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Youth physical activity profile: A gender perspective

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ABSTRACT

This study aimed to assess gender differences and correlates of physical activity (PA) among children in East Java, Indonesia. An observational population-based cross-sectional study was conducted on a representative sample of children (n = 900, mean age 13.27±0.97) in East Java. The instrument used in this study was the Children's Physical Activity Questionnaire, which measured the level of physical activity with high reliability (Kappa = 0.67–0.73) and moderate validity (r = 0.48). Boys reported higher engagement than girls in sport activities, school activities, and other activities, all differences being statistically significant (p = 0.000). Leisure time activities were slightly higher in boys, but this difference was not significant (p = 0.083). Overall CPAQ scores were also higher in boys (2.51 vs. 2.33, p = 0.000), indicating that boys generally had higher levels of physical activity than girls. In conclusion, girls are less likely than boys to engage in PA. Therefore, there is a need to consider the provision of a comprehensive multifaceted health behavior modification and interventions, such as targeted and regular physical education in schools.

KEYWORDS

Physical Activity; Gender; Youth; Indonesia

1. INTRODUCTION

Sport is an activity where our bodies move actively and motion to perform movements. Therefore, sport is very influential in our lives (Sutula, 2018). However, many teenagers or people need to pay more attention to the benefits of exercise, and one example occurred in cities in East Java. In adolescence, various changes, including physical, structural, and functional changes, differ between boys and girls (Breehl & Caban, 2023). Symptoms of adolescent material changes appear

when children begin to enter early adolescence, where changes in attitudes and behavior almost always accompany these changes. The difference is one of the effects of an experience he has never felt. This causes frequent problems or imbalances in adolescents. Lifestyle changes that lead to modernity and Western lifestyle are often found in big cities in Indonesia (Orhan, 2020). Prosperity and ease of life give rise to a sedentary lifestyle, significantly decreasing work or physical activity. The low level of physical activity in the modern lifestyle is also caused by a wrong interpretation of the role of sport which is only limited to enjoyment (entertainment)—coupled with the current trend of urban society with a sedentary lifestyle.

According to age group, the highest lack of physical activity was in the group of 75 years and older (76.0%) and 10-14 years of age (66.9%), and women (54.5%) were higher than men (41.4%). Based on the level of education, the higher the education, the higher the prevalence of less physical activity. The majority of less physical activity among urban residents (57.6%) is higher than among rural areas (42.4%), and the higher the level of per capita expenditure per month, the increasing prevalence of less physical activity (Delima et al., 2009).

Adolescence is a transitional age from childhood to adulthood. In adolescence, many changes occur in addition to physical changes due to increased muscle mass, tissue fat in the body, and hormonal changes. These changes significantly affect the nutritional and dietary needs of adolescents. Adolescent eating patterns can affect growth and will have an impact on chronic diseases in the future. An imbalance in energy intake in adolescents can cause nutritional problems, both nutritional issues and nutritional problems (Asna & Syah, 2021). Among adolescents, nutritional status is more of a worrying situation because it can lower self-confidence and cause severe psychological disorders. If overweight occurs in adolescents, it will grow into adolescents who lack confidence. Adolescents who are obese or overweight are known to be 3-4 times more at risk of heart disease. The incidence of overweight in adolescents is currently evidenced by the national prevalence based on primary health research data on adolescents who are overweight are 7.8% in young men and 15.5% in young women. The majority of malnutrition is relatively higher in women than in adolescent boys. Primary health research data found that overweight in Central Java province was 6.2% in young men and 12.7% in young women. In addition, several studies on the nutritional status of adolescents conducted in the city of Depok are pretty worrying. Sari's research of 126 Junior High School students found the prevalence of obesity at 34.7% and overweight at 23.82% (Sari, 2005). Young women are more prone to nutritional problems than young men because, in young women, fat accumulation occurs during puberty.

In contrast, there is muscle development in young men, so young women have fat about twice as large as young men. One of the factors affecting more nutrition is physical activity. Generally, someone who is obese is less active than someone with normal weight. Physical activity is the movement of the limbs that causes an essential expenditure to maintain physical and mental health and takes advantage of the quality of life to stay healthy and fit throughout the day. Regular physical activity that is done at least 30 minutes/Day. If more time is used for physical activity, then the benefits are also more (Abou Elmagd, 2016).

According to Huriyati et al. (2004), the time for light activity in a day further increases the risk of overnutrition. Overweight adolescents tend to do less physical activity compared to adolescents with normal weight. The preliminary survey conducted at SMP Muhammadiyah 10 Surakarta in February 2013 found that young women with a prevalence of overnutrition (overweight) are high at 28.03%.

