

Psychological variables involved in climbing. Operationalizing expert's knowledge.

Santolaya, M. ⁽¹⁾, Rubio, V. ⁽²⁾ and Ruiz-Barquín, R. ⁽³⁾

⁽¹⁾ Applied to Sport Psychology Unit, CPA, University Autonoma Madrid, Spain. miguel.santolaya@inv.uam.es

⁽²⁾ Dpt. Biological and Health Psychology, University Autonoma Madrid, Spain. victor.rubio@uam.es

⁽³⁾ Dpt. Educative and Evolutive Psychology, University Autonoma Madrid, Spain. roberto.ruiz@uam.es

Abstract

In climbing both technical and physical skills have proven to be highly demanding and plenty of research has been done to prove so, but, coaches and climbers claim that psychological factors play a determining role and are key for high performance.

It is true there is an ample catalog of publications available over the impact of psychological factors related to sports performance in general for mass sport, however, a strong established empiric or theoretical base to support psychology to be applied to climbing is still lacking. It becomes necessary to develop new strategies to address this issue.

The aim of this study was to identify psychological variables needed to improve and excel as a climber and to operationalize implicit expert knowledge. For this purpose, four high degree Spanish coaches were interviewed and took part in a three-round focus group.

Results found were organized and grouped according to the model of psychological dimensions proposed by Sánchez and Torregrosa (2005) and future lines of research were proposed for the improvement of psychological skills in climbing.

Keywords: Psychological outcomes, Climbing knowledge, Expert groups.

Résumé

En escalade il a été prouvé lors de nombreuses recherches que les aspects techniques et physiques jouent un rôle déterminant pourtant les entraîneurs et les grimpeurs prétendent que les facteurs psychologiques aussi jouent un rôle prédéterminant pour la haute performance.

Il est vrai qu'il y a un ample catalogue de publications accessibles sur l'impact des facteurs psychologiques en relation avec la performance des sports en général pour les sports. De toute façon, il manque une forte base établie empirique ou théorique pour supporter la psychologie appliquée à l'escalade. Il devient nécessaire de développer de nouvelles stratégies pour adresser ce problème.

Le but de cet étude est d'identifier les variables psychologiques nécessaires pour améliorer et exceller comme grimpeur et opérationnaliser la connaissance implicite experte. Dans ce but, quatre entraîneurs Espagnols ont été interviewés et ils ont pris part à trois rounds de discussion en groupe.

Les résultats ont tous été organisés et agroupés en accord avec le modèle de dimensions psychologiques proposé par Sánchez & Torregrosa (2005) et les lignes futures de recherche ont été proposées pour l'amélioration des compétences psychologiques pour l'escalade.

Mots clés: Resultats psychologiques, Connaissance de l'escalade, le Groupes d'experts.

1. Introduction

The spread of climbing practices has not ceased to increase over the last years (Sheel, 2004) partly due to the development of safety equipment and the creation of infrastructures which allow practicing indoor. Another reason for its boom is that climbing is a good training exercise which demands high levels of strength, flexibility, and stamina (Janot, Steffen, Porcari & Maher 2000, Maitland 1992).

Without any doubt, the development of this sports modality has drawn increasing scientific interest. The initial lines of research have been directed to address the physiological demands of this activity and the characteristics and parameters required for climbers from a physiological (i.e. high grades of prehensil strength, stamina of shoulders and waist) and anthropometric (i.e. lower sums of skin folds, low body fat percentage) point of view. Therefore, numbers of research studies have been published dealing with the variables and factors that influence climber's performance (Giles, Rothes & Taunton, 2006; Grant, Hasler, Davies, Aitchison, Wilson & Whittaker, 2001; Macleod, Sutherland, Buntin, Whitaker, Aitchison & Watt, 2007; Mermier, Janot, Parker & Swan, 2000; Watts, 2004).

However, there have been just a few studies that focus on the importance of psychological factors during climbing, and even less which have been focused on the impact of psychological factors on climber's performance (Feher, Meyers & Skelly, 1998; Llewellyn & Sánchez, 2008; Zuckerman, 1983), and how can these be assessed (Draper, Dickson, Blackwell, Fryer, Priestley, Winter & Ellis, 2011; Puertas, Chamarro & Font, 2005; Montalbetti & Chamarro, 2010).

Several years ago, Sánchez and Torregrosa (2005) developed the model of "psychological factors involved in sport climbing". According to this model, there are three main psychological dimensions involved in climbing: *Basic processes to capture and process information, motivational aspects, and emotional mechanisms.*

The aim of our study was to validate the model according to the expert knowledge of climbing coaches with vast experience in both, climbing and training.

2. Method

2.1 Participants

Four male climbing expert coaches with ages between 44 and 57 years and more than 20 years of experience participated in the study.

