Evaluation of secondary school students' attitudes towards physical education and sports classes: A meta-analysis study

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Abstract

The study aimed to examine the effects of secondary school students' gender variable and the variables that could be moderators on their attitudes towards physical education and sports classes. The study adopted the meta-analysis method, which is one of the methods of synthesizing research results, constituted the research model. Within the scope of the study, researches on secondary school students' attitudes towards physical education and sports classes were examined, and the findings obtained constituted the main data source of this study. As a result of the meta-analysis, it was revealed that there was no publication bias. According to the fixed effects model, the average effect size value was d = 083 in favor of male students, and 0.081 in the random effects model. As a result of the moderator analysis, it was determined that the researcher (s) was not a moderator for the calculated average effect size of the variables such as gender, research region, research type, class level, research year and sample number. In short, the gender variable had almost no effect on secondary school students' attitudes towards physical education and sports lessons.

Keywords: Physical education; sports; gender; meta-analysis; moderator.

1. Introduction

The main objective of the physical education and sports curriculum is to prepare students for the next level of education by developing their movement skills, active and healthy life skills, concepts and strategies as well as self-management skills, social skills and thinking skills that they will use throughout their lives. (MEB, 2018). Physical education is an integral part of a suitable education and general education. This course contributes to the physical, mental, social and spiritual development of children. It is quite meaningful that physical education and sports lessons can be made more effective

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and widespread in terms of multidimensional development of children. (Baylan, Baylan ve Kiremitçi, 2012; Kangalgil, Hünük ve Demirhan, 2006; Türkmen ve Varol, 2017). Physical education and sports are not only a field related to psychomotor development, but should be planned with affective and cognitive development (Baylan et al., 2012). Since physical education and sports lessons have a very important place in the general education system, developing a positive attitude towards physical activity constitutes the main purpose of physical education and sports lesson programs (Özyalvaç, 2010).

Attitude is an orientation that regularly creates an individual's feelings, thoughts and behaviors related to the psychological object (Kağıtçıbaşı, 2005). Attitude refers to the approach and distancing towards some concepts, objects and situations, but to show certain behavior towards them (Hılgard, Atkinson, & Atkinson, 1971). Students' attitudes must be recognized, developed or changed, as they affect their achievements. In addition, developing positive attitudes towards social institutions, rules and values can be achieved by getting to know them from these aspects (Ercan, 1998). Students who have negative attitudes towards the physical education lesson may reduce the efficiency of the lesson, not participate in the lesson, may not give importance to the lesson, or cause various problems in the way the lesson is taught (Güllü, Güçlü, & Arslan, 2009). For this reason, it is very important to know the factors that affect students' attitudes towards physical education and sports lesson, and to minimize the factors that negatively affect the attitudes towards physical education lesson in terms of achieving the goals of physical education lessons (Hekim, Tokgöz, & Yüksel, 2017).

Studies investigating student attitudes provide valuable information about what students think, feel, and know about physical education (Graham, 1995). Research on teaching and student achievement in physical education has contributed to a better understanding of the complex nature of the teaching-learning process. Including research on student attitudes in this area has the potential to provide a more general overview of student learning. In addition, gaining information about student attitude can help both teachers and students in the learning process (Silverman & Subramaniam, 1999). When the domestic literature is examined, it is seen that there is no difference in students' attitudes towards the course in terms of gender in some studies (Alpaslan, 2008; Gürbüz ve Özkan, 2012; Keskin, 2015; Kır, 2012; Kumartaşlı, 2010; Yaldız, 2013; A. Yıldırım, 2006). In some studies, female students (Erhan ve Tamer, 2009; Koçak ve Hümeriç, 2006) In some, it was concluded that male students (Akbulut, 2017; Balyan, 2009; Canlı, 2013; Güven-Karahan, 2011; Haşıl-Korkmaz ve Girgin-Holoğlu, 2011; Hünük, 2006; Hünük ve Demırhan, 2003; Kangalgil ve diğerleri, 2006; Karadağ, 2012; Koç, 2009; Şengül, 2016; Şişko ve Demirhan, 2002; Taşğın ve Tekin, 2009; Yağcı, 2012) have high attitudes towards physical education and sports lessons.

