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Crystal Vargos

Illinois State University, cmvargos@gmail.com

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THE EFFECTS OF SINGLE-SEX VERSUS COEDUCATIONAL PHYSICAL EDUCATION ON JUNIOR HIGH PHYSICAL ACTIVITY LEVELS AND SELF-COMPETENCE

Crystal Vargas

31 Pages

According to the Centers for Disease Control, more than one-third of adults in the United States are obese (DeAngelo, Kalumuck, & Adlin, 2015). Obesity affects people socially, culturally, genetically, metabolically, behaviorally, and even psychologically (DeAngelo et al., 2015). In 1972, Title XI was enacted (Title IX athletics, 2010). This law requires that all classes must be coeducational and equal opportunities must be provided for everybody, regardless of gender (Hannon & Williams, 2008). Physical Education (PE) classes then became coed. In many cases, coed classes have had a negative effect on a portion of the participation levels in PE (Murphy, Dionigi, & Litchfield, 2014). The purpose of this study was to examine single-sex classes versus coeducational classes in 7th grade PE and the effect it had on physical activity (PA) levels and self-competence. A secondary purpose was to examine differences in PA levels between males and females in PE.

One Junior High School in the Mid-West United States, the school where the study took place, has 598 students. The sample size was four classes of 7th grade students (n=40 females and n=45 males) for a total of 85 students. Students' ages ranged from 12-13. The study took place during eight lessons of a basketball unit. Skill and game play lessons were taught to the classes and PA level was monitored through Heart Zones Blink armbands. Average heart rate levels were documented by the Heart Zones software. A survey was given to all of the students in the

class that had been given parental consent to participate in the study. The survey given was a modified version of the Confidence in Learning Mathematics scale, Math as a Male Domain scale, and Usefulness of Mathematics scale (Fennema and Sherman, 1976) where basketball was substituted for mathematics. The survey was given a total of two times. The students took it one day before the unit started, and one day after it was over. Additionally, a teacher rating was completed for each individual in the class. The teacher ranked the students on a scale of one through three based on self competency. A rating of one indicates that the student is highly competent; a two indicates that the student is moderately competent, and a rating of a three indicates that the student has a low competency level in basketball. This rating occurred at the end of the unit. This was conducted to show whether there was a difference in PA levels in each environment for the highly skilled athletes compared to the students with low skill level or not. Results revealed that there was a statistically significant main effect of gender on heart rate during gameplay ($p=0.024$). On average, girls had 9.3 fewer bpm (mean difference= 9.3 bpm; 95% CI=-17.3 bpm, -1.3) compared to boys during gameplay. Out of the 85 participants, 30 of them preferred the single-sex setting and 55 of them preferred the coeducational setting. There was also a statistically significant setting x gender interaction where girls in the same-sex setting had, on average, 12.3 bpm higher heart rates during gameplay compared to girls in coeducational classes (mean difference= 12.3 bpm, 95% CI= 1.8 bpm, 22.8 bpm; $p= 0.022$).

KEYWORDS: Self-Competence, Heart Rate, Physical Education, Physical Activity Level

THE EFFECTS OF SINGLE-SEX VERSUS COEDUCATIONAL PHYSICAL EDUCATION
ON JUNIOR HIGH PHYSICAL ACTIVITY LEVELS AND SELF-COMPETENCE

CRYSTAL VARGOS

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THE EFFECTS OF SINGLE-SEX VERSUS COEDUCATIONAL PHYSICAL EDUCATION
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CRYSTAL VARGOS

COMMITTEE MEMBERS:

Skip Williams, Chair

Mary Henninger

Margaret Coleman

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CHAPTER I: THE EFFECTS OF SINGLE-SEX VERSUS COEDUCATIONAL PHYSICAL
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COMPETENCE

Introduction

According to the Centers for Disease Control (CDC), more than one-third of adults in the United States are obese (DeAngelo, Kalumuck, & Adlin, 2015). Additionally, obesity is responsible for 18% of all deaths in the United States (DeAngelo et al., 2015). Obesity affects people socially, culturally, genetically, metabolically, behaviorally, and even psychologically (DeAngelo et al., 2015). Obesity causes diabetes, hypertension, arteriosclerosis, heart attacks, strokes, cancer, difficulty in breathing, and worsened arthritis (DeAngelo et al., 2015). Partaking in Physical Activity (PA) is one way to prevent obesity, especially in adolescents (DeAngelo et al., 2015). More specifically, participating in physical education (PE) in school is an important way for children to be physically active (Kahan & McKenzie, 2015).

In 1972, Title XI was enacted (Title IX athletics, 2010). This law requires that all classes must be coeducational and equal opportunities must be provided for everybody, regardless of gender (Title IX athletics, 2010). PE classes then became coed. In many cases, coed classes have had a negative effect on a portion of the participation levels in PE (Murphy, Dionigi, & Litchfield, 2014). There are many different factors that have an effect on the participation level in PE other than gender itself (Murphy et al., 2014). For instance, social constructions of gender, gender stereotypes, support systems and social influences, classroom environment, the instructor, and the competitive design of PE classes all have influences on each gender in PE class (Murphy et al., 2014). Feelings of embarrassment, lack of confidence and self-efficacy, body image

concerns, disinterest in particular activities, and dominance of males in PE are also reasons why females, specifically, may dislike participating in PA in PE class (Murphy et al., 2014).

In a survey conducted by Cockburn (2011), nearly one-third of 9th grade females that were participants in the study disliked being in the same PE class as males. Additionally, close to one quarter of the girls that took the survey said that they would enjoy a class with only females more than a class with mixed genders. Furthermore, a study done by Lirgg (1993) found that at the middle school level, both males and females preferred single-sex PE classes. In another study, game involvement during a basketball unit was examined. Coeducational groups were compared with single-sex groups and it turned out that the students in the single-sex group had more game involvement than the students who were grouped with males and females (Pritchard, McCollum, Sundal, & Colquitt, 2014). This study displayed the effect of classroom environment and the importance of the quality of a PE program.

