






## Study on the motivations for the practice of speleology

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Mountain biker enjoying  
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### Abstract

This article studies the reasons that lead people to practise caving as a physical-sporting activity. To this end, the relationships between different motivations and variables of interest such as gender, academic studies, federation membership, caving level, and participation in “alpine” explorations were analysed. A cross-sectional study was carried out with 502 cavers (355 men, 146 women) aged 18-76 years ( $M = 45.38$ ;  $SD = 11.32$ ) and with caving experience between 1 and 73 years ( $M = 15.78$ ;  $SD = 13.54$ ). Participants completed an electronic survey on the reasons for caving and socio-demographic data. The results revealed that the main reasons for caving are intrinsic, such as being in contact with nature or gaining personal and life experience. Significant associations were also found for gender, level of education, federal affiliation, and participation in explorations. Future plans to promote caving should take these differences into account in their design.

**Keywords:** caves, caving, motivation, natural environment, physical activity.

## Introduction

In recent decades, participation in extreme and adventure sports in the natural environment, such as climbing, alpine skiing, or caving, has grown exponentially (Pain & Pain, 2005). Outdoor adventure sports elicit a degree of perceived excitement for the practitioner and also involve moving in a wild and vast environment, taking risks, and dealing with the unexpected (Pike & Beames, 2013). These practices provide higher levels of health and well-being than physical activity in built or indoor environments (Shanahan et al., 2016), as regular contact with the natural environment offers a multitude of physical and mental benefits (Hartig et al., 2014).

Among the different outdoor sports practices, caving is a complex discipline that requires specific logistics, detailed planning, multidisciplinary knowledge, comprehensive safety protocols, and teamwork (White, 2019). The discipline has been defined as a “sport science” or a “citizen science” and practitioners as “underground astronauts” (Cant, 2006; Mattes, 2015; Mencarini et al., 2021). However, most of these definitions mainly include characteristics related to the nature or origin and formation of the caves. Thus, Cuenca-Rodríguez (2021) points out that caving is an exploratory activity with two key parts, sport and science, which are united by curiosity. On the other hand, Pans et al. (2023) define caving “as a physical and sporting activity that takes place in a natural space and consists of the exploration or exploration of an underground cavity, either for scientific or recreational purposes, through the use of specific physical skills” (p. 58). Even so, there are very few existing studies that analyse and study this discipline in depth from the perspective of physical activity and sport sciences. In fact, in this same journal (started in 1985), caving is only mentioned within the taxonomies of adventure physical activities in nature (Olivera & Olivera, 1995; Olivera & Olivera, 2016), and in another article that studies the current situation of physical activities in the natural environment in physical education (González-Melero et al., 2023). Likewise, in *Apunts Sport Medicine* it also appears in three physiological studies (Balcells et al., 1986; Yzaguirre i Maura et al., 2008; Yzaguirre Maura & Balcells Diaz, 1989).

However, previous studies in other countries show that caving offers several benefits, such as the development of spatial skills, improvement of mental rotation, or perspective-taking (Muffato et al., 2022). Thus, according to a study of Italian cavers, most of these athletes perform vigorous physical activity at least once a week, indicating that they are very physically active (Viviani & Tommaso, 2017). At

the same time, caving practitioners have significantly lower levels of anxiety than the general population (De la Torre-Cruz et al., 2021). However, the practice of this type of activity also carries a number of risks to practitioners such as getting lost, inhaling polluted air, rockfall, or flooding (StartCaving.co.uk, 2017). In addition, qualitative studies focusing on the use of technology by cavers report the pleasure cavers take in exploring isolated places (Mencarini & Zambon, 2023).

