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Gender differences in competition participation among junior tennis players by age

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ABSTRACT

The aim of this study was to analyze the participation level of junior tennis players in national competitions based on age and gender. The authors conducted a quantitative research using comparative and descriptive analysis, based on the documentations and data from numbers of participants from PELTI-recognized Tournament (TDP) national match report for the 2024 period. Randomly, a total of 14 junior tennis championships were obtained, from which 2580 participants were involved. The results indicated that junior player participation in national competitions differed significantly by gender ($p<0.05$). Descriptively, the mean number of male participants was higher than that of female participants. No statistically significant differences in junior player participation were observed across age groups (A10, A12, A14, and A16) ($p>0.05$). Descriptively, the lowest levels of participation were observed in the A10 and A16 age categories. The results of this study are expected to be a consideration for determining policies in the field of tennis sports and can be used as a reference for more in-depth research.

KEYWORDS

Tennis Players; Competition; Age; Gender

1. INTRODUCTION

Tennis competition is an important tool in the development of tennis players' talents and abilities. In the early stages of an athlete's development, competition has essential role in shaping experience, competitive mentality and technical skills. Competitions at different stages is important contributor to achieve their peak performance, providing opportunities for players to further develop

their skills and gain international playing and travel experience. Competition is also an important platform by providing a pathway to higher levels of performance (Sotiriadou & Shilbury, 2009).

It is important to analyze the participation level of players in competitions to design more effective tennis coaching strategies and policies in the future. Measuring and analyzing sports participation data is critical to understand the trends (Eime et al., 2020). Studies on the analysis of competition's participants by age and gender can provide comprehensive insights for competition's organizers, coaches, and policymakers in determining a more inclusive and sustainable approach in coaching junior athletes. Further investigations should be developed by examining trajectories in different sports, countries, genders, and cultural contexts (Coutinho et al., 2023). A study has provided recommendations for conducting further research on analyzing invariance between individual sports (Monteiro et al., 2018).

Several studies examined sports participation in several countries based on age and gender, by combining these or in separated way. Research had examined how participation in sport for development programs in Senegal is associated with gender equality attitudes (Meyer & Roche, 2017). Many researches aimed to explore current levels of organized youth sports participation across Europe for both men and women (Emmonds et al., 2024), likes on participation in running sports (Frick, 2011), adventure sports (Apollo et al., 2023), and participation in a variety of sports (Breuer et al., 2011). Research conducted by the Victorian State Sports Association (SSA) observed the participation level in nine major sports (Eime et al., 2020). A similar study aimed to determine differences in motivation to participate in physical activity and sports in students from three age categories, namely early adolescents, middle adolescents, and late adolescents in India (Ahmed et al., 2020).

Information on age and gender distribution in youth tennis competitions can also be used as a basis for formulating policy strategies, knowing the shortcomings that may need to be corrected in the national coaching system. Age and Gender characteristics are a concern in the development of long-term athletes. In general, steps for tennis training is started by introduction to tennis at 7-8 years old, followed by specialization at 11-13 years old for girls and 12-14 years old for boys, and high performance training at 20-25 years old for girls and 22-27 years old for boys (Bompa & Buzzichelli, 2018). Research on sport in general suggests that youth sports participation may be more important among girls than boys in predicting physical activity in early adulthood (Kwon et al., 2021).

In Indonesia, research related to the characteristics of sports competition's participants based on age and gender, especially in tennis, is still limited. Most of previous studies tend to focus on analyzing athlete performance (Mainer-Pardos et al., 2024; Xu et al., 2024), assessment (Ngatman et al., 2024), injury (Llanes et al., 2023), and motoric profile (Alexandru & Lorand, 2015; Schluga Filho et al., 2016). On the other hand, aspects of competition participation that include demographic factors have not been widely studied. From the background and previous relevant research, no research has been conducted on studying its specific involvement in tennis, especially among juniors in Indonesia, which based on gender and age. This study aims to analyze junior tennis players' participation in national competitions based on age and gender. Thus, this research is expected to fill the literature gap in youth sports and make a real contribution to increase the number and quality of participation of young athletes in national tennis competitions. Research which analyzes these two variables simultaneously is needed to obtain a more comprehensive view of the challenges and opportunities in coaching junior athletes. The results of this study are expected to be considered when determining policies in the field of tennis.

2. METHODS

2.1. Participants

The participant data were obtained from the match reports of PELTI (Persatuan Lawn Tennis Indonesia, or Indonesian National Tennis Board)-recognized national tennis tournaments (TDP) held in 2024. Randomly, a total of 14 junior tennis championships were obtained, which consisted of 2580 participants, from boys and girls players in total, in various age groups.