The selection criteria for experts implied meeting a series of requisites: 1) holding the Climbing Sport official credentials and titles with more than five years of experience in training climbers. 2) having carried out longitudinal follow-ups of groups of students during more than 5 years of training. 3) having more than five years of experience in competitions either as a sport practitioner or trainer. 4) Having a degree in climbing at least "7a onsight", as per the french grading system of difficulty.

Additionally one was a national climbing referee and expert in mid-mountaineering and three of them held the title of mountain guide issued by the International Union of High Mountain Guide Associations (UIAGM), which is the highest title grade recognized by the Spanish Ministry of Education and Culture.

2.2 Material

An "ad hoc" questionnaire consisting of a total of 19 items referring psychological general abilities for sports and those likely to be important for climbing was used. The questionnaire was developed for participants to reply online on a five-point Likert scale and a free space for suggestions.

A semi-structured script was prepared with the results of the questionnaire to conduct the expert focus group.

A PowerPoint presentation with the objectives of the research was prepared for the focus group. The meeting was audio-visually registered and notes were taken both in paper and computer support.

3. Procedure

The procedure was established in three phases. First phase: Contact with experts, informed consent and online questionnaire.

When dealing with laymen in psychology, a problem found is that they do not label in the same way or share the same definitions as psychologists do. Therefore, as a previous step to extract expert knowledge, an online questionnaire referring psychological general abilities for sports was carried out to homogenize terminology.

Individual results from the online questionnaire stand out those psychological aspects highlighted by the expert coaches and helped to create a semi-structured script used to conduct the first meeting with the focus group.

Second phase: Based on a Grounded Theory methodology, a focus group with expert coaches took place to answer the question on which are the psychological factors involved in climbing, their impact and how important they can be to improve performance.

For the focus group a presentation was made available with the objectives of the research and clarification of the psychological concepts to be discussed during meetings.

At the meeting the themes versed around the psychological variables necessary to become a good climber, their importance on sport performance and their impact on detection of young talents. The focus was on the practice of climbing sports without specifying style (boulder, speed, lead) or modality (onsight, flash) attending to as a competitive sport and not only recreational.

To facilitate the above a semi-structured script was prepared presenting the key items to address during the meeting with a format of open questions allowing the compilation of a wide array of replies given by the experts.

Third phase: Transcription and codification of the knowledge obtained from the focus group. With all the information gathered, expert knowledge was analyzed and transformed into psychological variables. Corroboration and new contributions to the model of psychological dimensions proposed by Sánchez and Torregrosa (2005). Future lines of research proposals for mental skill improvement in climbers.

4. Results

Coaches usually claim that psychological variables are key to become an expert climber. Once you have mastered the technical aspect of the sport and maintain a competitive physical base, it is the mental abilities that make the difference both in the performance of climbers and their need to excel and in their impact on their performance in competition. However, coaches estimations about the psychological faculties of climbers are mainly based on implicit knowledge and the attributions they can make of their pupils to predict sports performance.

We found that results of the focus group matched with the model of psychological dimensions proposed by Sánchez and Torregrosa (2005), therefore variables were decided to be grouped in the same three dimensions. Clusters resulting for each dimension are shown below. The variables marked in bold are new contributions to the model.

As a result of knowledge provided by coaches, we highlight the coincidence of the results obtained in the focus groups with the model developed by Sánchez and Torregrosa (2005) and we bring new knowledge that can add consistency to findings.

Figure 1. Grouping of psychological variables

Basic processes to capture and process information	Motivational aspects	Emotional mechanisms
<ul style="list-style-type: none"> • Anticipation • Attention-concentration • Memorization-imagination • Creativity • Learning ability • Learning styles • Problem solving abilities 	<ul style="list-style-type: none"> • Self-efficacy • Self-confidence • Motivation • Self-realization • Autonomy 	<ul style="list-style-type: none"> • Stress management • Risk management • Activation management • Self-regulation • Frustration tolerance • Emotional regulation.

Attending to the basic mechanisms to capture and to process information, coaches underlined the importance of being prepared and anticipate each and every move previous to any action and during climbing. In fact, according to experts, being creative and having a high capacity to resolve problems and being able to mentally recreate movements and maintain concentration will impact in climbing performance.

Considering motivation, climbing shares same similarities to most of sports. As a young practitioner, the athlete should enjoy when learning to climb; as an elite sportsperson, the athlete must maintain a great amount of motivation to continue improving. Climbers are continually exposed to uncertainties and must adapt their performance to new routines and to new challenging outcomes. Therefore, strengthening self-confidence and self-esteem plays a determining role in climbing (Iso-Ahola, LaVerde & Graefe, 1988), and personal challenges and increased difficulties in climbing are linked to personal development (Ewert, 1994).

Regarding emotional mechanisms, it is necessary to be able to self-regulate oneself when facing potentially highly stressful situations with a risky component that can determine the decision making. Coaches found essential to be capable of properly manage arousal levels, self-regulate and manage the correct amount of physical and mental energy to face uncertainties without falling into frustration.