According to the National Association of Sport and PE (NASPE), a high-quality PE program includes an opportunity to learn, meaningful content, and appropriate instruction (NASPE, 2003). In order to provide a quality program, teachers must choose what is best for their students, such as the content to be taught, length of the lesson, and whether or not to teach the unit in a coeducational manner (Pritchard et al., 2014). Some units may work better in a coeducational setting, while others may be more fitting for a single-sex setting. Basketball was chosen for this study because of the popularity of the team sports that are commonly taught in PE. In addition, basketball is considered a gender-neutral sport. Playing invasion games, such as basketball, in gender-specific groups can potentially be a beneficial method that teachers can use in order to improve self-competence in students, especially females (Slingerland, et.al, 2014). Research shows that class type has a significant influence on students' perceived competence,

motivation, and performance (Derry & Phillips, 2004). Additionally, Rowe (1988) found that students in single-sex classes had an increase in confidence, compared with students in coeducational settings. This study will help further the research done on the effects of the PE environment on males and females. The purpose of this study was to examine single-sex classes versus coeducational classes in 7th grade PE and the effect it had on PA level and perceived self-competence. A secondary purpose was to examine differences in PA levels between males and females in PE. It is hypothesized that students in the single-sex classes will have higher activity levels and increased perceived self-competence. It is hypothesized that students in the coeducational PE classes will have lower activity levels and decreased perceived self-competence. It is hypothesized that males will have higher PA levels in PE regardless of setting than females, as measured by heart rate monitors.

Methods

Participants

This study was conducted at a junior high in the Mid-Western United States (U.S.). The ethnic makeup of the school was 88.5% of the students were White, 1.7% of them were Black, 4.5% were Hispanic, 2.3% were Asian, and 3% were Multiracial. The school where the study took place had 598 students. The sample size was four classes of 7th grade students (n=40 females and n=45 males) for a total of 85 students. Two teachers took part in this study. The first teacher had seven years of experience at the junior high level and had a bachelor's degree. The other teacher (the examiner) had four years of experience at the junior high level with a bachelor's degree as well.

PE Setting

The Junior High School had two large gymnasiums. One of the two was used for the study. Two of the four classes had a single-sex environment while the other two were coeducational. Both groups received the same basketball lessons.

Instrumentation

Demographic survey. Students were given a demographic survey by their instructor in a classroom setting. Questions regarding gender, age and feelings toward each PE environment were asked (see appendix A). All students filled out the demographic survey, but only those with assent and parental consent were analyzed for the study.

Perceived self-competence survey. A survey was given to all of the students in the class. Students that had given assent and parental consent were a part of the study. The survey given was a modified version of the Confidence in Learning Mathematics scale, Math as a Male Domain scale, and Usefulness of Mathematics scale (Fennema and Sherman, 1976), where basketball was substituted for mathematics (see appendix B). Questions focusing on confidence, usefulness, and gender-appropriateness were given in the survey and had choices numbered 1-5. 1 meaning strongly disagree, 2 meaning disagree, 3 meaning not sure, 4 meaning agree, and 5 meaning strongly agree. This survey was given a total of two times. The students took it one day before the basketball unit started and one day after it was over in a classroom. The survey was given by the instructor.

Heart rate monitor. The heart rate monitors that were used for this study were the Heart Zones Blink Armband. The monitors consisted of a programmable armband that had one button on it. The armband assessed heart rate, calories burned, distance, pace, and overall intensity level. The armband also used optical sensors and provided three different colored lights to

represent various heart rate zones. They were waterproof, rechargeable, and easy for students to manage (Heart Rate Training and Technology, 2015). At the end of the lesson, the data-collecting program Blink Armbands generated a report of the data. The report provided the average beats per minutes (bpm) per lesson.

Data Collection Procedures

Approval by the school administration and the IRB was obtained prior to the start of this study. The students in the class were each given a consent form to bring home to parents (see appendix C). All students turned in the consent form allowing them to participate in the study. A message was posted in the grading system as a brief overview of what the study entailed and reminded the parents to fill out the consent form. A review of the study was also given to the students in a verbal manner. Students were given a questionnaire regarding demographic information and the self-competence survey in a classroom from their respective teacher one day before the unit began and one day after it was over.

Students had previous experience with the Heart Zones Blink Armbands. However, before the study, students had a quick overview of the proper way to utilize the armbands. The students put on the heart rate monitors right after they got dressed and then proceeded to their assigned “squad spots.” The students already knew which heart rate monitor to utilize, as they were assigned a number. The students put the heart rate monitors back in their correct space after the lesson was completed. The instructor ensured that each armband was working properly and students were instructed to wear them on the forearm. Lessons were taught to the class and PA level was monitored through the armbands. Average heart rate levels were documented by the Heart Zones software.

The data was collected over a series of eight lessons. Four of the eight were skill days while the other four were game play days. The students in the single-sex setting were in the same gym as the males, but there was no interaction between the two genders. Both teachers gave the same lesson to each group. In the coeducational setting, the students were mixed and interaction with the opposite gender took place. Throughout the unit, lessons started out with a quick overview of what to expect. They were told that the lesson would start with a five-minute warm-up, which would be based on cardiovascular endurance. During the skill and game play days, lessons were designed to be cardiovascular endurance-based. The skill days consisted of the students practicing the skills for a short while, followed by a modified game that focused on the skill being learned at a relatively high intensity. Game play days consisted of the participants playing five on five games in a basketball tournament. At the end of each lesson, students reported their average heart rates using the Blink Armbands.

Data Analysis

Descriptive statistics for the total sample and separated by sex were completed and are presented as means \pm SD. Mean total/bpm for each individual were computed, as were mean scores computed for the subscales (confidence, usefulness, and gender-appropriateness) of the perceived self-competence survey and demographic information (See Table 1).

Statistical analysis was completed using STATA v14 (College Station, TX, USA). A 2 x 2 Factorial ANOVA was completed to examine the effect of setting (2 levels: co-ed, same sex) and gender (2 levels: male, female) on average heart rate during gameplay lessons, average heart rate during skill-based lessons, confidence, usefulness, and appropriateness). Main effects and the setting x gender interactions were examined within each ANOVA model. For the

psychometric variables, the “pre-test” measurements were used as covariates and the “post-test” measurements were the outcome variables. The a priori alpha level was set up at $p \leq 0.05$.