Table 1. Junior tournament Participants

Tournament	**A10**		**A12**		**A14**		**A16**	
	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl
14	334	231	455	244	436	285	378	217
Total Participants	**2580**							

2.2. Procedure and Data Analysis

The study procedure consisted of several steps. First, the 2024 match reports of PELTI-recognized national tennis tournaments (TDP) were collected. Second, 14 junior tennis championships were randomly selected, and the number of participants was recorded according to gender (boys and girls) and age group (A10, A12, A14, and A16). Third, the data were organized and

categorized according to these two variables. Finally, statistical analyses were conducted to examine differences in participation based on gender and age group.

The data were analyzed using multiple statistical steps. First, an independent samples *t*-test was used to determine differences in the number of participants based on gender (boys and girls), provided that the prerequisite assumptions were met. If the assumptions were not met, the Mann–Whitney *U* test was used. Subsequently, a one-way ANOVA or Kruskal–Wallis test was used to determine differences in participation across age groups (A10, A12, A14, and A16), depending on whether the assumptions for parametric testing were satisfied. Normality and homogeneity tests were performed to assess these prerequisites.

3. RESULTS

3.1. Descriptive Analysis Results

From 14 junior tennis tournaments in 2024, the average number of boy participants was 114, while the number of girl was 69. Details can be seen in Table 2.

Table 2. Description of the mean number of participants by gender

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Participants	Boy	14	114.50	48.193	12.880
	Girl	14	69.79	23.102	6.174

Based on the information presented in Table 2, boys had a much higher mean number of participants than girls. Regarding the standard deviation, the results indicate that the number of boys varied more widely across tournaments, whereas the number of girls was more concentrated around the mean, indicating less variation in this group. In other words, the greater variation among boys suggests a larger difference between the highest and lowest numbers of participants across tournaments. In contrast, girls showed more consistent participation, with a smaller spread around the mean.

Descriptive analysis more specifically describes the participation of junior players by gender and age group. Age groups consisted of A10, A12, A14, and A16, with boy and girl gender. The lowest average participant was in the A16 group with girl gender. A clearer description can be seen in Table 3.

Table 3. Description of tennis championship participants by gender and age

	Boy				Girl			
Age	**N**	**Mean**	**Min**	**Max**	**N**	**Mean**	**Min**	**Max**
A10	14	23.86	12	44	14	16.50	7	26
A12	14	32.50	7	58	14	17.43	6	32
A14	14	31.14	9	57	14	20.36	11	41
A16	14	27.00	12	64	14	15.50	7	31
Total	56	28.63	7	64	14	16.50	7	26

Table 3 provided a clearer picture of how boy and girl tennis players' performance compares by age, with boys tending to have higher scores, but also showing greater variation in scores than girls.

3.2. Participant Differences by Gender

The normality test for participants based on gender was fulfilled, with non-significant values of 0.435 > 0.05 for boys and 0.421 > 0.05 for girls. Therefore, a parametric test can be conducted using an independent-samples t-test.

Table 4. Participant differences based on gender

		F	**Sig.**	**t**	**df**	***p* value**
Participant	Equal variances assumed	4.060	.054	3.130	26	.004
	Equal variances not assumed			3.130	18.675	.006

There is a significant difference between the participants from boys and girls' junior players in the junior tennis championships during 2024 period, with a signiificant value of 0.004 <0.05.

3.2. Age Group Differences in Participation by Gender

The normality test for age groups participants based on gender is not entirely fulfilled. A10 was met with a significant value of 0.140>0.05 (boy) and 0.989>0.05 (girl). A12 was met with a significant value of 0.928>0.05 (boy) and 0.681>0.05 (girl). A14 was met with a signiificant value of 0.843>0.05 (boy) and 0.065>0.05 (girl). However, A16 groups did not pass the normality test (signiificant value 0.036 <0.05 (boy) and 0.068 >0.05 (girl). Therefore, the independent T test was carried out for A10, A12, and A14, while A16 group was using Kruskal-Wallis H non-parametric test.

Table 5. Gender differences in A10, A12, and A14 based on the independent samples t-test

		F	**Sig.**	**t**	**df**	***p* value**
A10	Equal variances assumed	4.515	.043	2.724	26	.011
	Equal variances not assumed			2.724	21.389	.013
A12	Equal variances assumed	3.748	.064	3.610	26	.001
	Equal variances not assumed			3.610	20.592	.002
A14	Equal variances assumed	4.109	.053	2.372	26	.025
	Equal variances not assumed			2.372	20.751	.027

Based on Table 5, it shows the results of the independent t-test for each age group: in the A10 group, the F value = 4.515 with a significance of 0.043, indicating that the variances of the two groups are significantly different (because $p < 0.05$). Suppose the variances are assumed to be equal, the t-value = 2.724 with df = 26 and p-value = 0.011 (less than 0.05), indicating a significant difference between the two groups. In that case, if the variances are not assumed to be equal, the t-value remains 2.724. However, the df changes to 21.389, and the p-value = 0.013, which still indicates a significant difference, so for the A10 group, it is concluded that there is a significant difference between the two groups in the A10 category.