These uncertain results motivated researchers more to investigate the subject, and more studies were conducted to clarify the effects of the gender variable. Meta-analytical studies provide an opportunity for a holistic approach to a specific topic by using tables and graphs in a single study consisting of many studies included on different samples (Borenstein, Hedges, Higgins, & Rothstein, 2013). In this respect, this study can contribute to the field by providing a synthesis in terms of gender differences in physical education and sports lessons by guiding researchers in the future on the subject.

Researches on student attitudes towards physical education and sports lessons have been conducted for a long time and many studies have been published on this subject. It can be seen that there is a need for a "meta-analysis study" that reveals the effectiveness of the studies conducted with the attitudes of secondary school students towards physical education and sports lesson in terms of their gender and examines this effect in terms of various variables. Basically, in this study, physical education at the secondary school students in Turkey and gender gym classes were designed to determine the attitude. In this direction, the study was carried out with the meta-analysis method. The characteristics that are thought to affect the studies by the researcher were determined and the following sub-problems were created in line with these characteristics:

In studies examining students' attitudes in gender variable, do researchers have a moderator effect on the general effect level of their gender?

In terms of students' attitudes on gender variable, does the type of publication (postgraduate thesis and scientific article) have a moderator effect at the general effect level?

In terms of students' attitudes in gender variable, do the regions (Marmara, Aegean, Eastern Anatolia, etc.) where the studies were conducted have a moderator effect at the general effect level?

Does the grade level (5,6,7 and 8) have a moderator effect at the general effect level in terms of students' attitudes in the gender variable?

Does the publication year and sample size have a moderator effect at the general effect level in terms of students' attitudes towards gender variable (meta-regression)?

2. Method

2.1. Research model

In the study, the meta-analysis method, one of the methods of synthesizing research results, was utilized. Analyzing, synthesizing and interpreting quantitative findings obtained from independent studies with advanced statistical techniques is referred to as meta-analysis. The purpose of a meta-analysis is; in order to reveal the facts, it is to combine the findings obtained from studies conducted on the same subject at different places and times, and to reach the most accurate quantitatively by increasing the number of samples (Cumming, 2012; Ellis, 2010; Hartung, Knapp, & Sinha, 2008; Kış, 2013; Yıldırım, 2014). In this study, using the statistical package program CMA 2.0 [Comprehensive Meta-Analysis] and jamovi 1.2.22 (The jamovi project, 2020) for Meta-Analysis, the effect sizes and variances of each study and the groups were compared. Cohen's kappa coder reliability and outliers' tests were performed using the SPSS package program.

2.2. Data collection

Examined attitudes towards physical education and sports classes of secondary school students in Turkey engaged in research and scientific articles according to gender variables, data sources form the basis of this research with graduate dissertation.

ULAKBİM, YÖK, Google Scholar, EBSCOhost, Web of Science databases were used to reach related researches.

In the selection of the studies included in the research;

Criterion 1: Published or unpublished study sources: Scientific articles, master's and doctoral dissertations were received.

Criterion 2: The suitability of the research method in the studies: In order to reach the effect size in the meta-analysis studies, it was taken into consideration that the included studies were in a survey design and they used gender as an independent variable.

Criterion 3: Including sufficient numerical data: For secondary school students taking physical education in the context of gender in order to calculate the effect sizes required for the meta-analysis study; Basic statistical data such as mean, standard deviation, and sample size were taken into account.

Criterion 4: Year of publication of studies: Execution of studies between 2000 and 2020.

