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The examination of jumping events athletes' competition season performance variables during the 2019 world championships

2019 dünya şampiyonası atlama branşında yarışan sporcuların yarışma sezonu performans değişkenlerinin incelenmesi

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ABSTRACT

The main goal of the athletes and coaches is to reach peak performance in major competitions. For this reason, understanding the elite-level athletes' performances during a season may provide useful information for training designs. The current study aimed to compare the performance variables of male athletes who achieved to compete in the finals and who were not successful during the qualification competitions and couldn't compete in the finals during the 2019 World Athletics Championship, jumping events, and to examine the relationships between performance variables. A total of 107 male athletes' (45 competed in the finals and 62 eliminated in the qualifications) performance variables from the 2019 World Athletics Championship were examined. Similarities and differences were determined with the Mann-Whitney U test and Spearman correlation analysis was used to examine the relationships among variables. According to the results of the study; Season mean performance (S-Mean) and the difference between the best performance of the season and qualification competition performance (WCH-Q) were found to be different between groups for all jumping events. Besides, season-best performance (SB) showed significant differences for all jumping events, except the high jump. When SB was evaluated for the long jump and high jump, it was seen that there was a significant difference between groups. In this study, it was found that the season average performance of the athletes competing in the final in the long jump and other jumping events was related to their final performance. Therefore, it can be interpreted that the athletes who have a high average during the competition season have a higher average performance in the world championship final competition.

ÖZET

Sporcuların ve antrenörlerin temel amacı, sezon içerisindeki hedeflenen yarışmalarda en yüksek performansa ulaşmaktır. Bu nedenle elit düzeydeki sporcuların bir sezondaki performanslarını anlamak, antrenman tasarımları için faydalı bilgiler sağlayabilir. Bu çalışma, 2019 Dünya Atletizm Şampiyonası'nda finallerde yarışan ve seçme müsabakalarında elenen erkek sporcuların yarışma sezonu performans değişkenlerini karşılaştırmayı ve bu değişkenler arasındaki ilişkiyi araştırmayı amaçlamıştır. 2019 Dünya Atletizm Şampiyonası'nda toplam 107 erkek sporcunun (45'i finalde, 62'si elemelerde yarıştı) performans değişkenleri incelendi. Mann-Whitney U testi ile benzerlikler ve farklılıklar belirlendi ve değişkenler arasındaki ilişkileri incelemek için Spearman korelasyon analizi kullanıldı. Araştırmanın sonuçlarına göre; Sezon ortalama performansı (S-Ortalama) ve sezonun en iyi performansı ile seçme yarışması performansı (WCH-Q) arasındaki fark, tüm atlama etkinlikleri için gruplar arasında farklı bulundu. Ayrıca, sezonun en iyi performansı (SB), yüksek atlama hariç tüm atlama yarışmalarında önemli farklılıklar gösterdi. Uzun atlama ve yüksek atlama için SB değerlendirildiğinde gruplar arasında anlamlı fark olduğu görüldü. Bu çalışmada, uzun atlama ve diğer atlama yarışmalarında finalde yarışan sporcuların sezon ortalama performanslarının final performansları ile ilişkili olduğu tespit edildi. Dolayısıyla müsabaka sezonunda ortalamaları yüksek olan sporcuların dünya şampiyonası final müsabakasındaki performans ortalamalarının daha yüksek olduğu şeklinde yorumlanabilir.

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1. Introduction

The concept of periodization, which sets out and summarizes the most basic assumptions regarding the scientific background for coaches and sports scientists, was originally published as physiological research by Soviet scientists in the 1960s. After a short while, by turning into a training scheduling and with its re-release in many countries, it became a universal background status for training planning analysis (Issurin 2010). Training plans are planned for a certain period and certain periods are prepared in a format called periodization. The periodization aims to minimize the training steps to achieve the optimal result necessary to reach the determined goal (Bartolomei et al. 2014; Bompa and Haff 2015; Issurin 2010; Nugraha, Dliss, and Asmawi 2017). In other words, it can be

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described as: to reach the targeted optimal performance values in a certain period (Haff 2013).

As in most other sports, in athletics too, the main aim of the athletes and coaches is to reach the best performance in the major competition during the season. Understanding performance behaviors during the competitive season, especially aimed at elite-level athletes, provides useful information for periodization design. Nowadays, the increased number of competitions, their quality, and the duration of the competition period the significant shortening of the phase allocated to the preparation have led to the emergence of different ideas in the periodization pattern (Açıkada 2018). Reaching the desired performance levels within the specified date range for the elite level athletes to participate in the aimed international competitions constitutes the primary target for the athlete and the coach during the season and transforms the periodization of the competition season into a dynamic structure. For this reason, it is known that the training plans of the athletes vary depending on the number and frequency of the competitions they participate in during the season. General annual training planning for elite-level athletes consists of (1) preparation phase, (2) competition phase, and (3) transition phase (Bompa 1994; Matveyev 1981).