Several studies on gender-related physical activity differences have been conducted, but they are still limited to the surface and have not looked at each indicator of physical activity. Some studies reveal that men's physical activity significantly differs from women's children, where men's physical activity is more significant. However, the data for the differences in each indicator of physical activity is still no further information. Therefore, this study aims to look at adolescents' physical activity on each indicator and the questionnaire instrument adapted to the conditions in Indonesia. Furthermore, it aims to determine the difference in four indicators of physical activity between boys and girls in East Java, Indonesia.

2. METHODS

2.1. Design and Participants

This research was an observational population-based cross-sectional study conducted in representative samples of school-aged children and adolescents in East Java, Indonesia, from October 2020 to March 2021. The technique used in sample selection is Stratified Random Sampling.

A total of 900 children were included in the study. The subjects were students in East Java fulfilling the inclusion criteria of students who are not physically disabled such as fractures in the legs, and students who do not experience menstruation, and exclusion criteria for students who are changing schools, who are sick such as infection, and heavy fat and heavy thin.

2.2. Instruments and Procedure

The instrument used is the Children Physical Activity Questionnaire, an instrument in the form of a questionnaire adopted by the World Health Organization to measure the level of physical activity of young people around the world, where CPAQ has been standardized internationally. Respondents were asked to fill in a statement about the daily activities and the required intensity of time. Many previous studies using this questionnaire, including in developing countries (Fillon et al., 2022), and previous studies have tested the validity (Bull et al., 2009). Previous research conducted by Bull, Maslin, and Armstrong in various countries, including Indonesia in Yogyakarta, revealed that this study has a substantial reliability value (Kappa 0.67 to 0.73). Meanwhile, based on research by Cleland et al. (2014), physical activity values from the Children Physical Activity Questionnaire (CPAQ) had a moderate degree of validity correlated with data from the accelerometer (r=0.48). The measurement of physical activity level is based on the MET (Metabolic Equivalent), which is the value used to determine the level of physical activity based on the Children's Physical Activity Questionnaire (CPAQ). The use of this questionnaire is to fill out a statement on the questions provided in the questionnaire. Questions on the CPAQ consisted of four indicators: sports activities (activities including playing soccer, dancing, basketball, running, swimming, etc.), school activities (activities including walking to school and cycling to school), and leisure activities (cycling, playing with pets, walking) and other activities (activities including listening to music, playing video games, reading, drawing, etc.).

PAQ-C is a tool used to assess overall physical activity in school-aged children ages 8-14 years and can also be used for ages 5-10 years who are in the school environment and have rest periods (Nnodum et al., 2017). The questionnaire consists of 10 question items; each point has a minimum value of 1 and a maximum of 5; then, the average value of all items will be taken. Assessment is done by giving a score of 1 to 5 to describe children's level of activity ranging from deficient activity, low, moderate, moderate to high, and very high. Physical Activity Questionnaire-Children (PAQ–C) is a personal report of the child by remembering his activities during the previous seven days, during school, at recess, after school, or on weekends (Biddle et al., 2011). In addition, PAQ–C is considered one of the instruments still effectively used as a survey instrument because it is fast and valid and provides an understanding of what includes physical activity and remembers how much activity was done in the past day (Ronghe et al., 2016). The questionnaire also includes questions about student height expressed in meters (m) and student weight expressed in kilograms

(kg) as BMI data. The results of height and weight are calculated using the formula BMI (kg/m2) = (Weight (kg)) / Height2 (m)) (Hangan & Gurgas, 2011).

Analysis and data processing in this study is to collect data from respondents by giving CPAQ questionnaires to respondents. In filling out the questionnaire, respondents were asked to fill in as is to ensure that the data obtained objective, collect questionnaires that respondents have filled.

2.3. Statistical Analysis

The data was processed with the help of software IMB SPSS version 22 and Microsoft Excel 2013. The study used descriptive statistics to summarize age, height, weight, BMI, CPAQ scores, and the distribution of BMI and physical activity levels by gender. The results of the data normality test using the Kolmogorov-Smirnov test showed that all data were normally distributed and then used the Man Whitney test. The study also conducted the independent t-tests to compare physical activity indicators between boys and girls, with significance set at $p < 0.05$.

3. RESULTS

A total of 900 children were included in the study. Table 1 shows the descriptive test results according to gender differences.

