QUALITY OF LIFE AND ITS ASSOCIATION WITH PHYSICAL ACTIVITY, PHYSICAL FITNESS, AND ENJOYMENT OF PHYSICAL EDUCATION IN YOUTH: A STUDY ON GENDER DIFFERENCES

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ABSTRACT

The COVID-19 pandemic significantly impacted health-related quality of life (HRQoL) among adolescents, with declines in physical activity (PA) and fitness (PF), partly due to school closures. Physical education (PE) in schools plays a crucial role in promoting well-being and PA. Research suggests gender differences in PA and PF and also in responses to PE.

A total of 176 adolescents (48.3% girls; mean age 15.6 ± 0.6) reported gender, age, weekly PA, HRQoL (Kidscreen-10), and enjoyment in PE (FEFS-J: pleasure, flow, recovery). PF was assessed using the German motor performance test 6-18.

Results showed that girls had significantly lower HRQoL and enjoyment in PE scores than boys, but not in PA or PF. Significant positive correlations between HRQoL and all 3 dimensions of PE enjoyment were found in girls (r_s = 0.31 – 0.54), while in boys, only pleasure showed a significant correlation with HRQoL (r_s = 0.32). Multiple regression analyses showed that pleasure in PE was positively associated with HRQoL for both girls (β = 0.49; R^2 = 0.30) and boys (β = 0.52; R^2 = 0.09).

In conclusion, the results highlight the importance of enjoyment in PE for HRQoL in both genders. Teachers should adapt their planned activities to consider the different ways in which boys and girls enjoy PE.

KEYWORDS

Enjoyment in PE, gender differences, health-related quality of life, KIDSCREEN, physical activity, physical fitness

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Highlights

- *Girls showed significantly lower mean values in HRQoL and the dimensions of enjoyment in PE than boys.*
- *Significant moderate to strong positive correlations between HRQoL and the three dimensions of enjoyment in PE were found in girls, while boys-only pleasure showed a significant correlation with HRQoL.*
- *Teachers should adapt their activities to how boys and girls experience enjoyment in PE.*

INTRODUCTION

The enhancement of adolescents' quality of life is considered central to supporting their development and promoting the health of future generations (Inchley et al., 2020). Adolescence is characterized by a period of life full of changes, in which it is particularly important to understand the factors that can improve or reduce quality of life (Arnett, 2001). Health-related quality of life (HRQoL) encompasses multiple factors particularly relevant during adolescence, a critical developmental phase. The KIDSCREEN-10 model identifies physical well-being, psychological well-being, autonomy and leisure, family relationships, peer and social support, and the school environment as essential components of HRQoL (Ravens-Sieberer et al., 2010). The dimension of psychological well-being, in particular, showed a significant decline during the COVID-19 pandemic, manifesting in adolescents as an increase in sadness, stress, and anxiety (Haile et al., 2024). The decline in psychological well-being

during the pandemic-related restrictions had lasting effects on HRQoL even after the pandemic (Haile et al., 2024). For many adolescents, the pandemic catalyzed self-reflection about health and well-being. Approximately one-third of adolescents desired to increase physical activity to improve mental health, while 16.7% sought to reduce sedentary behavior (Peuters et al., 2024). Such findings highlight the link between physical activity and psychological well-being among young people.

Children and adolescents who meet the recommended 60 minutes of moderate-to-vigorous physical activity (MVPA) per day (World Health Organization, 2010) more frequently report better overall well-being (Poitras et al., 2016). According to Haile et al. (2024), the proportion of adolescents in secondary school meeting the World Health Organization (WHO) recommendations was 80% in 2020, dropping to 55% in 2021. Physical activity was identified as a relevant factor in approximately 50% of adolescent analyses, particularly concerning the physical and social dimensions of HRQoL (Haile et al., 2024). Despite the clear benefits of meeting daily MVPA recommendations for overall well-being, achieving these levels often requires structured interventions. For example, school-based programs moderately improve fitness levels but have limited success in increasing overall physical activity (Meyer et al., 2014). Their long-term impact depends on student engagement and enjoyment (Neil-Sztramko, Caldwell, and Dobbins, 2021).