The chronological order and the precedency order and the number of competitions before the highest performance are defined as the issues that the training organizers emphasize. Because, these factors are considered to affect the Season's Best Performance (SB) (Açıkada 2018). The competition order and the design of the competition period specified in the training program according to the athletes' level and aims are important to achieve the highest performance in the aimed competition. Primary precedency competitions are considered as the competitions where the peak performance is expected (two to four competitions), secondary precedency competitions are defined as the competitions where high performance is expected and they serve as preparations for competitions where peak performance is expected (six to eight competitions). Lastly, third-precedency competitions are considered as training preparation for the first two precedency competitions (eight to ten competitions) (Açıkada and Bayraktar 2018). Sports scientists agree that athletes can reach high-performance levels by planning annual training specific to their branches to achieve the aimed goal. Therefore, the concept of periodization and its effects on performance development is of great importance to achieve the desired high-level performances, especially in target competitions. In the light of this information, the current study aimed to compare the performance variables of male athletes who achieved to compete in the finals and who were not successful during the qualification competitions and couldn't compete in the finals during the 2019 World Athletics Championship, jumping events. Moreover, it was aimed to examine the relationships between performance variables.

2. Methods

Forty-five male athletes who achieved to compete in the finals and 62 male athletes who couldn't pass the qualification competitions during the 2019 World Athletics Championship, jumping events constituted of the research group.

The data was obtained from the official website of World Athletics (WA), the International Athletic Federation (https://www.worldathletics.org/competitions/world-athletics-championships/iaaf-world-athletics-championships-doha-2019-7125365/timetable/bydiscipline).

World Athletic publishes all start lists and results for the 2019 World Championships on their official website. In addition, the valid or invalid performances of each athlete competing in the 2019 World Championships jumping events are detailed. The date of birth of each athlete competing in these championships, the dates of the competitions, and their performances were recorded from the database.

The following variables were defined as research variables:

- The number of days between the competition and the entry standard (Entry S./Day)
- Season-best performance (SB)
- Season mean performance (S-Mean)
- World championship qualification competition (WCH-Q)
- World championship qualification competition (WCH-F)
- Difference between the best performance of the season and qualification competition performance (SB-Q)
- Difference between the best performance of the season and final competition performance (SB-F)
- The number of competitions in a season (Comp.)
- The number of days between the competition and the best of the season (SB/Day)

This study was conducted following the Declaration of Helsinki. In addition, this study was conducted as an observational study with publicly available data. The data of the current study is available online in a raw format and was not collected through experimentation. For this reason, the current research has no ethical concerns as stated by Morley and Thomas (2005).

To conduct the statistical analysis of the current study IBM-SPSS 21.0 software was used. Conformity of the data to normal distribution was assessed with the Kolmogorov-Smirnov test. For variables without normal distribution; similarities and differences were determined with the Mann-Whitney U test. In addition, Spearman correlation analysis was used to examine the relationships among variables. The significance level was set at $p<0.05$.

3. Results

Competition season variables' median (25^{th} – 75^{th}) values and the comparison of two groups are given in Table 1. Besides, in the tables below, a comparison of season performance variables between two groups is given (Table 2-5).

When the performance variables of the athletes competed in the finals and were eliminated in the qualifications depending on the competition type were analyzed Entry S./Day showed similarities between groups ($p>0.05$). In contrast to this result, SB ($p<0.001$), S-Mean ($p<0.001$), SB-Q ($p=0.006$), Comp.

Table 1. Comparison of the Athletes Who Competed in the Finals and Were Eliminated in the Qualification Competition During Jumping Events in Terms of Research Variables

Variables	F&Q	N	Median (25th - 75th)	p
Entry S./Day	F	45	150.00 (78.00 – 214.50)	0.156
	Q	62	131.00 (62.50 – 199.75)	
SB	F	45	1214.00 (1189.00 – 1233.50)	***p<0.001***
	Q	62	1187.00 (1177.00 – 1198.00)	
S-Mean	F	45	1152.00 (1136.67 – 1176.17)	***p<0.001***
	Q	62	1121.17 (1105.50 – 1133.50)	
WCH-Q	F	45	1170.00 (1151.50 – 1184.00)	***p<0.001***
	Q	62	1116.00 (1082.25 – 1143.00)	
SB-Q	F	45	54.00 (17.50 – 73.00)	***0.006***
	Q	62	71.00 (44.75 – 109.00)	
Comp.	F	45	12.00 (10.00 – 14.00)	***0.027***
	Q	62	10.00 (8.00 – 13.00)	
SB/Day	F	45	42.00 (0.00 – 81.50)	***p<0.001***
	Q	62	81.00 (54.25 – 130.50)	

