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Relación entre la posición al final de la primera vuelta y la clasificación final en BTT XCO

Relationship between the position at the end of the first lap and the final classification in XCO MTB

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Resumen

Las competiciones de BTT Cross-country (XCO) élite consisten en varias vueltas de un circuito todo-o-terreno técnico. Al inicio de una carrera, un corredor de XCO no controla su posición en la parrilla, esta se premia primero, según su clasificación internacional, y luego según las demás condiciones previstas en el reglamento. Sin embargo, su actuación inmediatamente después del inicio y hasta el final de la primera vuelta, puede ser entrenada. Este estudio tuvo como objetivo analizar la relación entre la posición al final de la primera vuelta y la clasificación final en una competición de XCO. Los participantes fueron deportistas portugueses de alto nivel, de la categoría Élite masculina, que compitieron en competiciones nacionales celebradas en Portugal entre 2017 y 2020, con edades ≥ 19 años. Se concluyó que existe una correlación muy fuerte entre la posición ocupada por los corredores al final de la primera vuelta y la posición final en la carrera, media = 0,907 con p=0,006, la cual es estadísticamente significativa, por lo que tiene importantes implicaciones para la planificación de los entrenamientos en XCO.

Palabras clave: Mountain bike, pacing, partida, xco, posición

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Abstract

Cross-country mountain bike (XCO) elite competitions consist of several laps of a technical off-road course. At the start of a race, an MTB Cross-country (XCO) rider does not control his position on the grid, this is awarded first, according to his international ranking, and then according to the other conditions provided for in the regulations. However, his performance, immediately after the start and until the end of the first lap, can be trained. This study aimed to analyze the relationship between the position at the end of the first lap and the final classification in an XCO competition. The participants were high-level Portuguese athletes, of the Elite male category, who competed in national competitions held in Portugal between

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2017 and 2020, aged ≥ 19 years. It was concluded that there is a very strong correlation between the position occupied by the riders at the end of the first lap and the final position in the race, mean=0,907 and p=0,006, which is statistically significant, therefore have important implications for training planning in XCO.

Keywords: Mountain bike, pacing, departure, xco, position

Introduction

The Olympic Cross-country (XCO) MTB competitions are races of a single day, with a group start, disputed in several laps on a circuit of 4 to 6 km, on different types of surfaces, with 80 to 100 minutes duration (Stapelfeldt, 2004; UCI, 2021). Athletes are lined up at the start in lines of 8 elements, ordered by the international ranking, from the highest score to the lowest score. The geographic profile of an XCO course varies dramatically from race to race. Major competitions are usually disputed by more than a hundred riders, in a bumpy, technically and physically demanding, and often narrow, course, resulting in an explosive pace from the start, followed by intense and intermittent efforts in about 1h30 (Stapelfeldt, 2004). The nature of the sports seems to suggest that gaining a positional advantage at the start of the race will be critical to performance (Macdermid, 2012). In the exhaustive literature search, we found that few authors have addressed this topic (Macdermid, 2012), others have addressed it from the perspective of analysing pacing at XCO (Abbiss, 2013; Viana, 2013, 2018). (Macdermid, 2012; Novak, 2017; Viana, 2018) stated that the final position at the race is highly dependent on the initial position and it is necessary to design strategies for athletes to progress in the sport. However, the starting position is determined by the international ranking, which means that the best riders will always start in the front positions and this seems to suggest that they will naturally finish the race in the top positions. Several authors have also identified that pacing, defined by Atkinson (2003) as the load distribution throughout the race, is similar between the laps of an XCO race and that the best riders make a more consistent distribution during the event (Abbiss, 2013; Martin, 2012; Viana, 2013, 2018). Macdermid (2012) had already identified the need for a positional advantage at the beginning of the race. If a rider is placed on the starting grid in a position far from the front, it will be essential that he quickly regain as many positions as possible. Novak (2017) mentions that XCO riders, who start the race with a massive start, encounter several ups and downs and narrower paths, where cyclists are forced to follow in line, causing difficulties in overtaking slower ones and that riders starting at the back can be immediately disadvantaged, while riders starting at the front can continue pedalling at the desired pace. Confirming the above, in a study by Stapelfeldt (2004), it is stated that riders who started at the front of the race recorded maximum intensities of maximum oxygen consumption (VO2 max), while riders who started at the back of the grid only managed to register submaximal intensities. These data seem to suggest that, for those who start at the back of the grid, the difficulties that the course offers, the necessary overtaking, the crashes that may happen, will all contribute to these riders not being able to put their maximum potential on the track.