Results

Descriptive statistics for all variables can be found in Table 1. There was a statistically significant main effect of gender on heart rate during gameplay ($p = 0.024$). On average, girls had 9.3 fewer bpm (mean difference = 9.3 bpm; 95% CI = -17.3 bpm, -1.3 bpm) compared to boys during gameplay. There was also a statistically significant setting x gender interaction where girls in the same-sex setting had, on average, 12.3 bpm higher heart rates during gameplay compared to girls in coeducational classes (mean difference= 12.3 bpm, 95% CI= 1.8 bpm, 22.8 bpm; $p = 0.022$). Other follow-up comparisons revealed that girls had higher heart rates during gameplay compared to boys (158.8 bpm vs. 152.6 bpm; $p = 0.04$) in same-sex classes, but boys had higher heart rates during gameplay compared to girls in coeducational classes (147.0 bpm vs. 157.5 bpm, $p = 0.008$). There was not a significant relationship found in student preferences of PE setting in the survey with A= Coeducational setting B=Single-sex setting ($M=1.35$ $SD=.481$). Out of the 85 participants, 55 chose the coeducational setting and 30 chose the single-sex setting. There were no any other statistically significant effects that were found on any of the other dependent variables in the study ($p > 0.05$).

Discussion

Social constructions of gender, gender stereotypes, support systems and social influences, classroom environment, the instructor, and the competitive design of PE classes all have influences on each gender in PE class (Murphy et al., 2014). The purpose of this study was to examine single-sex classes versus coeducational classes in 7th grade PE and the effect it had on PA level and perceived self-competence. A secondary purpose was to examine differences in

PA levels between males and females in PE. There are many similarities as well as differences found between the current study and others that have been done when comparing PA levels, PE setting preferences, and self-competence levels.

The results of the study were interesting, as they displayed results similar to a variety of completed studies, but also had some different outcomes compared with others. For instance, Turvey and Laws' (1988) study had outcomes that displayed that males prefer the coeducational setting, which is different from what the current study has found. Additionally, Stidder (2000) found that the male participants preferred single-sex classes. In the current study, males did not show a preferred setting in physical education. The amount of males who preferred the single-sex physical education setting was similar to the number of males who preferred the coeducational setting. On the other hand, Osbourne et al. (2002) proved that students felt positively about the fact that they had the opportunity to interact with the opposite gender while in a coeducational class. This is similar to the findings of the current study, which displayed that students did not prefer one setting over the other.

The most significant relationship found in this study was that the females in the single-sex setting had higher average heart rates compared to females in the coeducational setting. The females in the single-sex setting had heart rates just as high as the males in the same setting, whereas females in the coeducational setting had heart rates that were significantly lower than the males. This relationship is similar to what was found in a study completed by Kulinna et al., (2003). That study took place in a coeducational setting with invasion games, very similar to the current study. In the study completed by Kulinna et al., (2003), the male participants were especially active while the females had lower levels of physical activity. That study also proved that the males' physical activity levels in the coeducational setting were similar to those in the

single-sex setting, which is comparable to the current study. In another study completed by Williams & Hannon, (In Press), junior high students' MVPA levels were examined using the tactical games model during a variety of units (basketball, soccer, flag football, and volleyball) in single-sex and coeducational settings. The results were consistent with the current study. The male students had similar levels of MVPA in both settings for every sports unit. The females in the study had higher levels of MVPA in the single-sex setting compared with the coeducational setting during the basketball unit.

Perhaps in the coeducational setting, females had fewer interactions with the basketball than they did in the single-sex setting. In a study conducted by Turvey and Laws (1988), results revealed that males received contact with the ball more often than females did during gameplay in the coeducational setting. Males tended to pass to one another as opposed to passing to a female, even if a female was open during the game. Many females stated that the males did not pass to them in class because they did not think that they were "good" at the sport (Turvey and Laws, 1988). This could be a reason why there was a significant relationship between the PE setting and heart rates among the females in the single-sex setting as compared to females in the coeducational setting in the current study.

McKenzie et al., (2004) examined the PA levels of females and males in both settings as well. Comparable to the current study, results indicated that the males had similar levels of PA in the coeducational setting as they did in the single-sex setting. However, unlike the current study, the females in the study completed by McKenzie et al., (2004) had higher PA levels in the coeducational environment than in the single-sex setting. Hannon and Ratliffe (2005) had similar findings after examining PA levels of males and females in each setting with the use of pedometers. Males and females in the study had an equal number or more steps per minute in the

coeducational setting compared with single-sex setting. In another study, conducted in Europe, middle school students' levels of MVPA were examined with heart rate monitors and results revealed that the participants had higher MVPA levels in the coeducational setting as compared to the single-sex setting (Van Acker, da Costa, Bourdeaudhuij, Cardon, and Haerens, 2010). The inconsistencies noted in the results of studies comparable to the current study prove that more research needs to be completed in order to discover the best learning environment for students in PE classes.

The survey given to the participants in the current study was a modified version of the Confidence in Learning Mathematics scale, Math as a Male Domain scale, and Usefulness of Mathematics scale (Fennema and Sherman, 1976), where basketball was substituted for mathematics (see appendix B). There were three types of questions asked in the survey, which included confidence, usefulness, and gender-appropriateness. The students were given the survey one day before the basketball unit started and one day after it had ended. Results indicated that there were no significant relationships between the pre and post survey as well as the single-sex setting versus the coeducational setting. In other words, students in the single-sex setting felt just as confident, useful, and appropriate in the basketball unit as the students in the coeducational setting.

