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**EXPERIENCING IN CLIMBING AND PSYCHOLOGICAL
EFFECTS OF SPORT CLIMBING**

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Abstract

A contemporary demands in adrenaline sport activities emphasize risk, danger and adrenaline on one hand, and desire for individual feelings of happiness on the other hand. The study analysed if sport climbing can influence common feelings and psychological states, in terms of proportional representation of the selected positive and negative indicators. The purpose of the study was to characterize experiencing in climbing and to find out psychological effects of a 3-month sport climbing course on individualized experiences and feelings. Qualitative changes were evaluated on a standardized scale SUPSO, in 46 respondents (aged 23.5±1.8 years). The method is based on verbalization of inner feelings, states and their expressions. The results were converted and calculated in proportions of the given positive and negative indicators. The significance of change was evaluated in quantitative analysis (Wilcoxon pair test, $\alpha_{0.05}$) by IBM SPSS Statistics 24. The results verified positive psychological effects of sport climbing. The change was manifested by significant difference between common and actualized psychological states and feelings. There was a statistically significant difference in all positive (wellbeing and activeness) and majority (80 %) of negative indicators (impulsiveness, discomfort and restlessness, anxious expectations, and sadness). Significant difference in depression and exhaustion was not confirmed. Climbing was described as a demanding adventure sport activity that combines physical and psychological features. Way and authenticity of experiencing can differ among individual climbing disciplines. The research showed that even sport climbing, which is considered to be performance-oriented, can positively influence psychological states and feelings.

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1. Introduction

The origin of mountaineering, or climbing, dates back to the Romantic period of the turn of the 18th and 19th century. Well situated people from higher social classes ceased to worry about the existential and financial matters, had more leisure time, having been bored with their lives at the same time. Aufmuth (2017) explained that climbing had represented an original need of existential uncertainty. As the society modernized, new climbing disciplines developed. In comparison to the original Romantic philosophy, the new disciplines differ in their basic characteristics: in its duration and the space where they are performed, in equipment, motivation, the rate of risk and demands on physical performance. A popularity of climbing increased especially in the last two decades of 20th century (Sheel, 2004), both as a recreational physical activity and a competitive sport.

Traditional climbing (mountaineering) was characterized by the first ascents associated with a high level of risk, increased by insufficient equipment and long-lasting, demanding physical performance. As a part of their training and preparation, climbers began to climb low rocks and search for more difficult lines. The beginnings of sport climbing are related to the organization of the first climbing races in lead climbing. Originally, they took place on natural rocks. Later on the first commercial artificial walls, which imitate a cliff setting, began to be built. Building artificial climbing walls was motivated by an effort to avoid the influence of weather and by the need of performance-oriented climbers to have a proper training environment. Kublak (2013) refers to the development of sport climbing within the gymnastic concept of mountaineering. New discipline on artificial climbing walls include lead climbing, speed climbing, and bouldering. Sport climbing is characterized by a reduced level of risk, intense strength training and a different motivation. These factors, together with the availability of equipment and increasing number of artificial walls, have contributed to development of a recreational form of sport climbing. It is now commonly used in strength training, therapy or school physical education. Many climbers are engaged in this sport not only for achieving extreme performances, but for the activity as such. Indoor sport climbing is a short-term activity with a low objective level of risk, while subjectively it is perceived as an adrenaline sport. This meets the contemporary demands for outdoor sports, especially in young people longing for experiences. Experience as an existential fact can become a means of personality development, as explained by Jirásek (2016).

2. Problem Statement

2.1. Aspects of sport climbing

Climbing demands developed coordination motor abilities, as a precondition to acquire climbing motor skills effectively. And in reciprocal relation, regular training of climbing can increase the level of coordination motor abilities. A quality of ideomotor functions allow a proper and effective coordination of movement (Kobesova & Kolar, 2014). Gnostic functions allow a climber to understand the movement in terms of spatial orientation, to be able to imagine the movement, to plan and anticipate. Executive functions are manifested in the use of adequate strength, suppressing of excessive movements, and rhythmicity. An example of proper use of coordination in climbing can be given in friction climbing, which needs just the right body position and proper balancing the centre of gravity and all the body segments. When the body position is well balanced, the climber can use just as much strength as needed, and the ascent is easier.