As we have seen, the benefits and risks of caving have been studied, but the motivation to go caving has not yet been explored. In addition, one of the most common questions asked of caving enthusiasts is “why do you go caving?” This question, which triggers the need to know why people go into caves and chasms for physical activity, could be answered by George Leigh Mallory’s reply in 1923 when he was about to make his third attempt at the summit of Everest and was asked why he was doing it: “Because it’s there”. However, apart from this anecdote, which serves to illustrate the need to know why the practice is being used, Ewert et al. (2013) went further and investigated the motivations that existed for the practice of adventure recreational activities. This study concluded that motivational factors can be social, sensation-seeking, and related to self-image. In addition, variables such as level of experience, gender, and type of activity showed different trends in these motivational factors. Dr. Alan W. Ewert has previously conducted several studies on motivation in outdoor activities, including specific disciplines such as climbing. In one of his studies, it was concluded that the most important motivational reasons for climbing, taking into account the level of experience of its practitioners, were challenge, gaining high mental concentration, and enjoyment of the natural environment (Ewert, 1985). Likewise, among the subsequent research carried out in Spain on motivation to climb, we find the study by López-Fernández et al. (2013). In this research, the reasons for climbing were classified into three main groups: one group whose main reasons for climbing were contact with nature, adventure, challenge, fun and physical fitness; another group, which reported personal experience, social relationship, peace, and health as motivations; and finally, the least numerous group, whose main reasons were image, competition, and social recognition. Furthermore, this study found differences in motivations according to the gender of the participants: female climbers showed a higher motivation towards climbing for fun and body image improvement than male climbers.

With the aim of expanding the scientific literature in

the field of caving, the purpose of this study is to find out the reasons for caving and whether there are differences in motivation according to gender, academic studies, federation membership, caving level or participation in “alpine” explorations.

## Methodology

### Procedure

The fieldwork was carried out between October 2022 and December 2022. Potential participants were contacted through the caving federations in Spain, some of which emailed a link to an online survey (administered by LimeSurvey, Version 5.4.13+) to their members. Participants were also contacted through social media posts (i.e. Twitter and Facebook). To access the full survey, participants had to click on a box

explaining the conditions of participation (i.e. confidentiality, anonymity, and the right to refuse or drop out) and finally give their informed consent. Prior to fieldwork, all procedures and materials were reviewed and followed the guidelines of the Ethics Committee of the University of Valencia. Prior to analysis, all data were checked for outliers, and an experimental mortality of 26 subjects was obtained due to failure to complete the survey correctly.

### Participants

The study involved 502 cavers (355 men, 146 women, and 1 non-binary) aged between 18 and 76 years ( $M = 45.38$ ;  $SD = 11.32$ ) and with caving experience between 1 and 73 years ( $M = 15.78$ ;  $SD = 13.54$ ). In addition, among the participants, the frequency of caving per month ranged from 0 to 23 days ( $M = 3.12$ ;  $SD = 2.53$ ). Table 1 presents the socio-demographic characteristics of the sample.

**Table 1**  
Sample characteristics according to variables of interest (N = 502).

Variable	N	% total
<b>Gender</b>		
Man	355	70.7
Woman	146	29.1
Missing	1	0.2
<b>Academic studies</b>		
School graduate	52	10.4
Higher Education	58	11.6
Vocational training	213	42.4
University students	150	29.9
PhD	29	5.8
Missing		
<b>Federated</b>		
Yes	474	94.4
No	28	5.6
Missing		
<b>Caving level</b>		
Beginner	59	11.8
Intermediate	221	44
Advanced	222	44.2
Missing		
<b>Participation in “alpine” explorations</b>		
Yes	186	37.1
No	316	62.9
Missing		

**Table 2**  
Place of residence of the surveyed (N = 502).

Residence	N	% total
Andalusia	63	12.5
Aragon	9	1.8
Asturias	23	4.6
Balearic Islands	51	10.2
Basque Country	18	3.6
Canary Islands	5	1
Cantabria	25	5
Castilla-la Mancha	10	2
Castilla y León	8	1.6
Catalonia	51	10.2
Extremadura	1	0.2
Galicia	49	9.8
La Rioja	2	0.4
Madrid	42	8.4
Murcia	8	1.6
Navarre	22	4.4
Other (Andorra, Portugal, France, and Mexico)	14	2.8
Valencian Community	101	20.1
Total	502	100

As can be seen, the majority of participants were male (70.7%). In terms of educational level, the most numerous profile was that of people with vocational training (42.4%). The caving level was distributed as follows: beginners (11.8%), intermediate (44%), and advanced (44.2%). The majority of respondents were federated (94.4%), and more than half of the participants had not taken part in any “alpine” exploration campaign (62.9%).

On the other hand, the place of residence of the participants was obtained in terms of Spanish region. Likewise, 2.8% of the sample were people whose place of residence is outside Spain. Table 2 shows the origin of the participants.

