

Investigation of time Relationship Between First Competition and PB Performance of All-Time Top 100 Athletes in Women's 20 km Race Walk

Kadınlar 20 km Yürüyüş Branşında Tüm Zamanların En İyi 100 Sporcusunun İlk Yarışması ile Kişisel En İyi Performansı Arasındaki Zaman İlişkisinin Araştırılması

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Abstract: Objective: The objective of this study is to examine the relationship between the participation of female athletes ranked in the all-time Top 100 list in the Women's 20 km walk event in their first international competition and their personal best times. Method: The research group consists of the top 100 athletes in the all-time list for the women's 20 km walk event. The athletes' date of birth, nationality, personal best (PB), PB competition date, WA points corresponding to the PB, and competition year information based on their first competition registration were obtained from the official World Athletics (WA) website (WA, 2024). The data was analyzed Pearson's correlation statistics were used to determine the relationships between the variables. Results: It was observed that athletes on the Top 100 race walking list had an average age of 26, the competition performance range was around 4 minutes, and athletes reached their PB performances on average 8 years after their first international competition registration. When examining the distribution of athletes in the Top 100 list by nationality, Russian athletes ranked first with 37%, while China ranked second with 25 athletes. In other words, Russian and Chinese athletes together accounted for 62% of the Top 100 list. A Statistically significant and strong correlation was obtained between the ages of athletes in the Top 100 list and the time it took them to enter the Top 100 list ($r=0.80$). In other words, as athletes' ages increase, the time it takes them to enter the Top 100 list also increases. Russian and Chinese nationality, who dominate the research group, are analyzed, it is understood that older athletes demonstrate their PB performances in competitions later in the year. Conclusion: Knowing the age at which elite athletes reach their peak performance is important for the healthy implementation of long-term athlete development programs. In long distance events like Race walking it is essential to have very long and consistent training periods until the best results.

Keywords: Race walk, top 100, 10 years training rule.

Özet: Amaç: Bu çalışmanın amacı Kadınlar 20 km yürüyüş branşında tüm zamanların Top 100 listesinde yer alan kadın sporcuların uluslararası ilke yarışmaya katılımları ile kişisel en iyi zaman arasındaki ilişkinin incelenmesidir. Yöntem: Araştırma grubu, kadınlar 20 km yürüyüş yarışmasında tüm zamanların en iyi 100 sporcusundan oluşmaktadır. Sporcuların doğum tarihi, uyruğu, kişisel en iyi derecesi (PB), PB yarışma tarihi, PB'ye karşılık gelen WA puanları ve ilk yarışma kayıtlarına dayalı yarışma yılı bilgileri, resmi Dünya Atletizm (WA) web sitesinden (WA, 2024) elde edilmiştir. Veriler, değişkenler arasındaki ilişkileri belirlemek için Pearson korelasyon istatistikleri kullanılarak analiz edilmiştir. Bulgular: Yürüyüş sporunda ilk 100 listesinde yer alan sporcuların ortalama yaşının 26 olduğu, yarışma performans aralığının yaklaşık 4 dakika olduğu ve sporcuların ilk uluslararası yarışmaya kaydolduktan ortalama 8 yıl sonra kişisel en iyi performanslarına ulaştıkları gözlemlenmiştir. İlk 100 listesindeki sporcuların milliyetlerine göre dağılımı incelendiğinde, Rus sporcular %37 ile ilk sırada yer alırken, Çin 25 sporcuyla ikinci sırada yer almıştır. Diğer bir deyişle, Rus ve Çinli sporcular Top 100 listesinin %62'sini oluşturdu. Top 100 listesindeki sporcuların yaşları ile Top 100 listesine girmeleri için geçen süre arasında istatistiksel olarak anlamlı ve güçlü bir korelasyon elde edildi ($r=0,80$). Diğer bir deyişle, sporcuların yaşları arttıkça, Top 100 listesine girmeleri için geçen süre de artmaktadır. Araştırma grubunu domine eden Rus ve Çin uyruklu sporcular analiz edildiğinde, yaşlı sporcuların yılın ilerleyen dönemlerinde yarışmalarda PB performanslarını sergiledikleri anlaşılmaktadır. Sonuç: Elit sporcuların en yüksek performanslarına ulaştıkları için geçen süre, uzun vadeli sporcu geliştirme programlarının sağlıklı bir şekilde uygulanması için önemlidir. Yürüyüş gibi uzun mesafe yarışlarında, en iyi sonuçlara ulaşmak için çok uzun ve tutarlı antrenman dönemleri geçirmek şarttır.

