## The Effect of Sport Education Model in Badminton Game on Moderate to Vigorous Physical Activity of Junior High School Students

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**Article Info**

**Abstrak**

Penelitian ini bertujuan untuk menguji apakah terdapat perbedaan aktivitas fisik dari setiap fase Sport Education Model (SEM) dengan menggunakan cabang olahraga bulu tangkis. Metode yang digunakan dalam penelitian ini adalah metode penelitian eksperimen dengan desain faktorial. Partisipan dalam penelitian ini adalah siswa SMP sebanyak 40 orang dengan pengambilan sampel menggunakan simple random sampling. Instrumen penelitian menggunakan Polar RC3 GPS dan untuk teknik analisis data menggunakan One-Way ANOVA. Hasil penelitian menyimpulkan terdapat perbedaan aktivitas fisik sedang hingga kuat dari setiap fase SEM dengan menggunakan cabang olahraga bulu tangkis dan pencapaian aktivitas fisik sedang hingga kuat menggunakan cabang olahraga bulu tangkis pada tahap akhir cenderung menurun.

**Abstract**

This study was aimed at examineing whether there are differences in the physical activity of each phase of SEM using badminton game. The method used in this study was an experimental research method with factorial design. Participants in this study were 40 junior high school students chosen through simple random sampling. The research instrument used Polar RC3 GPS. Data analysis techniques used One-Way ANOVA. The results of the study concluded that there are differences in moderate-to-vigorous physical activity from each phase of SEM in badminton game. The achievement of moderate-to-vigorous physical activity in badminton game tends to decrease in the final stages.

## INTRODUCTION

Indonesian citizen aged less that 10 year old who have low physical activity are around 48.2%. Besides that, the low physical activity level in rural area is 42,4%, while in urban area is 57,6% (KemenkesRI, 2011). The physical activity also decrease during childhood and adolescent stage (Trost et al., 2002). The decrease of physical activity involvement is high during junior high school period (between age 13 and 15) (Jaakkola & Washington, 2012; Nader, Bradley, Houts, Mcritchie, & Brien, 2008; Telama & Yang, 2000). Therefore, we need to study physical activity further to find out an accurate intervention (KemenkesRI, 2011).

The issue above is related to the basic competence objectives of physical education curriculum that considering the sport skills such as practicing variations and combination of basic techniques of various big ball games, small ball game, athletic, self-defense, rhythmic, and aquatic (Kemendikbud, 2012). Meanwhile, a good curriculum has key aspects that considers the national curriculum, and the syllabus is arrange to provide students 50% of class time to do moderate-to-vigorous physical activity (MVPA) (Perlman, 2012; USDHHS, 2010). It is clear that the achievement of physical activity in learning physical education is not only doing movements, but also paying attention of the time of physical activity in the moderate to vigorous activity zone.

In the physical activity achievement, it is also related with the statement that some physical activities program do not involve students in proper level of physical activity (Mckenzie et al., 2006; McKenzie, Marshall, Sallis, & Conway, 2000). Therefore, strategies to achieve physical activity needed is important. It helps students to be more active during physical education learning, thus teacher should be able to give a quality learning process with an appropriate learning strategy (Bryan & Solmon, 2012). Furthermore, one of the tools that could help teachers in learning process is the use of learning model (Ginanjar, 2015).

A model that seems to be beneficial to fulfill the achievement of the students' physical activity is Sport Education Model (SEM). Research conclude that the use of SEM affects physical activity. SEM contributes to the improvement of low motivated students' physical activity (Perlman, 2012). Students prefer SEM to traditional learning in physical activity achievement (André& Hastie, 2017). SEM fulfills the requirements of the MVPA activity limit (Hastie & Trost, 2002).

SEM is a model of curriculum that could be developed widely by school to be implemented in various sport activities (Jewett, Bain, & Ennis, 1995, hlm. 174). Moreover, SEM is a pedagogical model based on the small concepts that cooperation in a team would result in success as long as every member of the team play their role during the season in the lesson (Siedentop, Hastie, & Hans van der Mars, 2011, hlm. vii). SEM provides all aspects that is needed to facilitate competitions such as contract of role in a team, competition rules, scoring, referee, etc (Siedentop, 1994, hlm. 18). Students involved in SEM will be an educated, enthusiast, and competent person in sport (Siedentop, 1994, hlm. 4), through the characteristics of SEM, including: Seasons, Affiliation, Formal Competition, Culminating Event, Keeping Records, Festivity (Siedentop, 1994, hlm. 9).