***F**: Athletes competing in the final, **Q**: Athletes competing in the Qualification, **Entry S./Day**: The number of days between the competition and the entry standard, **SB**: Season-best performance, **S-Mean**: Season mean performance, **WCH-Q**: World championship qualification competition, **SB-Q**: Difference between the best performance of the season and qualification competition performance, **Comp.**:The number of competitions in a season, **SB/Day**: The number of days between the competition and the best of season.*

Table 2. Comparison of the Athletes Who Competed in the Finals and Were Eliminated in the Qualification Competition During the Long Jump Event in Terms of Research Variables

Variables	F&Q	N	Median (25th - 75th)	p
Entry S./Day	F	11	132.00 (68.00 – 187.00)	0.339
	Q	12	99.00 (57.75 – 182.00)	
SB	F	11	1219.00 (1208.00 – 1232.00)	***p<0.001***
	Q	12	1187.00 (1177.50 – 1192.00)	
S-Mean	F	11	1150.10 (1140.83 – 1176.33)	***p<0.001***
	Q	12	1113.99 (1102.47 – 1129.26)	
WCH-Q	F	11	1138.00 (1118.50 – 1153.00)	***p<0.001***
	Q	12	1081.50 (1058.75 – 1099.00)	
SB-Q	F	11	70.00 (59.00 – 112.00)	0.157
	Q	12	107.50 (85.50 – 119.25)	
Comp.	F	11	12.00 (11.00 – 14.00)	0.120
	Q	12	10.00 (9.25 – 12.75)	
SB/Day	F	11	42.00 (0.00 – 70.00)	***0.016***
	Q	12	87.50 (68.75 – 146.50)	

***F**: Athletes competing in the final, **Q**: Athletes competing in the Qualification, **Entry S./Day**: The number of days between the competition and the entry standard, **SB**: Season-best performance, **S-Mean**: Season mean performance, **WCH-Q**: World championship qualification competition, **SB-Q**: Difference between the best performance of the season and qualification competition performance, **Comp.**: The number of competitions in a season, **SB/Day**: The number of days between the competition and the best of season.*

(p=0.027), and SB/Day (p<0.001) were found to be statistically different between groups (Table 1).

When the SB (p<0.001), S-Mean. (p<0.001), WCH-Q (p<0.001), and SB/Day (p=0.016) performance variables of long jumpers were examined, there were statistically significant differences between groups. In addition, it was found that there were similarities between the two groups in terms of other variables (p>0.05) (Table 2).

Comparing the performance variables of triple jumpers, competed in the finals, and were eliminated in the qualifications, SB, S-Mean., and WCH-Q variables showed statistically significant differences between groups (p<0.001). When the other variables were examined it was seen that there were similarities for athletes who competed in the finals and were eliminated in the qualifications (p>0.05) (Table 3).

When the performance variables of athletes depending on the competition type were examined, S-Ort., WCH-Q, and SB/Day variables were found to be statistically significant between groups (p=0.026; p<0.001; p=0.019; respectively). In contrast, all other variables were found to be similar between groups (p>0.05) (Table 4).

Comparing the performance variables depending on the competition type of pole vaulters, it was seen that SB (p=0.010), S-Mean (p=0.003), and WCH-Q (p<0.001) variables were found to be statistically different between groups. Besides, other variables were found to be similar between groups (p>0.05) (Table 5).

In the following tables (Table 6-13), the comparison of the season performance variables of the athletes, who competed in the finals in the World Championships and the athletes who competed in the qualifications and failed to reach the finals, were indicated according to jumping events.