For this reason, it is of fundamental importance to assess the existence of a correlation between the position at the end

of the first lap and at the end of the race. After researching the digital platforms Ebsco, Web of Science and Google Scholar, no reference to this issue was found in the published scientific literature. This research gap on the subject attests to the relevance of this study, due to the influence that its conclusions may have on training strategies from the point of view of technical, physical and tactical preparation by the coaches and, consequently, on the performance in competition. Therefore, taking into account the importance of the starting grid position, as well as the constant pacing observed in the various laps of an XCO event, we suggest that the performance during the first lap can influence the final result. Thus, this investigation aims to analyse whether there is a relationship between the position occupied at the end of the first lap by a rider in an XCO MTB event and his final classification.

Objectives and hypotheses

The purpose of this study is to assess the correlation between the position at the end of the first lap and the final classification of a rider in an XCO competition. Also, to determine the importance of performance in the first lap in the final classification in an XCO competition and implications for training.

Its relevance is due to the fact that a similar study has never been carried out in cycling worldwide, the results of which could have implications for training.

Two hypotheses were formulated:

H1: There is a correlation between the position at the end of the first lap and the final classification in an XCO competition.

H0 (null hypothesis): There is no relationship between the position at the end of the first lap and the final classification in an XCO competition.

Methodology

Design

A quantitative study was conducted, based on the collection of data obtained on the classifications of the XCO events present on the website of the Portuguese Cycling Federation (FPC) at www.fpciclismo.pt and the respective starting orders of the riders.

Through the analysis of the data contained in the official classifications of the races considered, the hypotheses of this study were tested using the statistical analysis software SPSS.

Instruments

The rankings obtained on the FPC website are sorted according to the final time of each rider in the race. The lap times performed by each participant are also available. Times were recorded using the electronic classification system with FPC's software, with TAG decoder (TAG Heuer, La Chaux-de-Fonds, Switzerland). For statistical analysis, software SPSS/PC (Windows version 27, Statistical Package for Social Sciences, USA) was used.

Participants

The selected participants are high-level athletes who competed in the XCO National Championships in 2017 (n=15), 2018 (n=20), 2019 (n=12), 2020 (n=14) seasons and in the Portuguese Cup held in Valongo on June 16, 2019 (n=29). Athletes are part of the Elite male category, aged ≥ 19 years. The reason for choosing this group of participants is due, on the one hand, to the easy access to the necessary data and, on the other hand, to the fact that there is no published study

carried out with Portuguese athletes in national competitions, and finally, the opportunity to use data from high-level athletes.

Protocols

The XCO MTB National Championship (CN XCO) is disputed annually, in a single race. For this study, the classifications of the CN XCO for the seasons from 2017 to 2020 were considered, as well as the competition of the Portuguese Cup (TP XCO) of 2019 held in Valongo. For each of the races, the starting listings were also obtained, with the riders sorted by the order of call provided for in the FPC regulations for the CN XCO:

- Firstly, the most highly rated riders in the world ranking (UCI);

- Secondly, the highest-scoring riders in the updated TP XCO at the time of the race;

- Thirdly, in order of registration.

Athletes are called to the starting grid by the order of call defined by the regulations and lined up in parallel, in successive rows of eight riders. The rider in position one is the first to be called to occupy a position in the first row, the rider in position nine is the first to be called to the second row, and so on. Upon being called, each rider can choose his starting place within the respective line and available positions.

The rankings for the selected events were obtained from the FPC website, in the results area of national mountain bike competitions. For the purposes of this study, only those riders who finished the race in the same lap as the winner were considered, that is, all the athletes who completed the same number of laps as the winner.

Using the SPSS statistical analysis software, the hypotheses of this study were tested. The correlation between the order of passage at the end of the first lap (Post1Volta) and the position at the end of the race (PosFinal) was analysed, as well as the correlation between the starting position (PosPartida) and the PosFinal of each rider. The average variation of times per lap and the difference between the highest and the lowest value of time per lap (amplitude) in each race were also calculated.

