








Predictors and reasons for dropping out of long-distance mountain races

Sílvia Puigarnau¹  , Neus Guinovart, Itziar Urquijo²  & Saul Alcaraz¹  

¹ National Institute of Physical Education of Catalonia, University of Lleida (Spain).

² Deusto Sport & Society, Deusto University, Bilbao (Spain).

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*Corresponding author:

Sílvia Puigarnau
spuigarnau@gencat.cat

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Laura Kluge fighting for the puck in the match between Germany and Hungary during the Eishockey Deutschland Cup, in Landshut, Germany, on November 9, 2024
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Abstract

Interest in long-distance mountain races has been steadily increasing. Many varying factors other than physiological aspects must be considered in order to overcome these challenges, such as mental and strategic factors. The need to juggle so many factors at once may explain the high rate of race withdrawals or dropouts. The main aim of this study was to analyze the predictors of dropping out of long-distance mountain races and to discover participants' reasons for withdrawing from the Canfranc-Canfranc Ultratrail (2023) and Val d'Aran by UTMB races (2023). The participant dropout rate was 32.7%. The resulting predictors were negative sensations prior to the race and competing in the longest distance. After analyzing these predictors, the main reasons for dropping out were adverse weather, onset of debilitating fatigue, injury during the race, other performance-related factors, and illness and gastrointestinal distress. Our results demonstrate the importance of preserving health as an essential factor in dropping out of long-distance mountain races.

Keywords: drop out, endurance sports, survival, ultra trail.

Introduction

With the growing trail running trend (Venero, 2007), increasing interest in long-distance events has been observed recently among both amateur and professional athletes (Cejka et al., 2014). These challenging events (Scheer, 2019) attract athletes who want to test their mental and physical limits (Belval et al., 2019) as well as their strategic planning capabilities. These mental, physical, and strategic skills, however, are not always sufficient to endure the full gamut of challenges presented during these races, and many participants end up dropping out. Studying the reasons and factors involved in dropping out is essential to delving into the complex experiences of runners and their performance in these types of races.

These types of races and their specific characteristics are a growing concern to the industry professionals who are responsible for ensuring the safety of race participants (Glick et al., 2015). With that in mind, there is a need for a comprehensive approach (Lepers & Cattagni, 2012) that studies the physical, mental, and strategic aspects associated with successfully completing these races (Balducci et al., 2017). On that topic, Millet et al. (2012) state that it is essential to maximize aerobic capacity, plan strategically, develop mental toughness, manage recovery, and adapt to the weather and terrain conditions. According to Méndez-Alonso et al. (2021), individuals who participate in long-distance races tend to present mental toughness, resilience, and non-obsessive passion. Similarly, participants must have excellent cardiovascular, musculoskeletal, and mental fitness, an elevated awareness of their own body, and well-studied race preparation and strategy.

According to Philippe et al. (2016), dropping out of long-distance races is a common occurrence. Their study identified seven representative stages that lead up to dropping out: feeling pain, giving meaning to those feelings, adjusting running style, attempting to overcome the problem, other runners' influences, assessing the situation, and finally, deciding to drop out. The same authors (2017) later analyzed when these sequences occur during a race: 46.2% at resupply points, 35.6% during ascents, and less than 20% during descents. They also associated the most difficult terrain with more dropouts.

Along the same lines, Bordás and Fruchart (2023) offered an interesting view on decision-making models in adverse circumstances in mountain races. They found that athletes'

real-time perceptions of effort and pleasure influenced their decisions to reduce, increase, or maintain pace. These perceptions could be key to understanding the reasons behind deciding to drop out of a race.

As far as factors related to dropping out, we highlight psychological factors, health-related factors, and those related to vitality states. From a psychological perspective, Méndez-Alonso et al. (2021) observed that aspects such as mental toughness, resilience, and passion for the sport were positively related to race completion. This aligns with the results of Corrion et al. (2018), who found that self-efficacy and coping strategies based on seeking social support contributed to protecting against dropout, whereas avoidance-based coping strategies were positively related to race dropout.

Another key factor to explain dropout is associated with health preservation. In terms of health, if health-seeking is one of the foundational reasons for participating in a race, the absence of this motivation, or fear of health declining during the race, could lead to deciding to drop out. This relationship between risk and health highlights the complexities of decision-making under these circumstances (Chambers & Poidomani, 2022).

