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Relationship between Physical Activity, Physical Literacy Elements, and Gender among Senior Students

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Research Article
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Abstract

The aim of research is to assess the relationship between physical activity, Physical Literacy (PL) and gender among senior students. The research was conducted in 2022 in Lithuania with five city schools. Research participants were selected using a convenience sampling method: grade 10 to 12 (n=287) students 148 boys and 139 girls. A questionnaire survey was used for data collection: Portuguese Physical Literacy Questionnaire for Adolescents (PPLA-Q) to assess the psychological domain of PL (motivation, self-confidence, emotional and physical regulation); Rapid Assessment of Physical Activity (RAPA) Questionnaire - RAPA1 part, which allows to assess the level of physical activity. After analysing the psychological aspects of PL related to physical activity by gender, the obtained results suggest that boys' motivation for physical activity, self-confidence, emotional stability, assessment of physical limits score higher compared to the group of girls ($p<0.01$). PA motivation has a strong positive correlation with self-confidence ($p<0.01$) and a moderate correlation with physical regulation ($p<0.01$). Physical regulation has statistically significantly correlated with self-confidence ($p<0.01$) and better emotional regulation ($p<0.01$). Statistically significant differences by gender were found with all indicators of the psychological domain: PA motivation, self-confidence, emotional regulation, and physical regulation. Mean ranks of boys were higher in all variables; however, the major differences were found in the areas of self-confidence and physical regulation. PA had a direct correlation with all psychological PL elements (PA motivation, self-confidence, emotional regulation, physical regulation) and an inverse correlation with gender.

Keywords: Physical literacy, Physical activity, Motivation, Self-confidence, Emotional regulation, Physical regulation

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INTRODUCTION

Physical literacy (PL) is a holistic concept embracing interrelated physical, cognitive, psychological, and social variables applied in the context of physical activity (Mota et al., 2021). Although previous studies have shown that the level of student physical literacy is sufficient, it was found that, in contrast to physical competence, the level of knowledge and understanding needs to be improved (Tremblay et al., 2018). Lack of knowledge at a young age can lead to poor physical activity habits that tend to persist into adulthood (Johansen et al., 2006). There are reasonable grounds to believe that poor physical literacy can influence the decreasing level of students' physical activity. Physical literacy intervention programs have shown a positive change in increased physical activity and greater willingness and motivation to lead an active lifestyle (Choi et al., 2021). Physical literacy has been found to be associated not only with more frequent leisure time physical activities but also with academic achievements, less time spent on computers or phones, and better social skills (Gu et al., 2019; Saunders et al., 2018). This suggests that for the overall well-being of schoolchildren, it is essential to study and develop their physical literacy. People still lack knowledge about the type, benefits, and technicality of physical activity, because many who have started to increase their level of physical activity do it incorrectly and sometimes even harmfully (Rudd et al., 2020). The most accurate and popular definition of physical literacy was proposed in 2014 by the International Physical Literacy Association which was officially adopted in 2015 at the International Physical Literacy Conference, which defines physical literacy as the motivation, confidence, physical competence, knowledge, and understanding to value and take responsibility for engagement in physical activities for life. This article uses a physical literacy (PL) model conceptualized by Mota, Martins and Onofre (2021), consisting of four interrelated PL domains: Physical, psychological, cognitive, and social. The questionnaire developed by these authors (PPLA-Q) is an instrument designed to assess the psychological, social, and cognitive domains of PL for grade 10 to 12 adolescents.

Physical literacy has not been widely studied in Lithuania, as previously conducted research have focused on the level of literacy in relation to health, covering the ability of the respondents to find and understand information about health (Jakubauskaitė, 2022; Sveikauskas, 2008). Meanwhile, physical literacy is a multifaceted conceptualisation of the skills and knowledge required to fully realize the potential of physical limits and remain active throughout life (Giblin et al., 2014). Increasing the level of health-enhancing physical activity requires understanding of what knowledge or skills are lacking in the field of physical literacy.

Psychological factors related to physical activity (PA), such as PA motivation, self-confidence, physical self-concept, and emotional and physical regulation, have been investigated in previous studies both in Lithuania and internationally (Pulido et al., 2024; Skurvydas et all, 2021). However, these factors have not been examined as part of the structural components of physical literacy. Therefore, this study contributes to scientific novelty by exploring the psychological element of physical literacy.

It is likely that more physically active students, through engaging in physical activity, gain experience in overcoming psychological challenges related to PA, such as motivation and self-

confidence. Research shows that physical activity has an impact on self-confidence (Rutkauskaitė and Bendaravičiūtė, 2017) and induces favorable changes in motivation (Knittle et al., 2018). Based on these findings, the first hypothesis (H1) is proposed: More physically active senior students will demonstrate better psychological indicators of physical literacy (PA motivation, self-confidence, emotional regulation, physical regulation).

Scientific studies indicate that physical activity decreases among female students in higher grades (Lamanauskas and Armonienė, 2011). From a gender perspective, male students in grades 9–12 are more physically active (42.3%) compared to females (25.00%) (Rutkauskaitė and Bendaravičiūtė, 2017). According to WHO (2010) data, only 27.3% of 15-year-old girls meet physical activity recommendations, compared to 44.6% of boys (WHO, 2010). Therefore, the second hypothesis (H2) is proposed: psychological indicators of physical literacy are related to the gender of senior students. The aim - to assess the relationship between physical activity, Physical Literacy and gender among senior students.

METHODS

Research Model

This research study was designed according to the quantitative research method.

Population-Sample

The research sample was selected using the convenience sampling method. Based on data from the Education Management Information System, in 2022, there were five high schools operating in the city and district of Plungė, with a total enrollment of 517 senior students (aged 15–18). To calculate a reliable sample size, the Paniotto formula with a 5% margin of error was applied (Kardelis, 2017), determining that at least 226 students should be surveyed. A total of 287 students agreed to participate in the study and correctly completed the questionnaires (n=287), of whom 148 (51.56%) were male and 139 (48.43%) were female. The research was conducted in 2022 in the region of Western Lithuania with five city and/or region schools of Plungė.

Data collection methods

Quantitative research method and a survey were chosen to assess the level of physical literacy in senior secondary education students and its affecting factors. The respondents were surveyed by distributing questionnaires in schools and by sending an electronic version of the questionnaire via the "apklausa.lt" website.

Data Collection Tools

The research instrument consisted of two parts:

Physical Literacy and Physical Activity: Having received a permission from the author, the Portuguese Physical Literacy Questionnaire for Adolescents (PPLA-Q) Mota et al. (2021), was used, however, this article focuses only on results of the psychological PL domain. The psychological domain items covered 4 areas: Motivation for physical activity, self-confidence in physical activity, and questions on emotional and physical regulation.

Physical activity (PA) was assessed using the Rapid Assessment of Physical Activity (RAPA) Questionnaire - RAPA1 (the first seven scale items) part, which allows to assess the level of physical activity. Respondents who scored less than 6 points were assigned to a physically inactive group of people. Meanwhile, those with a physical activity score of 6 and above were assigned to a physically active group (Azfar et al., 2019).
The questionnaire additionally included questions to identify the sociodemographic indicators.