While school sports programs have shown a measurable impact on physical fitness, their success in fostering long-term physical activity relies heavily on student engagement and enjoyment (Neil-Sztramko et al., 2021). Specifically, school sports programs positively impact physical fitness, as measured by VO2 max (maximum oxygen uptake), an indicator of cardiovascular fitness (Neil-Sztramko et al., 2021). Adolescents who engaged in regular physical activity demonstrated significantly higher physical fitness, including better cardiorespiratory endurance, flexibility in the thigh and lower back muscles, abdominal muscle strength, and endurance, as well as upper body strength, compared to inactive adolescents (Mateo-Orcajada et al., 2022).

Physical fitness is a complex concept encompassing a subset of health- and skill-related abilities such as endurance, strength, speed, and coordination (Caspersen, Powell, and Christenson, 1985). Research by Utesch et al. (2018) has demonstrated that physical fitness can be evaluated through multiple specific subtests, each assessing different aspects like endurance or coordination, which can then be combined to form an overall assessment. Higher physical fitness has been associated with reduced anxiety, increased self-esteem, improved cardiovascular efficiency, and greater bone strength (Fletcher et al., 1996; O'Connor, Herring, and Caravalho, 2010; Warburton and Bredin, 2019).

A study by Krug et al. (2012) suggests that adolescents with better physical fitness also experience greater enjoyment in participating in sports. Enjoyment of physical education plays a key role in promoting long-term physical activity and fitness by fostering motivation and positive attitudes (Cairney et al., 2012; Deci and Ryan, 2000). Studies have shown that enjoyment in physical education significantly correlates with the quality of instruction, teacher support, and activities conducted (Bossmann, Woll, and Wagner, 2023; Herrmann, Seiler, and Niederkofler, 2016). A varied and student-centered approach can increase motivation and engagement, whereas an overly performance-focused curriculum may diminish enjoyment, particularly among less athletically inclined children (Hascher, and Baillod, 2005). Notably, children's autonomy and participation play a crucial role in enjoying physical education (Leisterer and Paschold, 2022). According to the self-determination theory by Deci and Ryan (2000), children and adolescents with greater control over the design and selection of physical education activities report higher levels of enjoyment and intrinsic motivation (Hascher, and Baillod, 2005).

Autonomy in physical education fosters intrinsic motivation and may address disparities in experiences of enjoyment and quality of life, particularly among different genders. These differences are often linked to social role expectations, self-perception, and psychosocial pressures (Engels, and Freund, 2018; Moksnes et al., 2016; Michel et al., 2021; Inchley et al., 2020). For instance, girls more frequently report stress and academic pressure, which can adversely affect their perceived quality of life (Ravens-Sieberer et al., 2019). A Europe-wide study found that girls experienced fewer positive well-being effects from high physical activity than boys. This highlights gender-specific differences in promoting and perceiving sports activities (McMahon et al., 2017). These studies underscore the need for gender-specific approaches to promoting quality of life and physical activity. Incorporating enjoyment of physical education as a factor can help identify gender-based barriers and support targeted measures to enhance well-being for both genders. While numerous studies emphasize the importance of physical activity and physical fitness for physical and mental health (Bailey et al., 2018; Cadenas-Sanchez et al., 2021), there is a growing need to investigate gender-specific nuances in quality of life, motivation, and engagement in school sports to promote tailored strategies and dismantle barriers (Sánchez Hernández et al., 2018). Research also reveals gender differences in enjoyment of school sports: boys tend to enjoy competitive and performance-oriented aspects, while many girls prefer cooperative and health-oriented approaches (Frömel et al., 2022).

The relationship between physical activity, physical fitness, and perceived quality of life among children and adolescents has long been a focal point of health research (Biddle et al., 2019). A comprehensive understanding of these factors is critical, as both physical activity and physical fitness contribute significantly to youth development (Poitras et al., 2016). A crucial aspect of this research is the integration of these components within the school environment, particularly in physical education classes, which influence students' enjoyment and engagement (Kirk, 2020).