Additionally, Rochat et al. (2017) examined vitality states during mountain races. Vitality states are the different conditions that runners experience. There are three main states: vitality preservation, vitality loss, and vitality revival. The authors observed significant differences in how these states evolved throughout a race between runners who completed the race and those who withdrew. Based on those observations, they pointed out the importance of knowing how to adapt and modify these states in order to complete the race.

Previous research has mainly used qualitative methodology to study the factors of dropping out of mountain races and provided a detailed understanding of participants' experiences in these competitive events. However, to supplement that research, we need to conduct studies that analyze the factors involved in the likelihood of dropping out and that quantify the main reasons for race withdrawal. With that in mind, the primary objective of this study was to analyze the predictors of dropping out of long-distance mountain races. In addition, the secondary objective was to determine why participants dropped out of the races, differentiating between races with three different distances.

Method

Participants

The study sample included a total of 211 participants ($M_{age} = 44.5$ years, $SD = 8.7$; 88.6% male) in the Val d'Aran by UTMB ($n = 80$) and Canfranc-Canfranc ($n = 131$) races. The participants competed in either the amateur ($n = 164$; 77.7%) or semi-professional ($n = 47$; 22.3%) category and had been competing for an average of 7.5 full seasons ($DE = 5.1$) in mountain races. In the Val d'Aran by UTMB race, we analyzed three distances: short (55 km with 3,700 m+), medium (110 km with 6,400 m+) and long (163 km with 10,000 m+). The same applied to the Canfranc-Canfranc race: short (45 km with 3,700 m+), medium (70 km with 6,100 m+) and long (100 km with 8,848 m+). All the above are considered long-distance races. The participants were distributed among the race distances as follows: short distance $n = 88$ (41.7%), medium distance $n = 56$ (26.5%), and long distance $n = 67$ (31.8%).

Instruments

We developed an ad hoc instrument to collect data on the predictors and reasons for dropping out of mountain races. This was a questionnaire to collect information on the participants' characteristics (i.e., sex, age, athletic level), their preparation (i.e., hours of training, injuries during the season), and their experience in mountain races (i.e., years practicing the sport, competition category, races run during the season, prior races from which they had withdrawn). The participants were asked if they had dropped out of the race and, if they answered positively, the reason or reasons that led to their decision. The participants completed the questionnaire virtually via Google Forms.

Procedure

The procedure used in the study of predictors and reasons for dropping out of mountain races was divided into three stages. First, the study was designed according to the principles of the Declaration of Helsinki and was approved by the Ethics Committee of the Arnau de Vilanova Hospital in Catalonia (1665). Next, we contacted the organizational committees of the Val d'Aran by UTMB and Canfranc-Canfranc races to explain the aim of the study and to coordinate data collection.

Contact was made three months prior to when each race was scheduled to be held. Once the organizations had granted approval, it was agreed that the research group would send a reminder email one week before each race. Lastly, runners who ran in both races in the previously stated distances were invited to participate in the study. After the races, the organizations sent emails to those participants with a brief introduction about the aims of the study and instructions on how to fill out the questionnaires. The first page of the questionnaire included an informed consent form. One week after this initial contact between the organization and the runners another email reminder was sent encouraging anyone who had not yet participated to do so.

Data analysis

The data were analyzed according to a three-step process and using the SPSS v. 26 statistics software. We first analyzed the data descriptively, with means and standard deviations for the quantitative variables and frequencies and percentages for the categorical variables. This preliminary analysis also enabled us to analyze lost values.

Secondly, to address the primary objective of the study and determine the predictors of dropping out of the races, we analyzed possible differences between participants who dropped out of the race and those who did not using χ^2 (categorical variables) and t-tests (continuous variables). The variables that differed significantly at a bivariate level ($p < .05$) between the runners who dropped out and those who did not were plugged into a logistic regression model to identify the factors independently associated with the likelihood of dropping out of the race. The binary logistic regression analysis was carried out using a forward stepwise procedure (entry criterion $p < .05$, elimination criterion $p > .10$).