## Resources

A questionnaire was used to collect the reasons for caving by frequency of choice, developed by López et al. (2013). This questionnaire was previously used to collect reasons for rock climbing. In addition, this questionnaire was based on that which was designed by Ewert (1994). The questionnaire used is composed of 14 items with reasons for caving, including 13 reasons for caving and one “Other” item with an open-ended response. In this question, participants were

asked to choose the reasons for practice that most represented them, and could indicate as many as they considered fit. In addition, socio-demographic data were collected (i.e. gender, level of education) and variables of interest in caving (i.e. membership of a federation, caving level, and participation in “alpine” explorations).

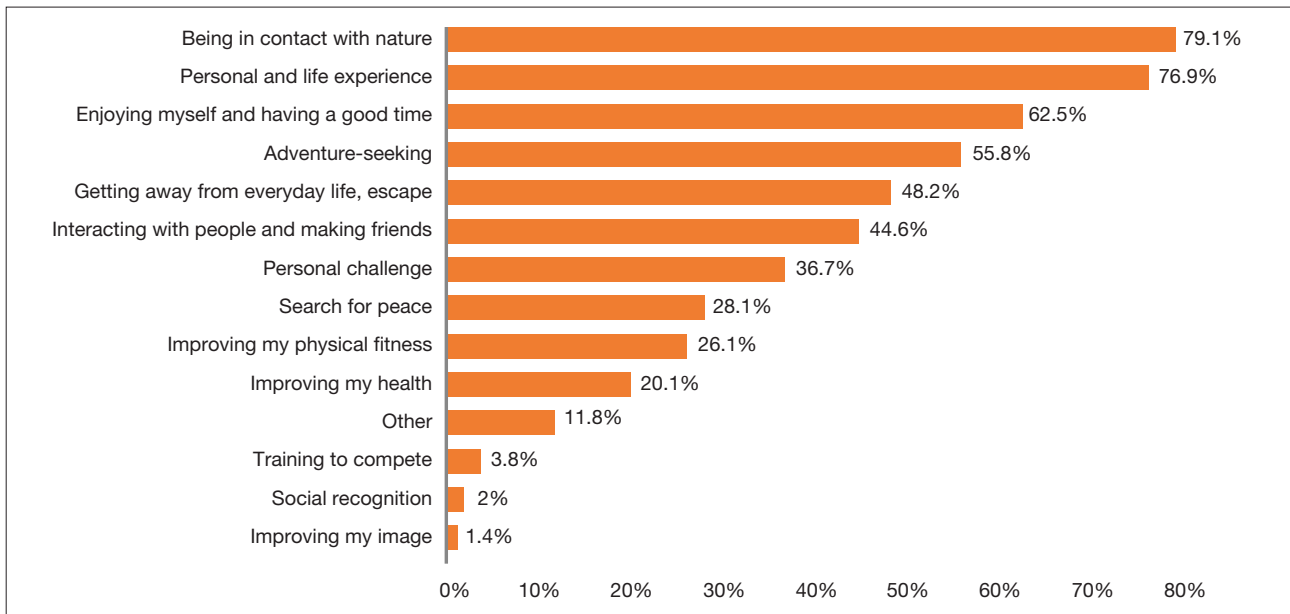
## Statistical Analysis

Statistical analyses were performed using SPSS version 28.0 software (SPSS Inc., Chicago, IL, USA) Pearson’s Chi-square test was used to analyse differences according to gender, and statistical significance was established at  $p < .05$ .