Table 1. Descriptive test results according to gender

Criteria (support)	Results		
	Boys (N=391)	**Girls (N=509)**	**All Gender (N=900)**
Age (year)	13.25±0.98	13.28±0.95	13.27±0.97
Height (cm)	154.23±12.12	152.77±7.86	153.41±9.96
Weight (kg)	45.78±12.16	44.36±8.49	44.98±10.27
BMI (kg/m^2)	19.14±4.00	19.01±3.36	19.06±3.65
CPAQ Scores	2.51 ± 0.60	2.33±0.52	2.41±0.56

About 43.44% were boys, and the mean (SD) of the children's age was 13.25 (±0.98) years, and 56.56% were girls, and the mean (SD) of the children's age was 13.28 (±0.95) years (Table 1). The boy's height was 154.23, and the girl's height means was 152.77; the weight means of the boys was 45.78, and the girl's means was 44.36. The data showed that boy's BMI means was 19.14, whereas the girl's means was 19.01. Then the CPAQ score for the boys was 2.51, and the girl's mean was 2.33.In the following, Table 2 shows the distribution of BMI categories among 900 students.

Table 2. Distribution of BMI level categories by gender

BMI Level Category	Boys (N=391)		Girls (N=509)		All Gender (N=900)	
	f	%	*f*	%	*f*	%
High-grade Underweight	128	32.74	135	26.52	263	29.22
Low-grade Underweight	79	20.20	123	24.17	202	22.44
Normal	148	37.85	222	43.61	370	41.11
Low-grade Overweight	14	3.58	16	3.14	30	3.33
High-grade Overweight	22	5.63	13	2.55	35	3.89

Most participants had a normal BMI (41.11%), followed by high-grade underweight (29.22%) and low-grade underweight (22.44%). A smaller proportion were overweight, with 3.33% classified as low-grade and 3.89% as high-grade overweight. Normal BMI was more frequent among girls (43.61%) than boys (37.85%), while boys showed a higher prevalence of high-grade underweight (32.74%) compared to girls (26.52%). Table 3 presents the distribution of physical activity levels among 900 students.

Table 3. Distribution of physical activity level categories by gender

PA Level Category (CPAQ)	Boys (N=391)		Girls (N=509)		All Gender (N=900)	
	f	%	*f*	%	*f*	%
Sedentary	21	5.37	36	7.07	57	6.33
Light	296	75.70	427	83.89	723	80.33
Moderate	74	18.93	46	9.04	120	13.33
Vigorous	0	0	0	0	0	0

The majority of participants demonstrated a light level of physical activity (80.33%), with a higher proportion among girls (83.89%) compared to boys (75.70%). Moderate activity was more common among boys (18.93%) than girls (9.04%). Only a small percentage of students were sedentary (6.33%), while none reported engaging in vigorous physical activity. In the following, Table 4 shows the mean values of physical activity indicators measured by the CPAQ instrument (gender differences). The data obtained from CPAQ includes four indicators: sports activities, activities at school, leisure, and other activities. Before starting the difference test, it is essential to note that the normality test and homogeneity test were first conducted.

Table 4. Physical activity indicators by gender

PA indicator (CPAQ instrument)	Boys (N=391)			*p (sig.)*
	Boys (N=391)	Girls (N=509)	All Gender (N=900)	
Sport activities	1.73±0.34	1.61±0.31	1.66±0.33	0.000*
Activity at school	8.77±2.31	8.10±1.96	8.39±2.15	0.000*
Leisure times	7.01±2.59	6.63±2.18	6.79±2.37	0.083
Other activities	2.57±0.91	2.33±0.84	2.43±0.88	0.000*
CPAQ scores	2.51 ± 0.60	2.33±0.52	2.41±0.56	0.000*

Boys reported higher engagement than girls in sport activities (1.73 vs. 1.61), school activities (8.77 vs. 8.10), and other activities (2.57 vs. 2.33), all differences being statistically significant ($p = 0.000$). Leisure time activities were slightly higher in boys (7.01 vs. 6.63), but this difference was not significant ($p = 0.083$). Overall CPAQ scores were also higher in boys (2.51 vs. 2.33, $p = 0.000$), indicating that boys generally had higher levels of physical activity than girls.

