Education and Science

Original Article

Vol 46 (2021) No 208 475-491

Evaluation of Physical Literacy in Secondary School Students *

Hakan Taş [1], Irmak Hürmeriç Altunsöz [2]

Abstract

The purposes of this study were (a) to determine the physical literacy of secondary school students, (b) to investigate whether there were any inter-relationships among sub-domains of physical literacy (physical domain, psychological domain, and behavioral domain) in secondary school students and (c) to identify whether any gender and grade difference exists in physical literacy of secondary school students. The participants were sixth and seventh-grade students (76 boys, 82 girls) from three urban public schools in Ankara. For the data collection, the Physical Literacy Assessment for Youth (PLAY) instrument, developed in Canada, was used to evaluate student's physical literacy. The PLAY instrument contains PLAYfun to evaluate the physical domain (motor competence) of students, PLAYself to evaluate the psychological domain of physical literacy, and PLAYinventory to evaluate the behavioral domain of physical literacy. For data analysis, The Pearson correlation was utilized to investigate the relationship between instruments. The independent t-test was run to determine whether any gender and grade difference exists. The findings were explained in three separate categories. First of all, the result of the psychological domain (PLAYself) indicated that students had 2.91 points. Psychological domain scores consist of two parts; (a) environmental participation score was 2.34 points, (b) self-efficacy score was 3.20 points. The students generally indicated that they were good at outdoor activities ($\bar{X}$ = 3.22, SD = 0.93) and they never tried or were not good at activities performed on ice and snow ($\bar{X}$ = 1.16, SD = 1.16). Behavioral domain (PLAYinventory) findings indicated that students generally participated in swimming, football, roller skating, bicycle, volleyball, running, walking, basketball. The physical domain (PLAYfun) findings indicated that the overall motor competence score of students was 37.96 which means they were placed in "emerging level". The result of the Pearson correlation indicated that there was a statistically significant correlation between the average psychological domain score and behavioral domain score (r (156) = .392, ρ <. 05). Furthermore, the independent t-test result

Keywords

Physical Literacy
Secondary School Students
PLAYself
PLAYfun
PLAYinventory

Article Info

Received: 07.03.2020
Accepted: 02.09.2021
Online Published: 03.07.2021

DOI: 10.15390/EB.2021.9907

* This article is derived from Hakan Taş's Master's thesis entitled "Evaluation of physical literacy of secondary school children", conducted under the supervision of Irmak Hürmeriç Altunsöz.

[1] Middle East Technical University, Faculty of Education, Dept. of Physical Education and Sports, Turkey, thakan@metu.edu.tr
[2] Middle East Technical University, Faculty of Education, Dept. of Physical Education and Sports, Turkey, hurmeric@metu.edu.tr

indicated that there was no grade difference between students. However, there was statistically significant difference between physical domain mean score of boys ($\bar{X}$ = 40.63, *SD* = 7.42) and girls ($\bar{X}$ = 35.49, *SD* = 6.13); *t* (156) = 4.76, ρ <. 05, r^2=.13. In conclusion, students had higher scores in the psychological domain, on the other hand, they had lower scores in the physical domain. In addition, students in the sixth and seventh grades did not meet the physical education and sports curriculum objectives in the motor competence test. For further research, the sample size should be increased and studies should be conducted to examine the physical literacy of students from different grades, schools, and cities.

Introduction

Physical activity is described as any bodily movement which is produced by skeletal muscles. Body movements require energy expenditure such as walking, running, and other recreational activities (World Health Organization, 2018). The benefits of regular physical activity participation are widely accepted for all ages and gender (Tremblay et al., 2011). Regular physical activity not only promotes a healthy and quality life (Haskell et al., 2007), cardiorespiratory fitness, and bone density but also reduce the risks of heart disease, stroke, and diabetes (World Health Organization, 2018) in the short and the long term (Longmuir et al., 2015). On the other hand, a physically inactive lifestyle has tremendous harm to human health and economic expense in the worldwide (Li, 2014). In order to reduce the harm of an inactive lifestyle, recommendations are suggested to children and to adults by the World Health Organization (WHO). For instance, children should do at least 60 minutes of moderate to vigorous-intensity physical activity (MVPA) per day and do exercise to gain strength. Adults should participate in at least 150 minutes of MVPA three days a week and do strength exercise two-three times a week (World Health Organization, 2018). However, children do not meet the recommended guidelines (Taylor & Kolen, 2016). It seems that sedentary lifestyles remain a significant problem around the world (Keegan et al., 2019). Thus, it is necessary to understand the underlying mechanism of the factors that influence physical activity and inactivity (Stodden & Goodway, 2007). One of the ways to increase physical activity is to gain knowledge of fundamental movement skills (FMS). Fundamental movement skills, which include manipulative skills (catching, throwing); locomotor skills (running, skipping); and non-locomotor skills (balance) are the key elements to participate in physical activity (Lubans, Morgan, Cliff, Barnett, & Okely, 2010). Fisher et al. (2005) indicated that FMS has a positive effect on habitual physical activity. The better motor skill development children have, the more children participate in various physical activities (Stodden & Goodway, 2007). Stodden et al. (2008) also indicated that fundamental movement skills are the ABC's of physical activity. However, only having motor competence might not be enough to engage in physical activity (Whitehead, 2010), physical literacy is emphasized as an important concept to be physically active. Physical literacy goes beyond physical activity and fundamental movement skills (Cale & Harris, 2018).

Over the recent years, many researcher and practitioners have been interested in the concept of physical literacy (Gunnell, Longmuir, Barnes, Belanger, & Tremblay, 2018; Keegan et al., 2019) and the number of studies related to physical literacy has increased in scientific papers (Edwards, Bryant, Keegan, Morgan, & Jones, 2017). The concept of physical literacy was put forward in 2001 to help global obesity (Tompsett, Burkett, & McKean, 2014). This concept has been put into practice in international policies to explain its importance in the field of education (Whitehead, Durden-Myers, & Pot, 2018). In the worldwide, there has been an increased interest in promoting physical literacy in both education and lifelong learning (Whitehead, 2007). The term "physical literacy" is described as 'an individual's capacity for a physically active lifestyle' (Longmuir & Tremblay, 2016). According to Edwards et al. (2019), 70% of the studies used the "Whiteheadian" perspective. Whitehead (2010) defined the perspective "*As appropriate to each individual's endowment, physical literacy can be described as the motivation,*

confidence, physical competence, knowledge and understanding to maintain physical activity at an individually appropriate level throughout life" (p. 5). Physical literacy consists of three main components which are physical, behavioral, and psychological. The physical domain refers to individuals' fundamental movement skills. The behavioral domain refers to whether individuals participate in physical activity or sports regularly. The psychological domain refers to the perceptions of individuals about themselves while participating in physical activity. Many studies indicate that physical literacy is a never-ending process (Ennis, 2015; Liedl, 2013). Because it improves lifelong participation in physical activity (Whitehead, 2010), and supports cardiorespiratory fitness, perceived physical competence, and body mass index (Tompsett et al., 2014). Physical literacy has some psychological benefits as well (Gehris et al., 2018). It promotes self-efficacy, self-confidence, understanding, and knowledge (Whitehead et al., 2018), promotes taking responsibility for engagement in activity (Cale & Harris, 2018). A child with high physical literacy moves confidently on ice, snow, water, and ground (Longmuir et al., 2015), good at using his/her own movement potential, and has high motivation and high nutritional skills as well (Tompsett et al., 2014). Ennis (2015) emphasized that a physically literate individual is a person who not only possesses knowledge and skills but can also demonstrate this knowledge and skills without hesitation. Furthermore, physical literacy is a necessary concept for both high-performance athletes and for people participating in regular physical activity (Balyi & Hamilton, 2004; Tompsett et al., 2014). On the other hand, children who have low physical literacy tend to withdraw from physical activity and prone to health problems (Longmuir et al., 2015).

