BOOK OF ABSTRACTS

from

9th International Mountain and Outdoor Sports Conference

Faculty of Physical Education and Sport

Charles University, Prague, Czech Republic

21st – 24th November 2018

9th International Mountain and Outdoor Sports Conference

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Prague, Czech Republic

Topics:

1. Outdoor activities for health and well-being
2. Outdoor and adventurous activities for learning
3. Training and performance in outdoor sports
4. Outdoor activities and socio-economic impacts

Practical workshops:

1. Training and testing in climbing
2. Wilderness Therapy workshop

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Organisers: Outdoor Sports Department, Faculty of Physical Education and Sport, Charles University

Prague, November 2018

Programme IMOSC 2018

Wednesday 21st November

9:30 – 10:00	Registration for the Day seminar and IMOSC
10:00	Pete Allison: Life-changing Experiences
11:00	Ivo Jirásek: Peak Experience and the idea of 'Horizon'
12:00	**LUNCH**
13:00	Jiří Klouda: Wilhelm Dilthey's Philosophy of Lived Experience
14:00	Jan Halák: The Phenomenology of Experiential Learning
15:00 – 15:30	**COFFEE BREAK**
15:30 – 16:30	John Quay: John Dewey's concept of experience
16:30 – 17:30	Round table: Philosophy and Theory of Experiential Education. Pete Allison, Ivo Jirásek and Jim Parry
18:00 – 19:30	IMOSC Registration
19:30	IMOSC Opening Banquet

Thursday 22nd November

8:30 - 9:30	IMOSC Registration
9:30 – 11:00	Official opening of the conference + unofficial icebreaking
11:00 – 11:15	**COFFEE BREAK**
11:15 – 11:45	**Christopher Gidlow - *Physical activity and natural environments: is there a link?***

11:45 – 12:05	Manuel Sand - *Paddling the stream of visitors – Socio-economic impact, environmental protection and regulations of kayaking on the river Altmuehl in Bavaria, Germany*
12:30	**LUNCH**
14:00 – 15:00	Barbara Eigenschenk - *Benefits of Outdoor Sports for Society (BOSS). A systematic review and European perspectives*
	Paul Jakubowski - *Self-Assessment of Acute Mountain Sickness in undergraduate students during a five-day expedition to the Atlas Mountain range*
15:00 – 15:30	**COFFEE BREAK**
15:45	Prague castle tour

Friday 23rd November

9:00 – 9:30	**Pete Allison - *Life Changing Experiences: Emerging themes and implications for practice***
9:30 – 10:15	Kurt Weis – *Being Outdoors - Going Native - Looking Indoors*
	Jayson Seaman – T*he eastern European roots of Experiential Learning: How Jakob Moreno shapes theory and practice in adventure education*
10:15 – 10:45	**COFFEE BREAK**
10:45 – 11:15	**John Quay - *Outdoor activities as occupations for learning***
11:15 - 12:00	Sina Hartmann, V. Vaněk - *The impact of an outdoor-based program on the development of social competencies of youth*
	Gunnar Liedtke - *Changing motivational values in the light of friluftsliv and the experience of nature*
12:30	**LUNCH**

14:00 – 15:00 Andy Martin - *Student Perceptions of Safety and Challenge: A Case Study of Outward Bound New Zealand*

Levi Nagy – *On the Interrelatedness of Humans and Nature*

Vegard Vereide - *Learning of decision-making in avalanche education in Norway*

Saturday 24th November

10:00 – 11:00 Jan Neuman, Andy Martin - *A Legacy of Outdoor Learning: 60 years of Turistika Activities and Outdoor Games*

Jiří Střípek, Tereza Houšková - *Project on Wilderness therapy in the Czech Republic and Poland*

11:00 – 11:30 **COFFEE BREAK**

11:30 – 12:00 *poster section*

Sofie Cataldo: *Investigation of outdoor learning themes and practice in British Primary Schools*

Jan Gajdošík: *Physiological responses to indoor wall climbing and climbing on the treadwall*