These findings highlight the need for further research into how gender differences in enjoyment of school sports impact broader outcomes like quality of life. However, studies exploring these aspects, particularly in the context of the COVID-19 pandemic, remain scarce. To our knowledge, no study has examined how enjoyment in physical education influences the quality of life in adolescents. Therefore, this

study aims to investigate associations of physical activity, physical fitness, and enjoyment of physical education with quality of life in adolescents, with a particular focus on gender-specific differences.

MATERIALS AND METHODS

Study Design and Participants

Using a cross-sectional design, secondary grammar schools in Western Austria, where direct contact with the directorate was available, were asked to participate (convenience sampling). To ensure that the curriculum timetable was similar among adolescents, only Grammar schools were contacted. Inclusion criteria for the participants were: a) being enrolled in the 10th grade of a grammar school and b) providing informed consent. A total of 176 adolescents (48.29% girls) with a mean age of 15.60 ± 0.63 years participated. Data collection took place between April 2023 and June 2023.

Before data collection, approval for the surveys and the fitness tests at schools was obtained from the Tyrolean Education Directorate, the Ethics Advisory Board of the University of Innsbruck (Certificate of Good Standing, 73/2021), and the schools' principals.

Test Procedures

Health-Related Quality of Life

Health-related quality of life (HRQoL) was assessed using the KIDSCREEN-10 questionnaire, a psychometrically robust and validated instrument designed to evaluate HRQoL in youth populations (Ravens-Sieberer et al., 2010). This tool serves as a screening, monitoring, and assessment instrument for children and adolescents aged 8–18, irrespective of the presence of chronic illness (Ravens-Sieberer et al., 2014a). The reliability and validity of the KIDSCREEN-10 have been rigorously evaluated and confirmed (Ravens-Sieberer, Wille, and Bettge, 2014b).

The KIDSCREEN-10 index provides a composite measure of quality of life, integrating aspects of physical and psychological well-being, interpersonal relationships with parents and peers, and school-related satisfaction (Ravens-Sieberer et al., 2014a). It consists of 10 items rated on a 5-point Likert scale ranging from 1 ("not at all") to 5 ("extremely"), with higher scores reflecting better HRQoL. Item scores are aggregated into a total score (T-score), which is subsequently transformed using RASCH-Person parameter estimates (Ravens-Sieberer et al., 2006). Higher transformed T-scores correspond to superior HRQoL.

Participants whose T-scores exceeded the sex-specific European normative mean values – 49.00 for females and 51.12 for males, as established by Ravens-Sieberer et al. (2006) – were categorized as having high HRQoL. T-scores above this threshold indicate high psychological well-being, characterized by descriptors such as happy, viewing life positively, satisfied with life, and emotionally balanced (Ravens-Sieberer et al., 2006). Conversely, lower scores signify diminished psychological well-being, described as no joy in life, feeling depressed, feeling unhappy, and having low self-esteem (Ravens-Sieberer et al., 2006).

The analysis required the use of programming commands (syntax files) or.sav files, and the protocol employed in this study was limited to cases with complete data. Incomplete datasets were excluded from the analysis to ensure data integrity (Ravens-Sieberer et al., 2006).

Physical Activity

To assess physical activity (PA), participants were asked whether they were members of a sports club or engaged in sports activities outside of school and sports clubs. The response options available to students were Yes/No. If the response was affirmative, the frequency of participation was documented in terms of hours per week. All responses marked as No were coded with a value of zero. For the analysis, the total number of hours per week from both questions was summed and used as an indicator of PA (hours per week) in accordance with the criteria established by Caspersen, Powell, and Christenson (1985) and Dasso (2019).

Physical Fitness

Physical Fitness (PF) was assessed using the German Motor Performance Test for the age group 6–18 years (Bös et al., 2009), a standardized test battery comprising eight components designed to evaluate distinct dimensions of PF. The test included the following test items: a 20-meter sprint to measure sprint velocity, backward balancing on three 3-meter-long beams of varying widths to assess coordination requiring precision, side-to-side jumps across a central line for 15 seconds to evaluate coordination under time constraints, the stand-and-reach test to measure flexibility, push-ups and sit-ups performed over a 40-second duration to gauge strength endurance, the standing long jump to determine explosive power, and a 6-minute run to assess aerobic endurance. According to Bös et al. (2009), the test battery demonstrated high inter-rater reliability (0.95) and satisfactory test-retest reliability (0.82), and it has been validated for the measurement of speed, coordination, flexibility, strength, and endurance. The assessments were conducted in the gymnasiums of the participating schools by physical education students who had received specialized training. All procedures were implemented strictly to the protocols outlined in the test manual by Bös et al. (2009).