Anahtar Kelimeler: Yürüyüş, top 100, 10 yıl antrenman kuralı.

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INTRODUCTION

Race walking is an Olympic event where no visible loss of contact should occur and the knee must be straightened until midstance. Walking is one of the disciplines in athletics that challenges the athlete's limits the most. There are two technical rules that distinguish walking from running competitions: the athlete must maintain visible contact with the ground throughout the walking competition, and when the athlete's front foot touches the ground during the competition, the knee must be straight and remain straight until the body passes over it. A race walker must comply with these two rules throughout the entire race. Race walking is among the longest races in Olympic track and field competitions, requiring a high level of fitness from athletes (Hanley, & Bissas, 2016; Pavei et al, 2014).

Looking at its historical development, the tradition of "footmen" accompanying the carriages of 18th and 19th century English aristocrats on long journeys is known to have inspired the modern Olympic walking event, originating from long-distance walking competitions called "pedestrian races" held in England between 1775 and 1800 (Schiffer, 2008). Walking was a sub-discipline within combined events until it was first contested as an Olympic event in 1908 (Jelonek et al., 2017). The first race walking

competition was included in the athletics program of the 1908 London Olympics as a 3500 m track race. Following the four-yearly Olympic Games, the World Cup race walking competitions in the men's 20 km and 50 km categories were first held in 1961, and the organization, which takes place every two years, has continued to this day. The women's World Cup race walking competitions began to be organized in 1979 under the name of the Eschborn Cup. These competitions were first held in 1996 as the European Race Walking Cup, organized together for both women and men. In 2021, the competition was renamed the European Race Walking Team Championships. Women competed in walking events for the first time in the athletics program at the 1992 Barcelona Olympic Games with the 10,000m race (Marlow 1990, URL-1, 2025). At the 1996 Atlanta Olympics, men's 20km, women's 10km, and men's 50km races were competition events. Due to the relatively difficult task of monitoring foot contact in 10 km races and judging, the women's 10 km race was also changed to 20 km. Although the first recorded 20 km women's race walking event dates back to 1931, race walking was first included in the Olympic Games program in 1992 in Barcelona with the 10,000 m event. Until 1997, women competed in the 10 km race walk in world cups, but in 1999

they competed in the 20 km event for the first time. However, at the 2000 Sydney Olympics, they began walking the same distance as men, 20 km. Race walking is maybe the most neglected discipline in athletics and the most discussed one, performed under the supervision of race walking judges and governed by strict rules (Schiffer 2008).

The Olympic race walking events, held as the women's 20 km, men's 20 km, and men's 50 km races between 2000 and 2020, have undergone another change for the 2024 Paris Olympic Games. The 50 km race walk, which took much too long in terms of television broadcasts, was removed from the competition schedule and replaced with a mixed relay race at marathon distance (42.195 km) to enhance spectator enjoyment. Among all disciplines, race walking is perhaps the athletics event that has undergone the most rule changes and sparked the most debate in the official competition program.

As in all other long-distance disciplines in athletics, where endurance and technique are both fundamental prerequisites, champions in race walking emerge from among the most talented and hardworking athletes. As with many extraordinary artistic performances, no one can deny that when it comes to achieving success in sports, some walkers are far more talented than others in certain areas. The winning time for the 2014 New York Marathon was just under 2 hours and 11 minutes, which is below the average finishing time (URL-2, 2025). It is useful to know that it was 2 hours earlier (URL-3, 2025; Hambric et al., 2016).