Ability to release the muscles not needed at the moment is another function necessary for a coordinated climbing motion. It is the ability of motor differentiation, which reflects the quality of inhibiting processes in brain. A climber has to proceed different sensory stimuli to solve a given motor task. E. g. the climber can see the holds and footholds, but he or she has to estimate the distance and accessibility (body awareness), anticipate the grip and friction according to the shape and surface. Kobesova and Kolar (2014) point out that the proprioceptive functions of body awareness, body assessment and kinesthesia are closely related to psychic, because they are connected to the centres of emotional experiencing.

Due to a comprehensive involvement of different bodily functions, as described in this chapter, indoor climbing can also be used as a therapeutic technique for prevention and treatment of various diseases and disabilities and improve the quality of life. Steimer and Weissert (2017) reviewed recent studies concerning indoor sport climbing and its therapeutic potential in multiple sclerosis and found positive effects on both physiological and psychological capabilities.

2.2 Experiencing and psychological involvement in sport climbing

Experiencing can be described as emotionalized perception of a present moment flow. Experiences are an inherent part of adventure sport activities, concerned also in adventure and experiential education (Jirásek, 2016). A contemporary trend emphasizes risk, danger and adrenaline on one hand, and desire for individual feeling of happiness on the other hand.

Optimal experience is described within positive psychology as “flow” (Bonaiuto et al., 2016). Applied to sport climbing it refers to a psychological state of a person who is immersed in climbing with energized concentration, optimal enjoyment and full involvement. Factors closely connected to flow are: focus, motivation, and positive energy. Commonly reported additional subjective characteristics connected to intense experiential involvement of flow are: the merging of action and awareness, a sense of control, and an altered sense of time (Csikszentmihalyi, 2014). In climbing, the current activity itself draws climber’s attention, so that he or she forgets what is going on around him or her. The only thing a climber is thinking about at the moment of the actual climbing is where to hold, where to stand and where to click the express sling. Thus a full concentration can generate a very intensive experience and allows a climber to “be here now”. In addition, there are emotions in climbing linked to the present moment, such as fear, pride, and trust (Luttenberger et al., 2015).

Killingsworth and Gilbert (2010) pointed out that happiness is to be found by living in the moment, and people should train to resist mind wandering and to “be here now”, in harmony with philosophical and religious traditions. The climbers can come close to states similar to mind concentration in meditations. Aufmuth (2017) characterized climbing experiencing as a state of actual being, an intensive feeling of life. Csikszentmihalyi (2015) explained, within the theory of flow, that the right sense of ascending the peaks is the climbing itself, and that a climber attempts nothing but what is inside him or her mind.

The experience of flow presupposes a well-balanced mutual relation between the level of difficulty of a climbing route and the abilities and skills of a climber. If a climber feels that difficulty exceeds abilities and skills, the emerged tension can be perceived as a fear. And vice versa, if the difficulty of a climbing route is too low, a climber can feel underestimated and bored. A factor that plays a role in the subjective level of difficulty of a route is the rate of risk. In indoor sport climbing the level of risk is objectively lower

compared to traditional rock climbing. This is due to the fact that fixed protections are placed in the artificial walls for climbers' belay in a different way than outdoors. A distance between individual fixed protections is usually shorter in artificial walls than in rocks, which reduces the risk in the sense of "fall factor". The results of a survey of the acceptable level of risk-taking for traditional rock climbers proved a significant difference of climbers' performance in dependence on rate of risk. Climbers usually reach lower performance according to the grading scale when climbing traditional routes with a higher level of risk (Chaloupský, 2014). However, concerning the rate of risk, beginners and recreational climbers can still perceive it as subjectively high even on artificial climbing walls, as they do not have enough experience and skills. Overcoming a fear of fall and accepting an adequate rate of risk can improve the skills of mental perception in an increased sense of self-efficacy (Aras & Ewert, 2016).

Popularity of sport climbing has increased in the last few decades, not only as a competitive sport, but also as a leisure time activity. In the gymnastic concept (Kublak, 2013) climbing can be characterized by deliberate coordinated movements of all the body and its segments, aimed to affect motor system and the level of motor abilities. Concerning sport climbing as included in the system of leisure physical activities, the importance and benefits were listed by Hrusova et al. (2017). The importance and benefits of leisure physical activities lays in both physical and psychological level. The physical level includes motor abilities and skills, posture, muscle strengthening and stabilization - physical fitness and health. The psychological level concerns control and management of emotions - confidence, self-esteem, experiencing - psychological health, and emotions as self-feelings, embodied feelings, and mental states.