In this meta-analysis study, the PRISMA directive shown in Figure 1 was adopted during the data collection process (Moher, Liberati, Tetzlaff, Altman, & The PRISMA Group, 2009).
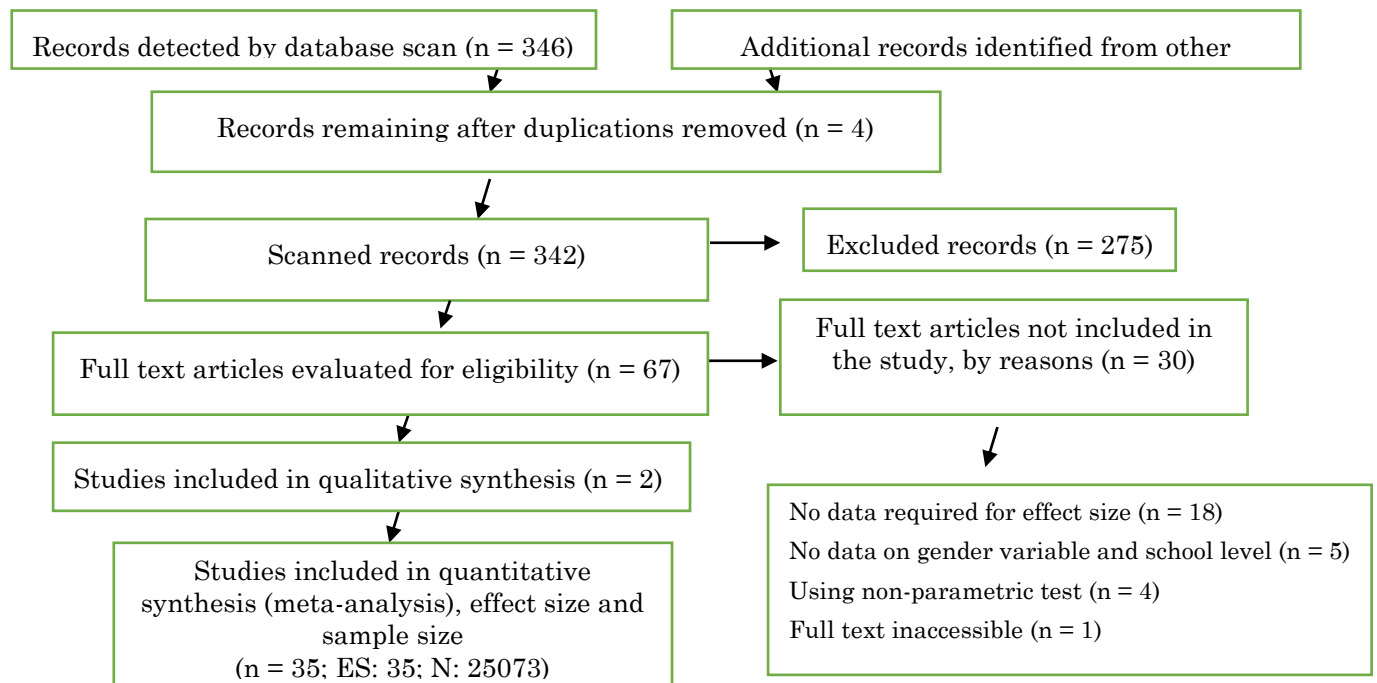

Figure 1. PRISMA flow chart

2.3. Data analysis

In this study, effect sizes and variances of each study and comparisons of groups were calculated by using statistical package programs for Meta-Analysis. In this study, while calculating the effect size of each study included in meta-analysis, the standardized effect size (Standardized effect size) developed by Cohen was preferred (Cohen, 1988). The study included male students as the experimental group and female students as the control group. Therefore, the calculated effect size is interpreted in favor of male students, and negative in favor of female students. Since the significance level was taken as 0.05 in the included studies, the significance level of the statistical analysis was determined as 0.05 in this study.

Sometimes it is desirable to combine two or more reported subgroups into a single group. This may be the case, for example, if a study presents sample sizes, averages, and standard deviations separately for men and women. Thus, data can be used to combine into a single sample size, mean and standard deviation for each intervention group. In this research, the data of some studies (Kangalgil et al., 2006, Türkmen and Varol,2017, Şengül, 2016) were obtained by the Cochrane data combination formula (Shuster, 2011).

Interview data of four randomly selected participants were coded by the second researcher in order to check the coding in the analysis of the data for reliability and to find out whether the coding match was sufficient. The agreement between the two researchers was found to be 0.88 with the formula "Reliability = (number of categories with agreement) / (total number of categories with and without agreement)". It has been stated that values above 0.70 are sufficient for inter-encoder reliability for matching two different encoders (Miles & Huberman, 1994). Establishing coding protocol reliability is a process that should be applied in the meta-analysis process (Card, 2012; Petitti, 2000). For this reason, the codings carried out during the study process were filled in separately by two experts (a faculty member who has a doctorate degree in physical education and lectured in the relevant programs of sports sciences faculties) in terms of the reliability of the study. Agreement among the coders was detected at a rate of 86.2%. Some researchers (Card, 2012) have considered the level of agreement that emerges by using the frequency data between the coders and stated that Cohen's Kappa statistics can be more reliable considering the chance factor due to the lack of options. As a result of the performed process, the reliability index between coders was found to be 0.84. The result between coders shows an almost perfect fit (Cohen, 1960; Landis & Koch, 1977; Viera & Garrett, 2005).