The performance development range of track and field athletes can be evaluated as a continuum consisting of the beginning, rise, peak, and decline phases (Kim and Yun, 2023). There is no single criterion for reaching elite and even championship level in any sport, but certain factors must be combined and developed correctly. Skill development is fundamental to human existence, and we are constantly developing new skills and improving existing ones throughout our lives. As in all sports, success in walking depends on the athlete's ability to develop and fine-tune a specific set of perceptual, cognitive, and motor skills (Williams et al., 2004). The age at which one begins participating in sports is of great importance. Starting sports at an early age provides an advantage, especially in sports that require technique and skill. We know that athletes who reach elite levels in sports such as gymnastics or swimming typically begin training at a very young age (5-7 years old). However, it is not accurate to assume that athletes who start later will always be at a disadvantage. Cote and colleagues have provided a comprehensive framework for sports expertise that summarizes different pathways to participation in sports during childhood. In the first and second pathways, they indicate that early exposure is fundamental to both elite athlete development and recreational sports participation. In the first and second approaches, they have stated that early modelling forms the basis for both elite athlete development and recreational sports participation. The early modelling period is based on two main elements of children's participation in sports: the first is participation in various sports, and the second is participation in intentional games. In contrast, the third approach shows the path to elite performance through early specialization in a sport. Early specialization refers to focusing on a single sport and engaging in numerous deliberate practice activities during childhood to develop athletic skills and performance (Côté et al., 2009).

A systematic training and development process is essential for producing elite and even champion athletes. By following long-term athlete development principles consistently and providing training suitable for each developmental stage, the maximum increase in athletic ability can be achieved in athletes. Therefore, it is crucial to thoroughly understand the specific developmental characteristics of athletes and to cultivate highly talented elite athletes (Chen et al., 2023).

Studies have indicated a negative correlation between starting at a very young age (4-5) and starting around 10-12 years old in areas such as chess and music. However, it has been found that starting early makes a significant difference in skills such as language learning. Genetic factors, the athlete's physical characteristics (muscle fiber type, body composition, metabolism), and psychological resilience influence the specialization process. Sprinters are characterized by a high proportion of genetically fast-twitch muscle fibers. There are many studies examining the effect of hereditary intelligence on performance in domains such as music and chess, as well as language skills. With the right training and motivation, it is possible for an athlete who starts late in a sport like walking, which is a form of endurance sport, to be successful. However, it is not always possible to say that athletic performance is genetically influenced by intelligence, even in a position such as playmaker, where information processing and decision-making are very high (Hambrick et al., 2016).

Research on intentional training, i.e., training programmed for a specific area (Ericsson, 2020), has resulted in widespread debate around the question of "how much training is enough?" The question of what quality training looks like in the long-term development of athletic skills is of great importance. Tucker and Collins (2012) A similar approach to Ericsson's 1993 article suggests that intentional practise—that is, expert athletic performance, skill acquisition, domain expertise, and repeatable superior performance—is a reasonable measure for evaluating the relationship and correlation between total training time and the effects of athletic training on performance. The measure of 10 years of training and 10,000 hours of practice to achieve elite performance has subsequently been used in meta-analyses evaluating the role of training in developing superior performance in various fields (Macnamara et al., 2014).

What is the acceptable level of return on investment for each hour of training performed? How can we measure the progression from practice to competition to understand quality? Coaches should consider how to be successful by doing the minimum amount of training possible, preventing wasted time and energy, and programs should be designed with these goals in mind. Talented athletes spend long hours applying and developing these skills to enhance performance and achieve excellence. Experiences of specialists in various sports disciplines regarding training indicate that over 10,000 hours of practice and training are required to reach elite performance levels. It appears that being consistent and motivated in participating in training, along with the training itself and the quality of its content, are among the most important factors in developing expertise (Williams et al., 2004).