Data Analysis

SPSS/PC software (Windows version 27, Statistical Package for Social Sciences, USA) was used for all statistical analyses. In all procedures, a significance level of 95% ($p \leq 0.05$) was adopted. The results were presented in the form of mean, standard deviation, maximum and minimum values and tables were built to present the results. In the study of the correlation between the position at the end of the first lap (Pos1Volta) and the start (PosStart) and the final result (PosFinal), firstly, Scatterplot graphs were created: Figure 1 - independent variable Pos1Volta and PosStart, and dependent variable PosFinal, with factor category of participants (male elite). Then, the Pearson Correlation Coefficient test was used, with the studied variables.

Results

The results of data collection, analysis and processing were recorded in tables 1 and 2.

In table 1, the data of the mean variations between the starting position and the end of the first lap (VM1), between the starting position and the position at the end of the competition (VM2) and between the position at the end of the first lap and the position at the end of the competition

(VM3) and respective standard deviations. The maximum (number of lost positions) and minimum (number of won positions) values were also recorded, as well as the amplitude between these two values, for each of the variations studied in each analysed race.

Table 2 shows the values resulting from the calculation of correlations between the position at the end of the first lap and the position at the end of the competition (CorPear 1) and between the starting position and the position at the end of the competition (CorPear 2).

Table 1.
Position variation values at the start grid, first and final lap

CN2017			CN 2018			CN 2019			TP 2019				C
M1	VM2	VM3	VM1	VM2	VM3	VM1	VM2	VM3	VM1	VM2	VM3	VM1	VM
,33	-3,87	-0,53	-3,10	-4,65	-1,55	-1,00	-1,42	-0,42	-5,79	-5,79	0,00	-2,43	-3,
473	6,376	2,306	6,268	6,710	1,322	4,690	4,716	1,754	9,586	10,243	3,017	5,192	7,3
3	3	4	10	8	0	4	3	3	12	11	8	3	3
19	-23	-5	-17	-19	-6	-15	-16	-2	-27	-30	-8	-18	-2
2	26	9	27	27	6	19	19	5	39	41	16	21	2

Pos1Volta=position at the end of first lap; PosPartida=position on the starting grid; PosFinal=position at the end of the race; VM1=médium variation PosPartida/Pos1Volta; VM2=médium variation /PosPartida/PosFinal; VM3=medium variation Pos1Volta/PosFinal; SD=standard deviation.

Table 2.
Pearson correlation

	CN 2017	CN 2018	CN 2019	TP 2019	CN 2020	Mean
CorPear 1	0,796	0,715	0,718	0,774	0,629	0,726
p	0,015	0,016	0,031	0,008	0,034	0,021
CorPear 2	0,895	0,993	0,883	0,933	0,832	0,907
p	0,005	0,000	0,010	0,001	0,013	0,006

CorPear1=Pearson correlation PosPartida/PosFinal; CorPear2=Pearson correlation Pos1Volta/PosFinal; p=p-value

Discussion

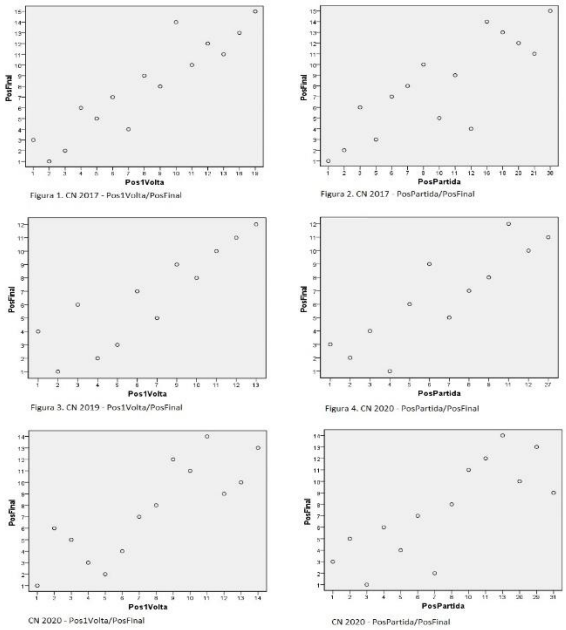
From the data collected, it is possible to verify that the average variations in the position of the riders between the start and the end of the first lap (VM1) and between the start and the end of the race (VM2), have values of the same order of magnitude, similar between themselves, negative, which means that the athletes gained positions throughout the race, in all five competitions analysed in this study. The same relationship can be observed when comparing the values of maximum and minimum variation in position between the two situations, VM1 and VM2, resulting in equally similar amplitude values, which reinforces the observed relationship. These results, which seem to suggest that the most significant number of position variations in the race, as well as their absolute value, occur during the first lap of the race, are in line with the literature and the review presented in this study (Macdermid, 2012; Novak, 2017; Viana, 2013).