In terms of condition motor abilities, climbing uses dynamic gymnastic movements combining explosive and static strength and endurance, with a specific physiological demand on isometric forearm muscle contraction (Morrison and Schöffl, 2007, Sheel, 2004). Sheel (2004) examined oxygen consumption and heart rate in climbing and confirmed demands on aerobic capacity. Mermier (1997) tested the aerobic load in indoor sport climbing and found out that average level is about 74 – 85 % of a predicted maximal heart rate. Chaloupsky (2015) found out that the heart rate values observed during the fall did not significantly exceed the heart rate values during the actual climbing. A significantly increased heart rate was found both in the lead climbing and top rope climbing (Draper et al., 2010), which showed a psychological involvement in both mentioned disciplines. The difference between lead climbing and top rope climbing is in an objective fall factor. The top rope belay means the climber uses a rope that has already been drawn to the top of the route (usually by a more experienced lead climber). With proper technique of belay the fall factor is reduced to zero. The fear of fall is connected to fear of injury. However, according to the injury statistics the rate of injury in sport climbing is lower compared to common popular sports, e. g. soccer or handball (Aras & Ewert, 2016).

3. Research Questions

What are the main aspects of sport climbing that can be related to experiencing and facilitation of a change in individual feelings and psychological states? How does sport climbing influence common feelings and psychological states, in terms of proportional representation of the selected positive and negative indicators?

4. Purpose of the Study

The purpose of the study is to analyse and describe experiencing in sport climbing and to find out psychological effects of a 3-month sport climbing course on individualized experiences and feelings.

5. Research Methods

The focus of the research is on experiencing in sport climbing. Sport climbing belongs to young climbing disciplines and it can be characterized as an activity with a potential to facilitate strong emotional perception. Different aspects of sport climbing were analysed and described above in problem statement. The main aim of the research was to find out the psychological effects of sport climbing on subjective feelings and experiences. The research participants were university students ($n = 46$, age $23,5 \pm 1,8$ years) who attended an optional 3-month common indoor sport climbing course for beginners. The duration and frequency of the intervention was 90 minutes of climbing a week. The research was carried out as a quasi-experiment at the end of the course, after the participants had acquired basic level of climbing skills and knowledge to be able to concentrate fully on the climb as such. Regarding climbing skills and performance level, by the end of the course most of the participants reached the difficulty of climb of grade 4 to 5 of the classification scale of UIAA (the international Climbing and Mountaineering Federation).

The main methods of data collection to evaluate qualitative psychological changes were the standardised assessment scales of Supso (Mikšík, 2004). They are based on verbalization of inner feelings, states and their expressions by a subjective individual self-evaluation of the respondents. The climbers' common feelings and states were tested at the beginning of the climbing lesson in pre-test. The actualized individual feelings and states were tested at the end of the climbing lesson, in post-test. The calculated gross scores were converted in proportions of the given indicators. The qualitative change was indicated by proportional representation of both positive and negative indicators. The positive indicators were assumed to be increased and the negative ones were assumed to be decreased. The procedures followed the standardized methods of Supso questionnaire, also used and verified in the previous research in the field of fitness sport activities by Hrusova et al. (2017). Two positive indicators were used, corresponding to comfort feelings of Psychological well-being (P) and Activeness (A). Five negative indicators were used, corresponding to discomfort feelings of Impulsiveness (I), Discomfort and restlessness (Di), Depression and exhaustion (De), Fears and anxious expectations (F), and Sadness (S). Statistical significance of change was tested in quantitative analysis (Wilcoxon pair test, $\alpha 0.05$) by IBM SPSS Statistics 25.

6. Findings

The findings confirmed positive psychological effects of indoor sport climbing. A climber needs a developed level of motor abilities, with special demands on coordination. Proprioceptive functions of body awareness, body assessment and kinesthesia are connected to emotional experiencing, through which it is closely related to psychological functions (Kolář, 2017).

