Spor Bilimleri Araştırmaları Dergisi
Journal of Sport Sciences Research
Vol: 8, Issue: 3, October 2023
E-ISSN: 2548-0723
URL: http://www.dergipark.org.tr/jssr

Physical Activity in Turkish Esports Players: Age Differences Approach

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Research Article
DOI: 10.25307/jssr.1352769
Received: 30.08.2023 Accepted: 13.10.2023 Online Published: 31.10.2023

ABSTRACT

Esports, which is a sport with high cognitive load, is thought to have certain dark side points from a sustainable health perspective due to the prolonged seated position. In this study, the focus has been on addressing the dark points through the physical activity levels and daily gaming durations of Turkish esports players. The research included 373 esports players between the ages of 14-24 residing in different cities of Turkey. The participants were divided into 3 categories: Adolescents (14-16), Late Adolescents (17-19), and Adults (20-24). The participants' demographic information, International Physical Activity Questionnaire (IPAQ) data, and daily gaming durations were collected through a web-based survey program. IPAQ and gaming times were separately analyzed using one-way independent measures ANOVA to compare three different age groups (Adolescent, Late Adolescent, and Adult). Results showed that there was a significant effect of age on gaming years, $F(2, 370) = 19.84$, $p < .001$, $\omega 2 = .09$ (medium effect), high-level physical activity $F(2, 370) = 3.33$, $p < .05$, $\omega 2 = .01$ (small effect) and sitting time scores $F(2, 370) = 6.15$, $p < .01$, $\omega 2 = .02$. The study results indicate that as years of e-gaming experience increase, it reveals the risk of 'professionalization '-based sedentary behavior.
Keywords: Esports, Physical activity, Video games, E-athlete, Gaming

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INTRODUCTION

Esports is a branch of sports that requires strong cognitive skills (Adamus, 2012), can be performed individually or in teams like other known sport branches, has certain rules and standards, and has become a phenomenon considering the number of both spectators and participants (Adamus, 2012; Mancı, 2022; Wagner, 2006). The announcement by the IOC that the Esports branch will be included in the upcoming Olympic games, along with the creation of leagues consisting of teams established with huge budgets, accelerated the 'professionalization' process of the athletes. Esports, which is newly developing in Turkey, has a federation and the number of licensed athletes is increasing day by day. Esports has a large participant base especially in the adolescent, young adult, and adult population (SHGM, 2023). The efforts of researchers on the general level of esports players in terms of 'sustainable health' are creating awareness and becoming an initiative that supports the increase in the quality of life.

The possible negative effects of 'sedentary life' and 'physical inactivity' that may arise due to the daily habit changes created by intense computer game participation on these individuals seem to be the dark corner of the subject. In general, there is a long sitting in the nature of computer games. Although new type of games like virtual reality aim to activate players physically, popular game types are still played in the traditional way. Esports players perform tasks that require mental effort, such as strategizing, decision-making, etc., rather than physical activities such as running and jumping. For this reason, it is reported that the stress, excitement, and motivation seen in esports participation cause changes on some physiological parameters such as respiratory rate and heart rate (Rudolf et al., 2016). There is no consensus yet on how esports affect physical activity levels. The study conducted by Hygen et al., (2022) on 1130 adolescent individuals, reported that the rate of moderate and high-level physical activity decreased while playing time increased (Hygen et al., 2022). Similarly, DiFrancisco-Donoghue et al., (2022) compared young adults who are non-gamers with esports players by matching their age (DiFrancisco-Donoghue et al., 2022). In the study, it was reported that esports players were physically less active than the non-gaming group. On the other hand, the study conducted by Giakoni-Ramírez et al., (2022) showed that 92.7% of 260 professional esport players had a moderate or high intensity physical activity (Giakoni-Ramírez et al., 2022). Considering that esports activity is performed by sitting down, studies showed that esports players are three times more physically active than office workers, and they have better hand-eye coordination compared to athletes (Grushko et al., 2021; McGeechan et al., 2009).

The studies in literature suggest that esports participation is concentrated on the young population and may have possible side effects. Moreover, the issue of whether esports by its very nature creates a state of physical inactivity is still controversial. In the literature, it is remarkable that experimental groups are with low numbers of participants and the studies are conducted without dividing the age by groups. Additionally, there is no research on the physical activity levels of Esports players from the Turkey perspective. In our study, we aimed to examine the physical activity levels and computer game playing times of adolescent, late adolescent, and adult esports players. In the light of the findings, it is aimed to define the potential benefits and risks of Esports in terms of physical health of the esport players.