Results of the test items were standardized using age- and sex-specific reference values, with a Z-score of 100 representing the average performance for each test (Bös et al., 2009). Z-scores exceeding 100 indicated performance above the average, whereas Z-scores below 100 reflected below-average performance, and the mean of all standardized Z-scores was calculated to serve as a comprehensive indicator of overall PF, i.e., the total Z-score (Bös et al., 2009).

Enjoyment in Physical Education

This variable was measured using the Questionnaire for the Measurement of Enjoyment in physical education (PE) in Adolescence (Fragebogen zur Erfassung der Freude am Schulsport im Jugendalter, FEFS-J) (Engels and Freund, 2018). It is based on a three-factor model encompassing the following dimensions: "pleasure" (e.g., "I enjoy PE"), "flow experience" (e.g., time flies during PE), and "recovery" (e.g., "during PE I can relax from other subjects"). Pleasure describes positive emotions and fun experienced during physical education classes. In contrast, flow experience measures the sense

of complete immersion in the activity, and recovery is rest and relaxation achieved through PE (Engels and Freund, 2018). The 3 dimensions consist of three items each, and responses were assessed on a 4-point-rating scale (0 = never, 1 = sometimes, 2 = often, 3 = always).

According to Engels and Freund (2018), the internal consistency results were good for pleasure (Cronbach's α = 0.86), acceptable for flow experience (Cronbach's α = 0.65), and good for recovery (Cronbach's α = 0.85). In the present study, the three dimensions showed at least good reliability for pleasure (Cronbach's α = 0.89), flow experience (Cronbach's α = 0.82), and recovery (Cronbach's α = 0.90).

To evaluate the FEFS-J, adolescents' responses to the individual items are assigned to the corresponding dimensions. Subsequently, mean values are calculated for each dimension to determine the individual levels of perceived enjoyment in these respective areas (Engels and Freund, 2019). The values range from 0 (minimum) to 3 (maximum), with the minimum meaning that the experience "never" occurs and the maximum meaning that the experience "always" occurs (Engels and Freund, 2018). This approach enables a nuanced analysis of enjoyment in PE and can provide valuable insights for designing and structuring PE classes (Engels and Freund, 2019).

STATISTICS

The statistical software SPSS 29.0.0.0 was used for the analysis. All data are presented as means ± standard deviations and absolute and relative frequencies. According to the tests on the normal distribution (Shapiro-Wilk), differences among metric data (HRQoL; PA; PF; pleasure; flow experience; recovery) between genders were evaluated either by independent t-tests or Mann–Whitney-U tests. In addition, associations were calculated for both genders between HRQoL and PA, PF, and the 3 dimensions of enjoyment in PE according to the tests on normal distribution either with Pearson product-moment correlation coefficient or Spearman's rank correlation coefficient. According to Cohen's (1988) categorization, correlations ranging from $r = 0.1$ to $r = 0.3$ are classified as small to moderate, correlations between $r = 0.3$ and $r = 0.5$ as moderate to large, and correlations exceeding $r = 0.5$ as large. Successively, Fishers Z transformations were performed to compare significant correlation values between girls and boys (Zar, 2005). Variables with correlation coefficients of $p < 0.1$ were additionally entered into multiple linear regression analyses with HRQoL as the dependent variable, separately for girls and boys (Ruedl et al., 2022).

All p-values were two-tailed, with values below 0.05 considered indicative of statistical significance.

