increases. Future research should look at the implementation and design of curricula that is designed to create an enjoyable experience for youth in physical education and not just focus on outcomes such as increasing physical activity alone.

Although total attitude declined from the pretest to the posttest, specific subgroups like girls stayed the same for enjoyment and curriculum-usefulness throughout the unit. It is clear that sub-groups changed differentially from the beginning to the end of the unit. Boys changed drastically, which show that attitude, may change differentially in sub-groups. Furthermore, the role of enjoyment has been highlighted in research (Bernstein, Phillips, & Silverman, 2011) in physical education and these data suggest that enjoyment played a big role in student attitude change. More research, however, in this area is warranted as total attitude declined from the pretest to the posttest. Furthermore, total enjoyment and total usefulness did not decline significantly from the pretest to the posttest for girls. This may suggest that although total attitude dropped significantly it was the result of the boys' attitude dropping more drastically, whereas the girls' attitude stayed relatively consistent.

Prior to this study, no study had looked at attitude change over a specific time such as a unit of instruction in physical education. Through the results in this study we can see that attitude is indeed malleable in a short time frame such as an instructional unit. The results of this study suggest a focus on interventions to potentially change attitude over the course of a unit. Since we know that attitude depends on several factors, including past experience, the field could begin to deliver instructional units that address declining attitudes in a variety of populations. Since we see that attitude changes differentially in boys and girls, we suggest that future units of instruction address young girls' needs in physical education to increase positive attitude and encourage them to continue participating in physical activity and physical education.

This unit of instruction was delivered over 6 weeks and consisted of written assignments and discussion delivered by the certified physical education teacher. The unit required more from the students than to just "play" or participate in physical activity. Depending on the strategy of the teacher to implement the required material, these assignments could take away from active time in the physical education class. These data suggest that the implementation of new curricula may have had an effect on student attitude and it effected boys and girls differently. Perhaps boys expected physical education time to be spent being physically active for the entirety of the class and to not spend time working on written assignments and discussion. This speaks strongly to the culture of traditional physical education across the USA and most of the world, whereas physical activity often is the core of the curriculum and written work is not implemented in most schools. Gender differences in attitude have also been found in other subjects across the curriculum. For instance, a review of research by Osborne (2003) cited that gender played a major role in students' attitudes toward science and deciding to pursue science coursework in school. The same study found that the proportion of males to females in science courses was higher in boys than girls. These gender differences and the disproportionate representation of women in science related fields has been explored in detail by Blickenstaff (2005). One can draw parallels between attitude declines in physical education and other subjects. There is clear decline in attitude as students get older in physical education and this drop is more prominent in girls (Silverman, in press). In related fields, such as science, females have been shown to drop out of the science field at various points whereas males have not dropped at the same rate (Blickenstaff, 2005). A lower attitude and negative early experiences in science have been culprits to a reduced representation of females in the field of sciences (Blickenstaff, 2005), a similar story could be told of physical education. In the physical education field, it has been shown that students' attitude can be related to behavioral intention to actually participate in physical activity (Silverman, in press). The area of student attitude and its' effect on participation levels of students, specifically girls, has been studied yet future research is needed to expand our understanding of this important topic.

Boys' and girls' attitudes reacted differently during the unit as suggested by the results (see Figure 1 and 2). Something may have happened during the implementation phase of the unit that affected attitude, and it affected boys and girls differently. Although girls' attitude scores did not decline significantly from the pretest to the posttest, boys did. This may suggest that girls are more open to change in units and alternate ways of learning

in PE than boys, or they may enjoy a unit that involves less MVPA (Fairclough, 2006). Since girls in classroom subjects seem to be more committed and organized with homework and coursework (Younger & Warrington, 1996), perhaps girls also have a more positive acceptance of homework in PE class. There is a notable lack of empirical research on the implementation of homework in physical education settings and future research should seek to explore the effects of homework on student attitude. Previous studies in physical education have not tracked attitude longitudinally across the implementation of a unit and therefore, it will be interesting to see future research begin to tease out the variables that may have had an effect on attitude, such as homework. Including homework and written work in physical education courses will become increasingly more relevant with the push for Common Core Standards for English language arts in the USA. Teachers must make a decision in the future on how to integrate reading and writing into their physical education curriculum to meet the requirements of the new standards. That decision will be either to assign it as homework and change the culture of traditional physical education or to assign the written work in class which would inevitably take away time from students' physical activity.

### Conclusions

When teachers repeat the same subjects year-after-year students often find physical education boring and it disassociates them from learning (Dismore & Bailey, 2011; Subramaniam & Silverman, 2007). There is a notable tug of war with students and teachers in implementing new and innovative units. Overall, attitude scores over the period of 6-weeks declined from the pretest to the posttest. Future research should examine how curricula could effect student attitude and what the effect of factors such as homework assignments given and greater focus on the technology has on attitude. We have yet to understand what role homework has on PE, as there is a notable absence of peer-reviewed literature on this topic in the field of physical education. If there is a struggle to implement small group discussion, written assignments, and the introduction of fitness concepts into physical education classes we should embrace that challenge. We should fight to change the culture to ensure our students are getting an adequate education and not just simply "working out" or "playing games."

Students' attitudes were positive overall and followed a trend that has been shown in prior research where attitude declines as students get older (Subramaniam & Silverman, 2007). This study was one of the first of its kind to use a pretest-posttest study design to study student attitude in physical education. The use of this study design helped confirm past research showing that attitude is malleable (Eagly & Chaiken, 1993). Furthermore, this study showed attitude can change significantly even over the course of a relatively short period of time such as a unit of instruction. Although attitude did not differ significantly by gender, it is important to note that certain factors of attitude interacted differently by gender, such as enjoyment. Changes were also observed in attitude sub-factors over the course of a unit of instruction. Enjoyment of the curriculum declined for boys, yet stayed the same for girls from the pretest to the posttest. Furthermore, sub-factors such as curriculum enjoyment and curriculum usefulness were the strongest predictors of total attitude in this study, reinforcing the need for educators to continue to make curricula relevant and exciting for students.

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