Implementing intentional training does not explain most of the performance differences in chess and music, which are

among the most studied areas alongside sports in expertise research. In other words, training practices can help explain a significant portion of the performance factors related to the field being competed in, but they leave a much larger portion of the factors affecting performance unexplained. As a consequence, intentional practice is required to explain why some people become champions despite sufficient training, while others do not (Hambrick et al., 2014). According to Ericson's (2020) framework, the focus should be on the action points believed to produce improved performance rather than avoiding certain issues in training. These action points aim to optimize the return on every hour invested in practice and enhance long-term skill acquisition. Elite athletic performance involves countless factors that interact with each other in complex ways to transform a talented athlete into a champion. The nature of these interactions and the process of creating a champion athlete remain shrouded in mystery. It is a well established fact in sports science that elite performance is the result of a combination of training and genetic factors. However, it is not clearly known to what extent champions are born with special inherited DNA or to what extent it is achieved through proper training.

The identification of talents and how sports federations allocate their limited resources to the optimal use of high-performance training programs is a question that attracts considerable interest due to its impact on the issue of developing elite and even champion athletes (Tucker and Collins, 2012). Athlete ratings and ranking lists are a point of interest for sports authorities, athletes, coaches, and spectators, and with the increasing commercialization of sports, rankings have become more prominent for potential investors. (Premkumar, et al., 2020).

The number of athletes of a country who participate in a particular sport at the Olympic Games is crucial for success. The more athletes a country has at an international competition, the higher the probability of winning medals (Csurilla and Fertő, 2024). In most areas of expertise, such as sports or art, there is a process of training and exercise that requires effort designed to optimize development. Even among elite and highly talented artists, individual differences are strongly linked to the amount of regular practice. Many behaviors once believed to reflect inherent talent are actually the result of at least 10 years of intensive practice. The analysis of expert performance provides

unique evidence about the potential and limits of advanced environmental adaptation and learning (Ericsson et al., 1993).

Considering the history of athletics in the Olympic Games, the aim of the present study is to examine the relationship between the time elapsed between athletes' first competition registrations and their PB performances in the women's 20 km walk, a relatively new discipline, and variables such as athletes' age and competition performance.

METHODS

The research group consists of the top 100 athletes in the all-time list for the women's 20 km walk event. The athletes' date of birth, nationality, personal best (PB), PB competition date, WA points corresponding to the PB, and competition year information based on their first competition registration were obtained from the official World Athletics (WA) website (WA, 2024). The ages at which the athletes performed their PBs were determined. The time taken to enter the Top100 list was calculated by determining the difference between the PB performance year and the first competition year. During the data collection it was gathered that %37 of the top 100 list from Russia and %25 of the list from China so we have searched why these two country very dominant in this event. According to the skewness and kurtosis test results of the research variables (due to being within the ± 2 range), it was observed that they were normally distributed. The mean and standard deviation, ranges, minimum and maximum values of the variables of the athletes' age, PB performance, PB performance ranking, month of the PB performance competition, WA score, and time to enter the top 100 list were calculated. The frequency and percentages of athletes in the Top 100 list by country were determined. Pearson's correlation statistics were used to determine the relationships between the variables.

Since the work data is available online in an unprocessed format and was not collected through experimentation, it does not raise ethical concerns, as noted by Morley and Thomas (2005).

RESULTS

The mean and standard deviation, minimum and maximum values, and skewness and kurtosis statistics for the athletes' data included in the study are presented in Table 1.

Table 1. Values for the research group's PB performance, age, ranking in the relevant competition, calendar month of the competitions, WA Score, and time between the first competition registration and PB performance

n=100	PB Performance (hh:mm:ss)	Age (years)	Rank	Comp. Month	WA-Score (point)	First Record (years)	Comp.
Mean	01:26:41	25,7	2,8	4,5	1196,0	8,3	
SD	00:01:05	4,5	2,1	2,3	19,6	4,6	
Range	00:04:24	19,5	10	10	79	23	
Min.	01:23:38	18,3	1	1	1172	0	
Max.	01:28:03	37,8	11	11	1251	23	
Skewness	-0,774	0,652	1,343	0,843	0,786	0,595	
Std. Error of Skewness	0,241	0,241	0,244	0,241	0,241	0,241	
Kurtosis	-0,296	-0,146	1,644	0,212	-0,274	0,095	
Std. Error of Kurtosis	0,478	0,478	0,483	0,478	0,478	0,478	