The survey given in the current study proved that students' self-competence levels are similar to one another, regardless of the physical education setting. This statistical finding is different from those found in a study completed by Lyu and Gill (2011). In the previously mentioned study, female participants in single-sex classes had higher scores in perceived physical competence, satisfaction, and effort compared with female participants in coeducational classes. In the same study, females in the coeducational classes had extremely low perceived

physical competence, low levels of satisfaction in PE, and displayed minimal effort. Deci and Ryan (2000) found that perceived competence has a direct influence on motivation, which could essentially improve levels of MVPA. This statistic makes the findings of the current study interesting. There were no significant relationships between self-competence levels and PA levels, but the PA levels between the females in each setting were significantly different. Perhaps more research needs to be completed on the relationship between self-competence levels and PA levels in the PE setting.

Overall, there are several studies that have shown similar results to the current study, but there are also studies that display variations to these findings. As previously mentioned, there are many recommendations for physical education teachers to use in order to provide quality education to students. Hill et al., (2005) suggested giving the students a survey every year to determine which activities hold their interest. Suggestions for teachers in the coeducational setting included avoiding rules that are gender based and removing competition (Griffin, 1985). In a study done by Acker et al., (2010), putting students into groups with fewer people for gameplay activities has also been proven to increase PA levels for students in PE. Since the current study did not show many significant relationships, more research should be done on the recommendations mentioned in various settings in order to provide the best methods of PE to promote lifelong learning.

Table 1

Average Scores for HR Skill Lessons, HR Game Lessons, HR All Lessons and Pre-and Post-Confidence, Usefulness and Gender Appropriateness (Mean \pm SD)

	Boys	Girls	Total
HR Skill Lessons	151.87 \pm 8.4	155.9 \pm 11.4	153.75 \pm 10.1
HR Game Lessons	153.7 \pm 9.7	149.8 \pm 13.8	151.86 \pm 11.9
HR All Lessons	152.8 \pm 7.6	153.0 \pm 12.2	152.92 \pm 9.9
Pre Confidence	3.34 \pm .28	3.19 \pm .19	3.27 \pm .26
Pre Usefulness	3.14 \pm .25	2.97 \pm .18	3.06 \pm .24
Pre Gender Appropriateness	3.15 \pm .25	3.09 \pm .21	3.12 \pm .24
Post Confidence	3.31 \pm .27	3.25 \pm .25	3.28 \pm .26
Post Usefulness	3.15 \pm .29	3.06 \pm .20	3.11 \pm .26
Post Gender Appropriateness	3.17 \pm .28	3.04 \pm .25	3.11 \pm .27

Note. Mean \pm Standard Deviation

Table 2

Average Scores for Coeducational and Same-Sex Preference Questions and Self-Perception Questions (Mean \pm SD)

	Boys	Girls	Total
<i>Coeducational & Same-Sex Preference Questions</i>			
1. I like being in the same class as the opposite gender.	3.8 \pm .81	3.92 \pm .92	3.87 \pm .86
2. I would rather be in a PE class with only students of the same gender as me.	2.42 \pm .94	2.25 \pm 1.0	2.34 \pm .97
3. I would rather be in a PE class with both males and females than in a PE class with only people the same gender as me.	3.96 \pm .85	3.78 \pm 1.1	3.87 \pm .96
<i>Self-Perception Questions</i>			
1. I like physical education.	3.51 \pm .55	3.07 \pm .66	3.31 \pm .64
2. I try hard in physical education.	3.56 \pm .55	3.30 \pm .56	3.44 \pm .57
3. I follow rules and behave well in physical education.	3.56 \pm .50	3.45 \pm .50	3.51 \pm .50
4. I have good sport skills in physical education.	3.49 \pm .66	3.00 \pm .82	3.26 \pm .77