Maria Stefania Ionel: *Psychological benefits of indoor cycling while immersed in a virtual environment*

Jan Kodejška: *Individual effect of cold-water immersion on handgrip performance in rock climbers*

Dominika Krupková: *The effect of passive recovery on repeated isometric performance and the relationship of the results to the observed data*

Oto Louka: *Teaching freediving at KTVS PF UJEP*

12:30	**LUNCH**
13:30 – 16:30	Tereza Houšková, Jana Švecová - Wilderness therapy workshop Connection with Nature = Connection with ourselves
19:00	Banquet

Organisers:

Partners:

Training and testing in climbing workshop programme

Saturday 24th November

8:00 – 8:45	**Registration for the Climbing workshop** – faculty entrance
9:00 - 9:30	Michail Michailov - *Optimisation of finger strength and endurance training*
9:30 - 10:00	David Giles - *Critical power in rock climbers*
10:00 - 10:30	Dicle Aras, Güney Çetinkaya - *Effects of four-week fingerboard local electromyostimulation training on wrist strength and endurance*
	Mirjam Limmer - *Acute effects of kinesio tape application over wrist flexor muscles on grip strength and sports climbing performance*
10:30 - 11:00	**COFFEE BREAK**
11:00 - 11:30	Stefan Künzell et al. - *Tactical decisions in bouldering after failures*
	Andrey Shunko, T. Kravchuk - *The effect of the psychomotor abilities level on the result in speed climbing of young climbers 1-2 years of study*
11:30 – 12:00	**Poster section**
	Sofie Cataldo: *Investigation of outdoor learning themes and practice in British Primary Schools*
	Jan Gajdošík: *Physiological responses to indoor wall climbing and climbing on the treadwall*
	Maria Stefania Ionel: *Psychological benefits of indoor cycling while immersed in a virtual environment*
	Jan Kodejška: *Individual effect of cold-water immersion on handgrip performance in rock climbers*
	Dominika Krupková: *The effect of passive recovery on repeated isometric performance and the relationship of the results to the observed data*
	Oto Louka: *Teaching freediving at KTVS PF UJEP*

12:30	**LUNCH**
14:00 – 14:30	Espen Hermans et al. - *Climbing specific training methods and its effect on performance*
14:30 - 15:00	Jiří Baláš - *Recovery during and after climbing*
15:00 - 15:30	**COFFEE BREAK**
15:30 - 16:30	„Climbing“ laboratory visit
16:30 – 17:30	Round table "Science for Practice" - scientists, trainers, competitors. What the science can offer and what the climbers need from science.
19:00	Banquet

Organisers:

Partners:

Physical activity and natural environments: Is there a link?

C. GIDLOW[1]

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Background
Physical activity has often been proposed as one of the reasons why living in greener neighbourhoods appears to be good for our health. Though intuitive, evidence that having good access to natural environments (green and blue space) can promote physical activity is mixed, at best. ‘

Aim
In the context of existing evidence, data will be presented from a range of recent epidemiological and experimental studies, including findings from the European PHENOTYPE project (www.phenotype.eu), to give a critical and contemporary perspective on the links between physical activity and natural environment exposure.

Method
A literature review was conducted

Results
Specifically, the presentation will cover: associations between residential natural environment exposures and self-reported physical activity; the potential dissonance between access to and use of natural environments; objective, location-specific measures of natural environment engagement and physical activity (using smartphone technology); and the importance of context.

Conclusions
Data presented will challenge previous assumptions that natural environments promote physical activity, but introduce the potential of ‘green exercise’; i.e., to consider the potential benefits of physical activity in natural versus urban or indoor environments.