Recent studies have shown that physical literacy has an effect on an individual's physical activity, personal, social, and cognitive development. It was emphasized that physical literacy supports one's participation in physical activity, supports the development of motor competence, and supports a psychological factor which is confidence, and motivation to participate in physical activity (Whitehead, 2010). These features play a key role in a physically active lifestyle (Edwards et al., 2017; Kiez, 2015). Physical literacy promotes self-efficacy, self-confidence, and creativity (Whitehead et al., 2018), which improves the cognitive, social, and emotional status of children regardless of their gender or individual differences (Gehris et al., 2018), and decreases health problems (Longmuir et al., 2015). In the literature, previous studies indicate that children's motor competence (Caput-Joginica, Locaric, & Privitello, 2009; Kozera, 2017; Kriellaars et al., 2019; Mandigo, Lodewyk, & Trendway, 2019) and their dietary behaviors are improved as a result of the physical literacy-related intervention. Furthermore, some studies reveal that boys had better strength and coordination (Caput-Joginica et al., 2009), better motor competence (Kozera, 2017), higher physical activity level. On the other hand, girls had higher cardiorespiratory endurance (Gu, Chen, & Zhang, 2019), better knowledge and understanding (Thomas, 2016), dynamic strength, flexibility and balance (Caput-Jonica et al., 2009). The concept of physical literacy is an important factor in evaluating student's fundamental motor competency, physical activity level, and perceptions about exercise. Limited studies related to physical literacy are available in Turkey. Thus, this study provides important information about the physical literacy of students and how to measure major components of physical literacy (behavioral, physical, and psychological domains).

The objectives of this study were (a) to determine the physical literacy of secondary school students (b) to investigate whether there was any relationship between sub-domains of physical literacy (physical domain, psychological domain, and behavioral domain) in secondary school students and (c) to identify whether any gender and grade difference exists in physical literacy of secondary school students. As such, this study had four research questions. Research questions are as follows;

1. What is the physical literacy of secondary school students?
2. Is there any relationship between the sub-domains of physical literacy of secondary school students?
3. Is there any difference between sixth and seventh-grade students in their physical literacy?
4. Is there any gender difference in the physical literacy of secondary school students?

Method

Design, Sampling, and Settings

The quantitative research methodology and the cross-sectional design was utilized for this study. Purposive sampling strategy was used to collect data. This study was conducted in two different districts in Ankara, Turkey. Data were collected from three urban public schools. The total number of participants was 158 secondary school students. Demographics information is provided in Table 1 below.

Table 1. Demographics Information of Participants

	N	$\bar{X}$age	SD	$\bar{X}$height	SD	$\bar{X}$weight	SD
Sixth grade	88	11.39	.56	150.31	7.42	42.40	9.10
Seventh grade	70	12.41	.67	156.27	9.06	44.66	10.59
Girls	82	11.78	.75	153.07	7.66	41.98	8.30
Boys	76	11.92	.83	152.82	9.72	44.95	11.08

*weight = kilogram, height = centimeter

Instruments

The Physical Literacy Assessment for Youth (PLAY) instrument which was developed at the University of Manitoba in 2009-2010 was used in this study (Sport for Life Society, 2017). PLAY includes a number of different tools that are meant to evaluate the physical literacy of children. The selected tools for the current study include; PLAYfun, PLAYself, and PLAYinventory. These tools are stated to be appropriate for children over the age of seven. PLAYfun is an assessment tool for the physical domain. PLAYself is a self-assessment tool for the psychological domain and PLAYinventory is a child's self-report of participation in physical activity or different activities which assesses behavioral domain. The detailed information about PLAYfun, PLAYself, and PLAYinventory are provided in Table 2 below.

Table 2. PLAYtools Instrument

	Aim of the instrument	Type of instrument	Content of instrument
PLAYfun	Physical domain	Motor competence test	18 tasks
PLAYself	Psychological domain	Survey	18 questions
PLAYinventory	Behavioral domain	Survey	Physical activity list

PLAYfun

PLAYfun (physical domain) is a motor competence test providing an assessment of fundamental movement skills. It includes 18 tasks (skills) and five sub-sections which are running (run in the square field, run to the funnel and come back), locomotor movements (crossover, skipping, galloping, hopping), upper and lower body object control skills (overhand throw, strike with a stick, one hand catch, kick the ball with a foot) and balance, stability and body control (balance walk forward and backward, drop to ground face down and getting back up). PLAYfun tool assesses the task rather than the skill. In this way, spatial awareness, skill ranking, and competency evaluation can be made. A holistic rubric with a 100 mm visual analog scale is used in the motor competence test. The overall process can be assessed as a whole with it, and some part of errors can be tolerated if the process has high quality (Mertler, 2001). The holistic rubric offers the researcher the opportunity to evaluate and make decisions about the process or outcome over a wide range of competencies (Moskal, 2000). Such features make this rubric different from other assessment tools (Kozera, 2017). Based on the scoring systems of PLAYfun, without age restrictions, zero points indicate that the task cannot be performed, and a hundred points indicate that the task is achieved completely. The scale is divided into four categories equally, which are initial, emerging, competent and proficient categories. The performance of the children is observed and checked according to the criteria in the PLAYfun manual, then one of the initial, emerging, competent or proficient areas related to that task is marked according to the child's performance.

PLAYself

PLAYself (psychological domain) is a self-report of physical literacy and measures the psychological domain score of children. There are four parts in the survey. The first part includes engagement in six different environments (gym, water, ice, snow, outdoor, and playground) and evaluates with a five-point-scale. Its score is from zero to four. It shows environmental participation as "never tried", "not so good", "ok", "very good" and "excellent" (the sum of the maximum score is 24). If a child marks 'very good' or 'excellent' in any environment, s/he feels very confident and capable enough to participate in the selected environment, however, if child marks "ok", "not so good" or "never tried", the child is needed to develop his/her practice in that environment. The second part is a self-description part assessing children's affective and cognitive domain (12 questions). It is a four-point scale (not true at all, not usually true, true and very true), and it shows a child's self-description of the psychological domain of physical literacy (maximum score is 48). The third part measures literacies in reading and writing, math and numbers, and physical activity perception. The last part is about the perception of a child's own fitness. The last two-parts were not included in this study.