Ethical Approval

Prior to conducting the research, an informed consent was obtained from the school administration and parents to include the students in this research. Ethical approval was obtained from Klaipeda University Faculty of Health Sciences Ethics Committee (2022/02-03) for this study. The research participants received a questionnaire to complete at their school and were sent an electronic version of the questionnaire on the website "apklausa.lt". The respondents were introduced to the aim of the research, guaranteed data confidentiality, anonymity, and assured of their voluntary participation in the survey. It took 10 - 15 minutes to complete the questionnaire.

Analysis of Data

Descriptive and mathematical statistical analysis were used for the data analysis: percentage frequencies, mean ranks and standard deviations were calculated. The chi-square test was used to assess the gender-based differences in physical activity and physical literacy. Derived subscale quantitative variables were created reflecting the general psychological indicators of the subscales. After confirming that the data followed a normal distribution according to the Kolmogorov-Smirnov test, the Student's t-test was used to compare these indicators by gender. The effect size (ES) was assessed using Cohen's d coefficient, which is interpreted as follows: 0 to 0.2 indicates a very small effect, 0.2 to 0.5 a small effect, 0.5 to 0.8 a medium effect, and >0.8 a large effect (Cohen, 1988; Cohen et al., 2000). The effect size was calculated only when a statistically significant difference was found. Correlation between the variables were measured using the Pearson correlation coefficient (r). The levels of statistical significance were calculated based on Cekanavicius and Murauskas (2014). Results were considered statistically significant when p-value was 0.05 or lower. SPSS 25 statistical software was used for the statistical data analysis.

FINDINGS

The obtained research results suggest that almost half (48.5%) of the respondents to the survey are physically inactive, i.e., the calculated physical activity index is <6 points. Gender-based results showed that 34.7% of boys and 62.3% of girls are physically inactive. Meanwhile, 65.3% of boys and 37.7% of girls are physically active. Boys are statistically significantly more physically active than girls ($\chi 2 = 168.28$, $df=8$, $p<0.05$).

Gender-based differences in the psychological domain indicators of physical literacy (PL)

Having created the derived variables, the indicators of the psychological PL variable elements were assessed (Table 1).

Table 1. Physical activity-related psychological indicators in gender groups

Elements of PL psychological domain	Gender	Mean Rank ± SD	t	df	p	Effect size (Cohen d)
PA motivation	Boy	15.45 ±3.74	4.79	285	0.01	0,56***
	Girl	13.39±3.63				
Self-confidence	Boy	29.39±7.34	6.38	285	0.01	0,75***
	Girl	24.05±6.74				
Emotional regulation	Boy	26.59±5.11	3.19	285	0.01	0.46**
	Girl	24.05±5.82				
Physical regulation	Boy	23.02±4.89	4.67	285	0.01	0,56***
	Girl	20.44±4.35				

A note: * extremely small effect, ** small effect, ***medium effect, **** large effect; SD - the standard deviation.

Statistical analysis of the results using the Student's t-test revealed statistically significant differences in the groups of boys and girls in terms of motivation for physical activity, self-confidence, emotional regulation, and physical regulation. Obtained data suggest that boys' motivation for physical activity is higher than girls', they are more self-confident and better assess their physical regulation and have more stable emotions.

Effect sizes were calculated using Cohen's coefficient. It was found that moderate correlations with gender were observed for PA motivation (Cohen's d = 0.56), self-confidence (Cohen's d = 0.75), and physical regulation (Cohen's d = 0.56), while a weak correlation was identified between gender and emotional regulation (Cohen's d = 0.46).

After a detailed analysis of each psychological element, only statistically significant results are presented below.

Having analysed motivation for physical activity, statistically significant differences between gender groups were observed in three of the seven statements measuring motivation. Based on the results presented in Figure 1, it may be concluded that boys are more motivated to engage in physical activity than girls. They chose the response option stating that they are highly motivated for physical activities three times more often than girls. Meanwhile, girls' motivation to engage in physical activities is average, as most girls chose the statement "moderately agree" and "somewhat agree". These differences in gender groups are statistically significant ($\chi 2$ =168.679; df =10; $p < 0.05$).

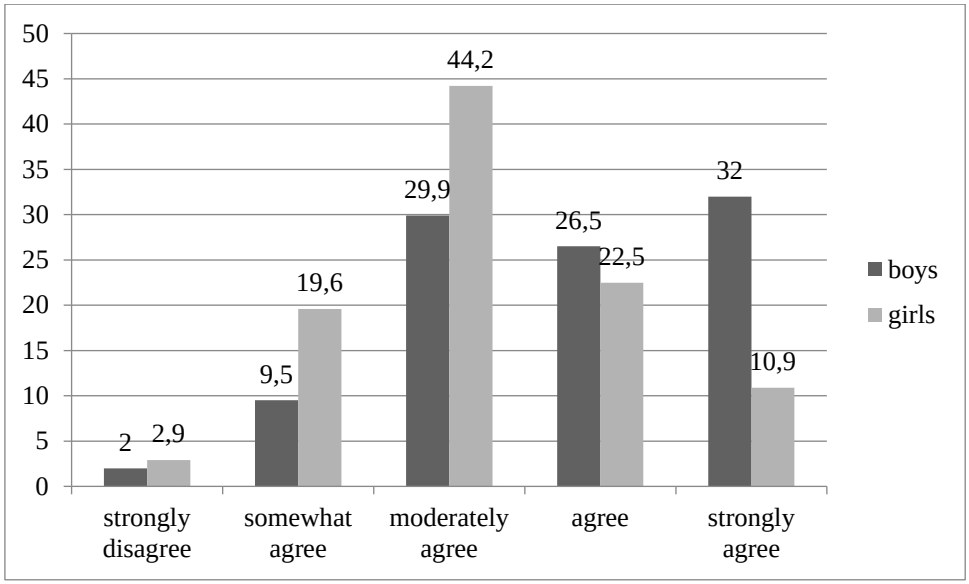

Figure 1. Gender-based analysis of the statement "I am motivated to practice PA"

Results demonstrate that girls practice physical activities statistically significantly more often than boys because of external motivation ($\chi 2 = 80.789$; $df = 10$; $p < 0.05$), (Fig. 2).