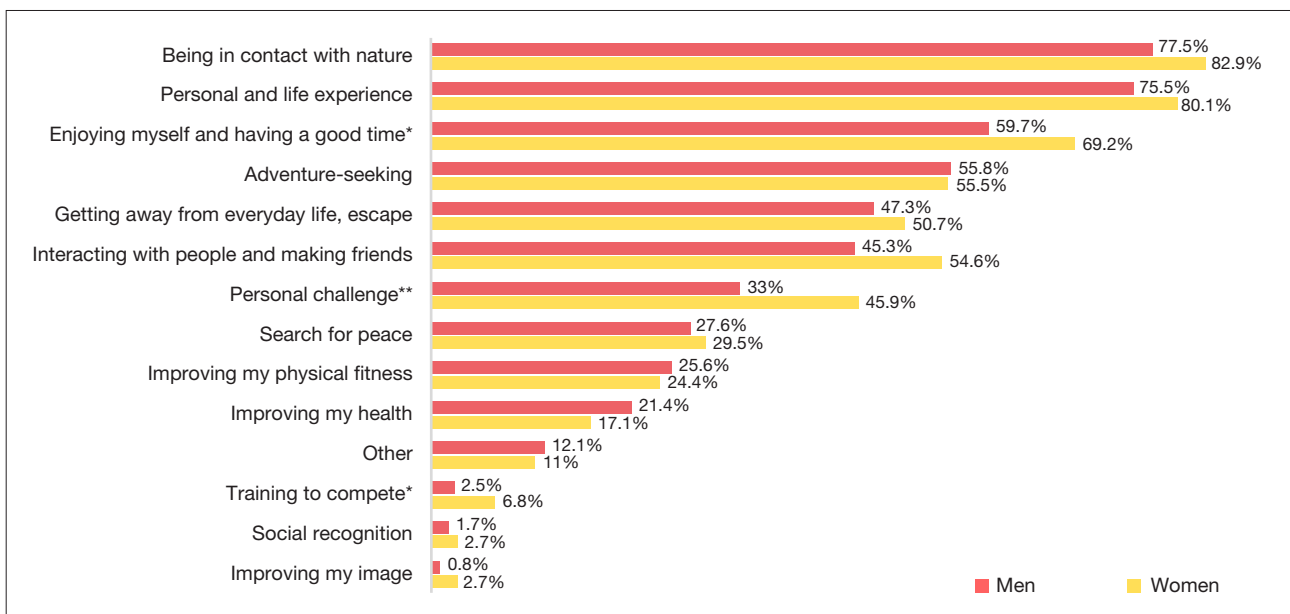
## Results

Figure 1 shows the results of the questionnaire on reasons for caving in order of frequency of choice. On the basis of these, two reasons can be observed that exceed 70%, namely “being in contact with nature” and “personal and life experience”. Two other reasons chosen by more than half of the sample were “enjoying myself and having a good time” and “adventure-seeking”.

**Figure 1**  
Reasons for caving, ordered by frequency of choice and expressed as a percentage.



**Figure 2**  
Frequency of choice of reasons for caving differentiated by gender.



\*indicates significant differences  $p < .05$ ; \*\*indicates significant differences  $p < .01$

This would be followed by “escape”, “making friends” and “personal challenge”, which would be around 40-30%. Among the group of reasons, around 30-20% are “peace”, “physical fitness”, and “health”. Among the least representative reasons were “training to compete”, “social recognition” and “improving my image”.

Also, the category “other” scored 11.8% and in the open answer section some people agreed and gave reasons for practice such as “exploration of new caves”, “scientific discovery”, “underground photography”, “rescue” or “work”.

Figure 2 shows the results differentiated by gender. Significant associations were found using the Chi-square test for three of the reasons for caving. The first of these was in the reason “enjoying myself and having a good time” ( $\chi^2_1 = 3.95$ ;  $p < .047$ ), where women scored 69.2% compared to 59.7% for men. The second, in “personal challenge” ( $c^2_1 = 7.45$ ;  $p < .01$ ), where women obtained a value of 45.9% compared to 33% for men. And the third, in “training to compete” ( $\chi^2_1 = 5.28$ ;  $p < .022$ ), where women had 6.8% compared to 2.5% for men.

In addition, significant differences by level of academic studies were found for the reason “personal and life experience” ( $\chi^2_4 = 12.04$ ;  $p < .017$ ), where, of the total percentage of 76.9% answered, 65.4% corresponded to school graduates, 69.0% to high school graduates, 76.10% to vocational training, 85.3% to university graduates, and 75.9% to doctoral graduates. Also, by caving level in “adventure-seeking” ( $\chi^2_1 = 4.03$ ;  $p < .045$ ), where beginners obtained 72.9%, intermediate 51.6%, and advanced 55.4%; and in “other” ( $\chi^2_1 = 8.58$ ;  $p < .047$ ) where beginners acquired 3.4%, intermediate 8.1%, and advanced 17.6%. Significant differences were also found in whether they were federated or not, in the reason of “social recognition” ( $\chi^2_2 = 8.58$ ;  $p < .014$ ), where the federated obtained 1.7% and the non-federated 7.1%; and in “Other” ( $\chi^2_2 = 13.99$ ;  $p < .01$ ), where the federated obtained 12.4% and the non-federated 0%. Finally, with respect to the variable of participation in “alpine” explorations, significant differences were only found for the reason “Other” ( $\chi^2_1 = 6.87$ ;  $p < .01$ ), where those who have participated in explorations obtained 16.7% and those who have not obtained 8.9%.