In addition, some literatures are related to SEM in the development of curriculum and learning process of physical education worldwide. SEM is suitable with the national standard content in America, the syllabus of physical education in Australia, and the national curriculum of England (Wallhead & O'sullivan, 2005). SEM is suitable with the national, state, and regional curriculum worldwide (Kinchin, 2006). SEM is found to be most appropriate to teach students the personal and social skill elements from achievement standard (Pill & Hastie, 2016). SEM could improve the self-determined behavior in physical education (Cuevas, García-López, & Serra-Olivares, 2016; Perlman & Karp, 2010)

SEM in this research will be conducted through badminton game that is categorized as racquet sports (Siedentop, 1994, hlm. 105). The reason of the use of badminton game is that badminton is a popular sport in Indonesia and the teachers know the rules and how to play the game. It is related with the questions conveyed by the students related to techniques and strategies. Therefore the students could the questions effectively and gain self-confidence by choosing the familiar sport (Siedentop, 1994, hlm. 7). It is also related to the gap of

research in investigating physical activity in net game (Perlman, 2012).

The SEM program used in this study employs three phases including 1) skill/ tactical development; 2) inter/ intra team games with practices; 3) and post-season (Perlman, 2012) by using the combination of various learning models including direct instruction, cooperative, and peer (Metzler, 2000, hlm. 254; Siedentop, 1998). The skill/tactical development phase (consisted of 4 meetings) pays attention on the ability of movement skill that will be used. This phase used direct instruction and cooperative type Student Team Achievement Division (STAD). The inter/intra team games with practices (consisted of 5 meetings) pays attention on the competition in team to face further competition with other team. In this phase, cooperative type Teams Games Tournaments (TGT), which involves competition in team and competition with other team, peer is used to find out the students who have a good ability (the result of the competition with other team in their group). It trains students who have less ability. The last phase, postseason (consists of 5 meeting), is a reflection from the previous phase. It is the last stage of the season of the lessonthat use the competition with other team by conducting tournament.

From the explanations, the researcher was aimed at examining the students' physical activity through SEM in badminton game with the purpose to find out differences of physical activity of each phase of SEM through badminton game.

## METHODS

### Design of the Study

The type of this study is a quantitative study. The method used in this study was true experiment study with factorial design.

### Participants of the Study

Factorial design is a modification of posttest-only control group designs (Fraenkel, Wallen, & Hyun, 2013, hlm. 277), to avoid various threat of posttest-only control group designs, 40 samples should be included in each group (Fraenkel et al., 2013, hlm. 271). Since there is an experiment group (using basketball) and control group (using badminton), the sample consisted of 80 students, 40 students in experiment group and 40 students in control group. The population of this study were 174 junior high school students grade VII. Therefore, this study took the existed sample from the population, 40 students for experiment group and 40 students for control group by using simple random sampling technique.

### Instrument of the Study

The data of physical activity were obtained and collected through Polar RC 3 GPS from the beginning to the end of the lesson. The data were taken from SEM program consisted of three phases (phase 1 = 4 meetings, phase 2 = 5 meetings, and phase 3 = 5 meetings. The total is 14 meetings) by using badminton game. The activity data needed by the researcher was from students' physical activity in moderate to vigorous zone of the Heart rate zone with the 70-100% bpm intensity. The instrument validity has been conducted on running with three acceleration time with the correlation 0.75 – 0.95 (Winter, Lee, Leadbetter, & Gordon, 2015). The Polar reliability shows the significant result 0.907 (Cooper & Shafer, 2019), and 0.99 (Esco, Mugu, Williford, McHugh, & Bloomquist, 2011). To strengthen the result, the researcher conducted instrument test to three students in basketball with the result, gained from cronbach's alpha, is 0,914 for the reliability.

### Data Analysis

The specific purpose of the study was to investigate the physical activity differences in each phase of SEM by using badminton game. The specific purpose contains one independent variable (SEM with three phases, 14 meetings in total) and one independent variable (physical activity with nominal data), thus the data were analyzed by using the One-Way ANOVA. One-Way ANOVA was used for data that have one Dependent Variabel (DV) and one Independent Variabel (IV). IV in One-Way ANOVA is a nominal data or group of data that contains three groups or more (Sufren & Natanael, 2013).