METHODS

Research Model

This research is an experimental model from quantitative research methods.

Participants

The study group of this research consists of 373 participants between the ages of 14-24 who are interested in esports and reside in different provinces of Turkey such as Izmir, Ankara, Istanbul, Adana, Diyarbakır and Trabzon. The research data were collected from esports players who received esports education through a web-based survey. According to McKay et al. (2022), the esports athletes recruited in this study can be classified as Tier 2 and Tier 1 representing "Trained/Development" players that compete on the local level (McKay et al., 2022) or can be classified as 'hardcore' gamers according to Scharkow et al. (2015) and Toth et al. (2021) (Scharkow et al., 2015; Toth et al., 2021). All subjects were informed about the procedures, and each gave their written informed consent to participate. In addition, for participants under 18 years of age, parental approval was obtained in addition to the consent forms.

Ethical Approval

The Ethics Committee of the Dokuz Eylül University approved all procedures and the experimental design (2021/29-04,6078-GOA). The study protocol follows the latest version of the Declaration of Helsinki.

Data Collections

The research data were collected through a web-based survey from esports players who received esports education, trained /played regularly, and volunteered to participate in the study (https://forms.gle/WVtVi7suPDZagw7f7).

Demographic Form: With the questions in the survey prepared for the participants, both their demographic information (age, gender, city, with whom they live, etc.) and their game playing time (daily game playing time and how many years they have been playing games) were collected.

International Physical Activity Questionnaire- Short Form: IPAQ-SF: It consists of 4 separate sections and 7 questions, and the questions in the survey ask about the participant's high-intensity, moderate-intensity, and low-intensity activities in the last week. The answers obtained allow the participants' physical activity levels to be determined indirectly in MET (min/week). Physical activity levels were classified as low physically active (600 MET min/week), moderate physically active (600-3000 MET min/week), and very active (> 3000 MET min/week). Many studies in the literature have shown that the form is valid and reliable for determining physical activity level (Craig et al., 2003; Saglam et al., 2010). IPAQ Turkish versions validity and reliability study in the Turkish version was conducted by Saglam (Saglam et al., 2010).

Following the data collection, the participants were divided into three groups as Adolescents (14-16 years old), Late Adolescents (17-19 years old) and Adults (20-24 years old) and analyzed according to the physical activity levels and playing time of the groups.

Analysis of Data

Analyses were conducted across 373 participants. IPAQ and gaming times were separately analyzed using one-way independent measures ANOVA to compare three different age groups (Adolescent, Late Adolescent, Adult). Effect sizes were calculated using r values ($\sqrt{SS_M/SS_T}$), ω values ($\sqrt{SS_M-(df_M)}$ $MS_R/SS_T + MS_R$) and $r_{contrast}$ values ($\sqrt{t^2/t^2 + df}$) were reported as estimations of effect size of main and interaction effects. In addition, three sets of planned comparisons were carried out to look at the changes in gaming year, high level physical activity and siting time between each age group. Findings of planned comparisons were provided instead of post-hoc comparisons where predicted results were also determined to be significant.

FINDINGS

Participants' Demographic Information and Physical Activity Results

The study included 373 participants interested in esports with an average age of 18.26±2.57 (years). The physical activity levels and playing time of the participants according to age groups are given in Table 1.

Table 1. The physical activity levels and playing time of the participants

	Adolescent (14-16) n=120 X̄	**Late Adolescent (17-19) n=127 X̄**	**Adult (20-24) n=126 X̄**	**Total Group n=373 X̄**
Age (year)	15.34±0.7	18.07±0.8	21.23±1.21	18.26±2.5
Gaming Time (hour/day)	5.58±2.681	5.64±2.847	6.06±2.768	5.76±2.76
Gaming Experience (year)	7.04±2.594	8.32±3.407	9.94±4.525	8.45±3.78
Physical Activity Level (MET/week)	3173.55±2819.00	3226.85±2845.58	2694.11±2701.83	3031.17±2792.43
High Physical Activity (min/week)	1544.33±1946.74	1279.06±1580.97	974.72±1648.50	1262.41±1739.26
Moderate Physical Activity (min/week)	611.33±1046.70	587.31±1518.42	603.68±1545.95	600.52±1390.81
Low Physical Activity (min/week)	1017.88±948.03	1360.47±1542.17	1115.71±1144.68	1168.23±1247.86
Sitting Time (min/week)	444.47±443.24	363.98±490.38	239.42±448.51	348.13±468.02