Note. Mean \pm Standard Deviation

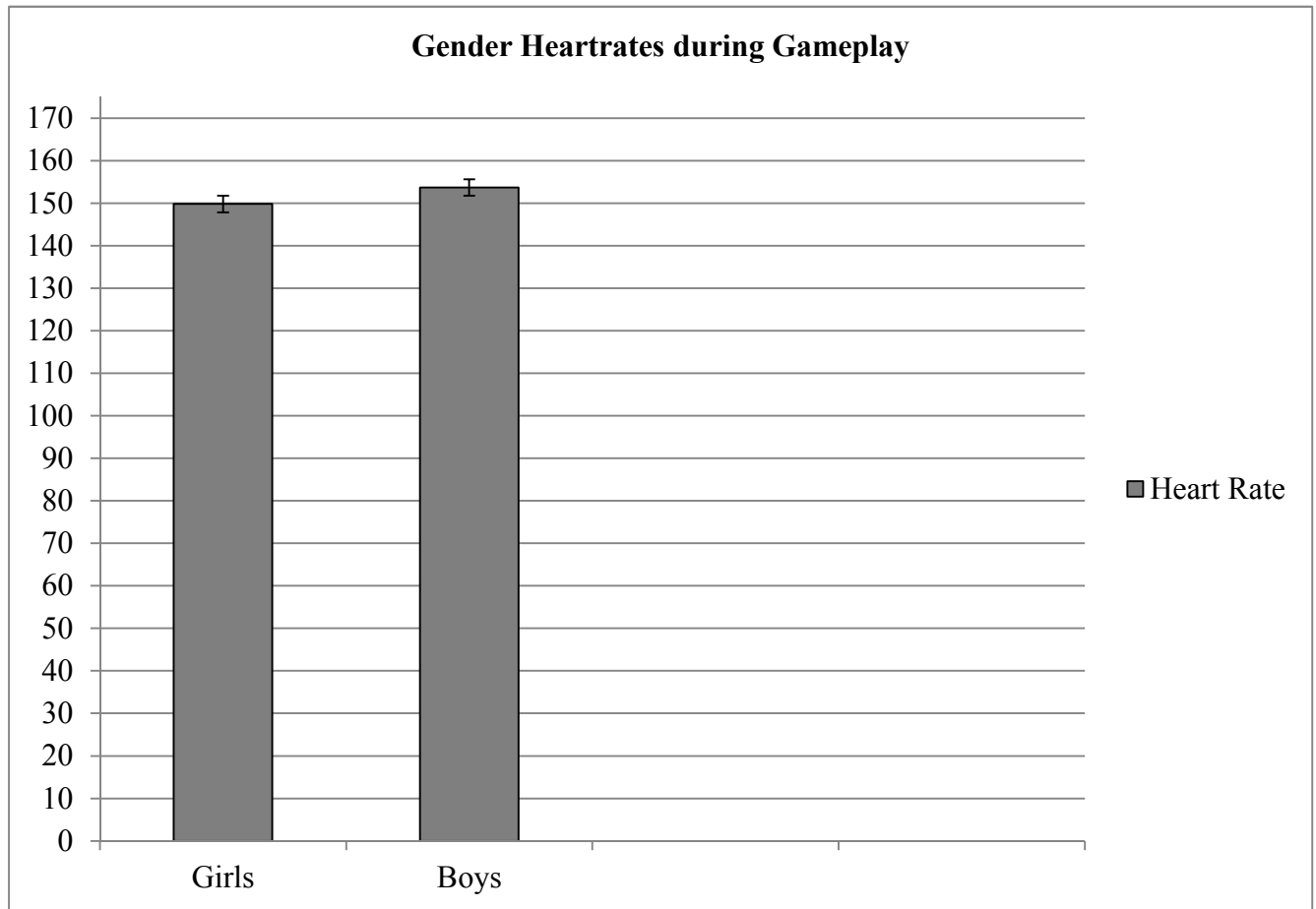


Figure 1. Mean differences of heart rate by sex during gameplay.

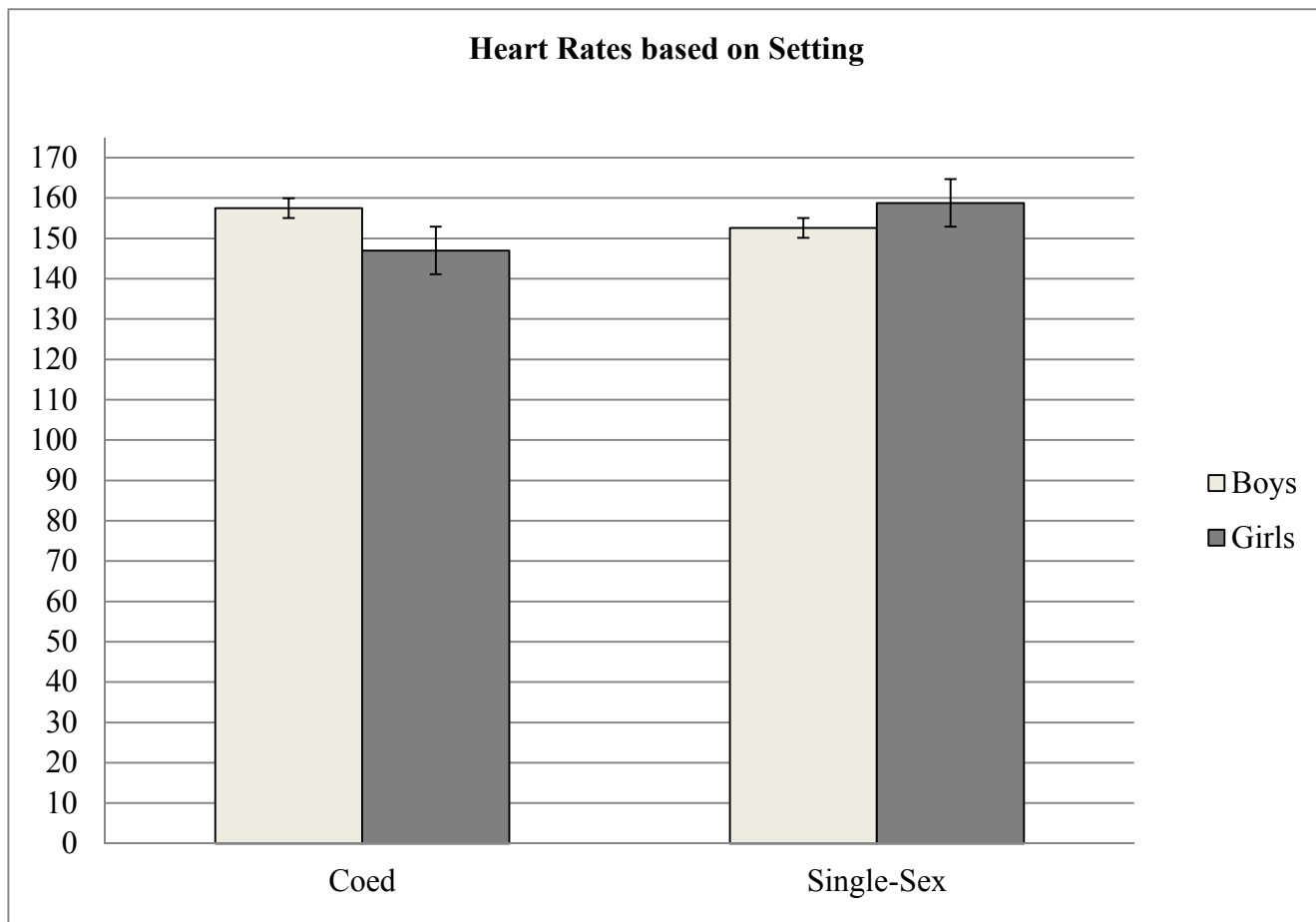


Figure 2. Mean differences of heart rate by sex and setting during gameplay.

CHAPTER II: EXTENDED LITERATURE REVIEW

The purpose of this study was to examine single-sex classes versus coeducational classes in physical education and the effect it had on physical activity level and self-competence. A secondary purpose was to examine differences in physical activity levels between males and females in physical education. Physical activity was measured using heart rate monitors known as Blink Armbands by Heart Zones. Perceived self competence was measured using a survey, which was a modified version of the Confidence in Learning Mathematics scale, Math as a Male Domain scale, and Usefulness of Mathematics scale (Fennema and Sherman, 1976). This review of literature is organized into three sections: (a) Coeducational and single-sex physical education, (b) perceived self-competence, and (c) physical activity measurement in physical education.