RESULTS

The mean T-score of HRQoL was 52.11 ± 10.92 for the total cohort. Mean values for PA and PF were 9.48 ± 5.04 hours per week and a total Z-score of 107.15 ± 6.77, respectively. Regarding the 3 dimensions of enjoyment in PE, mean values were 1.77 ± 0.82 for pleasure, 1.61 ± 0.82 for flow experience, and 1.54 ± 0.97 for recovery. Table 1 shows a gender comparison of mean values of HRQoL, PA, PF, and enjoyment in PE. Boys showed significantly higher values in HRQoL and all three dimensions of enjoyment in PE. No significant difference was found in PA and PF.

	Girls (*N* = 85) mean ± *sd*	Boys (*N* = 91) mean ± *sd*	*P* value
Health-related quality of life	48.64 ± 8.55	55.35 ± 11.90	< .001*
Physical activity	8.81 ± 5.57	10.00 ± 4.59	.077
Physical fitness	106.48 ± 6.76	107.78 ± 6.76	.153
Pleasure	1.41 ± 0.70	2.10 ± 0.79	< .001*
Flow experience	1.35 ± 0.67	1.86 ± 0.87	< .001*
Recovery	1.14 ± 0.84	1.91 ± 0.93	< .001*

*Note: *p < .05*

Table 1: Comparison of quality of life, physical activity, physical fitness, and dimensions of enjoyment in physical education between girls and boys

In Table 2, Spearman correlation coefficients r_s between HRQoL and PA, PF, and enjoyment in PE for both girls and boys are presented. The results indicate significant moderate to large positive correlation coefficients between HRQoL and the three dimensions of enjoyment in PE for girls. In contrast, only the dimension "pleasure" shows a significantly positive association with HRQoL, exhibiting a moderate effect for boys. Regarding Fisher Z comparison, a statistical significance with $p = .038$ was found for "pleasure," indicating a significantly higher association with HRQoL in girls compared to boys.

	Girls (*N* = 85)		Boys (*N* = 91)	
	r_s	*P* value	r_s	*P* value
Physical activity	0.24	.146	0.02	.894
Physical fitness	0.16	.137	0.14	.189
Pleasure	0.54	< .001*	0.32	.002*
Flow experience	0.31	.005*	0.18	.093
Recovery	0.44	< .001*	0.18	.095

*Note: *p < .05*

Table 2: Spearman correlation (r_s) between health-related quality of life and physical activity, physical fitness, and dimensions of enjoyment in physical education for girls and boys

According to the multiple linear regression analysis for girls (table 3), only the dimension "pleasure" of enjoyment in PE (β = 0.49) shows a significant positive association with HRQoL.

Factor	*B*	*SE B*	*β*	*t*	*P* value
Constant	40.12	1.84		21.76	< .001
Pleasure	5.89	2.03	0.49	2.91	.005*
Flow experience	- 2.15	1.86	- 0.17	- 1.16	.252
Recovery	2.50	1.33	0.25	1.88	.064

*Note: R = 0.568, R^2 = 0.297, B: unstandardized regression coefficient, SE B: standard error of unstandardized regression coefficient, β: unstandardized regression coefficient; *p < .05*

Table 3: Results of the multiple linear regression analysis of factors associated with HRQoL among girls (*N* = 85)

The results of the multiple linear regression analysis for boys are presented in Table 4. Higher values in the dimension "pleasure" of enjoyment in PE (β = 0.52) are significantly associated with higher values of HRQoL. In contrast, dimensions "flow experience" and "recovery" showed no significant associations with HRQoL.

Factor	*B*	*SE B*	*β*	*t*	*P* value
Constant	45.33	3.42		13.25	< .001
Pleasure	7.74	2.86	0.52	2.71	.008*
Flow experience	- 2.26	2.50	- 0.16	- 0.90	.369
Recovery	- 1.04	2.12	- 0.08	- 0.49	.627

*Note: R = 0.345, R^2 = 0.088, B: unstandardized regression coefficient, SE B: standard error of unstandardized regression coefficient, β: unstandardized regression coefficient; *p < .05*

Table 4: Results of the multiple linear regression analysis of factors associated with HRQoL among boys (*N* = 91), 2023

DISCUSSION

This study aimed to analyze associations of PA, PF, and enjoyment of PE with health-related quality of life in both female and male adolescents. Results of the multiple linear regression analyses found a significant positive association between pleasure and HRQoL in girls as well as in boys, although girls showed significantly lower mean values of HRQoL and within the three dimensions of enjoyment in PE.