X̄: mean, ±: standard deviations, min: Minute

A one-way independent ANOVA was conducted in order to see the effect of age on score of gaming year, daily gaming hour, and exercise type (high, moderate, low, siting and met). Results showed that there was a significant effect of age on gaming years, $F_{(2, 370)} = 19.84$, $p < .001$, $\omega 2 = .09$ (medium effect), high level physical activity $F_{(2, 370)} = 3.33$, $p < .05$, $\omega 2 = .01$ (small effect) and sitting time scores $F_{(2, 370)} = 6.15$, $p < .01$, $\omega 2 = .02$. This significance shows a linear trend in gaming year $F_{(1, 370)} = 19.84$, $p < .05$ and high physical activity $F_{(1, 370)} = 3.33$, $p < .05$, which indicates that as age increased with gaming year positively but decrease with high physical activity scores proportionately. Planned contrasts revealed that adolescents significantly have higher high exercise scores than adults $t(233.183) = -2.467$, $p < .05$, $r_{contrast} = .16$ (Figure 1).

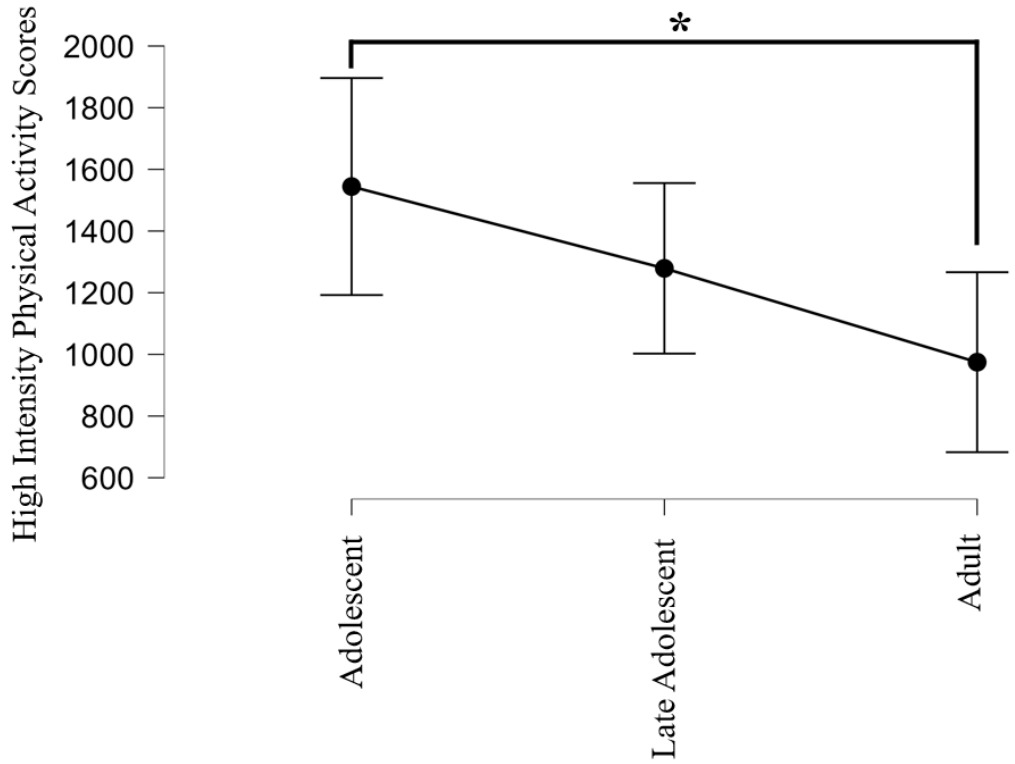

Figure 1. Mean (with 95% CI) high level physical activity scores of the participants by different age group
*p < 0.05

Results also showed that there was a significant quadratic trend between age and low exercise $F_{(1, 370)} = 4.70$, $p < .05$. Planned contrast showed that adolescents significantly have low level exercise scores than late adolescents $t(213.074) = 2.12$, $p < .05$, $r = .14$ (Figure 2).