It was observed that athletes on the Top 100 race walking list had an average age of 26, the competition performance range was around 4 minutes, and athletes reached their PB performances on average 8 years after their first

international competition registration. It can be said that the competitions in which the athletes included in the study achieved their PB performances were held on average in April and May.

The distribution of athletes in the study by the countries they represent is shown in Table 2.

Table 2. Frequency and percentage values for the countries of athletes in the study

Country	Number of Athletes (count)	Percentage in Top100 (%)	Cumulative Percent (%)
RUS	37	37,0	37,0
CHN	25	25,0	62,0
ECU	5	5,0	67,0
ESP	5	5,0	72,0
BLR	3	3,0	75,0
ITA	3	3,0	78,0
MEX	2	2,0	80,0
AUS	2	2,0	82,0
PER	2	2,0	84,0
CZE	2	2,0	86,0
BRA	2	2,0	88,0
COL	2	2,0	90,0
NOR	2	2,0	92,0
UKR	1	1,0	93,0
IRL	1	1,0	94,0
POL	1	1,0	95,0
ROU	1	1,0	96,0
JPN	1	1,0	97,0
POR	1	1,0	98,0
GER	1	1,0	99,0
LTU	1	1,0	100,0
Total (21)	100	100%	100%

When examining the distribution of athletes in the Top 100 list by nationality, Russian athletes ranked first with 37%, while China ranked second with 25 athletes. In other words, Russian and Chinese athletes together accounted for 62% of the Top 100 list, more than half. In the women's 20 km race walking event, it can be said that Russia and China dominate the performance development in this discipline.

The relationships between the variables of athletes' age, PB performance, the calendar month of the competition in which the PB performance was performed, and the time between the first competition registration and the PB performance (time to enter the top 100 list) are presented in Tables 3, 4, and 5.

Table 3. Relationships between the variables of age, PB performance, competition calendar month, and time between first competition registration and PB performance among walkers in the Top100

Top100		First Comp. Record	PB Performance	Comp. Month
Age	r	0,799**	0,08	0,296**
	p	0,00	0,44	0,00
First Comp. Record	r		-0,02	0,306**
	p		0,83	0,00
PB Performance	r			0,271**
	p			0,01

A Statistically significant and strong correlation was obtained between the ages of athletes in the Top 100 list and the time it took them to enter the Top 100 list ($r=0.80$). In other words, as athletes' ages increase, the time it takes them to enter the Top 100 list also increases. A low-level positive correlation was observed between the calendar month of the

competition in which athletes achieved their PB performances, their ages, their time to enter the Top 100 list, and their PB performances ($r<0.31$). It can be said that as athletes age, they perform better in the later months of the year, and those with a longer time to enter the top 100 list also perform better in the later months of the year.

Table 4. Relationships between variables such as age, PB performance, calendar month of competitions, and time between first competition registration and PB performance among Russian and Chinese walkers

		RUS (n=37)		CHN (n=25)			
		First Comp. Record	PB Performance	Comp. Month	First Comp. Record	PB Performance	Comp. Month
Age	r	0,732**	0,06	0,06	0,930**	-0,550**	0,16
	p	0,00	0,71	0,72	0,00	0,00	0,43
First Comp. Record	r		-0,24	-0,04		-0,591**	0,06
	p		0,15	0,80		0,00	0,77
PB Performance	r			0,09			0,03
	p			0,59			0,90

When Russian athletes dominating the Top 100 list were investigated, a positive and moderate correlation was observed between their time on the Top 100 list and their age. Among Chinese walkers, this correlation was found to be strong ($r=0.93$). Additionally, moderate negative correlations were found between Chinese athletes' PB

performances and their ages and first international competition records. In other words, athletes' best performances occurred at older ages. Similarly, it can be said that athletes who took longer to enter the Top 100 list performed better.