Qualitative changes in the structure of psychological states and feelings correspond to nature, level and quality of experiencing and activation. Positive and negative components normally exist in typical mutual relations (Mikšík, 2004), that were calculated in proportions, through which individual

psychological activations and prevailing psychological states can be characterized. The change in psychological involvement was manifested by significant difference between common and actualized psychological states and feelings. There was a statistically significant difference in all positive and majority (80 %) of negative indicators.

The results are illustrated in box plots in Figure 01 below. The change of distribution of the scores and their proportions between pre-test (a given component with number 1, e. g. P1) and post-test (a given component with number 2, e. g. P2) is depicted. Positive indicators (P, A) of psychological states and feelings were assumed to be increased and negative indicators (I, Di, De, F, S) were assumed to be decreased significantly, based on the effect of indoor sport climbing. A statistically significant increase was found out in the positive indicators. The increase was confirmed in both Psychological well-being and Activeness. A statistically significant decrease was found out in 4 out of 5 negative indicators. The decrease was confirmed in the components of Impulsiveness, Discomfort and restlessness, Fears and anxious expectations, and Sadness. Although a statistically significant ($\alpha 0,05$) decrease was not confirmed in the component of Depression and exhaustion, Figure 1 shows certain increase in terms of distribution in quartiles and the median score.

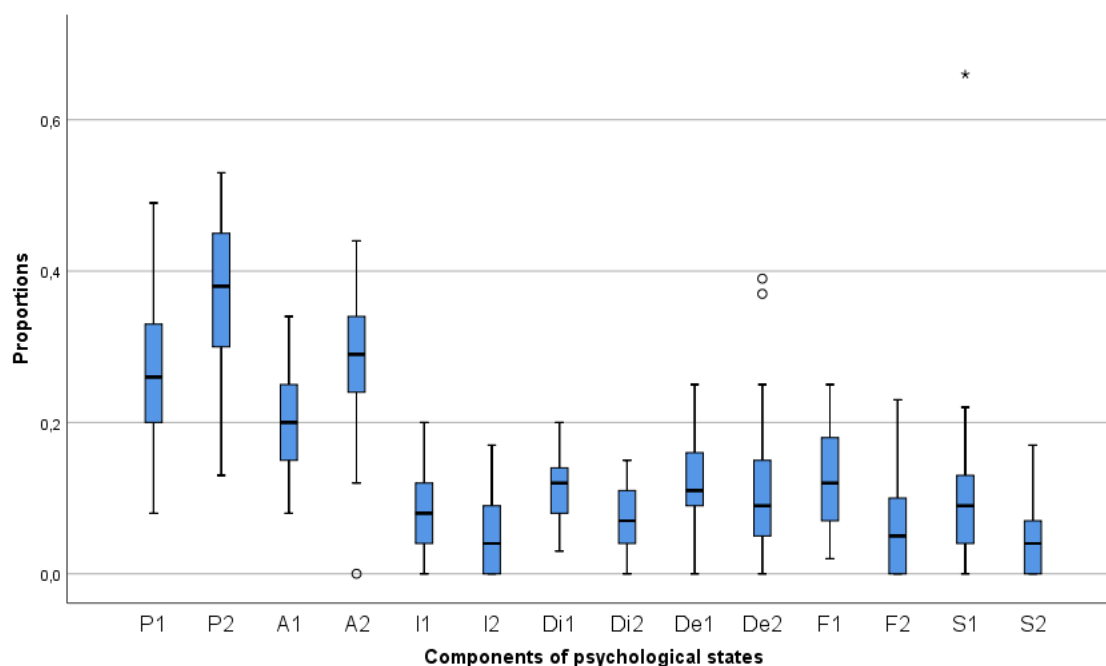


Figure 01. Distribution of proportions of the given components of psychological states between pre-test and post-test

Legend: Psychological well-being (P1, P2), Activeness (A1, A2), Impulsiveness (I1, I2), Discomfort and restlessness (Di1, Di2), Depression and exhaustion (De1, De2), Fears and anxious expectations (F1, F2), and Sadness (S1, S2).