Paddling the stream of visitors: Socio-economic impact, environmental protection and regulations of kayaking on the river Altmuehl in Bavaria, Germany

M. SAND [1]

[1] Institute for Outdoor and Adventure, University of Applied Management, Treuchtlingen, Germany

Background
The Altmuehl Valley Nature Reserve is popular among hikers, bikers and paddlers. The river Altmuehl is a 227km long, slow flowing stream that stretches from near Rothenburg on the Tauber to Kehlheim where it joins the Danube. The part between Treuchtlingen and Dietfurt is especially popular among water sports enthusiast and tourism has been growing. However, the river is now corwded during weekends and holiday periods, which causes potentail confict between user groups and environmental protection agencies. Other regions in Germany, such as on the river Wiesent have already initialted activities where the stram of visitors is dstributed.

Aim
This study examines the impact of kayak tourism in the area and the socio economic importance for the area. By creating an overview of target groups, paddled sections, types of accommodation and money spent in the area a bigger picture of kayak tourism can be drawn. This will also help to understand the environmental impact and possible conflicts with other user groups such as fishermen, stand up paddlers or hikers. The study delivers information on where regulations are needed and what can be done to protect the natural surroundings. The study will provide recommendations for controlling and distributing the stream of visitors.

Methods
A mixed method approach is used to examine the socio-economic impact, the current situation on different parts of the river, and the need for regulations. Kayak operators filled out information about the usage of boats on the different sections of the Altmuehl on selected days of the season. An online survey was conducted among kayak operators, tourist information centres and hospitality providers to gain a deeper insight into the target group and the current situation in the area. A focus group interview was conducted with providers, other user groups and environmental protection activists to look into the environmental aspects of the kayak tourism. Data was evaluated using SPPS statistics and qualitative content analysis.

Results/Conclusion
Kayak trips are mainly catered to younger adults and families, who stay for only a few days. The amount of tourists is rising slightly and landscape and nature are important motives for coming to the area. While kayak tourists are said to be no harm to nature and to the environment, there are still a few who do not behave appropriately. Kayak tourism draws in about 95.000 tourists per annum who are worth approximately 4.8 million € for the Altmuehl Valley Nature Reserve area. This outcome already leads to a crowded river while only 20% of the existing boats are used. More scenic parts of the river such as between Solnhofen and Dollnstein are way more crowded than other parts. This underlines the importance of regulations for the area, such as limits of boats per day/per section, and also water levels in relation to sensitive nature areas.

Benefits of Outdoor Sports for Society (BOSS). A systematic review and European perspectives

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[1] Department for Sport and Health Sciences, Technical University Munich, Germany,
[2] National Outdoor Centre, Tollymore, Northern Ireland

Background
This paper presents the first results of the project "Benefits of Outdoor Sports for Society" (BOSS https://outdoorsportsbenefits.eu/), a European Union, Erasmus+ funded project that has been developed and managed by members of the European Network of Outdoor Sports (ENOS). Further actions will use the evidence-based research to create a model for valuing the benefits of programmes or initiatives and will test this model in real field conditions.

Aim
Being active in a natural environment is associated with various benefits for individuals, groups and for society as a whole. However, there is a lack of a systematic collation of those benefits, especially at an EU level. An evidence base is needed to better understand and to support investment in health enhancing physical activity (HEPA) in the outdoors.

Method
A systematic literature review has been conducted with partners from seven European countries bringing together evidence on benefits associated with outdoor sports from national and international databases. Studies have been screened from a primary sum of 17,560 publications within a 15 years selection period. Relevant data of selected studies has been extracted from the full texts and translated into English if necessary.

Results
133 studies have been selected and grouped to six broad categories including physical health, mental health and wellbeing, education and life-long learning, active citizenship, crime-reduction and anti-social behaviour as well as additional benefits. Although the evidence base is not equally strong for all types of benefits, the review provides valuable insights into how outdoor sports contribute to various social benefits and how programmes are implemented in field practice. Additionally, varying perspectives from different countries in Europe are brought together.