Coeducational and Single-Sex Physical Education

It has been found that there have been several studies on the effects of coeducational classes versus single-sex classes in PE. In one study, girls were noted to have higher levels of MVPA in coeducational classes than in female-only classes (McKenzie, Prochaska, Sallis, and LaMaster, (2004). In the same study, it was concluded that boys had similar levels of MVPA in coeducational classes compared to male-only classes. Topics such as physical activity, motivation, self-efficacy, and self-competence were used to drive this research. Common themes for coeducational classes include MVPA, student interactions, and suggestions for teachers that are instructing PE classes in the coeducational setting. Themes for single-sex settings include student preferences and perceptions and advantages of the setting. Lastly, reasons for perceived incompetency were a common theme found among researching self-competence.

Physical Activity in Coeducational and Single-Sex Physical Education

There have been several studies on the effects of coeducational classes versus single-sex classes in PE. In a study regarding PE class preferences, 801 surveys were given to 9th grade students (Hill, Grant, Cleven, and Brian, 2005). 37 different activities were listed on the survey and a majority of the students felt that each of the various activities listed should be taught in a coeducational setting (Hill et al., 2005). Although there were a higher percentage of males preferring coeducational classes than females, the majority of the participants in the study did in fact favor coeducational classes over single-sex PE classes (Hill et al., 2005).

Another study was conducted in Fareham, England that focused on the observation of coeducational classes that had recently been implemented into the PE curriculum. Over the course of two years, teacher interactions were observed, in addition to the differences in the coeducational class change. Results indicated that males shouted out answers without raising their hands and they were much louder than the females in the class (Turvey and Laws, 1988). This negatively affected the class because more time was spent on behavior management rather than practice time for skills (Turvey and Laws, 1988). In addition, this limited the amount of teacher interaction with the females in the class because attention needed to be geared towards misbehavior by the males (Turvey and Laws, 1988). Contact with the ball during team games was also observed. Results revealed that males received contact with the ball more often than females did during game play (Turvey and Laws, 1988). Males tended to pass to one another as opposed to passing to a female, even if she was open during the game. Many females stated that the males did not pass to them in class because they did not think that they were “good” at the sport (Turvey and Laws, 1988).

Several articles have offered suggestions for PE teachers who are teaching in a coeducational setting. Hill et al., (2005) suggest giving students a survey every year to get activity preferences of both males and females. They also recommend giving the students the choice of unit to participate in if other teachers are offering a different unit during that time. Additionally, they suggest grouping the students by ability rather than gender and striving to keep the PE class enjoyable for all students. Griffin (1985) also made recommendations for teachers in a coeducational setting. She recommends avoiding using rules that are solely based on gender. For example, making a rule that a team can't shoot the ball until a girl has received a pass. Instead, make the rule that three players must receive a pass before a shot can be taken. She also suggests removing competition from skill-related lessons to focus on learning as opposed to winning. Acker, Costa, and Bourdeaudhuij (2010) suggest that modified game play has been proven to increase PA levels for both males and females. This can be done by putting fewer students on a team. Lastly, Turvey and Laws (1988) state that teachers frequently need to evaluate themselves and their teaching to ensure that "mixed-sex grouping becomes mixed-sex teaching as well."

It has been proven that males are more rambunctious in coeducational classes, yet they prefer this setting compared to single-sex classes (Turvey and Laws, 1988). There are less teacher interactions with females in coeducational classes, but there are studies to show that some females prefer the coeducational setting as well (Turvey and Laws, 1988). Several recommendations have been provided for teachers who are teaching in coeducational environments to run the classes smoothly.

The preference of males and females in PE regarding coeducational versus single-sex classes varies. For instance, a study was completed to survey students on their interest in PE and

the type of class that was preferred. Students who expressed enjoyment in PE also preferred single-sex classes (Treaner, Graber, Housner, and Wiegand, 1998). The students in this particular study were asked how they perceived single-sex classes. The males' responses generally stated that they felt as if they performed skills better, practiced more, had better behavior, learned more, and were less fearful of injury in a single-sex PE class compared to a coeducational class (Treaner et al., 1998). Additionally, females had similar responses. Findings reported that females felt as if they executed skills and team sports more efficiently, had more opportunities to practice skills, and felt less afraid of injury in single-sex PE classes compared to coeducational classes (Treaner et al., 1998).

In another study, individual interviews were given to 12 seventh and eighth grade students. Six interviews were conducted with males while another six interviews were with females (Osbourne et al., 2002). There were many themes that came about in the interviews, but only one was supportive of coeducational PE classes (Osbourne et al., 2002). Many students felt positively about the fact that they have the opportunity to interact with the opposite gender while in a coeducational class (Osbourne et al., 2002). On the other hand, some negative feelings were dismissed when the students were asked about single-sex PE classes, such as effort, same-gender interaction, contact and low intensity sports (Osbourne et al., 2002). Generally, the females disagreed with the males' cooperation in class, while the males disagreed with the females' effort in class (Osbourne et al., 2002). The participants in the study were supportive of single-sex interaction in single-sex classes and expressed that this type of class and the units that would be offered may be more suitable for each gender as well (Osbourne et al., 2002).

It has been found that females are not the only gender that would prefer single-sex PE classes. In a study conducted by Stidder (2000), 90% of the male participants stated that they

would rather participate in single-sex classes. Stidder (2000) also states that males are uncomfortable with putting themselves on display in front of peers. Scraton (1993) explains that some males may not feel as though they fit the part of a stereotypical male, which can become an issue in coeducational classes. This can lead to harassment and negative remarks from both males and females (Scraton, 1993).

In a recent study conducted by Derry and Allen (2004), advantages of single-sex classes for females were established. They found that females in single-sex classes were much more engaged in skill learning time and had more teacher interactions than the females in coeducational settings. According to Osbourne, Bauer, and Sutliff (2002), single-sex classes would be beneficial to females because activities that they are more interested in could be offered. Stidder (2000) found that females prefer individual and cooperative activities, while males prefer competitive activities and games.