Mean HRQoL scores were significantly lower in girls compared to boys. In line with this, previous studies have reported gender differences in HRQoL, with lower mean values in females (The KIDSCREEN group et al., 2009; J. Wang et al., 2022). According to Meade and Dowswell (2015), these differences may be attributed to various factors, including divergent social expectations, the more significant impact of puberty on females (such as menstruation and hormonal fluctuations), and a higher prevalence of physical health problems among females.

On average, boys reported more PA hours per week than girls, although the result failed to reach statistical significance with p = .077. In the literature, however, there is a consensus that girls are less active than boys (Kretschmer et al., 2023; Telford et al., 2016). Telford et al. (2016) suggested that the family environment, which may support girls' engagement in sports less than boys, is a possible reason for reduced PA among girls or reduced participation in organized sports such as sports clubs. Kretschmer et al. (2023) also pointed to differences in perception, noting that girls often perceive PA as more strenuous than boys.

Regarding physical fitness (PF), the mean total Z-score of the DMT 6-18 was higher in boys; however, this study found no significant gender differences. Generally, studies examining PF have shown that boys outperform girls in areas such as muscle strength, muscular endurance, muscular power, and cardiovascular fitness (Brazo-Sayavera et al., 2021; Rosselli et al., 2020; Tomkinson et al., 2018). These differences become more pronounced with age, particularly from around 12 years onward (Tomkinson et al., 2018). However, it is important to note that the total Z-score was used to operationalize physical fitness. The calculation of the total Z-score takes into account the mean and standard deviation of the age- and sex-matched norming sample (Bös et al., 2009) and can, therefore, be viewed as a standardization of fitness relative to age and sex. As a result, a Z-score of 100 for both a 15-year-old girl and an 18-year-old boy represents different levels of physical fitness, even though both Z-scores correspond to the average fitness level for their respective age and sex.

It was also found that girls scored significantly lower than boys in all 3 dimensions (pleasure, flow experience, recovery) of enjoyment in PE, with pleasure being rated highest for both genders. This corresponds well with the results in the validation study of the FEFS-J by Engels and Freund (2019). A possible explanation for the lower values in girls could be a lower motivation for PA. Romero-Parra et al. (2023) found differences between girls and boys, especially in both intrinsic motivation (e.g., enjoyment of movement) and integrated motivation (movement as part of their personal values), with boys showing higher values in both cases. Compared to elementary school, adolescent girls experience a higher amount of amotivation, which manifests as a lack of interest in physical activity (Romero-Parra et al., 2023). Romero-Parra et al. (2023) identify several reasons, including body image and perception, social and cultural factors, academic pressure, lack of time, insufficient and engaging activities, and a lack of role models or support. Girls, particularly in secondary schools, may struggle with negative body image and greater concerns about their appearance, and the increased pursuit of a certain body ideal may cause them to be less enthusiastic about physical activities that are perceived

as less beneficial for their self-image (Walters et al., 2023). In many cultures, and especially in school settings, there are still stereotypical views that sports and physical activity are more suitable for boys or certain types of activities (e.g., competitive sports), which could discourage girls from taking an interest in sports that do not align with these stereotypical views (Cárcamo, Moreno and Del Barrio, 2021). The increasing focus on academic achievement in secondary schools, combined with less free time and higher stress levels, can also reduce motivation to engage in regular physical activity (Romero-Parra et al., 2023). In secondary schools, there is often less variety in physical activity offerings that align with the interests and preferences of girls (Romero-Parra et al., 2023). The lack of female role models in sports or fitness and a lack of support from family, friends, or teachers can further diminish intrinsic motivation and lead to girls feeling less encouraged to stay active (Midgley et al., 2021).