Table 5. Relationships between variables such as age, PB performance, calendar month of competitions, and time between first competition registration and PB performance for walkers outside Russia and China

Except RUS and CHN (n=38)		First Comp. Record	PB Performance	Comp. Month
Age	r	0,708**	0,23	0,346*
	p	0,00	0,16	0,03
First Comp. Record	r		0,14	0,398*
	p		0,41	0,01
PB Performance	r			0,01
	p			0,95

When the relationship statistics of athletes other than those of Russian and Chinese nationality, who dominate the research group, are analyzed, it is understood that older athletes demonstrate their PB performances in competitions later in the year. It can also be said that athletes who take longer to enter the top 100 list after their first competition records similarly perform better later in the year.

DISCUSSION

The transition from youth to elite athletics in high-performance sports is a complex process that involves a unique blend of genetic and environmental influences. However, a better understanding of this complexity may be necessary to comprehend talent development programs (Hollings et al., 2014). These differences emerge long before the 10,000-hour training process is mentioned, but they allow predictions about which athlete will perform better or best in adulthood. Training determines success. The factors responsible for differences in adaptation gained through training are unclear, but genetic factors appear to be one of the probable factors that contribute to success (Tucker and Collins, 2012). In a study done by Allens and Hopkins, there's very little difference between men and women in peak age estimates for sports that require explosive power and endurance. They said that peak performance age estimates for specialized athletes and the activity durations that might be best for determining athletes' abilities can be obtained from linear trend equations (Allen and Hopkins, 2015). Additionally, it has been noted that young footballers who will professionally continue in

football demonstrate superior ball control skills, endurance capacity, and tactical awareness compared to their peers from the age of 14 onwards. However, it is important to consider that performance is a long-term development process and to recognize that it is difficult to definitively identify young talents before the age of 16 due to rapid development (Kearney and Hayes 2018, Boccia et al., 2017). Long-term investments in athletes can provide important information about strategic decisions regarding the choice of target activities and resource allocation (Allen and Hopkins, 2015).

In a study conducted by Hollings and colleagues, they estimated that the optimal age for high performance in various athletics disciplines is between 25 and 27. In a 2022 study by Gorzi and colleagues, it was found that the average age of elite race walkers was older than that of middle-distance runners and sprinters. In Steidl-Müller et al.'s study conducted with elite skiers at the end of the 2012-2013 season, they stated that the peak performance age for male alpine skiers was approximately 28. In their study, Allens and Hopkins (2015) stated that the average peak performance age in explosive power/sprint disciplines was 27. They noted that in endurance sports, this age can extend into the late thirties. In our study, the average peak performance age for athletes was found to be 26, similar to reference studies. Chen and colleagues reported that the average age of the top 100 players in the ATP (Tennis) rankings worldwide is approximately 27. These players typically start playing tennis around the age of 5 and enter the rankings at the age of 18. They indicated that it takes an

average of 44 months to enter the top 100, and the average age of entry into the top 100 is around 22. Kovalchick and colleagues (2017) found in their study that the average age at which the top 10 female tennis players in the rankings played their first major match was 15.5 years (99% CI = 14.8–15.9), emphasizing that this was 1.2 years earlier than players ranked between 51 and 100. Players ranked in the top 10 also remained in the top 100 for a longer period than other players.

Knechtle and colleagues (2020) reported in a study that Russian cross-country skiers and ultra-marathon runners are among the fastest athletes in many disciplines. Nikolaidis and Knechtle (2019) found in a study that Russian athletes are the fastest cross-country skiers among 15 nations, both in women and men. They noted that in endurance-related disciplines, success is dominated by a traditional training and competition strategy combined with appropriate sports facilities.