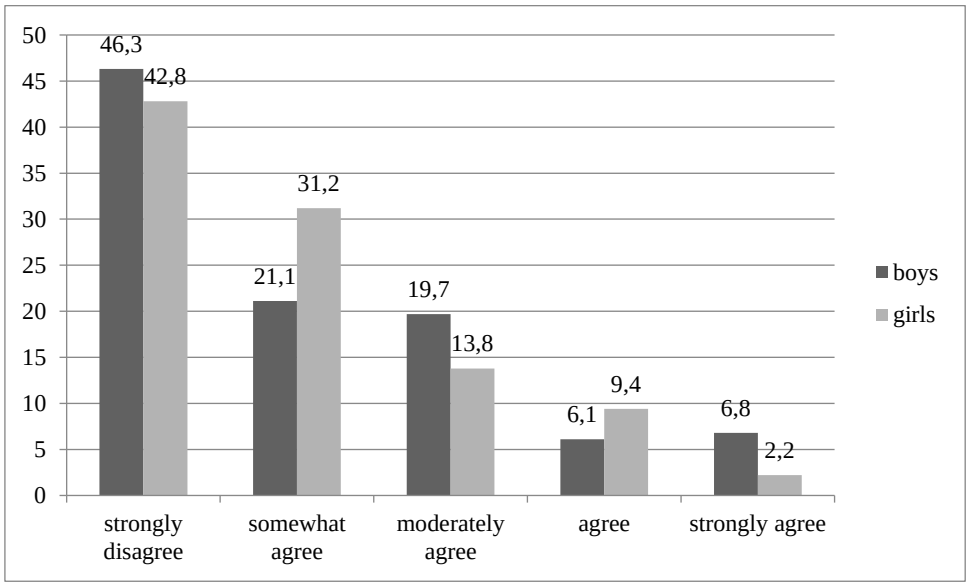

Figure 2. Gender-based analysis of the statement "I practice PA because others tell me I should"

Boys enjoy physical activity twice as often as girls ($\chi 2 = 167.843$; $df = 10$; $p < 0.05$). Almost half (44.2%) of the surveyed male students chose "strongly agree" with the statement that physical activity is fun, while girls only "moderately agree" (30.4%) and "somewhat agree" (17.4%) with the statement that physical activity is fun, (Fig. 3).

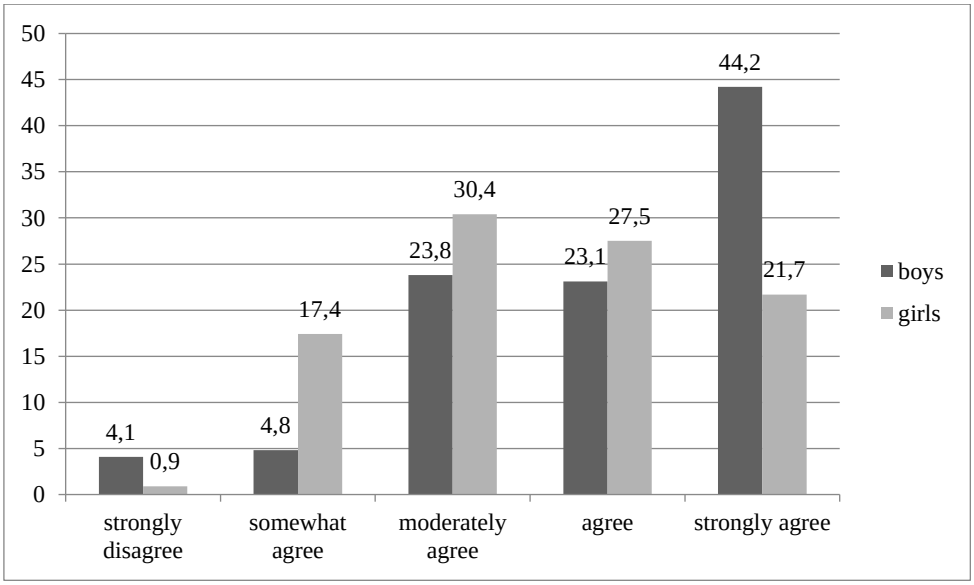

Figure 3. Gender-based analysis of the statement "I practice PA because it is fun"

Having analysed self-confidence in physical activity, gender-based statistical differences were found. Boys are more than twice as likely to be completely confident in their abilities during physical activities than girls. This difference is statistically significant ($\chi 2 = 97.97$, $df = 10$, $p < 0.05$), (Fig. 4).

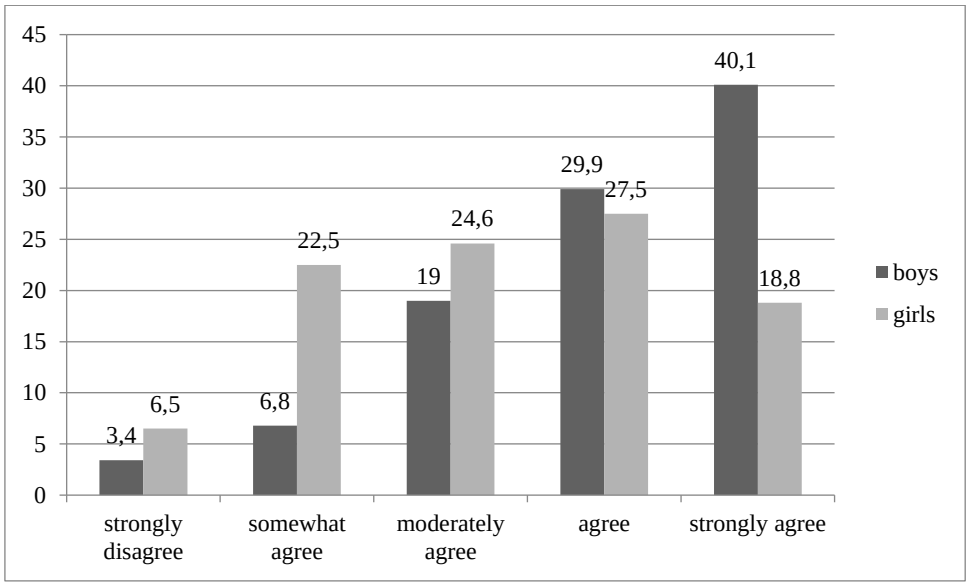

Figure 4. Gender-based analysis of the statement "I feel confident to practice PA"

We have further analysed how boys and girls rate their knowledge of how to become more self-confident (Fig. 5). A major statistically significant difference in the understanding of how to improve self-confidence between boys and girls was observed, revealing that girls lack knowledge of how to build self-confidence ($\chi 2 = 178.757$; $df = 10$, $p < 0.05$).

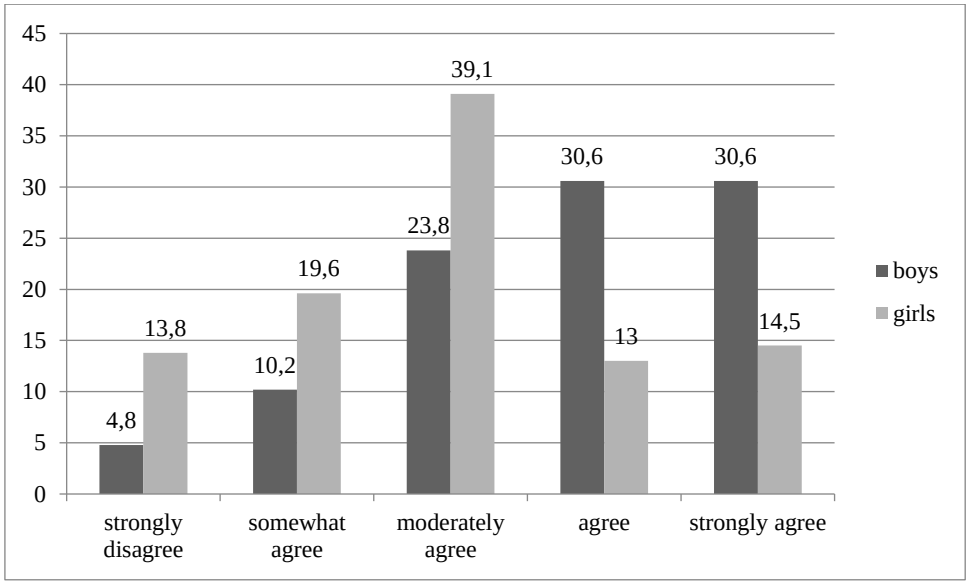

Figure 5. Gender-based analysis of the statement "I know how to become more self-confident"