## Discussion

To date, this is the first study on the motivations for caving among a large sample of cavers. The main results of the study show that the main reasons for caving are intrinsic motivations, such as being in contact with nature or gaining personal and life experience. This is evidence that caving is felt to be an intrinsically valuable practice in its own right and that it does not need external or social reinforcement for its motivation. Thus, in Mencarini’s study (2021), expert cavers said they felt like astronauts exploring the last untouched corners of the Earth.

Caving as a practice in the natural environment, whose main purpose is the discovery and exploration of unexplored or little-known environments, is in line with other disciplines practised in the natural environment such as mountaineering or climbing (Olivera & Olivera, 2016). Since there are no previous studies on the motivations of people who go caving, the results presented here will be discussed with studies of other types of caving in the natural environment. One of the main studies related to the motivation to practice activities in the natural environment is that of López et al. (2013) carried out with climbers in Spain. In this study the most frequent reason for climbing was being in contact with nature at 58.2%; however in

the present study, the results for being in contact with nature are 79.1%. In terms of personal and life experience, 76.9% of cavers chose it as a motivation, while 45.9% of climbers chose it as a motivation. In short, there is a discrepancy between climbers and cavers among the main reasons for caving and, although contact with nature is the main reason for both disciplines, it is not given the same importance, since 20.9% more cavers than climbers choose it as the motivation for their practice. This difference may be due to the fact that caving involves the discovery of nature. To give an objective example, at present, about 12 caving explorations are organised annually in the Picos de Europa National Park (Cantabrian mountain range), which report between 5 and 10 km of new galleries each year (Ballesteros, 2021). At the same time, it seems that after the health crisis, contact with natural areas has become more important for the general population (Tansil et al., 2022). On the other hand, it may also be due to the fact that there are more sports facilities such as climbing walls and very few caving walls.

Next, personal and life experience among male and female cavers is the second most chosen reason, however, among male and female climbers it was chosen in seventh place, with a difference with caving of 31% less than among male and female climbers. This discrepancy may be due to the sensations of entering a cave. As Mencarini and Zambon (2023) point out, despite the darkness, the narrowness, or the cold, cavers feel privileged and fascinated by their presence in this environment, as only a few can go and come back intact.

With regard to gender differences, results were obtained with significant differences in 3 items. From highest to lowest proportion, we found differences in “enjoying myself and having a good time”, where men obtained lower values than women, namely 59.7% versus 69.2%, respectively. These results are at odds with most studies of motivation in physical activity and sport, in which women tend to report this motivation to a much lesser extent than men (Frömel et al., 2022; Kopcakova et al., 2015).

The second item in which we found significant differences is “personal challenge” and, in fact, it is the one that has shown the greatest difference, namely 12.9% difference, in favour of women over men. While it is true that there are studies that report that women have a greater need for motivations that provide them with self-improvement, or that in some way imply responsibility, such as the fact of associating it with a goal to be achieved, or feeling good about

themselves (Drummond et al., 2022). Expressing this type of motivation as a personal challenge may have to do with the type of sport, as caving has a strong exploration component, and achieving a complete exploration can be considered an achievement in itself, as there are no marks to compete for and no comparisons between caving practitioners. Finally, significantly different results were also found for “training to compete” where women again obtained higher values than men. This is contrary to the results of studies in sport in general, which have recurrently found a lower interest of women in competition (Budd et al., 2018; Frömel et al., 2022). It is worth noting that this item was only selected by 3.8% of the respondents, and furthermore, what is involved in competitive caving is very different from what is involved in other sports. However, this information may be useful to suggest that the promotion of caving or vertical progression technique (VPT) competitions would be positive for the attraction of women in this sport. This result is in line with the previously mentioned importance of personal achievement and the fact that “compulsory” motivation is needed for women to give sport an important place in their lives (Drummond et al., 2022). Even so, in disciplines such as climbing or caving, competition is not a relevant motivation for climbers. In outdoor and adventure sports, competition takes second place, with the enjoyment of nature, adventure-seeking, the personal challenge or self-improvement or mere fun being the most repeated motivations (Gürer & Kural, 2023; López Fernández et al., 2013).