Conclusion
Mental health and well-being is significantly improved by participation in outdoor sports, and there are a wide range of physical health benefits including a reduced risk for several major diseases like heart attacks, stroke or cancer. However, outdoor sports are also effective for intra- and interpersonal development and contribute to other social benefits such as active citizenship and crime reduction. Connecting people with nature and resulting improved environmental education, awareness and behaviour are a key facet of outdoor sports. Outdoor sports provide a broad range of sport and recreational activities and opportunities that both engage and provide benefits to people of all ages, social or economic background and ability. Outdoor sports have few limitations to participation and are great for providing life-long physical activity. In times of increasing inactivity levels, urbanization and disconnection to nature, the authors see outdoor sports as one key solution to getting people involved in health-enhancing physical activities, fighting diseases and helping people to find and maintain an active, happy healthy lifestyle.

Self-assessment of acute mountain sickness in undergraduate students during a five-day expedition to the Atlas Mountain range

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[1] Department of Interdisciplinary Studies, Manchester Metropolitan University Cheshire, Crewe, United Kingdom

Aim
To explore the prevalence of acute mountain sickness (AMS) in undergraduate students on a five-day short haul expedition to the Atlas Mountain range, and evaluate if the subjects are capable of self-assessment using the Lake Louise Score for the diagnoses of AMS.

Methods
17 undergraduate outdoor activity students aged 19-40 years (8 female subjects) travelled to the Atlas Mountain range for five days at heights between 1740m and 4167m. Each evening members of the expedition team completed a Lake Louise self-assessment questionnaire. Group leaders were informed regarding any member of the team with a score of 3 or more. Appropriate treatments were then initiated. Statistical analysis was carried out using analysis of variance (ANOVA) to determine if mean scores for subjects, symptoms and effects of height were statistically significant, with p values <0.5 (SPSS for Windows160).

Results
Fifteen subjects completed the daily questionnaires, one questionnaire was lost and one was not returned (88.2% completion). In the study 11 of the 15 subjects had symptom scores greater than or equal to 3 with an associated headache after an increase in altitude, which is consistent with a diagnoses of AMS (73 %). The severity, duration and onset of the symptoms for the group were variable. During the expedition three students were given daimox to elevate the symptoms of acute mountain sickness on summit day at an altitude of 4167m. The range of days when subjects recorded a score of 3 or more was 0 to 5 for male subjects and 0 to 2 for female subjects. The acute mountain sickness scores correlated with a recent gain in altitude. Acute mountain sickness was more frequently reported in the male subjects. Over the 5 day expedition the eight male subjects had scores of 3 or more on 11 days, female subjects had a score of 3 or more on 7 days. Although female subjects overall had a lower score for AMS over the 5 days, only on day 4 were they significantly lower than male subjects, 75% and 43% respectively, and for scores of AMS < 3 female subjects 38% and male subjects 29%. Notable differences were recorded between male and female subjects scores recorded in the areas of sleeping (P= .520). Females suffered more from poor sleep and fatigued more (P=.401), whilst male subjects suffered more from headaches (P=1.76). Analysis for GIT (gastrointestinal tract symptoms) and dizziness/light-headedness did not take place as the scores recorded for each area were negligible.

Conclusion
AMS is a common a problem amongst all age groups. There are an increasing number of commercial groups travelling to high altitude. Currently there is a wealth of information on AMS, but little on the reliability of self-assessment. Subjects appeared to be competent in recognising the signs and symptoms of AMS, but questions were raised regarding the scoring of the symptoms AMS. The scoring system combined with observation and a graded ascent profile may contribute to safety in high altitude, but warrants further study.

Life changing experiences: Emerging themes and implications for practice

P. ALLISON[1]

[1] Penn State, USA

Background
Research in Outdoor Experiential Education typically focuses on short term benefits such as 1-2 years post experience and concurrently claims that these are 'Life Changing Experiences'. These positions are somewhat incompatible - if these are life changing experiences one could expect people to report such changes in their later years. A handful of studies have addressed this by undertaking retrospective studies but the work involved is considerable and the findings limited.

Aim
The research aim was to gain insight into what participants attribute to an intact expedition experience 40 years later.