PLAYinventory

PLAYinventory (behavioral domain) is a self-report which measures the behavioral domain of physical literacy. There are numerous leisure activities listed in a single sheet such as; swimming, running, cycling, football, and so on, if children participate in these activities regularly out of school in the past one year, they mark these activities. There are also available spaces on the form that allow students to write down other activities that are not included in the list. More than one physical activity or sports can be marked by students.

Procedures of the Study

This study was conducted in the 2018-2019 academic school year. The ethical procedures were followed. Firstly, an ethical report was taken from the Human Subject Ethics Committee in university and then the necessary permissions were taken from the Ministry of National Education. Consent forms were obtained from the parents to allow their children to participate in the study. All aspects of the measurement protocol, the purpose of the study, the significance of the study were explained to all stakeholders. The students had a chance of withdrawing from study whenever they want or had a chance of not answering questions.

Adaptation of PLAYtools

The Physical Literacy Assessment for Youth (PLAY) instrument was developed for Canadian children. In order to use the data collection tool for Turkish children, adaptation procedures were completed. Firstly, necessary permission was obtained from the test developer. Then, PLAYtools were translated by one linguist and two physical education experts from English (original language) to Turkish (target language) (Sinaiko & Brislin, 1973). After that, translated instruments were combined and sent to different linguists to translate from Turkish to English. As a result of the translations, it was seen that the back-translated items and the original English items reflect each other. Totally two linguists and two physical education experts worked on the translation procedures. In order to check face validity, the following questions were asked to experts working in the physical education field; (a) are the questions and items meaningful? (b) are the questions clear and appropriate? and (c) are the questions understandable? Besides, seven secondary school students were asked whether the questions were understandable or not. The measurement tool was arranged in line with the feedback. In addition, because of the cultural and traditional differences between Canada and Turkey, some of the sports and physical activities were excluded and/or added. Inline skating, skipping, trail running, cheerleading, spin classes, exercises classes, DVD/CD or home exercises, baton twirling, target shooting, and plating catch were removed. On the other hand, volleyball, basketball, judo, handball, wrestling, karate, folk dances were added to PLAYinventory.

The pilot study was conducted after the adaptation procedures of the instrument. The pilot phase of the study was conducted in one secondary school in May 2018. The whole sixth and seventh-grade children were invited to participate in the pilot study. A total of 86 students (51 boys, 35 girls)

participated in the pilot study. 32 students (17 boys, 15 girls) from 86 students participated in the motor competence test (PLAYfun).

Validity and Reliability of PLAYself

To check the validity of PLAYself, the content validity of the scale was assessed by an expert from the physical education field. Content validation is that the instruments include a sufficient sample of the domain of content and if the data collection tool is in an inaccurate format (such as giving a test written in English to children with a low level of English), it is expected to show that valid results cannot be obtained (Fraenkel, Wallen & Hyun, 2012). To check the reliability of PLAYself, Cronbach's alpha coefficient was used. According to Cronbach's alpha coefficient, the score of PLAYself was high (α = .81) (Fraenkel et al., 2012). Furthermore, confirmatory factor analysis (CFA) was done using Amos 24 analyzes program. In confirmatory factor analysis, the sample size should be equal or bigger than 5:1 ratio (Myers, Ahn, & Jin, 2011). Data were collected from 86 students for 12 questions. The findings of CFA indicated that PLAYself can be used in Turkish population ($\chi2$ = 78.74, df = 51, $\chi2$/df = 1.54; GFI = 0.87, CFI = 0.90, RMSEA = 0.08).

Inter and Intra-rater Reliability for PLAYfun

Before testing the reliability of the instrument, training sessions were organized for the observers. In the beginning, observers worked on the PLAYfun workbook, watched all videos for PLAYfun tasks (18 tasks) and then, assessed the children in the videos based on the PLAYfun workbook criteria. It lasted approximately 15-18 hours.

To check inter-rater reliability, two independent observers (a motor development & a physical education expert) watched 40 student's videos and assessed all of them one by one independently. Then, eighteen student's videos were evaluated in 5 hours, the other 18 student's videos were evaluated in four hours, and the last day four student's videos were evaluated in 45 minutes. A total of nine hours 45 minutes were spent to complete independent inter-rater reliability. The interclass correlation coefficient (ICC) was used. Findings indicated that there was good reliability among raters (α = .87) (Koo & Li, 2016). To check intra-rater reliability, the motor competence test of 40 students were observed. After one week passed, each student was observed again by the same observer. The results revealed that there was high reliability among raters (α = .95) (Koo & Li, 2016).

Data Analysis

In this study, both descriptive and inferential statistical analyses were performed for the data analysis with SPSS version 26. Descriptive statistics were utilized to present all means, standard deviations of variables. Inferential statistics were performed to analyze the relationship between the sub-domains of physical literacy, grade, and gender difference in physical literacy score. Independent t-test was used to analyze class and gender difference and independent t-test assumptions were checked before the analysis. The assumptions of the independent t-test are independent observation, normality check, and homogeneity of variance. All observations were completed independently. For normality check, histogram was evaluated and indicated that the data were normality distributed. For homogeneity of variance, Levene's test was used for grade and gender, the assumptions have not been violated p >.05. Pearson correlation coefficient for the relationship between sub-domains was performed. An alpha level was utilized as .05.

Results

Research Question 1. What is the physical literacy of secondary school students?

In this section, physical literacy domains were examined separately, the result of the psychological domain (PLAYself) indicated that students had an average score of 2.91. Psychological domain scores consist of two parts; (a) environmental participation score (in the gym, on the ice, in the water, etc.) was 2.34 points, (b) their self-efficacy score (What do you think about doing sports) was 3.20 points. The students generally indicated that they were good at outdoor activities ($\bar{X}$ = 3.22, *SD* = 0.93) and they never tried or were not good at activities performed on ice and snow ($\bar{X}$ = 1.16, *SD* = 1.16). This

information was provided in Table 3. Behavioral domain (PLAYinventory) findings indicated that students generally participated in swimming, football, roller skating, bicycle, volleyball, running, walking, and basketball.

The physical domain (PLAYfun) findings indicated that the overall motor competence score of students was 37.96 which means they were placed in emerging level (between 26-50 score). Their balance score ($\bar{X}$ = 52.12, *SD* = 9.26) was higher than the score of locomotor tasks ($\bar{X}$ = 33.96, *SD* = 8.63) and object control tasks ($\bar{X}$ = 33.47, *SD* = 8.04). When looking at the movement tasks separately, students had difficulty in performing crossover, skip, gallop, overhand throw, strike with a stick. However, it was observed that they got the highest score in forward balance walking task and lifting and lowering an object task.