5. Discussion

In the past decades, climbing has become a highly professionalized sport, improving technical demands and physical needs necessary to stand out as a high performer athlete (Aubel & Ohl, 2004; Pociello, 1995). It is known that climbing is both physically and psychologically demanding, but just a few pieces of research had been carried out to explore the specific role of psychological variables required for climbing performance.

This study was aimed to test whether the mental skills needed to excel as a climber according to Sánchez and Torregrosa's (2005) model fits with what expert climbers and coaches' implicit model consider as relevant and significant. The comparison between the variables of the model and the expert knowledge extracted may contribute to validate Sánchez and Torregrosa's (2005) model.

For that purpose, making use of expert judgment techniques we extracted expert coaches' knowledge and transformed it into psychological labels that can give us information about basic psychological needs to stand out in climbing.

The information obtained from the focus group showed the more relevant psychological aspects drawn by coaches. In agreement with Sánchez and Torregrosa (2005), three main dimensions were proposed Firstly, those that refer to preparation for climbing, memorization and mental replication, and the capacity to maintain concentration while solving climbing tasks (basic processes to capture and process information); secondly, those variables that encourage climbers to improve while having fun and pursuing continuous improvement of skills in climbing (motivational aspects); and thirdly, those related

to the need to be able to manage emotions and arousal levels when facing frustrating and uncertain difficulties (motivational aspects).

Results coincide with the previously established model and new variables are proposed that can help improve the model in the identification of psychological variables that influence on climbing performance.

Based on findings, it could be possible to create an assessment tool to help coaches evaluate climbers during training development processes and establish mental skill climbing specific programs to improve performance. Nevertheless, future research lies in the need to continue studying the influence of psychological variables in climbing.

6. References

- Draper, M., Dickson, T., Blackwell, G., Fryer, S., Priestley, S., Winter, D., & Ellis, G. (2011). Self-reported ability assessment in rock climbing. *Journal of Sports Sciences*, 29(8), 851-858. DOI: 10.1080/02640414.2011.565362.
- Feher, P., Meyers, M. & Skelly, W. (1998). Psychological profile of rock climbers: State and trait attributes. *Journal of Sport Behavior*, (21), 167-180.
- Giles, L., Rhodes, E. & Taunton, J. (2006). The physiology of rock climbing. *Sports Med.* (36), 529-45.
- Grant, S., Hasler, T., Davies, C., Aitchison, T., Wilson, J. & Whittaker, A. (2001). A. Comparison of the anthropometric, strength, endurance and flexibility characteristics of female elite and recreational climbers and non-climbers. *Journal of Sports Sciences*, 19(7), 499-505.
- Iso-Ahola, S., LaVerde, D. & Graefe, A. (1988). Perceived competence as a mediator of the relationship between high risk sports participation and self-esteem. *Journal of Leisure Research*, 21(1), 32-39.
- Janot, J., Steffen, J., Porcari, P. & Maher, M. (2000). Heart rate response and perceived exertion for beginner and recreational sport climbers during indoor climbing. *Journal of Exercise Physiology*, 3(1),1-7.
- Llewellyn, D. & Sánchez, X. (2008). Individual differences and risk taking in rock climbing. *Psychology of Sport and Exercise*, (9), 413-426.
- Macleod, D., Sutherland, D. L., Buntin, L., Whitaker, A., Aitchison, T., Watt, I., et al. (2007). Physiological determinants of climbing-specific finger endurance and sport rock climbing performance. *Journal of Sports Sciences*, 25(12), 1433-1443.
- Maitland, M. (1992). Injuries associated with rock climbing. *Journal of Orthopaedic & Sports Physical Therapy*, (16), 68-74.
- Mermier, C., Janot, J., Parker, D. & Swan, J. (2000). Physiological and anthropometric determinants of sport climbing performance. *British Journal of Sports Medicine*, (34), 359-366.
- Montalbetti, T. & Chamarro, A. (2010). Construcción y validación del cuestionario de percepción de riesgo en escalada en roca. *Cuadernos de Psicología del Deporte, Dirección General de Deportes-CARM*, 10(2). 43-56.
- Puertas, G., Chamarro, A. & Font, J. (2005). Propiedades psicométricas del cuestionario de habilidades psicológicas en escalada deportiva. *Cuadernos de Psicología del Deporte* 5(1 y 2), 9-18.
- Sánchez, X. & Torregrosa, M. (2005). El papel de los factores psicológicos en escalada. *Revista de Psicología del Deporte*, 14(2), 177-194.
- Sheel, A. (2004). Physiology of sport rock climbing. *British Journal of Sports Medicine*, 38(3), 355-359.
- Watts, P. (2004). Physiology of difficult rock climbing. *European Journal of Applied Physiology*, (91), 361-372.
- Zuckerman, M. (1983). Sensation seeking and sports. *Personality and Individual Differences*, 4(3), 285-292.