According to the Spearman correlation analysis results; SB and SB-Q showed a statistically high, positive, and significant

Table 3. Comparison of the Athletes Who Competed in the Finals and Were Eliminated in the Qualification Competition During Triple Jump Event in Terms of Research Variable

Variables	F&Q	N	Median (25^{th} - 75^{th})	p
Entry S./Day	F	12	175.50 (98.25 – 353.50)	0.094
	Q	20	127.50 (56.25 – 187.00)	
SB	F	12	1216.00 (1192.75 – 1241.75)	***p<0.001***
	Q	20	1175.50 (1161.50 – 1198.00)	
S-Mean	F	12	1161.77 (1131.47 – 1186.73)	***p<0.001***
	Q	20	1112.41 (1095.81 – 1131.92)	
WCH-Q	F	12	1158.00 (1154.50 – 1163.00)	***p<0.001***
	Q	20	1105.00 (1084.50 – 1138.50)	
SB-Q	F	12	55.50 (28.50 – 76.00)	0.150
	Q	20	75.00 (45.75 – 110.50)	
Comp.	F	12	10.00 (9.25 – 12.75)	***p<0.001***
	Q	20	9.00 (8.00 – 10.00)	
SB/Day	F	12	71.00 (7.00 – 91.00)	0.082
	Q	20	96.00 (52.75 – 153.75)	

***F**: Athletes competing in the final, **Q**: Athletes competing in the Qualification, **Entry S./Day**: The number of days between the competition and the entry standard, **SB**: Season-best performance, **S-Mean**: Season mean performance, **WCH-Q**: World championship qualification competition, **SB-Q**: Difference between the best performance of the season and qualification competition performance, **Comp.**: The number of competitions in a season, **SB/Day**: The number of days between the competition and the best of season.*

Table 4. Comparison of the Athletes Who Competed in the Finals and Were Eliminated in The Qualification Competition During High Jump Event in Terms of Research Variables

Variables	F&Q	N	Median (25^{th} - 75^{th})	p
Entry S./Day	F	10	179.00 (37.00 – 362.25)	0.733
	Q	13	135.00 (81.00 – 213.00)	
SB	F	10	1188.00 (1179.00 – 1224.00)	0.065
	Q	13	1179.00 (1179.00 – 1183.50)	
S-Mean	F	10	1141.00 (1121.55 – 1148.70)	***0.026***
	Q	13	1120.56 (1103.39 – 1126.90)	
WCH-Q	F	10	1170.00 (1170.00 – 1170.00)	***p<0.001***
	Q	13	1108.00 (1064.00 – 1143.00)	
SB-Q	F	10	1179.00 (1145.50 – 1224.00)	0.066
	Q	13	63.00 (36.00 – 115.00)	
Comp.	F	10	11.00 (8.00 – 13.75)	0.416
	Q	13	9.00 (8.00 – 11.50)	
SB/Day	F	10	1.50 (0.00 – 85.00)	***0.019***
	Q	13	100.00 (65.50 – 158.50)	

***F**: Athletes competing in the final, **Q**: Athletes competing in the Qualification, **Entry S./Day**: The number of days between the competition and the entry standard, **SB**: Season-best performance, **S-Mean**: Season mean performance, **WCH-Q**: World championship qualification competition, **SB-Q**: Difference between the best performance of the season and qualification competition performance, **Comp.**: The number of competitions in a season, **SB/Day**: The number of days between the competition and the best of season.*

Table 5. Comparison of the Athletes Who Competed in the Finals and Were Eliminated in the Qualification Competition During Pole Vault Event in Terms of Research Variables

Variables	F&Q	N	Median (25th - 75th)	p
Entry S./Day	F	12	128.00 (79.75 – 215.75)	0.929
	Q	17	139.00 (56.00 – 220.50)	
SB	F	12	1213.00 (1198.75 – 1261.50)	***0.010***
	Q	17	1198.00 (1187.00 – 1212.00)	
S-Mean	F	12	1165.00 (1147.78 – 1192.22)	***0.003***
	Q	17	1133.35 (1121.20 – 1149.60)	
WCH-Q	F	12	1198.00 (1184.00 – 1198.00)	***p<0.001***
	Q	17	1157.00 (1116.00 – 1157.00)	
SB-Q	F	12	1184.00 (1143.00 – 1219.25)	0.126
	Q	17	57.00 (30.00 – 72.50)	
Comp.	F	12	15.00 (10.25 – 22.50)	0.399
	Q	17	12.00 (10.00 – 17.50)	
SB/Day	F	12	67.50 (34.25 – 81.00)	0.755
	Q	17	66.00 (44.00 – 81.00)	

***F**: Athletes competing in the final, **Q**: Athletes competing in the Qualification, **Entry S./Day**: The number of days between the competition and the entry standard, **SB**: Season-best performance, **S-Mean**: Season mean performance, **WCH-Q**: World championship qualification competition, **SB-Q**: Difference between the best performance of the season and qualification competition performance, **Comp.**: The number of competitions in a season, **SB/Day**: The number of days between the competition and the best of season.*