Table 3. The Scores of Physical Activity Participation of Students in Different Environments

	In the gym		**On the water**		**On ice**		**On snow**		**Outdoors**		**On playground**	
	$\bar{X}$	*SD*	$\bar{X}$	*SD*	$\bar{X}$	*SD*	$\bar{X}$	*SD*	$\bar{X}$	*SD*	$\bar{X}$	*SD*
Total	2.56	1.09	2.22	1.30	1.16	1.16	2.04	1.44	3.22	.93	2.83	1.22
Boys	2.43	1.19	2.04	1.29	1.17	1.15	2.05	1.40	3.28	.78	2.99	1.05
Girls	2.68	.97	2.38	1.30	1.16	1.17	2.02	1.47	3.16	1.05	2.68	1.35
Grade 6	2.59	1.08	2.24	1.37	1.08	1.20	1.95	1.54	3.14	1.06	2.91	1.21
Grade 7	2.53	1.10	2.19	1.22	1.27	1.10	2.14	1.30	3.31	.71	2.73	1.24

Research Question 2. Is there any relationship between the sub-domains (motor competence, psychological domain, and behavioral domain) of physical literacy in secondary school students?

Psychological domain, physical domain, and behavioral domain were compared to determine whether there was a correlation between their average mean scores. There was a statistically significant correlation between average psychological domain score and behavioral domain score ($r\ (156) = .392$, $\rho < .05$) which was a medium correlation. However, there was not any statistically significant correlation between physical domain and psychological domain ($r\ (156) = .071$, $\rho > .05$), physical domain and behavioral domain ($r\ (156) = .018$, $\rho > .05$) (Table 4).

Table 4. Correlation between the Physical Literacy Domains

	PLAYself	PLAYfun	PLAYinventory
PLAYself	1		
PLAYfun	.071	1	
PLAYinventory	.392*	.018	1

$p < 0.05$

Research Question 3. Is there any difference between sixth and seventh-grade students in their physical literacy?

The result of psychological domain indicated that sixth grade students had ($\bar{X}$ = 2.95, *SD* = .48) slightly better self-description score than seventh grade students ($\bar{X}$ = 2.87, *SD* = .45). Environmental score was almost same in sixth grade students ($\bar{X}$ = 2.31, *SD* = .81) and seventh grade students ($\bar{X}$ = 2.36, *SD* = .70). It was found that both grades participated mostly in outdoor activities and least in ice activities. Their self-description score for sixth grade is ($\bar{X}$ = 3.26, *SD* = .39) and for seventh grade ($\bar{X}$ = 3.12, *SD* = .43). The result of the behavioral domain indicated that both grades participated in active video games, football, skating, bicycle, volleyball, running, walking. However, it has been observed that seventh graders participated in swimming more than sixth graders. Seventh-grade students participated in rope jumping activities different from sixth grade. The result of the physical domain demonstrated that seventh grade (39.19) had better motor scores than sixth grade (36.99) however, they were both placed in "emerging level". For sixth grade, highest score was in balance ($\bar{X}$ = 52.22,

SD = 9.11), however their locomotor ($\bar{X}$ = 33.43, *SD* = 9.38) and object control ($\bar{X}$ = 30.82, *SD* = 7.17) scores were almost same. For seventh grade student's highest score was in balance ($\bar{X}$ = 51.99, *SD* = 9.52), unlike sixth grade, their lowest score was in locomotor skills ($\bar{X}$ = 34.63, *SD* = 7.60) (Table 5). When looking at the fundamental movement task in the motor competence test separately, sixth-grade students had high score in their ability to balance walking forward and lifting and lowering the object. Their lowest score was in the crossover, skip, gallop, kick a ball, strike with a stick, and overhand throw. Seventh-grade students had also high scores in their ability to balance walking forward and lifting and lowering an object. Their lowest score was in crossover, skip, gallop, strike with a stick. The independent t-test was used to determine grade differences among physical domain, psychological domain, and behavioral domain mean scores. The independent t-test results indicated that there was not statistically significant difference between the physical domain score of sixth grade ($\bar{X}$ = 36.99, *SD* = 7.20) and seventh grade ($\bar{X}$ = 39.19, *SD* = 7.14); t (156) = -1.91, $\rho >$. 05, and between the psychological domain mean score of sixth grade ($\bar{X}$ = 2.95, *SD* = .48) and seventh grade ($\bar{X}$ = 2.87, *SD* = .45); t (156) = 1.07, $\rho >$. 05 and between the behavioral domain mean score of sixth grade ($\bar{X}$ = 9.92, *SD* = 6.30) and behavioral domain mean score of seventh grade ($\bar{X}$ = 9.01, *SD* = 7.23); t (156) = .84, $\rho >$. 05.

Research Question 4. Is there any gender difference in the physical literacy of secondary school students?

The result of psychological domain demonstrated that girls had better self-description score ($\bar{X}$ = 2.94, *SD* = .47) than boys ($\bar{X}$ = 2.88, *SD* = .47). Environmental score was almost same for boys ($\bar{X}$ = 2.33, *SD* = .73) and girls ($\bar{X}$ = 2.34, *SD* = .78). It has been observed that both genders participate in activities that are least on ice, mostly outdoor activities. The result of the behavioral domain revealed that students participated in walking, running, riding bicycle activities. Boys tended to participate in football, active video games, on the other hand, girls tended to participate in rope jumping and volleyball. The result of physical domain indicated that boys had higher score ($\bar{X}$ = 40.64, *SD* = 7.42) than girls ($\bar{X}$ = 35.49, *SD* = 6.13). It was observed that the highest score was in balance movements in both genders; male ($\bar{X}$ = 53.70, *SD* = 8.92), female ($\bar{X}$ = 50.66, *SD* = 9.39). On the other hand, the lowest score was obtained in object control skills for girls ($\bar{X}$ = 29.95, *SD* = 5.83), in locomotor skills for boys ($\bar{X}$ = 35.89, *SD* = 8.82). When looking at the movement tasks separately. Both genders had the highest score in the walking forward task and lifting and lowering an object task. In contrast, they have difficulty in skip, overhand throw, crossover, and gallop tasks. The independent t-test was used to determine gender differences among physical domain, behavioral domain, and psychological domain's mean score. The gender results indicated that there was a statistically significant difference in physical domain mean score of boys ($\bar{X}$ = 40.63, *SD* = 7.42) and girls ($\bar{X}$ = 35.49, *SD* = 6.13); *t* (156) = 4.76, $\rho <$. 05, r^2=.13. Eta squared showed that there was a large effect. However, there was not a statistically significant difference in psychological domain mean score of boys ($\bar{X}$ = 2.88, *SD* = .47) and girls ($\bar{X}$ = 2.94, *SD* = .47); *t* (156) = .87, $\rho >$. 05 and in behavioral domain mean score of boys ($\bar{X}$ = 9.88, *SD* = 7.34) and girls ($\bar{X}$ = 9.18, *SD* = 6.12); *t* (156) = .65, $\rho >$. 05.

Table 5. PLAYfun Score of Students

	N	**Total**		**Locomotor**		**Object Control**		**Balance**	
		$\bar{X}$	*SD*	$\bar{X}$	*SD*	$\bar{X}$	*SD*	$\bar{X}$	*SD*
Students	158	37.96	7.23	33.96	8.63	33.48	8.04	52.12	9.26
Grade 6	88	36.99	7.20	33.43	9.38	30.82	7.17	52.22	9.11
Grade 7	70	39.19	7.14	34.63	7.60	36.81	7.87	51.99	9.52
Boys	76	40.63	7.42	35.89	8.82	37.28	8.39	53.70	8.92
Girls	82	35.49	6.13	32.17	8.10	29.96	5.83	50.66	9.39

Discussion

The purposes of this study were (a) to determine the physical literacy of students in secondary school (b) to investigate whether there were any relationships between sub-domains of physical literacy (physical domain, psychological domain, and behavioral domain) in secondary school students and (c) to identify the gender and grade differences in physical literacy of secondary school students. The findings of the study were discussed for each research question.