Analysis of emotional regulation has revealed statistical gender-based differences (Fig. 6). Based on the scores of the emotion management item, it may be concluded that boys are better at managing their emotions since more than two thirds (67.4% in total) of boys "strongly agree" and "agree" with the statement that they can manage their emotions, while only 47.1% ($\chi 2$ =177.425; df=10; $p < 0.05$) of girls do so.

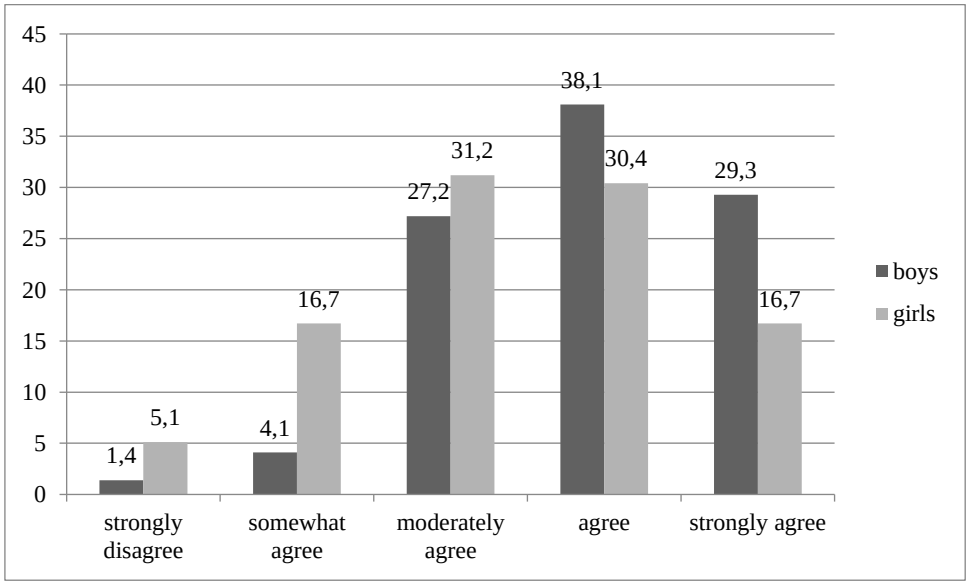

Figure 6. Gender-based analysis of the statement "I can manage my emotions"

When analysing physical regulation, statistical gender-based differences were found. Results of the statement "I recognize my physical limits" show that boys fully identify their limits more often than girls ($\chi 2$ =160.89, df= 10, $p < 0.05$), (Fig. 7). More girls than boys rate their understanding of physical limits as "moderately agree" (29.0%) and "agree" (36.2%).

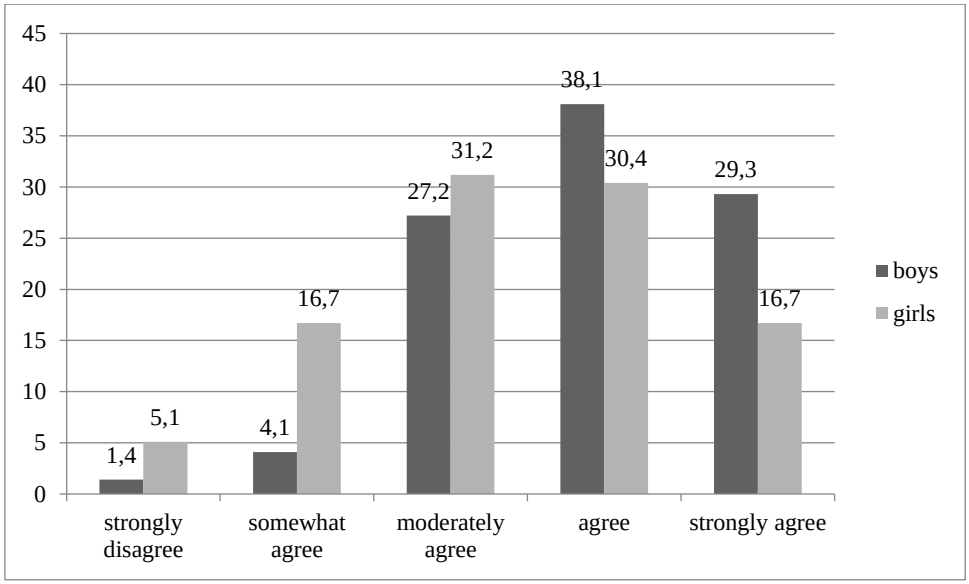

Figure 6. Gender-based analysis of the statement "I can manage my emotions"

Having analysed the student involvement in physical activities to improve their physical skills, the results have revealed that boys twice as often (36.1% of boys and 18.1% of girls) take actions to improve their physical skills compared to girls of the same age ($\chi 2 = 174.91$ df $= 10$, $p < 0.05$), (Fig. 8).

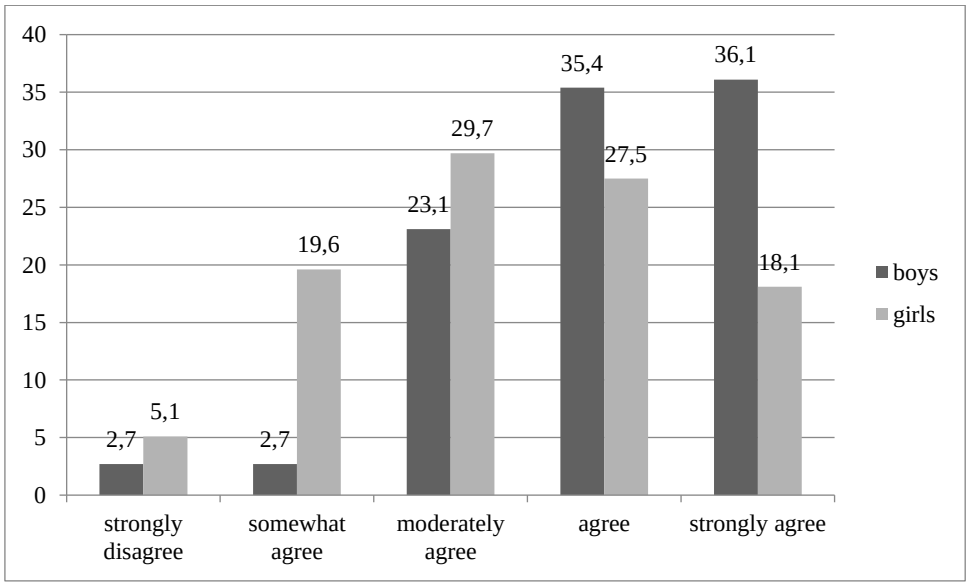

Figure 8. Gender-based analysis of the statement "I take action to improve my physical skills"

Relationship between physical literacy and physical activity

The aim was to determine whether there is a statistically significant relationship and the strength of the relationship between the physical activity and the elements of physical literacy (motivation, self-confidence, emotional regulation, and physical regulation) (Table 2).