Looking at the results in the table for group A12, the F value = 3.748 with a significance of 0.064, which means that the variances between groups are not significantly different. When the variances are assumed to be equal, the t-value = 3.610 with df = 26 and p-value = 0.001 (very small), which shows a strong significant difference between the two groups, while if the variances are not assumed to be equal, the t-value remains 3.610, but the df changes to 20.592 and p-value = 0.002, which still shows a significant difference so that for group A12 it can be concluded that there is a very substantial difference between the two groups.

Next, considering the table results for the A14 group, the value of F = 4.109 with a significance of 0.053, indicating that the variances are almost significantly different (p is close to 0.05) when assuming the variances are equal, the t-value = 2.372 with df = 26 and p-value = 0. 025, indicating a significant difference between the two groups. If the variances are not assumed to be equal, the t-value remains 2.372. Still, the df changes to 20.751, and the p-value = 0.027; these results indicate that there is a significant difference, so for the A14 group, it is concluded that there is a significant difference between the two groups. Based on the t-test results for the three age groups (A10, A12, and A14), we can conclude that all groups have significant differences between the two groups being compared.

Table 6. Mann Whitney U Test (A16)

	Participants
Mann-Whitney U	44.000
Wilcoxon W	149.000
Z	-2.485
Asymp. Sig. (2-tailed)	.013
Exact Sig. [2*(1-tailed Sig.)]	.012b

In Table 6 the p-value shows the value of Asymp. Sig. (2-tailed) = 0.013 with $p < 0.05$, this shows a statistically significant result; the two groups have a significant difference. In addition, the value of Exact Sig. (2-tailed) = 0.012 This value is also less than 0.05, thus strengthening the conclusion that there is a significant difference. Based on the results of the p-value (Asymp. Sig. and Exact Sig.) showing a number smaller than 0.05, it can be concluded that there is a significant difference between the two groups compared to the A16 category.

3.3. Participant Differences by Age and Gender

The normality test is not entirely fulfilled for the entire groups. All of them (A10, A12 and A14) but A16 are passed the <0.05 limit. Therefore, Kruskal-Wallis H non parametric is used to determine differences from this category.

Table 7. Kruskal-Wallis Difference Test H

	Participants
Kruskal-Wallis H	3.448
df	3
Asymp. Sig.	.328

Based on Table 7, the p value is 0.328, and the general limit for significance is 0.05. If the p-value is less than 0.05, there is a significant difference between the groups. In this case, $p = 0.328$ (greater than 0.05), so there is no significant difference in participants between junior players based on age.

Age-Related Differences Among Boy Participants

The normality test from boy participants data which based on age is partially fulfilled. Which A10, A12, and A14 all are passing the <0.05 limit, while A16 is not. Therefore for this, the difference test is conducted using the Kruskal-Wallis H non-parametric test.

Table 8. Differences among boy participants by age

	Boy Participants
Kruskal-Wallis H	3.975
df	3
Asymp. Sig.	.264

Based on Table 8, the p value is 0.264, and the general limit for significance is 0.05. If the p-value is less than 0.05, there is a significant difference between the groups. In this case, p = 0.264 (greater than 0.05), so it is concluded that there is no significant difference in participants between boy junior players based on age.

Differences Among Girl Participants by Age

For this category, data from all girl groups (A10, A12, A14 and A16) all are passed the prerequisite test (normality and homogeneity tests, with <0.05 limit). Therefore, one-way ANOVA can be used to determine the differences from each group.

Table 9. Differences among girl participants by age

	Sum of Squares	**df**	**Mean Square**	**F**	***p* value**
Between Groups	654.196	3	218.065	1.213	.314
Within Groups	9344.929	52	179.710		
Total	9999.125	55			

The results in Table 9 show that the significance value (Sig. = 0.314) is greater than 0.05, and the F = 1.213 indicates that there was no significant difference in the scores of girl participants by age group or in other words, age did not significantly affect the results obtained by girl participants in this study.

4. DISCUSSION

Data analysis shows a significant difference in the number of boy and girl junior players participating in national competitions. Specifically, there is a significant difference in the number of boy and girl junior players participating in national competitions based on age group. From descriptive analysis, it explains that the number of boy participants is more than girl participants. The same results are also found in research on sports participations, in general, as well as in the specific sports. Research on differences in sports participation in general by gender were found that in general, women participation in sports is lower than men (Warner & Dixon, 2015; Vandenborn et

al., 2019; Eime et al., 2020; Emmonds et al., 2024), with a 15% gap between the two (Mutohir et al., 2021). In detail, it is explained that women's participation in physical activity is 47%, while in men, it is 62% (Mutohir et al., 2021). Furthermore, the dominance of boys in sports participation is relatively the same, as research in 2020 showed children participating in sports is higher in boys (56.1%) than girls (52.0%) (on the participation of children aged 6-17 years) (Black et al., 2022). Research on the demographics in various sports participation using of 26,263 samples in Germany also concluded that different sports tend to have diverse determinants, and typical tennis players tend to be boy (Breuer et al., 2011).