The Physical Literacy of Secondary School Students

Based on the assessment of the environmental participation scores, the students mostly stated that they were good at outdoor activities, and they did not try the activities on ice and snow in general or they were not good at such activities. Besides, their environmental scores seemed to be similar regardless of gender and grade. Thus, the findings revealed that they felt very confident about doing physical activity in outdoor activities such as football, tennis, orienteering, and riding a bike. However, they were needed to improve their abilities for ice and snow-based activities and sports (Sport for Life Society, 2017). Research indicated that parent's involvement in physical activities and children's participation in physical activity is positively associated with each other (Fredricks & Eccles, 2005). Since the parents of the students do not prefer to participate in activities performed on ice and snow, the students do not prefer to participate in such activities and they prefer to participate in outdoor activities. Another reason might be that people living in Ankara do not have many opportunities to participate in ice and snow activities because of the geographical location. However, there are plenty of opportunities for outdoor and playground activities to participate in during the whole year in Ankara. If this study were done in the east of Turkey, for example in Erzurum or such cities, students would be expected to have a higher level of confidence for snow and ice-based activities.

Students had a high self-description of physical literacy in the psychological domain. The findings showed that they were highly motivated to learn new skills and attempt to participate in physical activity and sports. Few differences in their overall scores were found in all types of scores of the psychological domain. Based on the grade, sixth-grade students had higher self-description of physical literacy than seventh-grade students. Based on gender, girls seemed to have higher self-description of physical literacy than boys. However, previous studies found different results. For instance, it was observed that the intrinsic motivation scores of males for motor competence, self-perception, and physical activity were higher than females (Biddle & Armstrong, 1992; Crocker, Eklund, & Kowalski, 2000; Hayes, Crocker, & Kowalski, 1999). In addition to previous research findings, boys had more motivation scores than girls to exhibit competition and challenging motor abilities such as strength and endurance (Kilpatrick, Hebert, & Bartholomew, 2005). It is important that gender and grade differences should be analyzed more for future research.

The results of the behavioral domain demonstrated that students mostly participated in active video games, football, swimming, bicycle, volleyball, basketball, running, and walking. While boys preferred to participate in active video games and football, girls preferred to participate in roller skating and rope jump. Recent studies indicated that students generally participate in popular physical activities and sports such as football, basketball, and net games (Abernethy & MacAuley, 2003; Tozoğlu, Çağlaroğlu, & Tozoğlu, 2009; Sahlin, 1990). In addition to such a cultural effect or the popularity of sports, equipments and materials of the above mentioned sports are found in almost all outdoor playgrounds and all school gardens. In addition, in a district where the data were gathered, most of the students marked that they participate in swimming class and badminton sports. A reason might be that there was a swimming pool near the school. Thus, students have an opportunity to participate in swimming classes. In addition, Turkish Badminton Federation was located very close to the school. The physical education teacher expressed that badminton equipments for students were provided by the

federation and they had an opportunity to participate in badminton during school time. In the literature, previous studies revealed that availability of local facilities (Booth, Owen, Bauman, Clavisi, & Leslie, 2000), supportive environment (Giles-Corti & Donovan, 2002), and parks, indoor gym were positively associated with physical activity level and physical activity participation (Brownson, Baker, Housemann, Brennan, & Bacak, 2001). Furthermore, a high level of physical activity was associated with a high level of social support (Poortinga, 2006). The previous studies found that girls preferred to participate in gymnastics, volleyball, swimming, dance, and ice skating more than boys. On the other hand, boys participated in more masculine sports such as football, basketball, and boxing (Chalabaev, Sarrazin, Fontayne, Boiche, & Clement-Guillotin, 2013; Elling & Knoppers, 2005). Masculine and feminine sports types may affect the participation of students in activities, this may be one of the reasons why boys and girls prefer different physical activities or sports. In order to deal with these differences, teachers, trainers and even parents should encourage their children and students to participate in various activities in different settings without any categorization of sport types. Besides, policymakers should consider increasing the number of facilities such as swimming pools, recreational areas, and sports complexes for all age groups of students.

The result of the physical domain of physical literacy indicated that all students were placed in "emerging level" for fundamental movement skills. Their highest score was in balance tasks, however, their scores were almost the same for the locomotor and the object control tasks. Seventh-grade students had a slightly better motor competence test performance than sixth-grade students. Based on our secondary school physical education and sports curriculum (Ministry of National Education [MoNE], 2017), sixth and seventh-grade students are expected to master all fundamental movement skills and they are expected to apply these movements in various physical activity environments. Thus, sixth and seventh-grade students are expected to be at either "competent" or "proficient" levels. However, when we analyzed student's movement scores separately, they were generally placed in "initial level", "emerging level" and "competent level" but none of them were placed in a "proficient level" in any task. It means that students did not meet the physical education and sports curriculum objectives. These findings were supported by Kozera (2017), showing that 2.5% of fourth-grade students and less than 50% of eighth-grade students were met with physical education and sports curriculum objective's criteria in Canada. One of the reasons might be that students did not receive appropriate instruction during the class and could not practice adequately or they might not participate in physical activity during school time. Another reason can be that student's physical activity participation is negatively affected by the large number of students in the classroom or school. Furthermore, sports equipment, which is not sufficient for physical education classes, causes limited practice for any skill or activity. Another reason might be that the sports clubs and school lecture's qualities may not enough to develop children's motor competence or get them to achieve the physical education and sports curriculum objectives or to be competent in each fundamental movement skill. Thus, students could show a delay in their motor ability (Lubans et al., 2010).

With regard to gender differences, boys had better motor competence scores than girls. Both genders performed better balance tasks. On the other hand, girls had the lowest score in the object control task and boys had the lowest score in locomotor tasks. Previous studies indicated similar results that 9-11 years old boys had better motor competence than girls (Rudisill, Mahar, & Meaney, 1993) and boys had better motor competency score and object control than girls but boys had low scores in locomotor skills than girls in secondary school students (Barnett, Van Beurden, Morgan, Brooks, & Beard, 2009). On the other hand, some research indicated that girls do better on balance test (Kalaja, Jaokkola, Liukkonen, & Watt, 2010). Boys showed low competency in object control skills in elementary and high school students (Hardy, Reinten-Reynolds, Espinel, Zask, & Okely, 2012). Some previous studies did not find any gender difference in locomotor skill performance either in childhood (ten years)

or adolescence (sixteen years) (Barnett, Van Beurden, Morgan, Brooks, & Beard, 2010), and any difference was not found between shuttle run test and level of physical activity in seventh-grade students (Kalaja et al., 2010). These inconsistent findings showed that further studies should focus on gender differences in motor competency.