4. DISCUSSION

Based on the results of the study, it is known that, in general, physical activity between boys and girls is different. Furthermore, it is seen that the three indicators showed significant differences between boys and girls ($p < 0.05$) except for the leisure time indicator, where there was no real difference between adolescent boys and girls ($p > 0.05$). This is due to several factors. Research also showed that boys spend significantly higher time in PA than girls. Girls tended to engage more in homework and/or to socialize through the phone, which could be one reason, and they were also more likely to report the feeling that they did not enjoy. Other studies also indicated that the lowest prevalence of insufficient female activity could be potentially explained by societal factors, such as girls being required to support activity and domestic chores around the home in South Asia countries (Sutula, 2018), a similar feature to this study. The constant finding that boys engage more in moderate and vigorous PA underlines the need for PA intervention programs to target girls of all ages.

Based on the study's results, it is known that the four indicators of physical activity between men and women are different except for the leisure time indicator. This is a finding because there is no difference in leisure time indicators between boys and girls. Several factors, among others, can influence it. This is the same as a physical activity performed by adolescents with normal weight. The only difference is the duration and frequency of activity. Outdoor activities are not favored because the weather outside is hot or cold, so too much sweat out and quickly tired (Bates & Miller, 2008). Research from Skogen & Høydal (2021), adolescents who lack physical activity tend to be overweight. The results of Suza et al. (2020) research explain that when compared to the magnitude of the relationship between diet and physical activity, it turns out that physical activity is more associated with the occurrence of being overweight in adolescents. Following the theory, more nutrition is due to low physical activity, so the incoming energy intake is only slightly used for the activity, and most of it is stored as body fat. In addition to the lack of physical activity, the cause of excess weight (overweight) is due to food consumption (nutrients) that exceeds the normal needs of

the human body. A diet high in calories and fat causes the accumulation of energy in the form of fat, and this is accompanied by a lack of physical activity, for example, exercising. If it is allowed to continue and has become a patterned habit, it will accumulate in the body and eventually become overweight and even obese (Maślak et al., 2020). There are several important factors that can cause overweight in adolescents, especially a decrease in physical activity and an increase in physical inactivity (inactivity). In actual, inactivity is a factor that is a much greater influence on the occurrence of overnutrition compared to overeating. Teenagers ' physical activity now tends to decrease, teenagers play more computer/laptop games and watch tv. Some studies show that the increase in nutrition is more due to a decrease in total energy expenditure.

The results of the study are in line with the results of studies related to the level of leisure physical activity in a sample of adults in Brazil, and it is known that the level of activity in men is higher than in women. The results also align with previous studies from developed and developing countries, which showed that men are more active than women (Monteiro et al., 2003). However, when other domains of activity (domestic work, transportation work) were considered, no gender differences were observed (Hallal et al., 2003), except for strong activity (Hallal & Siqueira, 2004). This may be explained by higher levels of housework and physical activity among women. Previous studies proposed the term "gender bias" to explain the role of domains evaluated on physical differences in activity levels across the sexes; in that study, men were more likely to practice sports and exercise, while women were more likely to do daily walking and cycling (Abel et al., 2001).

In addition, other factors affect physical activity, like socioeconomic level. A strong relationship between socioeconomic level and leisure time was found. For both sexes, the lower the socioeconomic level, the higher the level of inactivity. Comparable findings have been found in other high-income Brazilian states and regions (Martinez-Gonzalez et al., 2001). The explanation for this finding relies on the need for more attractive public places for the practice of physical activity activities. Individuals are tempted to look for structured activities (e.g., sports in clubs and gyms in fitness clubs), all of which cost money on their own. In addition, individuals with lower socioeconomic status have less knowledge about sports-related issues, which may contribute to their unhealthy lifestyles (Domingues et al., 2014).

Despite this, it is interesting to note that the previous study, carried out in the same Brazilian city (Rawal et al., 2020), showed that when all domains of activity are considered, the direction of the relationship between socioeconomic status and physical activity level is precisely the opposite: the lower the socioeconomic level, the lower the level of inactivity. This association may also be

observed in other countries, especially low-and middle-income ones, where many activities are carried out during work, commuting, and household chores. Another critical issue is that low-income individuals are no more likely to settle simply because they have less money or less knowledge about the benefits of physical activity. These subjects also had different attitudes toward their health and body (Marmot, 2000).

In summary, these data indicate that while men practice physical activity because they enjoy it, women practice it to improve health or aesthetics. Women also report practicing physical activity due to medical advice more often than men. Women also visit the physician more regularly than men may explain this difference (Mendoza-Sassi & Béria, 2003). Thus, health professionals should be aware of their potential to mediate healthy behaviors among sick individuals and the population as a whole. The effects of gender are more complicated when one considers the mental health benefits of physical activity. From a national survey of over 6000 adults aged 24 to 65, Asztalos et al. researchers found that for men, participation in vigorous-intensity physical activity decreased feelings of depression, anxiety, and physical symptoms such as mental stress (somatization). The fact that men engage in higher levels and greater intensity of physical activity could be less detrimental to their mental health.