6.1. Discussion

Experiencing varies among individual climbing disciplines. The greatest space for love of nature, humbleness, self-awareness, mindfulness and meditation about the meaning of life and death is in the traditional mountaineering. In sport climbing the emphasis is laid more on performance. In new disciplines

(e.g. lead climbing, speed climbing or bouldering on artificial climbing walls) the achieved performances are to be compared and adored. Especially young people might be engaged in climbing in order to compare one another or to achieve certain social status and appreciation through their performance. Moreover, modern technologies enable easy and immediate digital record of a sport performance and subsequent self-presentation on social nets. However, in such cases the authenticity of experience is missing.

In the recent researches concerning sport climbing, Ewert and Dicle (2016) carried out a research survey examining psychological effects of eight weeks sport rock climbing training on anxiety and self-confidence. The results demonstrated significantly reduced cognitive and somatic anxiety and increased self-confidence. Their findings can be supported by the result of this study in psychological effects of a three-month indoor sport climbing course, in a statistically significant change in the decreased component of anxious expectations and sadness. Zieliński et al. (2018) reviewed recent research in the influence of sport climbing on Depression and anxiety. They suggested that controlling the feeling of fear and anxiety can benefit depression, which is one of the most common psychological disorders. In congruence, findings of Eddolls et al. (2018) suggested association of physical activity of adolescents with lower levels of depressive symptoms and higher levels of psychological and physical quality of life. According to the findings of Zieliński et al. (2018), depression affects 5 to 17 % of the population. Practicing sport climbing might become a tool of depression treatment, by controlling the feeling of fear and anxiety, as well as maintaining emotional stability. However, decreasing the component of depression and exhaustion was not confirmed in the statistical significance of difference in this study of psychological effects of an indoor sport climbing course. Depression and exhaustion was the only one, out of the given five negative components, that was not significantly decreased in their proportions. As mentioned above, Zieliński et al. (2018) suggested fear and anxiety to benefit depression. It might need longer time of practicing indoor sport climbing to affect the component of Depression and exhaustion, following the increased component of anxious expectation and sadness.

The summarized results of this study of effects of indoor sport climbing on individual feelings and psychological states are in agreement with the findings of the research of Sato, Jordan and Funk (2014), that leisure physical activity may enhance quality of life through positive experiences and psychological involvement in physical activity. The idea of indoor sport climbing used to enhance psychological feelings and emotions can be supported by the other research findings concerning experiencing or mindfulness. The research of Killingsworth and Gilbert (2010) revealed that people spend 46.9 % of their waking hours thinking about something different from what they are doing at the moment. Killingsworth and Gilbert (2010) explained that the ability to think about what is not happening is a cognitive achievement that comes at an emotional cost and that “a wandering mind is an unhappy mind”. They also found that people were least happy when having a rest, working, or using a computer. On the other hand, they were happiest when making love, engaging in conversation or doing exercise. Benefit of an active leisure, e. g. through sport activity to a passive having a rest, was also confirmed by Wilson et al. (2014). They found that most people seemed to prefer to be doing something than doing nothing, even if that “doing something” was negative. Westgate, Wilson and Gilbert (2017) confirmed that people enjoyed pleasant thoughts that occurred unintentionally more than pleasant thoughts that occurred intentionally. A suggested physical activity in this research is sport climbing. A full concentration, which is needed to a successful ascent, can generate a

very intensive experience and allows a climber to “be here now”. This is in agreement with Luttenberger et al. (2015) and the suggested difference of climbing from other common sports, in terms of supporting not only physical but also cognitive and emotional resources.

7. Conclusion

Climbing was described as a demanding adventure sport activity that combines physical and psychological features. Way and authenticity of experiencing differs among individual climbing disciplines. Indoor sport climbing was selected as an example of young climbing disciplines. Experiences are part of sport climbing, as a result of both physical and psychological load and tension. The quality of a psychological load and experiencing in sport climbing was evaluated by means of actualized psychological states of climbers. It is reflective of the process of optimizing their inner prerequisites in order to respond to the load. The findings confirmed positive psychological effects of sport climbing. The change was manifested by statistically significant difference between common and actualized psychological states and feelings. There was a statistically significant increase in all positive (wellbeing and activeness) and decrease in majority (80 %) of negative indicators (impulsiveness, discomfort and restlessness, anxious expectations, and sadness). Significant difference in depression and exhaustion was not confirmed. The research suggested that even sport climbing, which is considered to be performance-oriented, can positively influence psychological states and feelings.

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