Method
To address this issue a two phase research design was used with people who undertook a month long school based expedition 40 years ago. The first phase surveyed 45 participants asking them to recall life stories associated with the expeditions which involved canoeing and or mountaineering in French and Austrian Alps and the Pyrenees. Interviews were transcribed and analysed using thematic analysis. Data were read multiple times for meaning and summarised in a table developed and cross checked by multiple researchers. The second phase involved 10 interviews to probe in more depth and gain richer more nuanced insights into the learnings associated with the expedition over time.

Results
Three themes were identified: planning and preparation, confidence and development of gratefulness, and an ethic of service.

Conclusion
Methodological challenges and potential avenues for future research will be explored. Implications for research informed practice will be outlined.

Being outdoors - going native - looking indoors

Kurt WEIS[1]

[1] Technical University of Munich, Germany

Background
Twelve years ago, I spent twelve days in a tree-house, on one of the more remote islands of Hawaii. I loved it, it was great fun. In Germany, we also have people who live in tree-houses. Some of them have been living in tree-houses for years, environmental activists who want to protect the forest from clearing. They are not out there for fun. They know what they are there for.

15 years ago, I crossed the Gobi desert on foot. Three weeks, with a caravan of camels. I was in charge of the water supply. On the decisive day, we did find water. The night before I woke up at 2 o'clock and imagined what would happen if the last camel with some water supply would slip on one of those steep dunes, would fall and damage the last water bin. Then I suddenly became aware that this was one of the reasons why I had come here. I was sure we would get through, but I wanted to know the feeling what it means to face death. I spent hours with my headlights informing my diary in detail.

Discussion
The best known case and the best organized ritual for going into the wild for solving a personal problem, or for a spiritual experience, or for a possibly life changing experience is Vision Quest, or Vision Fasting. It was learned from the North American Lakota Indians as an initiation ritual: three days of preparation in the wilderness, four nights out there alone, no tent, just a cover for protection, enough water, no food, the last night awake in a self-built stone circle – and then two days of reporting the individual experience, mirrored by the leaders, but not commented. You should know why you want to go out there. What you see in the landscape of nature mirrors is the landscape of your soul. A simple example: In one Vision Quest we had a young lady in our group who had problems with death, suicide, etc. in her family. During the first three days of preparation, each and every day she returned with a skull of some dead animal. Nobody else did.

My last Vision Quest is worthwhile mentioning here. It was open only for people with previous Visions Quest experience and, different from normal Vision Quests, the topic was given: "The Process of one's own Death and Dying." We knew what we were there for. We had 24 or 48 hours for issues like what and whom to forgive, to whom to say good-bye, unfinished business, etc. I wrote a diary of 77 pages while out there in solitude. I was the happiest and most grateful of the whole group when looking back at my whole life. After the ten days with the group I took my tent and stayed in the same area all alone for another full week to let things settle down. This period was probably the most useful and sensitive part of the whole Vision Quest: letting the experience of my life grow like a tree of life, the roots reaching deeper and deeper, the trunk growing stronger and taller, the branches becoming wider and wider, and the top of the tree with all its leaves becoming larger and more capacious. Imagine yourself as an airport, with international and domestic flights. Organize your flights, or your awareness, into both directions, for the outer charm of nature, and for inner insights. In short: when you are outdoors, don't forget to look indoors.

Eastern European roots of experiential learning: How Jacob Moreno shaped theory and practice in adventure education

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Background
Experiential learning is often regarded as a form of learning descending from Greek philosophers (Stonehouse, Allison, & Carr, 2011), rekindled by thinkers in the modern era such as John Dewey and Kurt Hahn (Smith & Knapp, 2008). Contemporary work commonly defines it as an individual, psychological process. For example, Itin (1999) describes it as follows:

> *Learning is best considered as the process of change that occurs for the individual. … Experiential learning … involves 1) action, 2) reflection, 3) abstraction, and 4) application. So experiential learning is best considered as the change in an individual that results from reflection on a direct experience and results in new abstractions and applications* (pp. 91-92).