Hunter and Schmidt state that in the process of determining the extreme value, attention should be paid to studies whose effect sizes are quite different compared to others, and that a bad data set cannot be corrected without excluding these studies (Hunter & Schmidt, 2004). Hedges and Olkin consider the exclusion of a study determined to be an extreme value from the data set as a correct decision provided that

the general average is not affected by this operation but the model fit improves, and they suggest various methods to determine extreme values. According to the methods specified, studies that show relatively excessive deviation in forest graph axes can be considered as extreme values (Hedges & Olkin, 1985). In this study, whether the studies can be considered as extreme values was examined by forest plot, z score (4.80) and heterogeneity tests (Q = 1083.73,10; p <0.57). Depending on the explanations above, only one study (Haşıl-Korkmaz ve Girgin-Holoğlu, 2011) with effect size values outside the range of -1 and +1 was not included in the meta-analysis. Finally, analyzes were carried out with 35 studies.
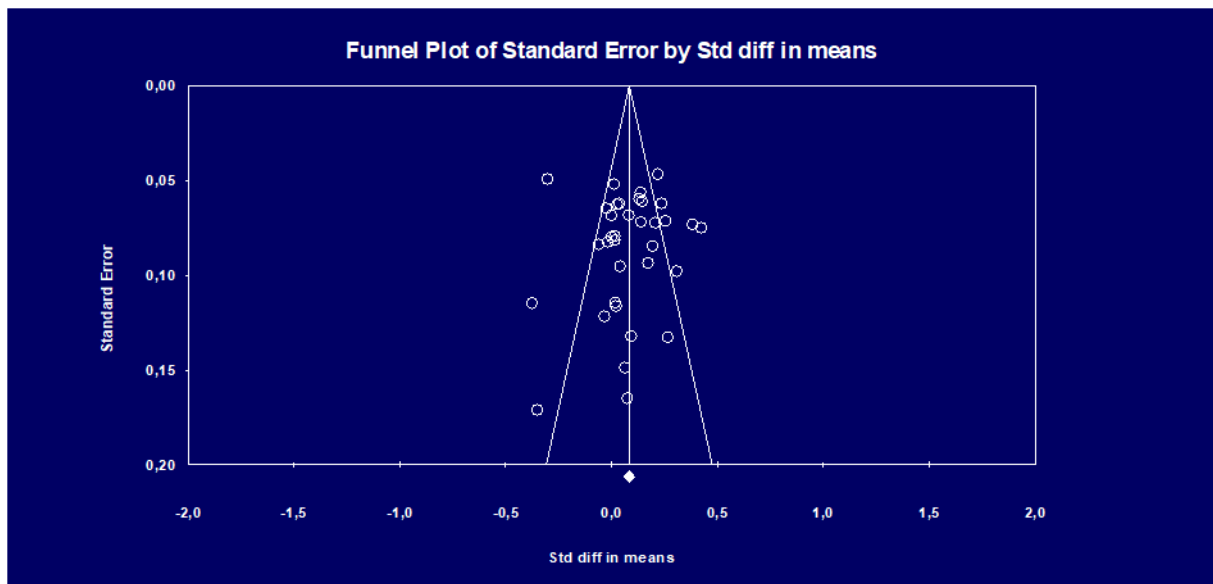
3. Results

3.1. Publication Bias

Figure 2. Funnel plot of studies containing effect size data regarding attitudes of secondary school students towards physical education lesson according to the gender variable

As can be seen in Figure 2, most of the individual effect sizes of the studies included in the meta-analysis were collected in a funnel and symmetrically. In addition, it is seen from Figure 2 that the individual effect sizes of the studies are gathered around the line in the secondary showing the general effect size. According to funnel scatter plot, it can be said that 35 studies included in meta-analysis did not have publication bias. However, since all individual effect sizes of the studies are not symmetrical in the funnel, publication bias statistics should also be considered. The confidence tests and results showing the bias of the studies included in the meta-analysis are given in Table 1.