Table 2. Relationship between PA, PL elements and gender

Variables	PA motivation	Self-confidence	Emotional regulation	Physical regulation	Gender	PA
PA motivation						
Self-confidence	**0.809****					
Emotional regulation	0.407**	**0.560****				
Physical regulation	**0.618****	**0.662****	**0.579****			
Gender	-0.227**	-0.306**	-0.144*	-0.195**		
PA	0.383**	0.279**	0.108	0.327**	-0.235**	

* ($p<0.05$), ** ($p<0.01$) – level of statistical significance. Differences were assessed using the Pearson correlation coefficient.

Correlation analysis of the considered variables has revealed that physical activity correlates with motivation for physical activity, self-confidence, emotional regulation, and physical regulation. Data presented in the table allow to conclude that motivation for physical activity has a strong ($r = 0.809$, $p<0.01$), positive correlation with self-confidence and a moderate ($r = 0.618$, $p<0.01$) correlation with physical regulation and a weak correlation with emotional regulation ($r = 0.407$, $p<0.01$). Physical regulation has statistically significantly correlated with self-confidence ($r = 0.662$, $p<0.01$) and better emotional regulation ($r = 0.579$, $p<0.01$). Correlation between the students' (grade 10 to 12) gender and psychological PL elements was weak, although statistically significant. The correlations between physical activity and the psychological elements of physical literacy are statistically significant, but weak.

DISCUSSION

Physical literacy radiates through a conscious decision to engage in physical activity for life, taking personal responsibility to be active on a regular basis. This includes establishment of priorities and sustainable engagement in different, meaningful, and personally challenging physical activity as an integral part of lifestyle. Lithuanian research results revealed that the total scor e of self-perceived physical literacy on average was 88.8 ± 17.6 of possible 125 points. The analysis of diferences by gender revealed, that more of girls (18.4 %) than of boys (17.5 %) evaluate their physical literacy (PL) level as insufficient. The self-perceived PL of boys (in total as well as in separate domains) was higher than that of girls ($p < 0.05$) (Brokiene & Gruodyte-Raciene, 2023).

Researchers propose that physical literacy focuses on skill acquisition. This way, it is similar to the construct of health literacy, which develops the ability to find, understand, evaluate and apply health information, thus linking knowledge with motivation and competence (Batterham et al., 2016; Mota et al., 2021). Physical literacy has been found to increase as children grow, as both girls and boys develop motor competence, which in turn builds children's self-confidence and understanding of movement control and terminology, as well as motivates more active engagement in physical activities (Cairney et al., 2019).

Psychological competence is one of the key components of physical literacy covering motivation for physical activity, self-confidence, emotional and physical regulation (Mota et

al., 2021). Our study confirmed the importance of these indicators in the study of the construct of physical literacy, and the effect size (0.75) shows a sufficiently large difference between the self-confidence of boys and girls.

Comparing our research results with other similar studies on gender differences in the context of psychological indicators, we observe certain patterns. Our findings indicate that boys generally exhibit higher scores in various psychological domains of physical literacy (particularly in self-confidence and motivation) than girls. The effect sizes (Cohen's d values range from 0.46 to 0.75) reflect small to medium differences. These results align with trends found in previous studies, which suggest that boys are more likely to have higher intrinsic motivation for physical activity, greater self-confidence, and that differences in emotional regulation also exist, although they are smaller, as indicated by the effect sizes in our study.

Studying the issue of motivation for physical activity has revealed that boys are more motivated to engage in physical activities than girls, and positive emotions is one of the key motivational aspects. The effect size (0.56) shows a moderate difference between boys' and girls' motivation for physical activity. Comparing our data with the results of a similar study conducted by Espada et al., (2023) with university students, we observe a similar trend that significant gender differences in physical activity motivation were found. Boys showed higher intrinsic and identified motivation than girls, where effect sizes were also moderate to large (for example, identified motivation with a large effect: Cohen's d about 0.60), (Espada et al., 2023).

Sattler et al., (2018) support this statement with similar results, i.e., girls are less motivated to engage in vigorous/moderate intensity physical activity compared to boys, and usually engage in physical activity only because they are dissatisfied with their bodies. We also managed to find more findings from other research supporting our results. According to a study conducted by Butt et al. (2011), the element of fun and enjoyment of sport experience and appeal of physical activity were the main pleasurable aspects of sport for boys but not for girls.

Recent research articles note that enjoyment of sport experience and motivation for physical activity are strongly correlated with the daily level of physical activity. This suggests that increasing children’s physical activity, first of all, requires a focus on their motivation (Burns et al., 2022).

Lithuanian researchers have also found that physical activity is strongly related to the autonomy of physical activity, a more positive assessment of body image Derkintiene et al. (2022), more frequent leisure time physical activity habits, positive self-esteem and better physical functions affecting the quality of life (Baceviciene et al., 2021). Having addressed the issue of self-confidence, our results are supported by Sechi et al., (2021) who found that girls are more often dissatisfied with themselves and are less confident than boys. Our study has found that girls had lower self-confidence scores. In a meta-analysis of gender differences in self-confidence in physical activity, boys were found to be significantly more self-confident than girls, with medium effect sizes (Cohen's d around 0.50), (Guérin et al., 2012; Morano et al., 2020). These results reflect similar patterns to our study, where boys are significantly more self-confident than girls (d = 0.75).

Research articles also report correlations between a female gender, lower levels of physical activity, higher cortisol release affecting negative emotional response and stress (Alghadir et al., 2020). Recent research also addresses the lack of confidence at a young age, which leads to poor engagement in physical activities. The authors of this research have found that respondents' knowledge of physical literacy was rated better than self-confidence (Buckler & Bredin, 2021). Studies have shown that physical activity is closely related to positive mental health outcomes in children and youth, especially in depression prevention and understanding of physical self-image, which is an integral component of self-esteem and self-confidence (Dale et al., 2019). Self-confidence and emotional stability increase motivation for physical activity, which highly affects exercise engagement. In turn, physical activity and its various experiences accumulate knowledge and competences that allow the physical literacy to develop. Thus, it can be said that the hypothesis H2 has been confirmed. When studying the psychological aspects of PL related to physical activity according to gender, it was found that boys' physical activity motivation, self-confidence, emotional stability, assessment of physical capabilities are manifested more than in the group of girls ($p < 0.01$). Although the correlations between gender and psychological PL items were weak, but statistically significant.