In this study students got the lowest score in some motor tasks such as crossover, gallop, skip, overhand throw, and strike with a stick. In particular, they have difficulty in gallop, overhand throw, and strike with a stick. During the striking and overhand throwing tasks, it has been observed that most of the students do not rotate, transfer weight, swing, or move their legs while throwing the ball or striking a ball with a stick. One of the reasons is that baseball and tennis sports are not as common and popular as football or basketball among people in Turkey. For this reason, striking the ball with a stick can be unusual for students and they may have difficulty while doing this task. However, students are used to performing skills such as overhand throw, gallop, and crossover. Thus, they were expected to score higher on these tasks. Perhaps students do not practice these skills in their lesson before. On the other hand, students were good at balance tasks which were balance walking forward and lifting and lowering the object. Further studies should be done by adding different variables such as socioeconomic status, cultural influence, school infrastructure to find out whether there is a difference in locomotor skills, object control, balance, and movement competence scores. Moreover, studies should be conducted with qualitative research method to better understand these differences.

Relationship among Behavioral Domain, Psychological Domain, and Physical Domain

Our findings revealed that there was a statistically significant correlation between the psychological domain score and the behavioral domain score of students. Physical domain score had no statistically significant correlation with the behavioral domain and the psychological domain. Physical literacy is a holistic approach. It is expected that children with high self-efficacy should participate in different kinds of physical activities in various environments or children with high physical activity levels tend to have high self-efficacy for physical activity. Previous researches support our findings, total physical activity level (Poitras et al., 2016) and high daily physical activity level (De Meester et al., 2016) were found to be associated with psychological and cognitive indicators. On the other hand, there was no correlation between the physical domain and other domains. In the literature, previous researches revealed a correlation between motor competence and physical activity level. For instance, there was a positive relationship between motor competence and physical activity level for children (Barnett et al., 2016; Lubans et al., 2010). A positive relationship between children's time in physical activity and gross motor competency was found in one study (Barnett et al., 2016) and locomotor skill was found to have a positive association with physical activity of children (Cohen, Mogan, Plotikoff, Callister, & Lubans, 2014). Furthermore, researchers indicated that perceived motor competence and actual motor competence should have a positive relationship in youth and adolescents (Barnett, Ridgers, & Salmon, 2015; Lubans et al., 2010; Robinson, 2011).

In this study, there was no correlation between the physical domain and the other two domains. The reason might be that self-description of physical literacy and physical activity participation survey were filled by students. The real situation of physical activity participation was not known. Furthermore, the PLAYinventory measurement tool is a list that contains different types of activity and sports. If students participated in these activities out of school, they just made a mark to the activities. However, the instrument does not show frequencies, how long students participate in an activity, how many times they participate in an activity per week. It shows only types of activity which is one of the limitations of this survey. On the other hand, PLAYfun is a motor competency test which was filled by a researcher. Thus, It has more objective test than PLAYself and PLAYinventory surveys. Furthermore, because of their high self-efficacy on motor competency, students may have too many expectations from themselves and therefore, they may think that they are participating in various physical activities, but

they may not actually participate. Objective measurement tools for physical activity might be preferred for future research in order to get more accurate results for physical activity levels.

Grade Difference among Behavioral Domain, Psychological Domain, and Physical Domain

The result of this study indicated that there was no statistically significant difference between sixth and seventh-grade in any physical literacy domain. The findings indicated that sixth and seventh-grade students had a similar score, however, the difference was not statistically meaningful. It means that they have similar motivation levels, confidence, knowledge, and understanding toward physical activity and sports. In terms of physical education and sports curriculum objectives, physical activity participation and movement concepts, principles, and related life skills should be better for students as the grade increases (MoNE, 2017). A previous study conducted by Barnett et al. (2016) indicated that there was a positive relationship between age and fundamental motor skill components such as object control, locomotor skills, and stability. Another study showed that as children age increases, lower-body competence increases (Rudisill et al., 1993). In order to learn different skills, students should be provided a sufficient amount of practice and instruction in different settings by teachers and/or practitioners. Moreover, teachers and parents should be aware of the physical education and sports curriculum objectives and the difference between sixth and seventh grades. Teachers should increase the complexity of lesson plans as student's grade increases. As age increases, the motor competence of students should be better.

Gender Difference among Behavioral Domain, Psychological Domain, and Physical Domain

The results showed that there was a statistically significant difference in the physical domain in favor of boys. The findings of this study were supported by previous studies showing that boys had significantly better motor competence in preschool (Robinson, 2011), between 9-11 ages of children (Rudisill et al., 1993), in secondary school students (Barnett et al., 2009), at all age levels (Kalaja et al., 2010) and more physically active than girls in secondary school students (Crocker et al., 2000). A possible reason might be that boys generally more competitive, more active in physical education lessons, in break time, or after school. Moreover, boys may be more interested in sports. For instance, football and basketball are popular in Turkey and most of the male students are fun of a sports club. This can lead to greater involvement of students in sports, affecting their participation in football, basketball, or related activities during childhood and adolescence, resulting in better motor competence.

There was no statistically significant difference between the psychological and behavioral domain scores of boys and girls. Previous studies revealed that boys have a significantly better level of MVPA, they were more active than girls (Barnett et al., 2015). Boys demonstrated higher perceived physical competence than girls (Robinson, 2011; Rudisill et al., 1993). Teachers should be aware of gender differences in perceived motor competence, physical activity level, and motor competency. In addition to that teachers should provide a sufficient amount of information about physical activity to improve student's knowledge and awareness about physical activities and sports.

Strength and Limitations

It is important to mention that this study had some strengths and limitations. The study's main strength was that all domains of physical literacy were investigated at the national level for the first time. PLAY measurement tools were translated into the Turkish language which was a significant contribution to the physical education field. The study's first limitation was that the data were collected from only two different grades in different districts. The second limitation was that only public schools were included. The third limitation was that only the quantitative research design was used during the data collection procedure. The fourth limitation was that the convenience sampling method was used to select the participants. This method limits the study's results for generalization to the population.

Future research on physical literacy should;

- Be integrated qualitative research design to understand student's sport participation behaviour, their self-efficacy, and motivation deeply.
- Increase the number of participants to deeply analyze and to generalize the findings.
- Add other grades (fifth and eighth) to determine the physical literacy of students and to investigate the differences between grades.
- Include private school students in the study and investigate the difference between public and private school students.
- Be conducted in different cities in Turkey. The result of the physical activity participation might be different and student's environmental participation score can be different. It helps to understand how a supportive environment and availability of facilities can affect the results.
- Add the different variables like body mass index, waist size.
- Add other PLAYtools instruments (e.g., PLAYcoach) to understand and analyze the physical literacy of students from different stakeholders (Sport for Life Society, 2017).

Suggestions

Based on the findings of the study, the following recommendations were listed for school administrators, physical education teachers, and parents.

- Physical education teachers should increase the physical literacy knowledge of students. In their lesson plans, the components of physical literacy should be emphasized.
- Physical education teachers should be aware of physical education and sports curriculum to provide developmentally appropriate practices for different grade students.
- Parents and physical education teachers should encourage children to engage in different sports in various settings.
- School administrators should provide different opportunities in the school setting for students to develop motor skills and knowledge in terms of physical literacy.