Table 1. *Confidence tests and results showing the bias status of the studies included in the meta-analysis*

Confidence tests	Confidence test data	
	Z-value for the studies reviewed	6.166
	P-value for the studies reviewed	.000
	Alpha	.050
Rosenthal's Safe N	Tail	2
	Z value for alpha	1.959
	Number of studies reviewed	35
	Safe N (FSN)	312
	Tau	-.068
Begg and Mazumdar Rank Correlations	Z value for tau	.582
	p-value (1-tailed)	.280
	p-value (2-tailed)	.560
	Standard error	1.302
	95% lower limit (1-tailed)	-2.869
	95% upper limit (2-tailed)	2.428
Egger's Linear Regression	t value	.169
	df	33
	p value (1 tailed)	.433
	p value (2 tailed)	.866

As seen in Table 1, Rosenthal's Safe N Test results reveal that the meta-analysis result is statistically significant (p = .000). In order for the meta-analysis result to be no longer significant, that is, to be p> .05, 312 studies with an effect size value of zero are needed. The fact that Kendall's Tau coefficient obtained from Begg and Mazumdar Rank Correlations is not statistically significant (-.068 ve p = .566) indicates that there is no publication bias. It can be stated with 95% confidence that there is no publication bias from Egger's Linear Regression method (p = .866> .05).

3.2. The Combined findings of the effect size meta-analysis of secondary school students on the gender variable according to the fixed and random effects model

Table 2. *The Combined findings of the effect size meta-analysis of secondary school students on the gender variable according to the fixed and random effects model and the homogeneity test*

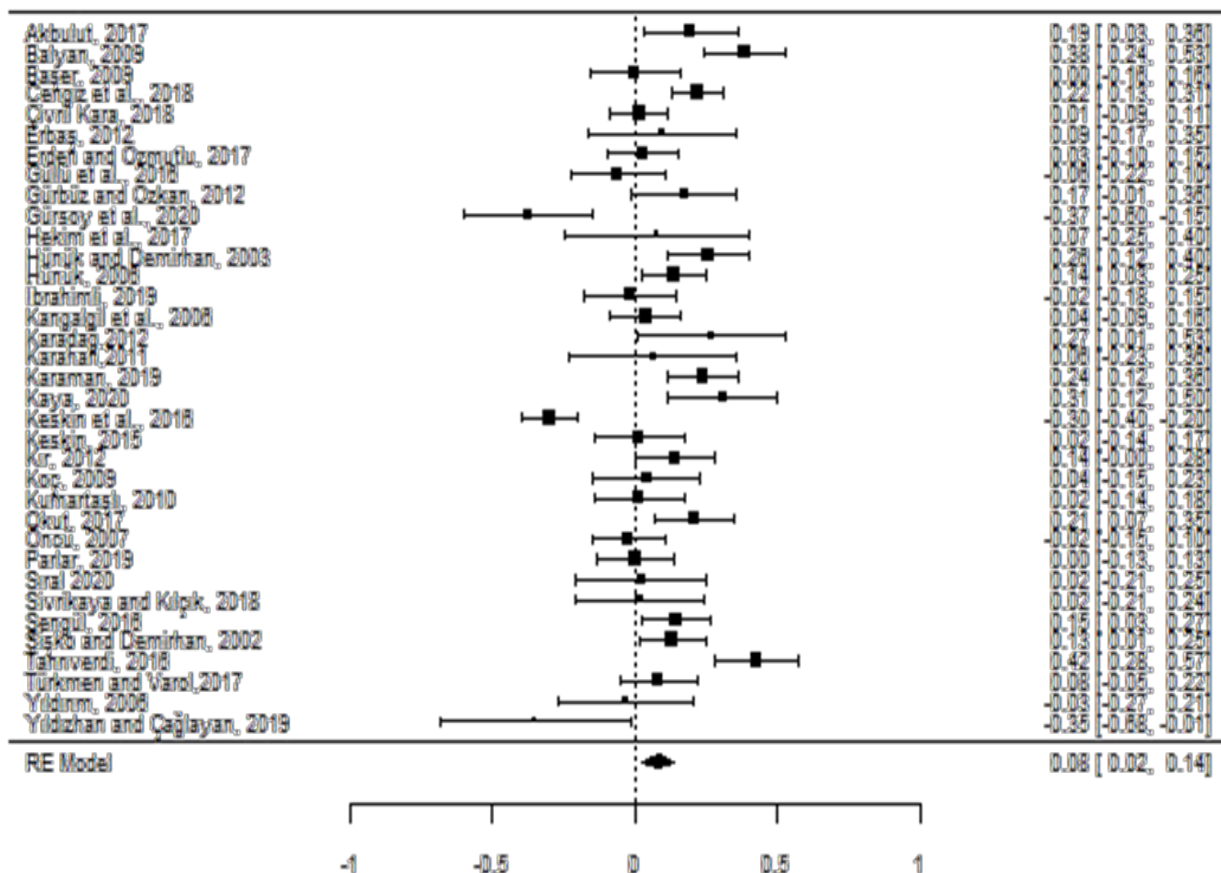| Model	Effect size and 95% confidence interval					Null hypothesis			Heterogeneity		
	Number of studies	Effect size	Standard error	Variance	Lower limit	Upper limit	Z-value	p	Q-value	Df (Q)	I²
Fixed	35	0.083	0.013	0.000	0.059	0.108	6.578	0.000	172.852	34	80.330
Random	35	0.081	0.030	0.001	0.023	0.139	2.724	0.006			