We found evidence in the scientific literature that physical literacy is closely related to physical activity (Caldwell et al., 2022). These research-supported statements agree with our collected results. When analysing the situation of physical activity, researchers emphasize three essential aspects: physical activity among children and adolescents is insufficient worldwide, girls are less active than boys and the level of physical activity decreases with age (Aubert et al., 2021). These statements agree with the results obtained during our study - girls are less active. Findings of a study conducted in Lithuania in 2020 confirm this conclusion - boys and younger students tend to be more active (Karklelis et al., 2021).

We found that 34.7% of boys and even 62.3% of girls do not reach the weekly recommended levels of physical activity. Similar results were also recorded by other Lithuanian researchers as 64.2% of girls and 39.6% of boys were not physically active enough (Rutkauskaite, & Visockyte, 2021). Research conducted on a global scale also reports a particularly high number of young people failing to meet the physical activity recommendations. According to Sallis et al. (2016), as much as 80% of youth is inactive. According to a recent study conducted in 52 states, physical activity among young people varies by region, with the percentage of students who are not physically active enough ranging from 36% to 72% (Ozemek et al., 2019). Researchers also notice that physical activity continues to decline and during the period from 2006 to 2016, the level of physical activity among schoolchildren has decreased by one tenth (Fernandes, 2018). According to data from surveys conducted in 64 countries around the world, exercise engagement among boys was on average 1.58 times higher than among girls, with the largest differences observed in high-income countries (Ricardo et al., 2022).

During a study on physical activity conducted in 49 states, it was found that less than 30% of older schoolchildren comply with physical activity recommendations provided by WHO (2015), which the boys follow more often. The major gender-based difference is recorded in the Middle East and North Africa region (Darfour-Oduro et al., 2018). During a study conducted in Portugal, it was found that 52% of boys were moderately physically active and

only 16% very active, and 42% of girls were moderately physically active, while only 5% of girls were very active (Pereira et al., 2018). These results support our research results that boys are more physically active than girls. Researchers believe that girls are less likely to reach the WHO-recommended levels of physical activity due to perceived barriers to physical activity, which are more common in girls than in boys (Rosselli et al., 2020).

There are also several scientific publications claiming a further decrease in physical activity among students during the COVID-19 pandemic (Morres et al., 2021). It was noticed that girls who previously were less physically activity than boys maintained their previous level of physical activity better during the quarantine period, while boys' physical activity has dropped more (Orlandi et al., 2021). Our study was conducted after the pandemic; however, we cannot compare whether the physical activity of students in higher grades has decreased because we did not study this aspect.

After analysing the correlation between physical activity and the psychological elements of physical literacy (motivation, self-confidence, emotional regulation, and physical regulation), we found that they are influenced by the level of physical activity, but the established correlations are statistically significant but weak. Thus, the hypothesis (H1) was confirmed: FA was directly correlated with all psychological elements of PL (FA motivation, self-confidence, emotional regulation, physical regulation). Scientists increasingly emphasize the importance of physical education for the development of students' physical literacy. Physical education lessons promote integrated physical activity experience that develops both theoretical knowledge and practical skills in the context of self-awareness and motivation to exercise (Lundvall, 2015). Other researchers have documented significant relationships between physical literacy and moderate/vigorous intensity physical activity, physical competence, and motivation to exercise, play sports, and self-confidence (Coyne et al., 2019). The level of physical literacy is also associated with better physical performance, which is a result of more frequent and higher intensity physical activity (Pastor-Cisneros et al., 2021). Theory suggests that a higher level of physical literacy improves movement skills, encourages active leisure time, outdoor games, involvement in physical education, and sports (Faigenbaum, & Rebullido, 2018).

Scientists highlight the increasing impact of the Internet. More than ever before, information on social media is critical to physical literacy. Physical literacy videos were found to generate the most interest, followed by visual information covering emotional domains of physical literacy such as motivation, self-confidence, and self-esteem (Bopp et al., 2019). According to researchers, physical literacy is a holistic concept embracing interrelated physical, cognitive, psychological, and social variables applied in the context of physical activity (Mota et al., 2021). Thus, having summarised our collected results and the analysed research articles, it may be concluded that physical literacy is affected not only by physical activity but also by psychological health. The psychological indicators of physical literacy between boys and girls differ significantly, and this should be considered when developing interventions aimed at reducing gender disparities in physical literacy.

CONCLUSIONS

Having analysed the indicators of the psychological domain of physical literacy (PL), statistically significant differences by gender were found in all indicators of the psychological component: PA motivation, self-confidence, emotional regulation, and physical regulation. Mean ranks of boys were higher in all variables, however the major differences were found in the areas of self-confidence and physical regulation.

Having analysed the indicators of the psychological domain of physical literacy (PL) by gender, it was found that boys are more motivated than girls to engage in physical activity ($p< 0.05$), the idea of fun and enjoyment is more important for them ($p< 0.05$); they are self-confident and feel confident when performing physical activities twice as often as girls ($p < 0.05$); have better emotional and physical regulation: are able to control emotions better ($p < 0.05$), more often identify their physical limits ($p < 0.05$) and more often take actions to improve their physical skills ($p < 0.05$). PA motivation among girls mainly arises from external encouragement to engage in physical activity ($p<0.05$), yet in terms of self-confidence, they lack knowledge on how to build self-confidence ($p < 0.05$).

Physical activity has a direct correlation with all PL psychological elements (PA motivation, self-confidence, emotional regulation, physical regulation) and an inverse correlation with gender. It was found that PA motivation has a strong ($r = 0.809$, $p<0.01$) positive correlation with self-confidence and a moderate ($r = 0.618$, $p<0.01$) relationship with physical regulation. Physical regulation has statistically significantly correlated with self-confidence ($r = 0.662$, $p<0.01$) and better emotional regulation ($r = 0.579$, $p<0.01$). The correlation between gender and psychological PL elements was weak, although statistically significant.

Limitations

The conducted research came with both strengths and weaknesses. One of its strengths is an international, research-based physical literacy questionnaire. The major weakness is a relatively small sample of research subjects, based only in the region of Western Lithuania. Further studies should conduct research with a larger sample of subjects and cover a greater area of the country. In addition, to assess the physical activity, it is recommended to use accelerometers that can objectively measure the level of physical activity, rather than a questionnaire.

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Conflicts of Interest: The authors declare no conflict of interest in the study.

Ethical Approval

Ethics Committee: Klaipeda University Faculty of Health Sciences Ethics Committee
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REFERENCES

Alghadir, A. H., Gabr, S. A., & Iqbal, Z. A. (2020). Effect of gender, physical activity and stress-related hormones on adolescent's academic achievements. *International Journal of Environmental Research and Public Health*, *17*(11), Article 4143. https://doi.org/10.3390/ijerph17114143

Aubert, S., Brazo-Sayavera, J., González, S. A., Janssen, I., Manyanga, T., Oyeyemi, A. L., ... & Tremblay, M. S. (2021). Global prevalence of physical activity for children and adolescents; inconsistencies, research gaps, and recommendations: A narrative review. *International Journal of Behavioral Nutrition and Physical Activity*, *18*(1), Article 81. https://doi.org/10.1186/s12966-021-01155-2

Azfar, S., Murad, M., & Azim, S. (2019). Rapid assessment of physical activity and its association among patients with low back pain. *Cureus*, *11*(12), Article e6373. https://doi.org/10.7759/cureus.6373

Bacevičienė, M., Jankauskienė, R., & Širkaitė, M. (2021). Associations between intuitive exercise, physical activity, exercise motivation, exercise habits and positive body image. *Public Health*, *95*(4), 57-66.