References

Abernethy, L., & MacAuley, D. (2003). Impact of school sports injury. *British Journal of Sports Medicine*, *37*(4), 354-355.

Balyi, I., & Hamilton, A. (2004). Long-term athlete development: Trainability in childhood and adolescence. *Olympic Coach*, *16*(1), 4-9.

Barnett, L. M., Lai, S. K., Veldman, S. L., Hardy, L. L., Cliff, D. P., Morgan, P. J., ... Rush, E. (2016). Correlates of gross motor competence in children and adolescents: A systematic review and meta-analysis. *Sports Medicine*, *46*(11), 1663-1688.

Barnett, L. M., Ridgers, N. D., & Salmon, J. (2015). Associations between young children's perceived and actual ball skill competence and physical activity. *Journal of Science and Medicine in Sport*, *18*(2), 167-171.

Barnett, L. M., Van Beurden, E., Morgan, P. J., Brooks, L. O., & Beard, J. R. (2009). Childhood motor skill proficiency as a predictor of adolescent physical activity. *Journal of Adolescent Health*, *44*(3), 252-259.

Barnett, L. M., Van Beurden, E., Morgan, P. J., Brooks, L. O., & Beard, J. R. (2010). Gender differences in motor skill proficiency from childhood to adolescence: A longitudinal study. *Research Quarterly for Exercise and Sport*, *81*(2), 162-170.

Biddle, S., & Armstrong, N. (1992). Children's physical activity: An exploratory study of psychological correlates. *Social Science & Medicine*, *34*(*3*), 325-331.

Booth, M. L., Owen, N., Bauman, A., Clavisi, O., & Leslie, E. (2000). Social-cognitive and perceived environment influences associated with physical activity in older Australians. *Preventive Medicine*, *31*(1), 15-22.

Brownson, R. C., Baker, E. A., Housemann, R. A., Brennan, L. K., & Bacak, S. J. (2001). Environmental and policy determinants of physical activity in the United States. *American Journal of Public Health*, *91*(12), 1995-2003.

Cale, L., & Harris, J. (2018). The role of knowledge and understanding in fostering physical literacy. *Journal of Teaching in Physical Education*, *37*(3), 280-287.

Caput-Joginica, R., Lončarić, D., & de Privitello, S. (2009). Extracurricular sports activities in preschool children: Impact on motor achievements and physical literacy. *Hrvatski Športskomedicinski Vjesnik*, *24*(2), 82-87.

Chalabaev, A., Sarrazin, P., Fontayne, P., Boiché, J., & Clément-Guillotin, C. (2013). The influences of sex stereotypes and gender roles on participation and performance in sport and exercise: Review and future directions. *Psychology of Sport and Exercise*, *14*(2), 136-144.

Cohen, K. E., Morgan, P. J., Plotnikoff, R. C., Callister, R., & Lubans, D. R. (2014). Fundamental movement skills and physical activity among children living in low-income communities: A cross-sectional study. *International Journal of Behavioral Nutrition and Physical Activity, 11*(1), 49.

Crocker, P. R., Eklund, R. C., & Kowalski, K. C. (2000). Children's physical activity and physical self-perceptions. *Journal of Sports Sciences*, *18*(6), 383-394.

De Meester, A., Stodden, D., Brian, A., True, L., Cardon, G., Tallir, I., … Haerens, L. (2016). Associations among elementary school children's actual motor competence, perceived motor competence, physical activity and BMI: A cross-sectional study. *PloS One*, *11*(10), e0164600.

Edwards, L. C., Bryant, A. S., Keegan, R. J., Morgan, K., & Jones, A. M. (2017). Definitions, foundations and associations of physical literacy: A systematic review. *Sports Medicine*, *47*(1), 113-126.

Edwards, L. C., Bryant, A. S., Morgan, K., Cooper, S. M., Jones, A. M., & Keegan, R. J. (2019). A professional development program to enhance primary school teachers' knowledge and operationalization of physical literacy. *Journal of Teaching in Physical Education*, *38*(2), 126-135.

Elling, A., & Knoppers, A. (2005). Sport, gender and ethnicity: Practices of symbolic inclusion/exclusion. *Journal of Youth and Adolescence*, *34*(3), 257-268.

Ennis, C. D. (2015). Knowledge, transfer, and innovation in physical literacy curricula. *Journal of Sport and Health Science*, *4*(2), 119-124.

Fisher, A., Reilly, J. J., Kelly, L. A., Montgomery, C., Williamson, A., Paton, J. Y., … Grant, S. (2005). Fundamental movement skills and habitual physical activity in young children. *Medicine and Science in Sports & Exercise*, *37*(4), 684-688.

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2012). *How to design and evaluate research in education.* New York: McGraw-Hill.

Fredricks, J. A., & Eccles, J. S. (2005). Family socialization, gender, and sport motivation and involvement. *Journal of Sport and Exercise Psychology*, *27*(1), 3-31.

Gehris, J. S., Simpson, A. C., Baert, H., Robinson, L. E., MacDonald, M., Clements, R., ... Schneider, S. (2018). Resource to share with parents: Helping your child develop physical literacy. *Journal of Physical Education, Recreation & Dance, 89*(6), 50-59.

Giles-Corti, B., & Donovan, R. J. (2002). The relative influence of individual, social and physical environment determinants of physical activity. *Social Science & Medicine*, *54*(12), 1793-1812.

Gu, X., Chen, S., & Zhang, X. (2019). Physical literacy at the start line: Young children's motor competence, fitness, physical activity, and fitness knowledge. *Journal of Teaching in Physical Education*, *38*(2), 146-154.

Gunnell, K. E., Longmuir, P. E., Barnes, J. D., Belanger, K., & Tremblay, M. S. (2018). Refining the Canadian Assessment of physical literacy based on theory and factor analyses. *BMC Public Health*, *18*(2), 1044.

Hardy, L. L., Reinten-Reynolds, T., Espinel, P., Zask, A., & Okely, A. D. (2012). Prevalence and correlates of low fundamental movement skill competency in children. *Pediatrics*, *130*(2), e390-e398.

Haskell, W. L., Lee, I. M., Pate, R. R., Powell, K. E., Blair, S. N., Franklin, B. A., … Bauman, A. (2007). Physical activity and public health: Updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Circulation*, *116*(9), 1081.

Hayes, S. D., Crocker, P. R., & Kowalski, K. C. (1999). Gender differences in physical self-perceptions, global self-esteem and physical activity: Evaluation of the physical self-perception profile model. *Journal of Sport Behavior*, *22*(1), 1.

Kalaja, S., Jaakola, T., Liukonen, J., & Watt, A. (2010). The role of gender, enjoyment, perceived competence, and fundamental movement skills as correlated of the physical activity engagement of finish physical education students. *Scandinavian Sport Studies Forum, 1*, 69-87.