Third, and lastly, to satisfy the secondary objective, we analyzed the reasons for dropping out. To that end, we classified the different reasons based on responses to the open-ended questions and obtained the following categories: Weather conditions, Injury during the race, Pre-race injury, Fatigue, Mental factors, Performance, and Illness and gastrointestinal distress. We then obtained the frequencies and percentages for each type of reason for dropping out. We also analyzed the frequency and percentage of each reason for the three race modalities: short distance, medium distance, and long distance.

Results

Primary objective: predictors of withdrawal

Comparison between participants who do and do not drop out

The preliminary data analysis revealed the percentage of lost values was less than 5% for all variables, and thus had no impact on the subsequent analyses. Out of the total number of

participants, 69 runners dropped out of the race (32.7%). As seen in Table 1, we found statistically significant differences between the runners who dropped out of the race and those who did not for three variables. In that regard, a higher number of participants who dropped out of the race reported not having positive sensations at the starting line (23.2% vs. 12.0% for those who did not drop out), were mainly competing in the longest distance (53.6% vs. 21.1% for those who did not drop out), and had been competing for more years in mountain races (8.6 vs. 7.0 for those who did not drop out).

Table 1
Comparisons between individuals who do and do not drop out of races.

Variable	Participants who do not drop out	Participants who do drop out	Comparison (χ^2 or T-test)
Sex, n (%)			
Male	127 (89.4 %)	60 (87 %)	NS
Female	15 (10.6 %)	9 (13 %)	
Competition category, n (%)			
Amateur	111 (78.2 %)	53 (76.8 %)	NS
Semi-professional	31 (21.8 %)	16 (23.2 %)	
Positive sensations prior to the race, n (%)			
No	17 (12 %)	16 (23.2 %)	$p = .044$
Yes	125 (88 %)	53 (76.8 %)	
Race distance, n (%)			
Short	73 (51.4 %)	15 (21.7 %)	$p < .001$
Medium	39 (27.5 %)	17 (24.6 %)	
Long	30 (21.1 %)	37 (53.6 %)	
Injuries during the year, n (%)			
No	91 (64.1 %)	46 (66.7 %)	NS
Yes	51 (35.9 %)	23 (33.3 %)	
Drops out in previous races this year, n (%)			
No	118 (83.1 %)	50 (72.5 %)	$p = .072$
Yes	24 (16.9 %)	72.5 (27.5 %)	
Age, <i>M</i> (SD)	44.3 (8.5)	44.8 (9)	NS
Years competing in mountain races, <i>M</i> (SD)	7.0 (4.8)	8.6 (5.5)	$p = .032$
Number of previous races this year, <i>M</i> (SD)	4.5 (3.7)	4 (3.1)	NS
Weekly hours of training, <i>M</i> (SD)	8.1 (4.1)	8.9 (4.4)	NS

Note. NS = Not significant ($p > .05$)

Predictors of dropping out

The three variables from the previous stage that presented significant differences between runners who did and did not drop out of the race were plugged into the binary logistic regression model as predictors of dropping out. Withdrawal from previous races that year was also added as a predictive variable, with a value of $p = .072$ in the bivariate comparison. As seen in Table 2, the statistically significant predictors in the binary logistic regression (Hosmer–Lemeshow test: $\chi^2(3) = 0.955$, $p = .812$; Nagelkerke's $R^2 = .189$) were, positively, lack of positive sensations before the race (OR = 2.645; 95 % CI = 1.154 – 6.061) and negatively, competing in the short distance (OR = 0.154; 95% CI = 0.072 – 0.328) and in the medium distance (OR = 0.364; 95% CI = 0.171 – 0.774) races compared to the longest distance.

Supplementary aim: comparing the reasons for dropping out among runners

As seen in Table 3, weather conditions (37.7%) were the main reason for dropping out for both the general sample and for the participants in the medium and long-distance races. As for participants in the shorter distance races, the main reason

for dropping out was related to illness and gastrointestinal distress. Some of the other most stated reasons included suffering an injury during the race (23.2%), the effects of fatigue (20.3%), and performance-related reasons (17.4%), such as not making cut-off times or dissatisfaction with one's own performance.