Table 6. Results of the Competition Variables of the Athletes Competing in the Final in the Long Jump

Variables	*n*	Comp.	S-Mean.	WCH-Q	WCH-F	SB-Q	SB-F	Entry S./ Day	SB/Day
SB	11	0,011	0,424	0,096	0,292	***0,820*****	0,373	0,280	0,058
Comp.	11		-0,243	-0,343	-0,220	0,301	0,230	0,097	0,494
S-Mean.	11			0,037	***0,855*****	0,351	-0,381	0,367	-0,508
WCH-Q	11				,068	-0,355	0,273	0,212	-0,054
WCH-F	11					0,187	***-0,651****	0,018	***-0,648****
SB-Q	11						0,345	0,276	0,248
SB-F	11							0,319	***0,649****
Entry S/Day	11								0,311

**p<0,05. **p<0,001.*

***Entry S./Day**: The number of days between the competition and the entry standard, **SB**: Season-best performance, **S-Mean**: Season mean performance, **WCH-Q**: World championship qualification competition, **WCH-F**: World championship qualification competition, **SB-Q**: Difference between the best performance of the season and qualification competition performance, **SB-F**: Difference between the best performance of the season and final competition performance, **Comp.**: The number of competitions in a season, **SB/Day**: The number of days between the competition and the best of season.*

Table 7. Results of the Competition Variables of the Athletes Who Were Eliminated in the Long Jump Qualification Competition

Variables	*n*	Comp.	S-Mean.	WCH-Q	SB-Q	Entry S./Day	SB/Day
SB	12	0,267	0,512	***0,662****	-0,135	-0,083	0,342
Comp.	12		-0,032	0,102	-0,259	0,416	0,105
S-Mean.	12			***0,666****	-0,365	-0,175	-0,070
WCH-Q	12				***-0,694****	-0,495	-0,295
SB-Q	12					0,346	***0,793*****
Entry S./Day	12						0,361

**p<0,05. **p<0,001.*

***Entry S./Day**: The number of days between the competition and the entry standard, **SB**: Season-best performance, **S-Mean**: Season mean performance, **WCH-Q**: World championship qualification competition, **SB-Q**: Difference between the best performance of the season and qualification competition performance, **Comp.**: The number of competitions in a season, **SB/Day**: The number of days between the competition and the best of season.*

Table 8. Results of the Competition Variables of the Athletes Competing in the Final in the Triple Jump

Variables	*n*	Comp.	S-Mean.	WCH-Q	WCH-F	SB-Q	SB-F	Entry S./Day	SB/Day
SB	12	0,494	***0,797*** **	***0,611*** *	***0,776*** **	***0,748*** **	-0,246	0,423	0,085
Comp.	12		0,218	0,383	0,312	0,305	0,062	0,154	-0,219
S-Mean.	12			***0,618*** *	***0,622*** *	0,573	-0,317	0,085	-0,035
WCH-Q	12				***0,698*** *	0,007	***-0,597*** *	0,244	-0,470
WCH-F	12					0,406	***-0,739*** **	0,430	0,021
SB-Q	12						0,204	0,268	0,486
SB-F	12							-0,284	0,312
Entry S/Day	12								0,078

**p<0,05. **p<0,001.*

***Entry S./Day**: The number of days between the competition and the entry standard, **SB**: Season best performance, **S-Mean**: Season mean performance, **WCH-Q**: World championship qualification competition, **WCH-F**: World championship qualification competition, **SB-Q**: Difference between the best performance of the season and qualification competition performance, **SB-F**: Difference between the best performance of the season and final competition performance, **Comp.**: The number of competitions in a season, **SB/Day**: The number of days between the competition and the best of season.*

Table 9. Results of the Competition Variables of the Athletes Who Were Eliminated in the Triple Jump Qualification Competition

Variables	*n*	Comp.	*S-Mean.*	*WCH-Q*	*SB-Q*	Entry S./Day	SB/Day
SB	20	0,386	***0,751*** **	0,356	0,189	0,256	0,297
Comp.	20		0,400	0,439	-0,374	0,435	0,040
S-Mean.	20			***0,551*** *	-0,144	0,272	0,183
WCH-Q	20				***-0,758*** **	-0,029	-0,380
SB-Q	20					0,183	***0,680*** **
Entry S./Day	20						***0,655*** **

**p<0,05. **p<0,001.*

***Entry S./Day**: The number of days between the competition and the entry standard, **SB**: Season-best performance, **S-Mean**: Season mean performance, **WCH-Q**: World championship qualification competition, **SB-Q**: Difference between the best performance of the season and qualification competition performance, **Comp.**: The number of competitions in a season, **SB/Day**: The number of days between the competition and the best of season.*

relationship for performance variables of long jumpers competed in the finals (r=0.820; p<0.001). Similarly, S-Mean and WCH-F showed a statistically significant, high, and positive relationship (r=0.855; p<0.001). When WCH-F was examined it was seen that WCH-F and SB-F had a moderate, negative relationship (r=-0.651; p<0.001). Besides, WCH-F and SB/Day showed statistically significant, moderate, and negative relationships (r=-0,648, p<0,001). Moreover, there was a statistically significant, moderate, and positive relationship between SB-F and SB/Day (r=-0.649; p<0.001) (Table 6).