Similar differences is also found in some specific sports. A study using longitudinal data in long-distance running confirmed the findings that, on average, women's races over the years were less competitive than men's races (Frick, 2011). The same situation is found in the adventure sports of mountaineering and ultramarathon. A study concluded that although girl participation has increased, the gender gap is still evident in quantitative involvement in these forms of sport (Apollo et al., 2023).

From our research, data analysis shows no significant difference in junior players participating in national competitions based on age. The results of the Differential Test of more than 2 groups using Kruskal-Wallis H showed a sig value of 0.328> 0.05. The mean Rank of each age is as follows: A10 is 24.71, A12 is 32.25, A14 is 32.82, and A16 is 24.41. Similar research concluded that there was no significant difference in sports participation in children aged 12-17 years (55.6%) compared to children aged 6-11 years (52.5%) (Warner & Dixon, 2015).

Descriptive analysis explains the participation of junior players based on age and gender. Based on Graph 1, it can be concluded that the two age groups with the low involvement are the A10 and A16 groups. The graph also concludes a drastic decline in the A16 group for both men and women. While the mean for men in the A14 group was 31.14, participants in the A16 group had a lower mean of 27. A14 had a mean of 20.36, and A16 had a lower mean of 15.5. The conclusion on the decline is supported by the results of global data that also shows similar: about 31% of adults aged 15 years and over are not active enough, with men reaching 28% and women at 34% (World Health Organization, 2015). The highest level of participation is achieved in the age category of 6-12 years and has decreased entering the age of 19 years (Maksum & Indahwati, 2021).

A study identified 2011 participant registration data for seven popular Australian sports (Australian Football, Basketball, Cricket, Hockey, Lawn Bowl, Netball, and Tennis). The study

concluded that most participants (64.1%) were under 20, but participation declined rapidly during adolescence (Eime et al., 2016). A study on youth sports in Oslo (Norway) also reported that participation in sports clubs was much lower in girls than boys aged 16-18 (Strandbu et al., 2019). Sports participation provides a direct means to achieve health-promoting physical activity; however, sports participation declines during adolescence (Hopkins et al., 2022). This proportion decreases with age from 10 to 19 years, reaching a low of 4% for 15-19 year-olds (Eime et al., 2020). In a study of the sport of long jump for girls, results indicated that participation peaked at the A12 category, then declined to the A23 category with a considerable drop at A17 (Rüeger et al., 2023). Sports participation declines during adolescence (Emmonds et al., 2024). There is a significant decrease in boy participation rates across all sports during adolescence from A14-A16 and A16-A18. There were substantial decreases in girl participation rates from A14-A16 for most sports (Emmonds et al., 2024).

The results of this study serve as a basis for exploring factors inhibiting the participation of junior girl players in the competition stage. Overcoming barriers in sports and increasing equality in women's sports requires the identification of factors associated with sports participation among women (Hopkins et al., 2022). Need to determine the barriers, facilitators and strategies that influence women's participation and development in sport (Foppiano-Vilo et al., 2022). The study's results on the low participation of players in the A10 group and the decline in participation in the A16 group can be studied more deeply regarding the underlying factors. Participation analysis is the first step to generating a better understanding of the reasons for the reduction in the number of athletes in adolescence to provide input for program and policy development so that it can be sustained (Eime et al., 2016). Understanding the motives that influence physical activity participation is critical for developing interventions to promote higher levels of engagement (Molanorouzi et al., 2015).

It is necessary to overcome existing limitations in conceptual, methodological, and analytical approaches to provide better quality information to guide sports programs and coach interventions in adolescent populations (Soares & Carvalho, 2023). By knowing these factors, it is hoped that there will be policies to encourage participation in gender and age groups. Developing a supportive environment for physical activity and sports will be a key way to increase adolescent participation rates (Ahmed et al., 2020).

5. CONCLUSIONS

Thus, it can be concluded that there are significant differences in the participation of junior tennis players in national competitions based on gender. Descriptively, the average number of boy players is more than girl participants. Next, there is no significant difference in junior player participation based on age group (A10, A12, A14, and A16). Descriptively, player participation fell at the age of 16 years. The results of this study are expected to be used as a reference for more in-depth research. Factors influencing junior player participation based on age and gender must be researched in depth. The results of this study are also expected to be considered when determining policies in the field of tennis sports.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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