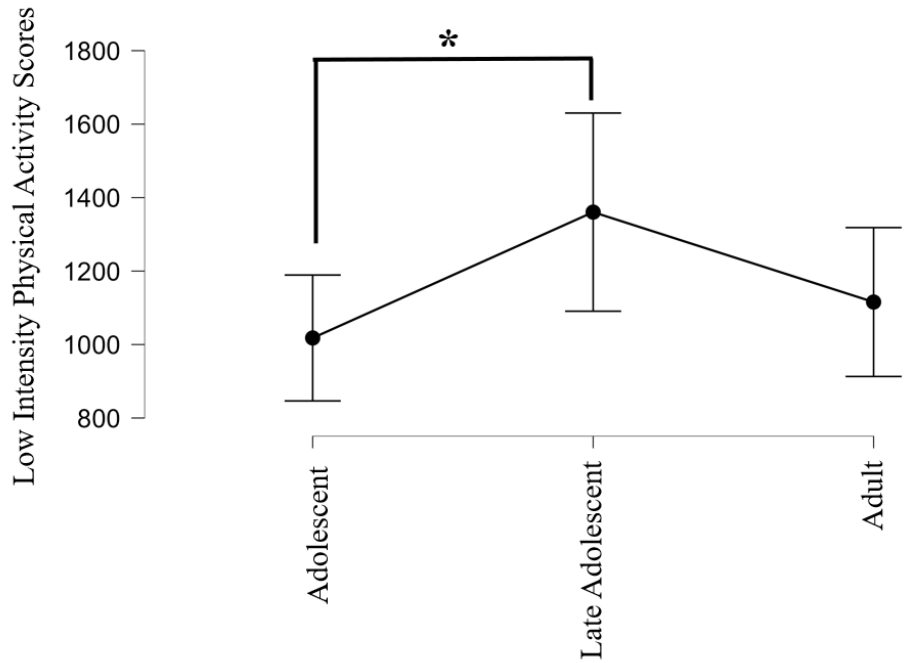

Figure 2. Mean (with 95% CI) low level scores of the participants by different age
* p <0.05

The correction analyses showed that age is significantly correlated with gaming year r = .33, p < .001, high level exercise r =-.14, p < .01, and sitting time scores r = -.19, p < .001 (Figure 3). This indicates that as person's age increase gaming year also increase; however, high lever exercise and siting time scores decrease with age. Another significant correlation is that gaming year increases with daily gaming hour increase r= .24, p < .001, This can be interpreted as screen time increases as a person's gaming year increase (Figure 3).