Figure 3. Forest chart

Looking at Table 2, data in 35 studies included in meta-analysis according to calculations show that according to the fixed effects model, male students have a positive and mild attitude than female students. However, since the effect size value is lower than 0.20, it has been determined that it has a weak effect according to Cohen's classification (Cohen, Manion ve Morrison, 2011). In addition, the forest graph for the individual effect size of the studies is presented in Picture 3. The homogeneity test, also known as Q-statistics, was calculated as Q = 172.852. The value of 34 degrees of freedom at 95% significance level was found to be 45,773 from the X2 table. Since the Q-statistic value exceeds the critical value of the chi-square distribution, the absence hypothesis of homogeneity for the distribution of effect sizes is rejected in the fixed effects model. In other words, it was determined that the effect size distribution has a heterogeneous feature according to the fixed effects model. Developed as a complement to Q statistics, I^2

reveals a clearer result regarding heterogeneity (Petticrew ve Roberts, 2005; N. Yıldırım, 2014). I^2 etki büyüklüğüne ilişkin toplam varyansın oranını göstermektedir. I^2 istatistiği Q istatistiğinin aksine çalışma sayısından etkilenmemektedir. I^2 'nin yorumlanmasında ise % 25 düşük düzeyde heterojenliği, % 50 orta duzeyde heterojenliği ve % 75 yüksek düzeyde ¨ heterojenliği göstermektedir (H. Cooper, Hedges ve Valentine, 2009). As a result of the homogeneity tests (Q and I^2) performed for the gender variable, there was a high level of heterogeneity between studies, the model was converted to a random model for the combination process. The results of the moderator analysis (mixed effect analysis) made in order to reveal the reasons for this heterogeneity are given in Table 3.

Borenstein et al state that moderator analysis is required to identify possible causes of heterogeneity between studies. Therefore, analyzes were made on behalf of some moderators to discover the reasons for heterogeneity (Borenstein, Hedges, Higgins, & Rothstein, 2009).

Table 3. *Categorical moderator results regarding gender effect regarding physical education lesson*

Moderatör	k	d	SE	%95 CI	$Q_{between}$	p
Researcher Gender	35				1,303	0,254*
Male	23**	0.128	0.029	0.071; 0.184		
Female	7**	0.068	0.044	-0.017; 0.153		
Type of Study	35				0.243	0.622*
Postgraduate Thesis	22**	0.122	0.030	-0.108; 0.123		
Article	13**	0.007	0.059	0.064; 0.181		
Grade Level	32				2.402	0.301*
5,6,7,8	11	0.136	0.045	0.049; 0.223		
6,7,8	15	0.031	0.057	-0.081; 0.142		
8	6	0.127	0.046	-0.037; 0.216		
Research Area	33				5.807	0.325*
Mediterranean	3**	0.098	0.097	-0.092; 0.287		
Eastern Anatolia	6**	0.111	0.084	-0.054; 0.276		
Aegean	4**	0.058	0.149	-0.233; 0.349		
Central Anatolia	11**	0.134	0. 029	-0.079; 0.190		
Black Sea	6**	0.067	0. 032	-0.005; 0.130		
Marmara	3**	0.005	0. 051	-0.096; 0.105		

* The significance level was taken as (p <0.05).