Keegan, R. J., Barnett, L. M., Dudley, D. A., Telford, R. D., Lubans, D. R., Bryant, A. S., ... Vella, S. A. (2019). Defining physical literacy for application in Australia: A modified Delphi method. *Journal of Teaching in Physical Education*, *38*(2), 105-118.

Kiez, T. K. (2015). *The impact of circus arts instruction on the physical literacy of children in grades 4 and 5* (Master's thesis). The University of Manitoba, Canada. Retrieved from https://mspace.lib.umanitoba.ca/jspui_org/bitstream/1993/30711/4/Kiez_Tia.pdf

Kilpatrick, M., Hebert, E., & Bartholomew, J. (2005). College students' motivation for physical activity: Differentiating men's and women's motives for sport participation and exercise. *Journal of American College Health*, *54*(2), 87-94.

Koo, T. K., & Li, M. Y. (2016). A Guideline of selecting and reporting interclass correlation, coefficients for reliability research. *Journal of Chiropractic Medicine, 15*(2), 155-163.

Kozera, T. R. (2017). *Physical literacy in children and youth* (Doctoral dissertation). The University of Manitoba, Canada. Retrieved from https://pdfs.semanticscholar.org/d6d1/b73a571806bb5b2d8b859e83c332f699227a.pdf

Kriellaars, D. J., Cairney, J., Bortoleto, M. A., Kiez, T. K., Dudley, D., & Aubertin, P. (2019). The impact of circus arts instruction in physical education on the physical literacy of children in grades 4 and 5. *Journal of Teaching in Physical Education*, *38*(2), 162-170.

Li, L. (2014). The financial burden of physical inactivity. *Journal for Sport and Health Science*, *3*(1), 58.

Liedl, R. (2013). A holistic approach to supporting physical literacy. *Physical & Health Education Journal, 79*(2), 19.

Longmuir, P. E., & Tremblay, M. S. (2016). Top 10 research questions related to physical literacy. *Research Quarterly for Exercise and Sport*, *87*(1), 28-35.

Longmuir, P. E., Boyer, C., Lloyd, M., Yang, Y., Boiarskaia, E., Zhu, W., … Tremblay, M. S. (2015). The Canadian Assessment of Physical Literacy: Methods for children in grades 4 to 6 (8 to 12 years). *BMC Public Health*, *15*(1), 767.

Lubans, D. R., Morgan, P. J., Cliff, D. P., Barnett, L. M., & Okely, A. D. (2010). Fundamental movement skills in children and adolescents. *Sports Medicine*, *40*(12), 1019-1035.

Mandigo, J., Lodewyk, K., & Tredway, J. (2019). Examining the impact of a teaching games for understanding approach on the development of physical literacy using the Passport for Life Assessment Tool. *Journal of Teaching in Physical Education*, *38*(2), 136-145.

Mertler, C. A. (2001). Designing scoring rubrics for your classroom. *Practical Assessment, Research & Evaluation, 7*(25), 1-10.

Ministry of National Education. (2017). *Physical education and sport course curriculum (5-8 grades).* Ankara: Ministry of National Education Publication.

Moskal, B. M. (2000). Scoring rubrics: What, when and how?. *Practical Assessment Research & Evaluation 7*(1), 3. doi:10.7275/a5vq-7q66

Myers, N. D., Ahn, S., & Jin, Y. (2011). Sample size and power estimates for a confirmatory factor analytic model in exercise and sport: A Monte Carlo approach. *Research Quarterly for Exercise and Sport*, *82*(3), 412-423.

Poitras, V. J., Gray, C. E., Borghese, M. M., Carson, V., Chaput, J. P., Janssen, I., ... Sampson, M. (2016). Systematic review of the relationships between objectively measured physical activity and health indicators in school-aged children and youth. *Applied Physiology, Nutrition, and Metabolism*, *41*(6), S197-S239.

Poortinga, W. (2006). Perceptions of the environment, physical activity, and obesity. *Social Science & Medicine*, *63*(11), 2835-2846.

Robinson, L. E. (2011). The relationship between perceived physical competence and fundamental motor skills in preschool children. *Child: Care, Health and Development*, *37*(4), 589-596.

Rudisill, M. E., Mahar, M. T., & Meaney, K. S. (1993). The relationship between children's perceived and actual motor competence. *Perceptual and Motor Skills*, *76*(3), 895-906.

Sahlin, Y. (1990). Sport accidents in childhood. *British Journal of Sports Medicine*, *24*(1), 40-44.

Sinaiko, H. W., & Brislin, R. W. (1973). Evaluating language translations: Experiments on three assessment methods. *Journal of Applied Psychology*, *57*(3), 328.

Sport for Life Society. (2017). *Physical literacy assessment for youth tools (PLAYtools).* Retrieved from http://physicalliteracy.ca/play-tools/

Stodden, D., & Goodway, J. D. (2007). The dynamic association between motor skill development and physical activity. *Journal of Physical Education, Recreation & Dance*, *78*(8), 33-49.

Stodden, D. F., Goodway, J. D., Langendorfer, S. J., Roberton, M. A., Rudisill, M. E., Garcia, C., … Garcia, L. E. (2008). A developmental perspective on the role of motor skill competence in physical activity: An emergent relationship. *Quest*, *60*(2), 290-306.

Taylor, N. M., & Kolen, A. M. (2016). After-school programming that provides the daily physical activity recommendations for children. *Runner: The Journal of the Health and Physical Education Council of the Alberta Teachers' Association*, *47*(2), 36-40. Retrieved from http://www.hpec.ab.ca/uploads/files/RunnerVol47No2.pdf#page=38

Thomas, M. P. (2016). *Association of exergaming with physical literacy in canadian children* (Doctoral dissertation). University of Lethbridge, Canada. Retrieved from http://opus.uleth.ca/handle/10133/4768

Tompsett, C., Burkett, B. J., & McKean, M. (2014). Development of physical literacy and movement competency: A literature review. *Journal of Fitness Research*, *3*(2), 53-74.

Tozoğlu, S., Çağlaroğlu, M., & Tozoğlu, D. Ü. (2009). Maxillofacial injuries and mouthguard use during sport activities in children and adolescents. *Atatürk Üniversitesi Diş Hekimliği Fakültesi Dergisi*, *2009*(1), 20-25.

Tremblay, M. S., Warburton, D. E., Janssen, I., Paterson, D. H., Latimer, A. E., Rhodes, R. E., ... Murumets, K. (2011). New Canadian physical activity guidelines. *Applied Physiology, Nutrition, and Metabolism*, *36*(1), 36-46.

Whitehead, M. (2007). Physical literacy: Philosophical considerations in relation to developing a sense of self, universality and propositional knowledge. *Sport, Ethics and Philosophy*, *1*(3), 281-298.

Whitehead, M. (Ed.). (2010). *Physical literacy throughout the lifecourse*. New York: Routledge.

Whitehead, M. E., Durden-Myers, E. J., & Pot, N. (2018). The value of fostering physical literacy. *Journal of Teaching in Physical Education*, *37*(3), 252-261.

World Health Organization. (2018). *Global strategy on diet, physical activity and health.* Retrieved from https://www.who.int/dietphysicalactivity/pa/en/