According to the Spearman correlation analysis results conducted with performance variables of long jumpers, eliminated in the qualifications; WCH-Q showed a statistically significant, moderate, and positive relationship with SB (r=0.662; p<0.05) and S-Mean (r=0.666; p<0.05). On the other hand, WCH-Q and SB-Q showed a significant, moderate, and negative relationship (r=-0.694; p<0.05) while SB/Day and SB-Q had a high, positive relationship (r=0.793; p<0.001) (Table 7).

Examining the SB performance of triple jumpers competed in the finals; it was found that there was a high and positive correlation between S-Mean (r=0.797; p<0.001), WCH-F (r=0.776; p<0.001), and SB-Q (difference) (r=0.748; p<0.001). Moreover, there was a moderate, positive, and significant relationship with WCH-Q (r=0.611; p<0.05). When S-Mean was analysed; it was seen that there was a moderate, positive, and significant correlation with WCH-Q (r=0.618; p<0.05) and WCH-F (r=0.622; p<0.05). Examining the WCH-Q; it was found that there was a significant, moderate, and positive relationship with WCH-F (r=0.698; p<0.05), a significant, moderate, and negative correlation with (r=-0.597; p<0.05). When the final performances of the athletes were analysed it was found that there was a significant, high, and negative correlation with SB-F (difference) (r=-0.739; p<0.001) (Table 8).

According to results of performance variables analysis of triple jumpers eliminated in the qualifications; SB and SB-Mean showed a statistically significant, high, and positive relationship (r=0.751; p<0.001). While there was a moderate and positive relationship between WCH-Q and S-Mean (r=0.551; p<0.05); WCH-Q and SB-Q showed a high and negative relationship (r=-0.758; p<0.001). Besides, SB/Day had a significant, moderate, and positive relationships with SB-Q (r=0.680; p<0.001) and Entry S./Day (r=0.655, p<0.001) (Table 9).

When the SB performance of high jumpers who competed in the finals was examined; there were high, positive, and significant relationships with final performance (r=0.797; p<0.001) and SB-Q (r=0.965; p<0.001). While competition

Table 10. Results of the Competition Variables of the Athletes Competing in the Final in the High Jump

Variables	*n*	Comp.	S-Mean.	WCH-Q	WCH-F	SB-Q	SB-F	Entry S./Day	SB/Day
SB	10	0,103	0,588	-0,298	***0,797*****	***0,965*****	-0,320	0,019	-0,213
Comp.	10		-0,248	-0,292	0,152	0,193	-0,242	***-0,756****	-0,065
S-Mean.	10			0,175	***0,635****	0,458	-0,348	0,267	-0,214
WCH-Q	10				-0,177	-0,532	-0,248	0,522	-0,186
WCH-F	10					***0,733****	***-0,767*****	0,105	***-0,645****
SB-Q	10						-0,198	-0,142	-0,105
SB-F	10							-0,195	***0,858*****
Entry S/Day	10								-0,226

**p<0,05. **p<0,001.*

***Entry S./Day**: The number of days between the competition and the entry standard, **SB**: Season-best performance, **S-Mean**: Season mean performance, **WCH-Q**: World championship qualification competition, **WCH-F**: World championship qualification competition, **SB-Q**: Difference between the best performance of the season and qualification competition performance, **SB-F**: Difference between the best performance of the season and final competition performance, **Comp.**: The number of competitions in a season, **SB/Day**: The number of days between the competition and the best of season.*

Table 11. Results of the Competition Variables of the Athletes Who Were Eliminated in the High Jump Qualification Competition

Variables	*n*	Comp.	*S-Mean.*	*WCH-Q*	*SB-Q*	Entry S./Day	SB/Day
SB	13	0,304	0,539	0,077	0,488	-0,353	0,017
Comp.	13		0,175	-0,173	0,402	-0,253	0,240
S-Mean.	13			0,549	-0,106	-0,448	-0,237
WCH-Q	13				***-0,780****	-0,033	***-0,683****
SB-Q	13					-0,281	***0,747****
Entry S./Day	13						-0,062