Discussion

This study analyzed the predictors for dropping out of long-distance mountain races and the reasons that lead runners to decide to drop out. Our results show that a lack of positive sensations at the start of the race and competing in the longest distance modalities are predictors of race dropout. The study also highlights how adverse weather conditions, illness and gastrointestinal distress, injuries during the race, the effects of fatigue, and performance-related aspects play additional, key roles in dropping out of races with these characteristics. As a whole, our results allowed us to delve into the phenomenon of mountain race dropouts, enabling us to quantify predictors and motives and to identify health preservation as a key aspect of dropping out of these types of events.

Table 2

Predictors for dropping out of the mountain race.

	B	Wald χ^2	p	OR	95 % IC
Positive sensations prior to the race	0.973	5.285	.022	2.645	1.154 - 6.061
Short distance (versus long)	-1.870	23.527	0	0.154	0.072 - 0.328
Medium distance (versus long)	-1.011	6.883	.009	0.364	0.171 - 0.774
Constant	0.063	0.061	.805	1.065	

Nota. OR = Odds ratio; CI= Confidence interval for the OR.

Table 3

Description of the reasons for dropping out.

Reason for dropping out	Full sample	Short distance	Medium distance	Long distance
Weather	26 (37.7 %)	2 (13.3 %)	8 (47.1 %)	16 (43.2 %)
Injury during the race	16 (23.2 %)	3 (20 %)	4 (23.5 %)	9 (24.3 %)
Pre-race injury	5 (7.2 %)	1 (6.7 %)	0 (0 %)	4 (10.8 %)
Fatigue	14 (20.3 %)	3 (20 %)	1 (5.9 %)	10 (27 %)
Mental factors	3 (4.3 %)	2 (13.3 %)	1 (5.9 %)	0 (0 %)
Performance	12 (17.4 %)	3 (20 %)	3 (17.6 %)	6 (16.2 %)
Illness and gastrointestinal distress	9 (13 %)	4 (26.7 %)	3 (17.6 %)	2 (5.4 %)

Note. NS = Not significant ($p > .05$)

Health preservation seems to play a fundamental role as a predictor of withdrawal in relation to the lack of positive sensations prior to the race and as a reason for dropping out. Despite the considerable numbers of runners (who may or may not be sufficiently prepared) willing to sign up for long-distance races to test themselves in an athletic challenge, it can be inferred from our study that the decision to drop out is related to avoiding situations that could result in worsening health. In that regard, prior research has highlighted the importance of maintaining a balance between athletic challenge and health preservation (Chambers & Poidomani, 2022). Similarly, this result is closely related to the paradigm shift taking place within sports activities in recent years. While focus has traditionally been placed on performance, today many studies prioritize analyzing factors associated with athletes' overall well-being (Thuany et al., 2023; Le Goff et al., 2021). This is even more true in the case of long-distance races (in which participation only continues to increase), as runners expose themselves to highly demanding (Jaenes et al., 2022; Rose et al., 2023), and very likely unhealthy situations (Scheer et al. 2021) that contribute to the onset of injury (Hoffman & Krishnan, 2014).

Predictors for dropping out of long-distance mountain races

Sensations at the start of a race seem to play a fundamental role in the process of deciding to drop out of a race. These sensations are highly personal and involve assessing both non-specific (e.g., evaluating expectations) and specific aspects (e.g., presence vs absence of discomfort). These results may help complete the succession of sequences described by Philippe et al. (2016) by adding the importance of sensations felt prior to starting a race. Our results can also be associated with the vitality states experienced during the race as described by Rochat et al. (2017). Therefore, it is possible that a lack of positive pre-race sensations could be related to states of vitality loss that are associated with dropping out. Likewise, it is possible that race expectations may impact the how participants feel prior to the race. The connection between these results and those from our study suggest that an analysis of the reality that fits the situation, proper identification of which indicators enable us to adequately evaluate pre-race sensations, and putting those sensations into perspective could help minimize the impact of negative feelings on the likelihood of dropping out.

As for race distance, we observed that dropout rates increased with longer distances. This could be due to the increased duration and cognitive, motivational, and emotional

demands required in races of this kind, as well as runners' own perceptions of greater effort and level of fatigue (Berger et al., 2024). On the other hand, psychological factors such as perfectionism have been associated with long-distance runners and one could associate dropping out of a race with self-protection strategies to avoid social and personal failure (Curtis & Hutchinson, 2022) when runners feel they are not performing up to their expected level.