As there are many findings that support coeducational classes, there are also several studies which promote single-sex classes. Males and females have both been found to prefer single-sex classes because of interactions with one another and the level of skill in game play. There are many females and males that are more comfortable participating in PE with peers of the same gender. Furthermore, Kulinna, Martin, and Lai (2003) found that in coeducational classes involved in invasion games, the males are especially active while adolescent females have lower levels of PA. Additionally, single-sex grouping strategies may be an advantage, as they provide safety in contact activities (Gabbei, 2004).

Perceived Self-Competence in Physical Education

In a study conducted by Olafson (2002), individual interviews were given to females regarding their thoughts and feelings about PE classes with mixed genders. Many of the females

felt that the males were looking at them, and some of them gave examples of remarks that the boys have said to them in class. The girls were embarrassed to change into a t-shirt and felt that their bodies were exposed for everyone to see. Girls in the study were self-conscious that the boys would make a negative comment to them if they made a mistake in a game, so some of them resorted to steering clear of game involvement to avoid male comments about mistakes being made.

According to a study done by Lyu and Gill (2011), female participants in single-sex classes had higher scores in perceived physical competence, satisfaction, and effort than the female participants in coeducational classes. Females in the coeducational classes had extremely low perceived physical competence, low levels of satisfaction in PE, and displayed minimal effort. In 2006, Evans found that females recognized males in a coeducational class as the audience, which may have led to incompetence. McKenzie (2004) discovered that males interrupted females' learning in PE, causing incompetence and less time to practice skills. Conversely, when females are in class together without males, they may help and encourage one another as opposed to interrupting one another. This can lead to higher perceived competence (Lyu and Gill, 2011).

It is very clear that coeducational classes and single-sex classes have an effect on perceived self-competence in both males and females. In general, males and females favor single-sex classes because they are less self-conscious of how they look and how they perform in games as opposed to coeducational classes. Especially in secondary settings, students may feel uncomfortable in front of the opposite sex when they are dressed in their PE uniforms. Single-sex classes provide comfort and continuity for both sexes. In addition, competence is a direct influence of motivation, which could essentially improve levels of MVPA (Deci and Ryan,

2000). In fact, according to Hannon and Ratliffe (2005), perceived competence may have more influence on motivation in PE than actual competence. For these reasons, teachers in PE can make certain efforts to increase students' perceived competence, which is why this study is important (Corbin, 2002).

Physical Activity Measurement in Physical Education

“Technology-based interventions in physical education curricula (e.g., pedometers, heart rate monitors, Dance Dance Revolution, etc.) have become popular in recent years as a means to motivate technologically-savvy students to participate in physical education class” (Partridge, King, Bian, 2011). Technological instruments can help teachers provide specific feedback for individuals (Partridge et al., 2011). More specifically, heart rate monitors have become popular in physical education classes as they enhance the curriculum, motivate students to increase participation levels, and assess progress (Nichols, Davis, McCord, Schmidt, Slezak, 2009).

Because of the current obesity epidemic, it has become essential for individuals to learn how to be physically active as they transition into adulthood. The use of heart rate monitors can aide in encouraging lifetime learners. Heart rate monitors can help teachers assess the physical activity levels of students (Nichols et al., 2009). They provide feedback based on the heart rate levels the students achieved during a specific period of time (Nichols et al., 2009). Additionally, heart rate monitors provide more independence for the students, increased motivation, more time for teachers to provide feedback, and they help the students learn about what it feels like to be in various heart rate zones (Nichols et al., 2009). In one study, students were interviewed on their perceptions of heart rate monitors after wearing them in physical education class. Results indicated that students learned that in order for the more physically fit to reach a target heart rate zone, intensity levels must increase (Partridge et al., 2011). For these reasons, heart rate monitors

have the potential to help combat obesity. However, more research needs to be done on the topic of heart rate monitors in the physical education setting, as comparatively little has been done thus far (Clapham, Sullivan, & Ciccomascolo, 2015).

Conclusion

There have been numerous studies comparing single-sex and coeducational PE classes. According to the previously stated research, males in a coeducational class are not as well-behaved as they are in single-sex classes (Turvey and Laws, 1988). Teachers in coeducational classes spend more time on behavior management, leading to fewer interactions with females (Turvey and Laws, 1988). Alternatively, less is used on behavior management time in single-sex classes, which leads to more interactions with females and more practice time for skills (Osbourne et al., 2002). In general, students that prefer single-sex classes are more comfortable with peers that are the same gender, learn skills better, and are less afraid of injury (Treaner et al., 1998). Conversely, students who prefer coeducational classes enjoy the student interaction with the opposite sex (Osbourne et al., 2002).

Several recommendations have been made for teachers in coeducational classes to avoid common problems that occur. For instance, giving students a choice, changing the rules of certain games, and removing competition from skill practice are all methods a teacher can use when placed in a coeducational PE class environment (Hill et al., 2005 & Griffin, 1985). There are definitely pros and cons to both settings, so it is important for teachers to have the knowledge to adapt to both.

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APPENDIX A: DEMOGRAPHIC SURVEY

Name: _____
Gender: _____
Grade: _____

1 **2** **3** **4** **5**
Strongly Disagree **Disagree** **Not Sure** **Agree** **Strongly Agree**

1. What setting would you prefer to participate in the basketball unit?
a. Coeducational
b. Same gender only

2. I like being in the same class as the opposite gender

1	2	3	4	5
SD	D	NS	A	SA

3. I would rather be in a PE class with only students of the same gender as me.

1	2	3	4	5
SD	D	NS	A	SA

4. I would rather be in a PE class with both males and females than in a PE class with only people the same gender as me.

1	2	3	4	5
SD	D	NS	A	SA

APPENDIX B: SELF-COMPETENCE SURVEY

Name: _____
 Gender: _____

CODE: C = Confidence Scale, U = Usefulness Scale,
 G = Gender-appropriateness Scale

	1	2	3	4	5
	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

C 1. Generally, I feel confident about attempting basketball in PE.