Batterham, R. W., Hawkins, M., Collins, P. A., Buchbinder, R., & Osborne, R. H. (2016). Health literacy: Applying current concepts to improve health services and reduce health inequalities. *Public Health*, *132*, 3-12. https://doi.org/10.1016/j.puhe.2016.01.001

Bopp, T., Vadeboncoeur, J. D., Stellefson, M., & Weinsz, M. (2019). Moving beyond the gym: A content analysis of YouTube as an information resource for physical literacy. *International Journal of Environmental Research and Public Health*, *16*(18), Article 3335. https://doi.org/10.3390/ijerph16183335

Brokiene, R., & Gruodyte-Raciene, R. (2023). Self-perceived physical literacy of adolescents and it's relationship with body mass index. *Public Health, 3*(102), 62-70.

Buckler, E. J., & Bredin, S. S. D. (2021). Examining the knowledge base and level of confidence of early childhood educators in physical literacy and its application to practice. *Early Years*, *41*(2-3), 202-217. https://doi.org/10.1080/09575146.2018.1514488

Burns, R. D., Bai, Y., Podlog, L. W., Brusseau, T. A., & Welk, G. J. (2022). Associations of physical activity enjoyment and physical education enjoyment with segmented daily physical activity in children: Exploring tenets of the trans-contextual model of motivation. *Journal of Teaching in Physical Education*, *42*(1), 184-188. https://doi.org/10.1123/jtpe.2021-0263

Butt, J., Weinberg, R. S., Breckon, J. D., & Claytor, R. P. (2011). Adolescent physical activity participation and motivational determinants across gender, age, and race. *Journal of Physical Activity and Health*, *8*(8), 1074-1083. https://doi.org/10.1123/jpah.8.8.1074

Cairney, J., Dudley, D., Kwan, M., Bulten, R., & Kriellaars, D. (2019). Physical literacy, physical activity and health: Toward an evidence-informed conceptual model. *Sports Med., 49*, 371–383. https://doi.org/10.1007/s40279-019-01063-3

Caldwell, H. A. T., Proudfoot, N. A., DiCristofaro, N. A., Cairney, J., Bray, S. R., & Timmons, B. W. (2022). Preschool to school-age physical activity trajectories and school-age physical literacy: A longitudinal analysis. *Journal of Physical Activity and Health*, *19*(4), 275-28. https://doi.org/10.1123/jpah.2021-0635

Cekanavicius, V., & Murauskas, G. (2014). *Applied regression analysis in social studies*. Vilnius University.

Choi, S. M., Sum, K. W. R., Leung, F. L. E., Wallhead, T., Morgan, K., Milton, D., ... & Sit, H. P. C. (2021). Effect of sport education on students' perceived physical literacy, motivation, and physical activity levels in university required physical education: A cluster-randomized trial. *Higher Education*, *81*(6), 1137-1155. http://dx.doi.org/10.1007/s10734-020-00603-5

Cohen, L., Manion, L., & Morrison, K. (2000). *Research methods in education* (5th ed.). Routledge. https://doi.org/10.4324/9780203224342

Cohen, J. (1988). Statistical power analysis for the behavioral sciences. (2nd ed.). Lawrence Erlbaum. https://doi.org/10.4324/9780203771587

Coyne, P., Dubé, P., Santarossa, S., & Woodruff, S. J. (2019). The relationship between physical literacy and moderate to vigorous physical activity among children 8-12 years. *Physical & Health Education Journal*, *84*(4), 1-13.

Dale, L. P., Vanderloo, L., Moore, S., & Faulkner, G. (2019). Physical activity and depression, anxiety, and self-esteem in children and youth: An umbrella systematic review. *Mental Health and Physical Activity*, *16*, 66-79. https://doi.org/10.1016/j.mhpa.2018.12.001

Darfour-Oduro, S. A., Buchner, D. M., Andrade, J. E., & Grigsby-Toussaint, D. S. (2018). A comparative study of fruit and vegetable consumption and physical activity among adolescents in 49 low-and-middle-income countries. *Scientific Reports, 8*(1), Article 1623. https://doi.org/10.1038/s41598-018-19956-0

Derkintiene, S., Budreikaite, A., & Kontautiene, V. (2022). (Dis)satisfaction with the body image among 13-14-year-old students of Lithuanian schools. *European Journal of Contemporary Education, V*11, (2), 338-349. https://doi.org/10.13187/ejced.2022.2.338

Espada, M., Romero-Parra, N., Bores-García, D., & Delfa-De La Morena, J. M. (2023). Gender differences in university students' levels of physical activity and motivations to engage in physical activity. *Education Sciences, 13*(4), Article 340. https://doi.org/10.3390/educsci13040340

Faigenbaum, A. D., & Rebullido, T. R. (2018). Understanding physical literacy in youth. *Strength & Conditioning Journal*, *40*(6), 90-94. https://doi.org/10.1519/SSC.0000000000000417

Fernandes, H. M. (2018). Physical activity levels in Portuguese adolescents: A 10-year trend analysis (2006–2016). *Journal of Science and Medicine in Sport*, *21*(2), 185-189. https://doi.org/10.1016/j.jsams.2017.05.015

Giblin, S., Collins, D., & Button, C. (2014). Physical literacy: Importance, assessment and future directions. *Sports Medicine*, *44*(9), 1177-1184. https://doi.org/10.1007/s40279-014-0205-7

Gu, X., Zhang, T., Lun-(Alan)-Chu, T., Zhang, X., & Thomas-Thomas, K. (2019). Do physically literate adolescents have better academic performance?. *Perceptual and Motor Skills*, *126*(4), 585-602. https://doi.org/10.1177/0031512519845274

Guérin, E., Bales, E., Sweet, S., & Fortier, M. (2012). A meta-analysis of the influence of gender on self-determination theory's motivational regulations for physical activity. *Canadian Psychology, 53*(4), 291–300. https://doi.org/10.1037/a0030215

Haas, P., Yang, C. H., & Dunton, G.F. (2021). Associations between physical activity enjoyment and age-related decline in physical activity in children-results from a longitudinal within-person study. *Journal of Sport & Exercise Psychology*, *43*(3), 205-214. https://doi.org/10.1123/jsep.2020-0156

Jakubauskaitė, J. (2022). *Fizinio ugdymo mokytojų fizinis raštingumas bei jo komponentų taikymas fizinio ugdymo pamokų met [Physical literacy of teachers of physical education and application of its components in lessons of physical education].* Master Thesis, Lietuvos sporto universitetas, Kaunas, Lithunia