** Subgroup numbers of 1 were not included in the moderator analysis.

As a result of the moderator analysis, it was determined that the research region, the type of the study and the researcher's gender were not a moderator for the calculated average effect size. As a result of the meta regression made to determine whether the year the research was conducted was a moderator or not; Over the years, it has been revealed that the effect sizes of the studies have a downward trend in the difference in favor of female students, but this result is not statistically significant (coefficient = [-

.005]; p = .369). In addition, as a result of the meta regression made to determine whether the sample size is a moderator or not; It was seen that there was no difference between the sample size and the attitudes of male and female students, and this result was not found to be statistically significant (coefficient = .000; p = .851).

4. Discussion

In this study, 35 effect sizes belonging to 35 studies constituting a sample of 25073 people were calculated. In the Fixed Effects Model, a statistically significant effect size of 0.081 was found in favor of male students as a result of the merging process. This result is a weak result according to Cohen's classification (Cohen et al., 2011). In the random effects model, a statistically significant effect size of 0.081 was found in favor of male students as a result of the merging process. When these results are evaluated together; It can be said that there is almost no difference between male and female students in terms of secondary school students' attitudes towards physical education and sports lessons. It can be said that this result is a reference for future studies. In the Random Effect Model, the difference between boys and girls was found to be 0.081 [95% CI 0.023-0.139].

When the primary studies included in the meta-analysis were examined one by one, it was determined that the effect value of the attitudes of male students compared to female students was small in only eight studies (Balyan, 2009; Cengiz, Kılıç ve Soylu, 2018; Hünük ve Demırhan, 2003; Karadağ, 2012; Karaman, 2019; Kaya, 2020; Okut, 2017; Şişko ve Demirhan, 2002), while it was weak or very weak in other studies. According to the random effects model in this study, it can be said that finding a weak difference between the attitudes of secondary school students towards physical education and sports lesson in terms of gender supports the results of these studies. In other studies, it has been reported that female students have more positive attitudes than male students (Güllü, Cengiz, Öztaşyonar ve Kaplan, 2016; Gürsoy, Zekioğlu, Gürsoy ve Çamlıyer, 2020; İbrahimli, 2019; Keskin, 2015; Parlar, 2019; Yıldırım, 2006; Yıldızhan ve Çağlayan, 2019). The results of these studies are not compatible with the fact that male students have more positive attitudes towards physical education and sports lesson than female students according to the random effects model.

Silverman and Subramaniam stated that mixed reasons for findings in attitude research in sports pedagogy may be different levels of analysis, target population (student), data collection tools and measurement issues (Silverman ve Subramaniam, 1999). Erden and Özmutlu stated that among the reasons for the difference in gender variable, there may be reasons such as students' feeling more comfortable in lessons, being more active and energetic (Erden & Özmutlu, 2017). Gürsoy et al. Count the more venues and environments where activities are held for male students in social life, which explains the high attitude of female students towards the lesson (Gürsoy et al., 2020). Hekim et al. Argued that different results in the literature might be the way physical

education and sports lessons were taught (Hekim et al., 2017). He reported that female students' attitudes towards physical education lesson may depend on the gender of the teacher in the course (Keskin, Öncü, & Küçük, 2016). Yıldızhan and Çağlayan predicted that teachers' attitudes towards male and female students or teacher behaviors perceived by students according to their gender are effective in their attitudes according to gender (Yıldızhan & Çağlayan, 2019). Başer explained that the behaviors exhibited by teachers in lessons can affect the attitude in the gender variable (Başer, 1998).

5. Conclusions

From the studies in the domestic literature, it can be said that secondary school students' attitudes towards physical education and sports lesson almost do not differ in the gender variable. The result, which is very weak and in favor of male students, can be explained with a holistic understanding from the attitude of the teacher to the subject of the lesson and the way of teaching. It can be said that it is important for boys and girls to develop different attitudes towards the lesson in order to teach the lesson in a healthy way. In addition, it can be stated that the result is remarkable for parents as well as teachers, researchers and trainers. In the moderator analysis conducted to explain a weak effect size for the gender variable in terms of secondary school students' attitudes towards physical education and sports lesson, it was observed that the variables of the researcher's gender, the type of the study, the grade level, the region where the study was conducted, the year of publication and the sample number were not moderators.

Regarding the study;

• There is no need for teachers to differentiate between boys and girls for the activities to be done in the lesson.

• It is necessary to focus on researches on this subject (gender variable) with meaningful results

• It can be explained that a global study on the subject will add more significance to the field.

Acknowledgements

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