Regarding the results of the correlation analyses, gender-specific differences in how enjoyment in PE relates to HRQoL were found. While all three dimensions of PE enjoyment showed a significant positive correlation with HRQoL in girls, only the dimension "pleasure" revealed a significant positive correlation with HRQoL in boys. Furthermore, when comparing the significant correlation coefficients for "pleasure" between genders, a large correlation was found among girls ($r_s = 0.54$), whereas a moderate correlation was found for boys ($r_s = 0.32$). Fisher's Z-transformation indicated that these differences in the correlation coefficients between girls and boys were statistically significant.

These findings suggest that girls benefit from a comprehensive approach to fostering enjoyment in PE, where all dimensions (pleasure, flow experience, and recovery) play an important role. The relationship discovered by Fierro-Suero et al. (2023), which is more pronounced in girls than in boys, between positive emotions and future activity intentions could be taken into account. A positive and diverse PE environment could substantially enhance their quality of life (Rocliffe et al., 2024). In contrast, only the "pleasure" dimension significantly correlates with HRQoL, showing a moderate effect size for boys. This suggests that boys primarily react to the immediate enjoyment and positive experiences in PE. At the same time, according to a study by Berki, Csányi, and Tóth (2024), dimensions like challenge (perception and handling of difficult tasks and goals) or meaning (activity is perceived as important for one's life and well-being) seem less relevant to their HRQoL.

Results of the multiple regression analyses further emphasize the importance of the "pleasure" dimension for girls as well as for boys, with significant positive associations with HRQoL. This underscores that fun and immediate satisfaction are crucial for both genders' well-being. Interventions focused on enhancing enjoyment in PE through engaging and entertaining activities could, therefore, effectively improve the quality of life of female and male adolescents. However, it is important to note that the R^2 in the regression model for girls is substantially higher than for boys ($R^2 = 0.30$ vs. $R^2 = 0.09$), indicating a greater proportion of variance explained by the same independent variables in girls compared to boys. Therefore, enjoyment in physical education appears to be a particularly relevant factor influencing girls' health-related quality of life.

Physical education provides students with regular and structured physical activities (Latino and Tafuri, 2023). Furthermore, school sports can positively influence physical activity during leisure time (Sasayama et al., 2024). Some adolescents are physically active solely through school activities, suggesting that school sports can be an important source of physical activity (Sasayama et al., 2024).

These findings offer valuable insights for designing future PE curricula. For girls, programs should foster all three dimensions of enjoyment – pleasure, flow experience, and recovery – through diverse and engaging activities to comprehensively support their well-being. For boys, the emphasis should be on activities that maximize immediate enjoyment, such as games or team sports. Additionally, strategies could be introduced to gradually enhance their appreciation for challenge and meaning in PE, potentially broadening the positive impact on their HRQoL.

Several limitations should be considered when interpreting the findings of this study. Firstly, the cross-sectional design prevents any causal conclusions from being drawn. Future longitudinal research could provide better insights into the predictive capabilities of the independent variables, especially of enjoyment of school in PE on HRQoL, and additional factors, such as the social environment or individual attitudes towards sports, could be included to better explain the observed gender differences. Secondly, there is an inherent risk of bias (e.g., decline in attention or untruthful responses) in self-report questionnaires, even when they are validated, as is the case with the KIDSCREEN-10 and the FEFS-J. This risk is also present when non-validated questionnaires are used, as is the case with the PA questionnaire. However, the lack of validation further complicates the assessment of PA.

Future studies might incorporate objective tools for measuring PA, such as pedometers or accelerometers. However, it is noteworthy that in a recent study by Gall et al. (2020), self-reported PA emerged as the strongest predictor of children's HRQoL assessed with Kidscreen questionnaires. Thirdly, we tested linear relationships for factors associated with HRQoL. However, considering the distinct regression model results for boys and girls regarding HRQoL, a non-linear model might be more suitable.

CONCLUSION

In conclusion, the findings underline the importance of enjoyment of PE for the HRQoL of adolescents of both genders. For girls in particular, enjoyment of school PE appears to be an important factor in improving HRQoL, especially given that girls, on average, report lower HRQoL than boys. Tailored approaches that address the different needs of boys and girls are crucial to increasing motivation for physical activity in and out of the school environment and thus promoting the long-term physical and mental well-being of adolescents.

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