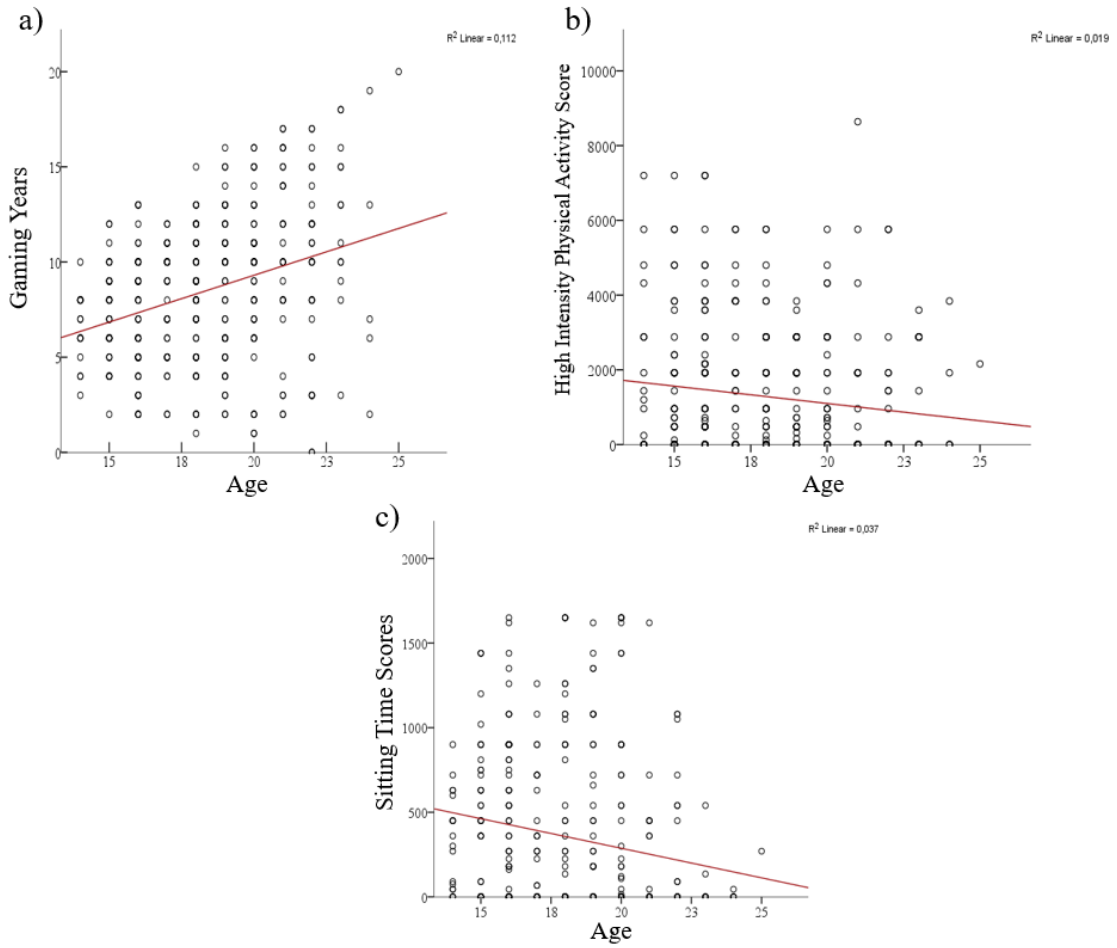

Figure 3. Correlation between age and gaming years (a), High level exercise (b), and Sitting Time (c)

DISCUSSION

The study aimed to investigate the playing time and physical activity levels of Turkish esports players. Present study has a higher number of participants than similar studies (Giakoni-Ramírez et al., 2022; Kopp, 2017; Seo, 2013). The main findings of the study were I) the level of high intensity physical activity decreased significantly with advancing age II) total physical activity levels decreased to inadequate level with advancing age III) esports activity duration was not affected by the age variable.

The interesting finding of the study was that the high intensity activity level of the adolescent group was significantly higher than the adult group (Adult = 974 MET (min/week) vs

adolescent= 1544 MET (min/week). The energy expended for high intensity physical activity decreases linearly with age. Considering the data of a few studies conducted on esports players in the literature; Hygen et al., (2022) reported that the rate of moderate and vigorous exercise decreased as the duration of the game increased in their study on 1130 adolescents (Hygen et al., 2022). Similarly, DiFrancisco-Donoghue et al., (2022) compared young adults who were esports players and non-gamers by age-matching (DiFrancisco-Donoghue et al., 2022). In the study, it was reported that esports players were less physically active than the non-playing group. On the other hand, Pedraza-Ramirez et al., (2020) reported that 92.7% of the participants participated in moderate or vigorous exercise in their study conducted with 260 professional esports players (Valdez et al., 2012).

The aforementioned research findings are very similar to our study findings. We would like to draw attention to the need for an in-depth investigation into the underlying causes of this age-related decline. The benefits of regular exercise are varied and well known, including improved respiratory and cardiovascular functioning, improved muscular fitness (i.e., muscular strength, endurance, and power), reduced risk factors for cardiovascular disease, reduced morbidity, and mortality, as well as a plethora of other benefits (e.g., reduced depression and anxiety, enhanced quality of life, and improved cognitive function and sleep (Kanaley et al., 2022). High-intensity activities, on the other hand, may offer similar health and performance benefits as moderate-intensity activities despite requiring less time (Atakan et al., 2021). According to our results, it is thought that the age-related decrease in high intensity activity may be a 'risk factor that negatively affects health' due to the gradual loss of regular exercise behavior and that the awareness of esports players on the subject should be increased.