1	2	3	4	5
SD	D	NS	A	SA

U 2. It's good to know how to play basketball so that I can play than in my free time.

1	2	3	4	5
SD	D	NS	A	SA

G 3. I would have more faith in letting a boy make an important play in a basketball game than a girl.

1	2	3	4	5
SD	D	NS	A	SA

C 4. I'm no good in basketball.

1	2	3	4	5
SD	D	NS	A	SA

U 5. Basketball is not important for me to use in my free time.

1	2	3	4	5
SD	D	NS	A	SA

G 6. Learning basketball in PE is just as appropriate for girls as it is for boys.

1	2	3	4	5
SD	D	NS	A	SA

C 7. I have a lot of self-confidence when it comes to basketball.

1	2	3	4	5
SD	D	NS	A	SA

U 8. I will probably participate in basketball many times as I grow up.

1	2	3	4	5
SD	D	NS	A	SA

G 9. Girls are certainly coordinated enough to do well in basketball.

1	2	3	4	5
SD	D	NS	A	SA

C 10. I don't think I could do harder skills in basketball.

1	2	3	4	5
SD	D	NS	A	SA

U 11. I see basketball as an activity that I will rarely participate in during my free time as I get older.

1	2	3	4	5
SD	D	NS	A	SA

G 12. When a girl engages in games during basketball, it is feminine to let the boy win.

1	2	3	4	5
SD	D	NS	A	SA

C 13. I am sure that I can learn skills for basketball.

1	2	3	4	5
SD	D	NS	A	SA

U 14. I learn basketball now because I know how useful it will be later in life

1	2	3	4	5
SD	D	NS	A	SA

G 15. I would trust a girl just as much as I would trust a boy to make an important play in a game during basketball.

1	2	3	4	5
SD	D	NS	A	SA

C 16. I'm not the type of person to do well in basketball.

1	2	3	4	5
SD	D	NS	A	SA

U 17. Learning basketball is a waste of time.

1	2	3	4	5
SD	D	NS	A	SA

G 18. It's hard to believe that a girl could be great in basketball.

1	2	3	4	5
SD	D	NS	A	SA

C 19. I think I could handle more difficult skills in basketball.

1	2	3	4	5
SD	D	NS	A	SA

U 20. Knowing basketball will help me enjoy my free time.

1	2	3	4	5
SD	D	NS	A	SA

- G 21. Basketball is for boys; cheerleading is for girls.
- | | | | | |
|----|---|----|---|----|
| 1 | 2 | 3 | 4 | 5 |
| SD | D | NS | A | SA |
- C 22. For some reason, even though I try, basketball seems really hard for me.
- | | | | | |
|----|---|----|---|----|
| 1 | 2 | 3 | 4 | 5 |
| SD | D | NS | A | SA |
- U 23. When thinking about my adult life, it is not important for me to learn skills in basketball.
- | | | | | |
|----|---|----|---|----|
| 1 | 2 | 3 | 4 | 5 |
| SD | D | NS | A | SA |
- G 24. Girls can do just as well as boys in basketball.
- | | | | | |
|----|---|----|---|----|
| 1 | 2 | 3 | 4 | 5 |
| SD | D | NS | A | SA |
- C 25. I can do well in basketball skill tests.
- | | | | | |
|----|---|----|---|----|
| 1 | 2 | 3 | 4 | 5 |
| SD | D | NS | A | SA |
- U 26. Basketball is a worthwhile subject area to learn
- | | | | | |
|----|---|----|---|----|
| 1 | 2 | 3 | 4 | 5 |
| SD | D | NS | A | SA |
- G 27. I would expect a girl participant in basketball to be a masculine type of person.
- | | | | | |
|----|---|----|---|----|
| 1 | 2 | 3 | 4 | 5 |
| SD | D | NS | A | SA |
- C 28. Some activities I can handle O.K., but I usually mess up in basketball.
- | | | | | |
|----|---|----|---|----|
| 1 | 2 | 3 | 4 | 5 |
| SD | D | NS | A | SA |
- U 29. I expect to make little use of basketball when I get out of school.
- | | | | | |
|----|---|----|---|----|
| 1 | 2 | 3 | 4 | 5 |
| SD | D | NS | A | SA |
- G 30. Boys are not actually better than girls in basketball.
- | | | | | |
|----|---|----|---|----|
| 1 | 2 | 3 | 4 | 5 |
| SD | D | NS | A | SA |

Section 2: Self – Perception Items

(4 = Strongly agree, 3 = Agree, 2 = Disagree, 1 = Strongly disagree)

- ___ 1. I like physical education.
- ___ 2. I try hard in physical education.
- ___ 3. I follow rules and behave well in physical education.
- ___ 4. I have good sport skills in physical education.

APPENDIX C: INFORMED CONSENT

This sheet was be filled out by all of the parents/guardians of the student participants. Consent/assent to participate in the study was provided by the sheet below.

Parents/Guardians:

I am Crystal Vargas, head of the Physical Education department at Mokena Junior High School. I am currently a graduate student and will be conducting a research study under the supervision of Dr. Skip M. Williams from the School of Kinesiology at Illinois State University. I will be conducting a study focusing on the differences between coeducational and non-coeducational settings in physical education class and the effects it has on physical activity levels and perceived self-competence. Students will be wearing the Blink Armbands to measure their heart rate during the basketball unit (8 lessons). In addition, they will be taking a survey to measure their perceived self-competence based on the setting that they are in (coeducational or non-coeducational) before and after the study.

Your child's participation is voluntary, and there will be no penalty for choosing not to participate or dropping out at any time during the study. It will not affect their grade and there will be no risk to participating in this study. Your child will become more aware of what it feels like to be in the healthy fitness zone, and feedback from the survey may positively change the way MJHS manages physical education.

All of the responses will be confidential and your child's name will not appear anywhere. Please let me know if you have any questions. You can reach me at: xxxx@xxxx.xxx. Thank you!

Sincerely,
Crystal Vargas

Please fill out the following and have your child return it back to me.

I give consent for my child _____ to participate in the above study.

Parent Signature: _____

Student Signature: _____