With regard to the differences found depending on the level of studies with respect to the reason for practice that refers to personal and experiential experience, we observe that this reason is much more important for people with university studies, and then for those with vocational training and doctorate studies, than for people with a school-leaving certificate and baccalaureate. Possibly because the first groups are already immersed in the world of work and caving can provide an experience of social escape or relief from work and/or social burdens. In order to explore this reason further, one should look at age and its correspondence with the level of education, as it is usually the youngest people who have the lowest level of education, as they have not yet completed their education. In this sense, we can associate the differences found according to the level of education to differences in age, where higher motivation scores are usually obtained with increasing age (Gavin et al., 2014).

In addition, beginner cavers tended to value adventure-seeking motivation more highly than intermediate and advanced cavers. This can be related to studies by Ewert (1985), where differences were found in the reasons for practice in climbers according to the level of experience in the discipline. Beginner climbers climbed for extrinsic reasons such as social recognition, escape, or socialisation. However, more advanced climbers selected more intrinsic reasons, including excitement and personal challenge. Compared to our results, it can be seen that caving does not follow the same trend as climbing, as people with lower levels were the ones who valued intrinsic reasons the most. Also, advanced individuals have more specific motivations than beginners (i.e. rescue, exploration, research). Interestingly, there were also differences in social recognition for federation affiliation, with non-federated people having higher values. This could be because people seeking social recognition shy away from federative movements, which in principle are more about the collective rather than the individual. However, it should be kept in mind that this study compares 474 federated versus 28 non-federated individuals. In turn, members gave other reasons such as photography, caving, scientific discovery and explorations of new caves; these motivations should be taken into account for future studies of motivation in caving and included in future questionnaires or reasons for caving practice. Also, in the “Other” item, differences were seen among those who had participated in “alpine” explorations, with those who had participated also giving more reasons. Here standard knowledge in the caving discipline would reveal that people who are federated and involved in exploration tend to be the ones who are most involved in exploration of new caves, rescue (caving rescue), and photography.

Finally, regarding the limitations of the present study, there is one main limitation that deserves to be mentioned, and that is that in the field of speleology there is a large volume and dissemination of publications that are not included in scientific databases (i.e. WoS, Scopus, Google Scholar), and it is very difficult to access these other publications. However, there does seem to be a favourable trend in recent years in the publication of scientific articles on caving, not only related to Karst but also to other aspects of this discipline. It is therefore hoped that this research will add to and contribute to the broadening of scientific knowledge within the world of caving.

## Future studies

In order to gain a deeper insight into the reasons why people go caving, qualitative research could be carried out, as was done in Ewert's study (Ewert et al., 2020). In this study, semi-structured interviews were conducted with mountain bikers, rock climbers, and whitewater rafters in which motivation to practise was addressed. Applying this methodology with caving practitioners would allow the scientific literature on caving as a sport to be expanded. It would also be advisable to work on the elaboration of a questionnaire specific to this physical-sporting practice that includes the different sensitivities and disciplines of caving and their motivations. Furthermore, caving has not yet been approached and studied in depth from the physical activity and sport sciences, perhaps due to its complexity when collecting data, so there are still many interesting studies that can contribute to its exploration from different disciplines.

## Conclusions

This article has explored the reasons for caving among a large sample of male and female cavers. The results allow two conclusions to be drawn regarding the object of study. The first is that the motivations for caving are mainly to be in contact with nature and to gain personal and life experience, i.e. intrinsic motivations. In addition, fun and adventure-seeking are also reasons chosen by more than half of our survey. On the other hand, the results have shown that there are gender differences in reasons such as "enjoying myself and having a good time", "personal challenge" and "training to compete". Finally, the results described above are interesting for future plans to promote the practice of caving and its orientation.

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