In Brownell's book (2008), he states that the success of Chinese athletes should also be attributed to the values that sports and its representation on the international stage embody in China. He mentions that China's desire to host the Olympics and to train athletes and teams that will win medals and even become champions is almost as old as the Olympic Games themselves. As a result of the selections made and the support given to talented athletes in pursuit of these goals, it is possible to see Chinese athletes performing at the highest level in almost every sporting activity.

Csurilla and Fertő (2022) highlighted in their study that population size positively affects Olympic success, suggesting that a country's economic strength and investment in sports may be related to winning medals at the Olympic Games. The role of superpower countries, sports cultures, and the impact of sports levels is mentioned in explaining Olympic success.

Kalata and colleagues' study included 181 athletes and examined the isokinetic values of soccer players and track and field athletes. Soccer players demonstrated higher isokinetic strength and more balanced physical values

compared to the track and field group. Physical therapists and strength coaches should focus on younger age groups, particularly U15, due to higher prevalence and lower relative strength, regardless of their specialty (Kalata et al., 2025). There is also evidence regarding the importance of previous experience in identifying talent and beginning training, and the early development of athletic foundations is seen as a major advantage in achieving elite performance more quickly in later years. In a study conducted on athletes with sprint performance and anthropometric suitability criteria, 16 athletes were included in the study. These athletes were much more successful than other competitors who were more experienced than themselves and managed to enter the top 6 in the rankings in their respective disciplines within a period of 14 months and qualified for the Olympics. The key point here is the transfer of skills that form the basis of performance through the transfer of past athletic experience (Tucker and Collins, 2012).

In conclusion, no country consistently wins medals in all sports from one Olympic Games to the next. Therefore, the factors determining countries' successes and failures can be analyzed, and strategies can be developed for the Olympics and international competitions based on the results of this analysis. Csurilla and Fertő (2022). Knowing the age at which elite athletes reach their peak performance is important for the healthy implementation of long-term athlete development programs. Sports, one of the most peaceful ways for societies to compete, can be approached by implementing programs that foster well-rounded skill development from a young age. Athletes introduced to sports at an early age and trained systematically can achieve great success.

Ethics Statement: In this article, the research process was conducted in accordance with the journal's writing guidelines, publication principles, research and publication ethics, and ethical standards of the journal. The author bears full responsibility for any potential violations related to the article.

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GENİŞLETİLMİŞ ÖZET

Bu çalışmanın amacı Kadınlar 20 km yürüyüş branşında tüm zamanların Top 100 listesinde yer alan kadın sporcuların uluslararası ilke yarışmaya katılımları ile kişisel en iyi zaman arasındaki ilişkinin incelenmesidir.

Yürüyüş, atletizmin teknik açıdan en zorlayıcı branşlarından biri olup, sporcunun yerle sürekli temasını koruması ve dizinin adım boyunca düz kalması zorunluluğu ile koşudan ayrılmaktadır. Tarihsel olarak 18. ve 19. yüzyıl İngiltere'sinde "yaya yarışları" olarak bilinen etkinliklerden gelişen yürüyüş, 1908 Londra Olimpiyatları'nda ilk kez atletizm programına dahil edilmiştir. 1961 yılında erkekler için 20 ve 50 km kategorilerinde Dünya Kupası yürüyüş

yarışmaları başlamış, kadınlar ise 1979'dan itibaren bu organizasyonlarda yer almıştır. Kadınlar olimpiyat arenasına ilk kez 1992 Barcelona Oyunları'nda 10.000 m yürüyüş ile katılmış, 2000 Sydney Olimpiyatları'nda ise erkeklerle aynı mesafede (20 km) yarışmıştır. 2024 Paris Olimpiyatları'nda 50 km erkekler yürüyüşü kaldırılarak yerine karışık maraton bayrak yarışı eklenmiştir.