The results of our study indicate that adolescent and late adolescent esports athletes were 'adequately' active, whereas adult esports athletes were moderately active (3173.55 MET (min/week) and 2694.11 MET (min/week, respectively). There are studies in the literature reporting that esports athletes generally lead an active lifestyle and meet the recommendation standards of the World Health Organization (Harding & Noorbhai, 2021; Pereira et al., 2021; Rudolf et al., 2020). In a study conducted by Pereira et al., (2021) with 433 participants, it was reported that the median value of the physical activity level of esports athletes was 5.625 (MET-min x week-1) and 87.1% of the participants met WHO standards (Pereira et al., 2021). In a study conducted by Harding and Noorbhai (2021) with 102 participants, it was reported that the majority of participants achieved the reference value for moderate and vigorous exercise, even during the Covid-19 period (Harding & Noorbhai, 2021). In addition, Rudolf et al. (2020) reported that 2/3 of esports players lead an active life in accordance with WHO standards in their study on 1066 people (Rudolf et al., 2020). The physical activity level findings of Turkish esports players are similar to the literature information presented above.

Another finding was that the daily playing time of esports players increased as their playing age increased. Esports activity is a passionate sport that involves intense cognitive tasks (Kowal et al., 2018; Mancı, 2022) and increases the workload of physiological mechanisms of cardiovascular (Dykstra et al., 2021), hormonal, neuronal and partially metabolic systems during the game. Nonstable physiological responses occur during the game or competition depending on the reactions caused by visual or auditory stimuli. In its general characteristics, skills such as attention, perception (Green & Bavelier, 2003), intuition, planning, and reaction are at the forefront (Granic et al., 2014; Zimmer et al., 2016; Zimmer et al., 2022). Therefore,

this sport is not based on 'physical exertion' but on 'structured physical exertion' in pre-game preparations to be successful. In support of this information, research results showing that the game performances of physically active esports players are at a higher level than other players have started to find a place in the emerging literature (Giakoni-Ramírez et al., 2022; McNulty et al., 2023; Nicholson et al., 2020). As a result of the research, we think that the fact that the time spent during the game in esports players shows a relationship with age-related physical activity levels and sitting times indicates that esports is related to possible health risks and personal physical activity preferences.

It was found that the findings related to low intensity physical activity of adolescent age esports athletes and adult age athletes were significantly lower than those of late adolescent age athletes. This quadratic table is quite remarkable. Low-intensity physical activity includes core activities such as walking along with daily chores. Independent of moderate and high intensity physical activity, daily activities are more determinant, as there is less 'exercise' related physical activity. We emphasize that the variables affecting the emergence of this finding should be examined in more depth.

Limitations

The inability to collect data such as height and body weight has impeded the examination of the anthropometric implications of physical activity and esports. Potential errors in anthropometric information provided in personal inquiries, rather than being measured by the researcher, should also be considered, as they can affect the accuracy of the study in web-based data collection processes. Another limitation is the high standard deviation in the data. From a general perspective, this arises from variables influencing lifestyle, such as natural socio-economic and socio-cultural differences among participants in a newly emerging sport throughout Turkey. On the other hand, when measuring subjective feedback-based physical activity levels, individuals' tendency to exaggerate should not be forgotten. As a precaution, although our questionnaire explanations address this issue, the objectivity of measurements conducted through field tests is an undeniable fact.

CONCLUSION

The study results highlight the following key points for Turkish esports players:

I. As age progresses, the increase in time spent at the beginning of gaming might be a process expected during the 'professionalization' phase; however, the 'risk of physical inactivity' arising from prolonged sitting time becomes evident.

II. The linear decrease in high-intensity physical activity duration with age stands out as a 'Risk Factor,' potentially leading to the loss of esports players' 'Regular Exercise Participation' behavior.

III. Regarding the low participation in low-intensity physical activity, the observed decline in adolescent and adult groups also encompasses daily activities like walking, necessitating further detailed investigation.

IV. For future research, we believe there is a need for large participant group-based field-test studies.

Raising awareness among esports players about physical activity and exercise, along with promoting cognitive-motor exercise applications (e.g., efforts enriched with complex audio-visual stimuli), could potentially enhance participation through the enjoyment of exercise, positively impacting esports performance.

Acknowledgments: The authors would like to thank all participating esports players, their coaches, the Esports Education Project, and also ÇG and ZÜ for their statistical support.

Author Contributions: All authors have read and agreed to the published version of the manuscript. Research Design- EM and EG, Data Collection- EM, statistical analysis- EM and EG; Manuscript preparation, EM and EG.

Funding: This research received no external funding.

Data Availability Statement: Not applicable**.**

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

Ethical Approval
Ethics Committee: Dokuz Eylül University Ethics Committee
Date: 2021/29-04
Decision/Protocol Number: 6078-GOA

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