However, there is a clear difference in VM3 parsing. In fact, the results obtained regarding the average variation between the position at the end of the first lap and the final position (VM3), reveal a clear reduction compared to VM1 and VM2. In this case, the variation of the maximum value (loss of positions) remains stable when compared to VM1 and VM2, but there is a significant reduction in the minimum values (gain of positions - going up in the race´s classification) when related to VM1 and VM2. The amplitude values in VM3 are lower than in VM1 and VM2 (there is a reduction of between 44 and 22% respectively), so this fact seems to suggest that, in the relationship between the position at the end of the first lap and the final position in the race, there is greater stability of positions among

athletes compared to what was found through VM1 and VM2.

These data are in accordance with Abbiss (2013) and Viana (2013, 2018), who refers to stability in pacing, that is, in the loads distributed throughout the race. The analysis of the data obtained through the correlations between PosPartida/PosFinal (CorPear 1) and Pos1Volta/PosFinal (CorPear 2) confirms and reinforces the previous analysis. Indeed, we observed a strong positive correlation in CorPear 1, meaning that the lower the starting position (or call order), the better the final classification in the race, which is in line with the scarce literature found that emphasizes the importance of the starting position for the final position. A mean correlation of 0.726 with p=0.021 was obtained, which we can consider strong and statistically significant. However, in the analysis of CorPear 2, we found that this correlation is even stronger and more significant, with a mean value of 0.907 and p=0.006, thus reinforcing its strength and statistical significance. This correlation can be observed in the Scatterplot graphs represented in Figure 1.

Figure 1.



From these data, it is possible, at first hand, to reinforce the importance of the position that the rider occupies in the starting grid for his final classification. This relationship was statistically proven in this study and is in agreement with the published literature. We can also confirm that the position that the athletes occupy at the end of the first lap, undergoes fewer variations until the end of the race, compared to the variation in the position they occupy on the starting grid until the end of the first lap. The relationship between Pos1Volta and PosFinal is very strong and, therefore, it can be concluded that the rider's position in the first lap of the race has a significant influence on the final result and this has implications for training planning and the approach to competition. From the above, it is possible to affirm that hypothesis 1 of this study was confirmed.

Conclusions

With this study, it was possible to conclude that there is a great variation between the position occupied on the starting grid and the position occupied at the end of the first lap among the riders of an XCO MTB competition. Also, that between the end of the first lap and the end of the race, there is less variation of positions. We also concluded that there is a very strong correlation between the position occupied by the riders at the end of the first lap and the final position in the race, which is very strong and statistically significant.

The conclusions presented in this study allow coaches to reflect on the entire training process and its implications. In the world of cycling, more specifically in the XCO MTB, the strategy used in competition involves raising points that enable the athletes to climb their position

in the international ranking, as it allows them to gain positions in the starting grid that we confirm as preponderant for the final result. According to the data presented, it is proposed that coaches should create a training and competition plan based on three fundamental areas for improvement of the final result in the race:

- Develop participation strategies in international competitions of the different categories that allow riders to conquer the necessary UCI points to rise in the international ranking and, consequently, gradually improve their position on the starting grid;

- Creation of training exercises that enhance performance at the start and throughout the first lap, in a phase characterized by an explosive start, a course of high technical demand and probable overtaking difficulties;

- Creation of training exercises that allow the maintenance until the end of the race of the proper pace/intensity after a first lap performed at high intensity.

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