Johansen, A., Rasmussen, S., & Madsen, M. (2006). Health behaviour among adolescents in Denmark: Influence of school class and individual risk factors. *Scandinavian Journal of Public Health, 34*(1), 32-40. https://doi.org/10.1080/14034940510032158

Karklelis, I., Vebriene, O., & Lisinskiene, A. (2021). Physical activity of adolescents between the age of 14 – 19 years. *Sport Science, 2*(100), 14-19. https://doi.org/10.15823/sm.2021.100.2

Lundvall, S. (2015). Physical literacy in the field of physical education–A challenge and a possibility. *Journal of Sport and Health Science, 4*(2), 113-118. https://doi.org/10.1016/j.jshs.2015.02.001

Morano, M., Robazza, C., Ruiz, M. C., Cataldi, S., Fischetti, F., & Bortoli, L. (2020). Gender-typed sport practice, physical self-perceptions, and performance-related emotions in adolescent girls. *Sustainability, 12*(20), Article 8518. https://doi.org/10.3390/su12208518

Morres, I. D., Galanis, E., Hatzigeorgiadis, A., Androutsos, O., & Theodorakis, Y. (2021). Physical activity, sedentariness, eating behaviour and well-being during a COVID-19 lockdown period in Greek adolescents. *Nutrients, 13*(5), Article 1449. https://doi.org/10.3390/nu13051449

Mota, J., Martins, J., & Onofre, M. (2021). Portuguese Physical Literacy Assessment Questionnaire (PPLA-Q) for adolescents (15–18 years) from grades 10–12: Development, content validation and pilot testing. *BMC Public Health, 21*(1), Article 2183. https://doi.org/10.1186/s12889-021-12230-5

Orlandi, M., Rosselli, M., Pellegrino, A., Boddi, M., Stefani, L., Toncelli, L., & Modesti, P. A. (2021). Gender differences in the impact on physical activity and lifestyle in Italy during the lockdown, due to the COVID-19 pandemic. *Nutrition, Metabolism and Cardiovascular Diseases, 31*(7), 2173-2180. https://doi.org/10.1016/j.numecd.2021.03.011

Ozemek, C., Lavie, C. J., & Rognmo, Ø. (2019). Global physical activity levels-Need for intervention. *Progress in Cardiovascular Diseases, 62*(2), 102-107. https://doi.org/10.1016/j.pcad.2019.02.004

Pastor-Cisneros, R., Carlos-Vivas, J., Muñoz-Bermejo, L., Adsuar-Sala, J. C., Merellano-Navarro, E., & Mendoza-Muñoz, M. (2021). Association between physical literacy and self-perceived fitness level in children and adolescents. *Biology, 10*(12), Articlee 1358. https://doi.org/10.3390/biology10121358

Pereira, R., Santos, R., Póvoas, S., & Silva, P. (2018). Environment perception and leisure-time physical activity in Portuguese high school students. *Preventive Medicine Reports, 10*, 221-226. https://doi.org/10.1016/j.pmedr.2017.10.013

Pulido, J.J., Tapia-Serrano, M.Á., Díaz-García, J., Ponce-Bordón, J.C., & López-Gajardo, M.Á. (2021). The Relationship between students' physical self-concept and their physical activity levels and sedentary behavior: The role of students' motivation. *Internationas Journals of Environmental Research and Public Health, 18*(15), Article 7775. https://doi.org/ 10.3390/ijerph18157775

Ricardo, L. I. C., Wendt, A., Costa, C. D. S., Mielke, G. I., Brazo-Sayavera, J., Khan, A., Kolbe-Alexander, T. L., & Crochemore-Silva, I. (2022). Gender inequalities in physical activity among adolescents from 64 Global South countries. *Journal of Sport and Health Science, 11*(4), 509–520. https://doi.org/10.1016/j.jshs.2022.01.007

Rosselli, M., Ermini, E., Tosi, B., Boddi, M., Stefani, L., Toncelli, L., & Modesti, P. A. (2020). Gender differences in barriers to physical activity among adolescents. *Nutrition, Metabolism and Cardiovascular Diseases*, *30*(9), 1582-1589. https://doi.org/10.1016/j.numecd.2020.05.005

Rudd, J. R., Pesce, C., Strafford, B. W., & Davids, K. (2020). Physical literacy-A journey of individual enrichment: An ecological dynamics rationale for enhancing performance and physical activity in all. *Frontiers in Psychology*, *19*(7), Article 1904. https://doi.org/10.3389/fpsyg.2020.01904

Rutkauskaite, R., & Visockyte, E. (2021). Students‘ skills and experiences using informatikon and communication technologies in remote physical education lessons. *Sport Science*, *2*(100), 46-56. https://doi.org/10.15823/sm.2021.100.6

Sallis, J. F., Bull, F., Guthold, R., Heath, G. W., Inoue, S., Kelly, P., ... & Lancet Physical Activity Series 2 Executive Committee. (2016). Progress in physical activity over the Olympic quadrennium. *The Lancet*, *388*(10051), 1325-1336. https://doi.org/10.1016/s0140-6736(16)30581-5

Sattler, K. M., Deane, F. P., Tapsell, L., & Kelly, P. J. (2018). Gender differences in the relationship of weight-based stigmatisation with motivation to exercise and physical activity in overweight individuals. *Health Psychology Open*, *5*(1), 1-11. https://doi.org/10.1177/2055102918759691

Saunders, T. J., MacDonald, D. J., Copeland, J. L., Longmuir, P. E., Barnes, J. D., Belanger, K., ... & Tremblay, M. S. (2018). The relationship between sedentary behaviour and physical literacy in Canadian children: a cross-sectional analysis from the RBC-CAPL Learn to Play study. *BMC Public Health*, *18*(2), Article 1037. https://doi.org/10.1186/s12889-018-5892-9

Sechi, C., Loi, G., & Cabras, C. (2021). Addictive internet behaviors: The role of trait emotional intelligence, self-esteem, age, and gender. *Scandinavian Journal of Psychology*, *62*(3), 409-417. https://doi.org/10.1111/sjop.12698

Skurvydas, A., Lisinskiene, A., Lochbaum, M., Majauskiene, D., Valanciene, D., Dadeliene, R., Fatkulina, N., Sarkauskiene, A. (2021). Physical activity, stress, depression, emotional intelligence, logical thinking, and overall health in a large Lithuanian from October 2019 to June 2020: Age and gender differences adult sample. *Internationas Journals of Environmental Research and Public Health*, 18(23), Article 12809. https://doi.org/10.3390/ijerph182312809

Sveikauskas, V. (2008). *Health education.* Medical University Publishing House.

Tremblay, M. S., Costas-Bradstreet, C., Barnes, J. D., Bartlett, B., Dampier, D., Lalonde, C., ... & Yessis, J. (2018). Canada’s physical literacy consensus statement: Process and outcome. *BMC Public Health*, *18*(2), 1-18. https://doi.org/10.1186/s12889-018-5903-x