**p<0,05. **p<0,001.*

***Entry S./Day**: The number of days between the competition and the entry standard, **SB**: Season-best performance, **S-Mean**: Season mean performance, **WCH-Q**: World championship qualification competition, **SB-Q**: Difference between the best performance of the season and qualification competition performance, **Comp.**: The number of competitions in a season, **SB/Day**: The number of days between the competition and the best of season.*

Table 12. Results of the Competition Variables of the Athletes Competing in the Final in the Pole Vault

Variables	*n*	Comp.	S-Mean.	WCH-Q	WCH-F	SB-Q	SB-F	Entry S./Day	SB/Day
SB	12	0.413	***0.600****	0.365	***0.617****	***0.879*****	0.077	***0.684****	0.069
Comp.	12		-0.056	-0.123	0.164	0.525	0.088	0.157	0.397
S-Mean.	12			0.471	***0.824*****	0.544	-0.483	***0.876*****	-0.117
WCH-Q	12				0.484	-0.027	-0.185	0.246	-0.457
WCH-F	12					0.454	***-0.710*****	***0.737*****	0.179
SB-Q	12						0.151	***0.696****	0.241
SB-F	12							-0.336	-0.124
Entry S/Day	12								-0.042

**p<0,05. **p<0,001.*

***Entry S./Day**: The number of days between the competition and the entry standard, **SB**: Season-best performance, **S-Mean**: Season mean performance, **WCH-Q**: World championship qualification competition, **WCH-F**: World championship qualification competition, **SB-Q**: Difference between the best performance of the season and qualification competition performance, **SB-F**: Difference between the best performance of the season and final competition performance, **Comp.**: The number of competitions in a season, **SB/Day**: The number of days between the competition and the best of season.*

Table 13. Results of the Competition Variables of the Athletes Who Were Eliminated in the Pole Vault Qualification Competition

Variables	*n*	Comp.	*S-Mean.*	*WCH-Q*	*SB-Q*	Entry S./Day	SB/Day
SB	17	0.429	***0.561****	0.168	0.353	0.327	0.018
Comp.	17		0.096	0.084	0.170	-0.098	-0.289
S-Mean.	17			***0.656****	-0.337	0.481	0.052
WCH-Q	17				***-0.835****	0.158	-0.054
SB-Q	17					-0.038	0.046
Entry S./Day	17						***0.554****

**p<0.05 **p<0.001.*

***Entry S./Day**: The number of days between the competition and the entry standard, **SB**: Season-best performance, **S-Mean**: Season mean performance, **WCH-Q**: World championship qualification competition, **SB-Q**: Difference between the best performance of the season and qualification competition performance, **Comp.**: The number of competitions in a season, **SB/Day**: The number of days between the competition and the best of season.*

number and Entry S./Day had a negative, significant relationship (r=-0.756; p<0.05),; S-Mean and WCH-F had a moderate, positive relationship (r=0.635; p<0.05). Examining the WCH-F variable, it was seen that there was a high, positive relationship with SB-Q (r=-0.733; p<0.05), a moderate and negative relationship with SB-F (r=-0.767; p<0.001), and SB/Day (r=-0.645; p<0.05). Besides, there was a high, positive, and significant relationship between SB-F and SB/Day (r=0.858; p<0.001) (Table 10).

According to the correlation analysis results conducted with performance variables of high jumpers eliminated in the qualifications; WCH-Q showed a high and negative relationship with SB-Q (r=-0.780; p<0.001) while there was a moderate and negative relationship with SB/Day (r=-0.683; p<0.05). Besides, SB-Q and SB/Day showed a significant, high, and positive relationship (r=0.747; p<0.001) (Table 11).

When the SB performances of pole vaulters who competed in the finals were examined; it was found that there was a moderate relationship with S-Mean (r=0.600; p<0.05), WCH-F (r=0.617; p<0.05), and Entry S./Day (r=0.684; p<0.05). Besides, there was a high and positive relationship with SB-Q (r=0.879; p<0.001). Moreover, S-Mean performance was found to have a high, positive relationship with WCH-F (r=0.824; p<0.001) and Entry S./Day (r=0.876; p<0.001). In addition, it was seen that the final performance had a high, negative relationship with SB-F (r=-0.710; p<0.001), a high, positive relationship with Entry S./Day (r=0.737; p<0.001). Finally, it was found that SB-F and Entry S./Day had a moderate, positive, and significant relationship (r=0.696; p<0.05) (Table 12).