On the other hand, the authors found that walking was positively associated with emotional well-being for women, and moderate-intensity physical activity reduced symptoms of somatization. They propose that walking, in particular, could allow opportunities for social interaction and bonding that are highly valued among women. They concluded that men benefit more from vigorous physical activity, whereas women get from lighter activity.

Morimoto et al. (2006) found a differential effect of physical activity on health-related quality of life in men and women, but women had a more favorable effect than men. By participating in low-intensity physical activity, women are probably better off regarding their mental health. For example, biological, environmental, and psychological influences that differ from their male counterparts will likely affect a new mother's physical activity requirements. These are just a few examples of sex-related responses to different physical activity levels when considering mental health outcomes. Gender differences in biological structure and function, from the moment of conception, men and women differ anatomically and follow different development patterns. Their brains differ in composition, overall size, regional proportions, connectivity, and maturation processes. For example, the female brain has more gray matter, and the male brain has white matter and cerebrospinal fluid. These neurological differences may likely drive human development towards gender-aligned

behaviors, including a preference for and attraction to physical activity. Although, to date, no study has directly linked these structural differences to physical activity levels, this is a vital link that needs to be explored. A lot of behavioral and cognitive differences observed between males and females, such as verbal and visuospatial tasks, could be partly explained by the above information. Other early biological gender differences can also contribute to different physical activity levels. For example, males are longer and heavier at birth and have greater vital capacity and proportionally larger hearts and lungs than females. With physical maturity, male muscles become more robust, larger cross-sectionally, and comprise larger muscle fibers than women, especially in the upper body. Such physical differences benefit men in physical activity.

Combined with these physical differences, men's cardiovascular physiology also means they are more biologically capable of vigorous physical activity than women (Hands et al., 2016). For example, men have lower heart rates when engaged in the same level of exercise, higher VO2 max levels relative to body mass, higher red blood cells per unit plasma volume, wider airways, and greater lung diffusion capacity. When placed under cardiovascular stress, men respond by increasing vascular resistance and, consequently, blood pressure, whereas women increase their heart rate and are more at risk of fainting. Many observed differences in exercise response can be attributed to genetic, biological differences, regulatory factors, sex hormones, or a combination. Evidence from several animal studies suggests that estrogen, progesterone, and testosterone mediate exercise response and, consequently, physical activity in men and women.

The observed differences in physical activity levels and exercise behavior between boys and girls may reflect human evolution (Telford et al., 2016). For example, Darwin stated that males must be strong, fit, and courageous to compete with other males to attract a suitable mating partner, so, therefore, biologically tend to be more active. Societal expectations also play a decisive role in shaping the behavior of men and women.

Repeatedly, men and women differ in their attitudes and motivations towards sports and exercise across the lifespan (Martín Rodríguez et al., 2013). Boys were identified as more attracted to physical exertion than girls, which in turn influenced their participation. For boys, demonstrating physical power and social status is generally a more important goal. In contrast, girls tend to be more motivated by friendship, personal satisfaction, body image, and self-expression. Gender differences in motivation and attitudes and varying parental expectations manifest in children's play and activity patterns. Boy’s games are generally more boisterous and involve speed, strength, endurance, and aggression.

On the other hand, girls play less hard and are more likely to compete relationally, engage in play parenting, focus on turn-taking, regular sequences, partial engagement, or solitary activities. In school, girls spend more time in smaller same-sex groups and engage in verbal play, conversation, and socializing. In contrast, boys play in larger groups, which lend themselves to more physically active team games, such as soccer (Martínez-Andrés et al., 2017).

5. CONCLUSIONS

Boys were more active than girls. Four physical activity indicators showed a significant difference except for the leisure time indicator, which showed no difference between boys and girls. Given the importance of physical activity for health and disease prevention, one consequence of girls' lower levels of physical activity is that they are assumed to be at greater risk regarding their health status. As a result, researchers, practitioners, and policymakers often recommend strategies that encourage girls to increase physical activity levels to meet recommended standards. Boys and girls tend to engage in different intensity levels and types of physical activity. We must reconsider how these differences are reported and addressed in policy and practice. Future research and debate must be recommended to examine the complex interactions between environmental, behavioral, and biological factors with gender and physical activity.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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