## RESULT AND DISCUSSION

The result of the data analysis using One-Way Anova found the value of $F_{count}$ is 6.66, df=1 with significance level 0.01 < 0.05, thus it infers that there is a

difference moderate to vigorous physical activity in each level of SEM with the use of badminton game. Since there was a significance, post hoc with tukey test was conducted. The result of the Tukey test, there were four average differences signed by "*" that can be seen in Table 2. In phase column 1, there is an average difference between phase 1 and phase 3 with the average difference 12.75, significance 0.02 < 0.05. Hence, the skill/ tactical development phase gave more influence that postseason phase on the physical activity zone moderate to vigorous. In the phase 2 column, there is average differences between phase 2 and phase 3 with the average difference 10.40, significance 0.04 < 0.05. Therefore, the inter/intra team games with practices phase contributes more impact than postseason on the moderate to vigorous physical activity zone. In the phase 3 column, since there was a negative average difference, related to the previous explanation, phase 1 and 2 gave more impacts than phase 3. In the other words, the skill/ tactical development and inter/ intra team games with practices contribute more influence that postseason on the moderate to vigorous physical activity zone.

**Table 1.** The Result of One-Way Anova Data Analysis

|  | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 433.26 | 2 | 216.63 | 6.66 | 0.01 |
| Within Groups | 357.95 | 11 | 32.54 |  |  |
| Total | 791.21 | 13 |  |  |  |

**Table 2.** The result of the Post Hoc Tukey Test

| (I) SEM | (J) SEM | Mean Difference (I-J) | Std. error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
|  |  |  |  |  | Lower Bound | Upper Bound |
| Phase 1 | Phase 2 | 2,35 | 3,83 | 0,82 | -7,99 | 12,69 |
|  | Phase 3 | 12,75* | 3,83 | 0,02 | 2,41 | 23,09 |
| Phase 2 | Phase 1 | -2,35 | 3,83 | 0,82 | -12,69 | 7,99 |
|  | Phase 3 | 10,40* | 3,61 | 0,04 | 0,66 | 20,14 |
| Phase 3 | Phase 1 | -12,75* | 3,83 | 0,02 | -23,09 | -2,41 |
|  | Phase 2 | -10,40* | 3,61 | 0,04 | -20,14 | -0,66 |

This study had a purpose to test the physical activity differences in each phase of SEM using badminton game. The result of the research support and give description that the use of SEM with three phases includ-

ing: skill/ tactical development; 2) inter/ intra team games with practices; 3) and postseason (Perlman, 2012) gave impacts on the physical activity achievement. The result of this study also gives a point of view that SEM could be used in badminton games. Besides that, SEM with three phases in badminton game on the achievement of physical activity moderate to vigorous in skill/ tactical development phase and inter/ intra team games with practices contributes more influences than the postseason phase. Therefore, this study supports that SEM is not always used in team sport, but also could be used in the individual sport. Grant used tennis game (Siedentop, 1994). Bell used gymnastics sport (Siedentop, 1994). SEM used athletic sport (Pereira, Araújo, Farias, Bessa, & Mesquita, 2016).

According to the learning process, the skill/ tactical development phase is a phase that gives the most influential impact on the moderate to vigorous physical. It might be because the students move more often since they learnt to master the basic skill of badminton, thus they did basic technique activities and did not spend much time in doing activities. In addition, it also considers the high number of the shuttlecock used in this phase. In the inter/ intra team games with practices where there are two phases including training phase and tournament phase in group and with other groups. In this phase, the physical activity tended to decrease. It might be because when the students had tournament they did not spend much time to move. In addition, they just used one shuttlecock in the tournament. Therefore, if the shuttlecock was in or out, there were lots of opportunities of the decrease in physical activity to restart the game. Therefore, it affects significantly the next phase, the postseason phase. This phase is the tournament phase. In the postseason, the achievement of physical activity decreased significantly. It was caused by the opportunities to decrease the physical activities as explained in the previous explanation.

From the learning process, it becomes the contradiction. The SEM with three phases (Perlman, 2012) using basketball game, the achievement of physical activity in each phase tended to increase. In the postseason phase, the outcome of the physical activity achievement is significant. It could be because the choice of the game, basketball game gives opportunities to be more active physically since it is faster to start the game and

to keep moving although the players do not hold the ball (Perlman, 2012).

Therefore, the finding of this study shows that in the competition phase of SEM, the physical activity achievement tended to decrease that was cause by the opportunities to decrease the physical activity to start the game. Therefore, the researcher suggest that the research related to the finding is investigated. Besides that, manipulating the SEM program in badminton game to improve the chance to achieve the physical activity and using better tools to gain the data are suggested. Due to the lack of experiment classes in this research, the result of this study cannot be generalized and cannot compare various individual sport in racket or target game.

## CONCLUSION

According to the result of the study, it concludes that there is a difference in moderate to vigorous physical activity in each phase of in SEM during badminton game. The finding of this study shows that the implementation of SEM in badminton game a person's physical activity achievement tends to decrease in the final phase. Therefore, there is a contradiction from the result, thus a further investigation is needed.

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