Yürüyüş branşı, teknik hassasiyet ve dayanıklılığın bir arada olduğu, hakem gözetimi altında en tartışmalı atletizm disiplinlerinden biridir. Elit performansla ulaşmak; genetik faktörler, erken yaşta spora başlama, sistematik antrenman, kasıtlı uygulama (deliberate practice) ve motivasyonun

birleşimiyle mümkündür. Araştırmalar, üstün performansın yalnızca doğuştan gelen yeteneğe değil, uzun yıllar süren planlı çalışmaya dayandığını göstermektedir. Ericsson'un 10.000 saat kuralı, elit sporculuğa ulaşmada sistemli ve kaliteli antrenmanın önemini vurgular. Ancak bu süre, tek başına başarıyı açıklamak için yeterli değildir; antrenmanın niteliği, sporcunun psikolojik dayanıklılığı ve çevresel koşullar da belirleyici faktörlerdir.

Araştırma grubunu 20 km yürüyüş kadınlar branşında bütün zamanlar listesindeki 100 sporcu oluşturmaktadır. Top100 listesindeki sporcuların doğum tarihleri, milliyetleri, kişisel en iyi dereceleri (PB), PB yarışma tarihi, PB derecesine karşılık gelen WA-puanı, ilk yarışma kayıtlarına bağlı yarışma yılı bilgileri World Athletics (WA) resmi web sayfasından alınmıştır (WA, 2024). Sporcuların PB performansını gerçekleştirdikleri yaşları belirlenmiştir. PB performans yılı ile ilk yarışma yılı farkı hesaplanarak top100 listesine girme süresi bulunmuştur.

Araştırma değişkenlerinin basıklık çarpıklık test sonuçlarına göre (± 2 aralığında olması sebebiyle) normal dağılım sergilediği görülmüştür. Sporcuların yaş, PB performansı, PB performans yarışmasındaki sıralaması, PB performans yarışmasının yapıldığı ay, WA-puan, top100 listesine girme süresi değişkenlerinin ortalama ve standart sapma, aralık, minimum ve maksimum değerleri hesaplanmıştır. Top100 listesinde ülkelere bağlı sporcuların frekans ve yüzdeleri bulunmuştur. Değişkenler arasındaki ilişkileri tespit etmek için pearson korelasyon istatistiği kullanılmıştır. Çalışma

verileri, işlenmemiş bir formatta çevrimiçi olarak mevcut olduğundan ve deney yoluyla toplanmadığından, Morley ve Thomas (2005) tarafından belirtildiği gibi etik kaygı taşımamaktadır.

Yürüyüş sporunda ilk 100 listesinde yer alan sporcuların ortalama yaşının 26 olduğu, yarışma performans aralığının yaklaşık 4 dakika olduğu ve sporcuların ilk uluslararası yarışmaya kaydolduktan ortalama 8 yıl sonra kişisel en iyi performanslarına ulaştıkları gözlemlenmiştir. İlk 100 listesindeki sporcuların milliyetlerine göre dağılımı incelendiğinde, Rus sporcular %37 ile ilk sırada yer alırken, Çin 25 sporcuyla ikinci sırada yer almıştır. Diğer bir deyişle, Rus ve Çinli sporcular Top 100 listesinin %62'sini oluşturdu. Top 100 listesindeki sporcuların yaşları ile Top 100 listesine girmeleri için geçen süre arasında istatistiksel olarak anlamlı ve güçlü bir korelasyon elde edildi ($r=0,80$). Diğer bir deyişle, sporcuların yaşları arttıkça, Top 100 listesine girmeleri için geçen süre de artmaktadır. Araştırma grubunu domine eden Rus ve Çin uyruklu sporcular analiz edildiğinde, yaşlı sporcuların yılın ilerleyen dönemlerinde yarışmalarda PB performanslarını sergiledikleri anlaşılmaktadır.

Elit sporcuların en yüksek performanslarına ulaştıkları yaşı bilmek, uzun vadeli sporcu geliştirme programlarının sağlıklı bir şekilde uygulanması için önemlidir. Yürüyüş gibi uzun mesafe yarışlarında, en iyi sonuçlara ulaşmak için çok uzun ve tutarlı antrenman dönemleri geçirmek şarttır.