Reasons for dropping out of long-distance mountain races

Based on our results, health preservation was also directly or indirectly linked to many of the reasons for dropping out as stated by the race participants. The main reason for dropping out was adverse weather conditions. At the physiological level, adverse conditions can present a risk to health (e.g., increases or decreases in body temperature, changes in blood pressure). In terms of emotional and cognitive aspects, poor conditions can lead to more fatigue and may hasten decision-making, such as deciding to drop out (Peng et al., 2023; Próchniak & Próchniak, 2020; Wagner et al., 2019).

Our results show that injuries prior to or during the race were another important reason for dropping out. In that regard, Hespanhol et al. (2017) reported a mean prevalence of trail running-related injuries with a higher prevalence for overuse injuries than for acute injuries. We can deduce from our results the importance of designing injury prevention programs that look out for the health of race participants (e.g., Vincent et al., 2022). Our results also indicate a higher prevalence of injury-related reasons for dropping out in longer distances. In relation to this result, it is important to consider the study from Hoffman and Fogard (2011) that highlights that the incidence of injury is not directly related to race distance but is related to the general sport of ultra running and the elevated number of training hours.

Fatigue is another health-related reason for dropping out. One study by Temesi et al. (2021) supports the hypothesis that central fatigue plays a crucial role in decreased performance among runners, particularly in longer distance events. However, a Hoffman and Fogard study (2011) indicates that exhaustion influences runners' performance but does not register as a primary cause of withdrawal. As the evidence is not clear-cut, we think it is important for future studies to delve deeper into what triggers the onset of perceived fatigue. For example, it is known that inadequate food and water intake strategies during these races can lead to the onset of fatigue and worsening performance (Hargreaves et al., 2004; Jeukendrup et al. 2011; King et al., 2018), which could lead to dropping out.

Practical applications

In terms of practical applications, on the one hand our study allowed us to identify the main factors and reasons related to dropping out of long-distance mountain races. Professionals in different scientific fields related to this sport (physiology, psychology, nutrition) can use these results to design and implement prevention and intervention protocols that holistically address all the reasons identified. On the other hand, our study shows that the health variable plays a fundamental role, both directly and indirectly, in deciding to drop out of a race with these characteristics. We believe these results could be of particular interest when organizing mountain race events and courses as they focus on finding a balance between the inherent challenge that these races present and preserving the health and safety of the participating individuals.

Limitations and future research

Despite the results this study offers, we must highlight two main limitations. On the one hand, the reasons for dropping out were coded according to an open-ended question. While asking the question in this manner allowed participants to provide more detailed explanations of their reasons for dropping out of the race, this meant that the research team was responsible for classifying those reasons into the categories that were later analyzed. Second, we must point out the situational nature of the sample analyzed. It represents a portion of the total number of participants who dropped out of the Val d'Aran by UTMB and Canfranc-Canfranc races, and the data collected could have been influenced by the specific characteristics of these competitive events (e.g., type of terrain, topographic profile, conditions on the day of the event). Therefore, we encourage future research to analyze the predictors and reasons for dropping out during events with different characteristics in order to complement the results of this study.

We would also like to propose two future lines of complementary research. First, we propose analyzing individual differences between runners, contextualizing the problem from a comprehensive point of view. For example, in terms of psychology, emotional regulation, personality, and mental toughness could be included since previous studies have stated that these could be deciding factors (De la Vega et al., 2011). It may also be interesting to analyze perceived race quality, which would involve assessing factors like perceived value, logistical infrastructure, or supplementary services (Madruga-Vicente et al., 2021). Second, we believe that studying race dropout could benefit from a methodological approach that tracks runners' experiences during the race.

Wearable technology like physiological and performance monitoring devices could be very useful for gaining objective information about factors involved in effort management, race strategy, and decision-making.

Conclusion

As far as we know, this is the first study to analyze the predictors of dropping out of long-distance mountain races. Specifically, our research shows how races with longer distances and more elevation gain, as well as a lack of positive sensations prior to the race, are related to a higher likelihood of dropping out of a race. Our results also highlight weather conditions, injuries, fatigue, and under par performance as reasons for dropping out of mountain races. Based on our study, we can infer the importance of balancing athletic challenge with health prevention in order to optimize experiences during long-distance races and to encourage safe and sustainable participation in these types of sports events.

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