According to the performance variables' analysis results of pole vaulters were eliminated in the qualifications; while there was a significant, high, and positive relationship between WCH-Q and SB-Q (r=-0.835; p<0.001), there was a significant, moderate, and positive relationship with S-Mean (r=-0.656; p<0.001). Besides, there was a significant, moderate, and positive relationship between SB and SB-Mean (r=0.561; p<0.05), as well as S./Day and SB/Day (r=-0.554; p<0.05) (Table 13).

4. Discussion

In the curent study, the performance variables of male athletes who competed in the finals and were eliminated in the qualifications of the 2019 World Athletics Championships in jumping events and were compared. According to the results of the study; S-Mean and WCH-Q were found to be different between groups for all jumping events. Besides, SB showed significant differences for all jumping events, except the high jump. When SB was evaluated for the long jump and high jump, it was seen that there was a significant difference between groups. Besides, when all the jumping events were evaluated together, SB, S-Mean, WCH-Q, competition number, and SB-Day variables were found to be significantly different among groups.

In addition, when the relations between the performance variables in the season according to the events were examined; there was a negative relationship between WCH-F and SB-Day for long jumpers. Accordingly, WCH-F, WCH-Q performances, and SB-Day variables were found to have a negative relationship. It can be interpreted that the increase in the competition performance for these events is related to the fact that the season's best performance was reached close to the competition date.

Athletes competed in the finals are expected to show better results. In relation with this expected situation; SB was found to be significantly different among groups and higher in the F group. Besides, competition number of the athletes competed in finals were found to be statistically higher than the athletes eliminated during the qualifications. According to this result, it can be interpreted that athletes need to compete a higher number of competitions in a season to achive better ranking in the target competitions. Finally, SB-Day was found to be statistically lower for the F athletes. This means that F athletes had their SB closer to the targeted competition than Q athletes. As a results, it can be said that F athletes had higher form levels.

According to the World Athletics (2017) competition rules, in the world championship jumping events qualification competition, a performance level called the entry standard is determined by the competition delegate for the athletes to reach the finals. Almost all of the athletes who reach this performance withdraw from the competition to prepare for the final stage as soon as possible instead of trying a better performance. When we look at all the jumping events, it was seen that the performance differences between the SB and the qualification competition of the athletes competing in the final

were positively related to the best performance of the season at a high level. This suggests that some athletes with the best performance of the season, after passing the entry standard performance in the qualification competition, did not force their performance and withdrew from the competition.

The number of competitions in the season and their arrangement by date have high importance for the best performance in the targeted major competition (Açıkada and Bayraktar 2018). There are some studies in the literature examining the number of competitions in a competition season of elite athletes (T. Örs et al. 2019). When the number of competitions of elite male long jumpers during a season was examined, it was seen that they had an average of 10.1 competitions. In another study, examining the same variable for high jumpers, this value was 8.8 for male jumpers (B. S. Örs and Bayraktar 2020). In many sports events, depending on the increased number of competitions by International Sports Federations; the number of competitions of high-level athletes also increased. As a result, top elite athletes have started to participate in a higher number of competitions (Issurin 2008). In addition, some studies state that athletes should participate in the competition between 7-10 years before the maximal performance (Bompa 1994). Looking at the results of the study, it was found that the athletes competing in the world championship competed in an average of 11 competitions during the competition season. In the light of this information, it can be interpreted that the results of the current study support the literature. In a study conducted with the long jump events, a model for estimating the season's best performance depending on the average of the first two competition performances in the competition season was created. According to the results of the study, it was found that this prediction model predicted the season's best performance with a deviation of 0.9% in five male athletes in the 2019 world lists (Ors and Bayraktar 2021). In addition, it was seen that the increase in the performance averages of the athletes in the first two competitions is proportional to the best performance increase in the season. In this study, it was found that the season average performance of the athletes competing in the final in the long jump and other jumping events was related to their final performance. Therefore, it can be interpreted that the athletes who have a high average during the competition season have a higher average performance in the world championship final competition.

5. Conclusion

The current study, which examined the performance variables of the athletes in a competition season and the relationships between these variables, was carried out to create a prediction for the major competitions for the coaches. Thus, coaches can take as an example the approaches outlined in the findings of the current research on issues such as the dates of the competitions during the year, their formation, performance levels, and the realization of the pre-determined jump-off degrees on the targeted date. It is believed that by creating similar studies for different athletics events; it can be determined how the periodization principles are applied in the different athletics branches. This information can guide the coaches in the relevant athletics event in the training planning.

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