Such presentations rarely scrutinize the origins of the phrase *experiential learning*, although a cursory examination of the literature reveals its usage only came into vogue after the 1960s (Seaman et al., 2017). Dewey (n.d./1981) expressly rejected psychological interpretations of his concept of *experience*, favoring cultural and historical interpretations instead. What is revealed by an historical interpretation of experiential learning?

Aim
The aim is to trace the origins of the concept of experiential learning to its roots in the human potential movement, and to examine its influence on modern adventure education.

Method
Methods of inquiry chiefly involved reviewing literature.

Results
The first use of modern *experiential learning* methods were used in a community relations training in New Britain, Connecticut, USA in 1946 by Kurt Lewin, Ronald Lippitt, Leland Bradford, and Kenneth Benne (Seaman et al., 2017). A major influence on the organizers was Romanian-born psychotherapist Jacob Moreno, who pioneered methods of group therapy involving role playing and interpretation of 'here and now' events as significant for individual psychological formation. Moreno's principles figured prominently in the design of 'T groups', which became the template for later models of experiential learning.

Conclusion
Educators promoting outdoor and adventure activities often rely on the concept of experiential learning both to organize practice and to justify their use. By doing so, they reproduce ideas and practices initially established in the 1920s by Jacob Moreno, later popularized by the human potential movement between the 1950s and 1970s as leaders of the movement produced schematic models designed for widespread use. Outdoor and adventure educators therefore work, perhaps unwittingly, in Moreno's psychotherapeutic tradition, which deserves greater scrutiny.

References

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Outdoor activities as occupations for learning

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[1] University of Melbourne, Victoria, Australia

Aim

This theoretical paper investigates how the educational contribution of outdoor activities can be understood in formal schooling.

Discussion

Outdoor recreational activities play a part in the education of young people, often associated with formal schooling. There is general awareness of the educational merit of these activities, value which is conveyed via narrative accounts of the learning that occurs during outdoor experiences. When incorporated into schooling, outdoor activities are often extra-curricular, external to the core academic curriculum, which is comprised of disciplinary bodies of knowledge and skill. Outdoor activities are chiefly about action and doing, whereas disciplinary school subjects, such as mathematics and history are concerned primarily with knowledge and knowing. While knowledge is required to achieve any outdoor activity, the focus is not usually curricular knowledge. Instead, knowledge is specific to the activity. This distinction between knowing and doing keeps curricular and extra-curricular apart, so they exist in schools as parallel endeavours, which rarely inform each other explicitly. This is made clear via the curricular aims of disciplinary school subjects, supported via assessments which often involve examinations for testing acquisition of knowledge and skill. In outdoor activities the assessment is different and concerned with successfully completing the activity itself. This positions outdoor activities as inferior to academic subjects in a school setting. Underlying this is the emphasis placed on knowledge as the "currency" of education. Knowledge is perceived to be like money, in that once acquired it can be used across various situations – transferred – unproblematically. This belief supports the aim of schooling for students to acquire much important knowledge (which knowledge is important is a curriculum question) because this will best prepare them for life after school. They will bank that knowledge, as Paolo Freire (1972) put it derogatively, for use in the future, but there is a major problem with this belief, as the world does not have a common currency when it comes to knowledge. Just as currency changes across borders, the meaning of knowledge can change across borders too. The question is then about the borders across which the meaning of knowledge can change, as well as the regions these borders circumscribe. Drawing on the educational philosophy of John Dewey, I argue that these regions are occupations, and that outdoor activities function as occupations (Quay, 2015). Dewey (1916, p. 361) claimed that "*education through occupations … combines within itself more of the factors conducive to learning than any other method*." An occupation is an adult job, but Dewey applied this word to every undertaking: being a sibling, a school friend, a member of a political party, an artist. Occupations are ways of being, as are outdoor activities. In connection with doing, Dewey argued that an occupation is "*a continuous activity having a purpose*" (p. 361). In association with knowing, Dewey pointed out that an occupation is "*an organizing principle for information and ideas; for knowledge and intellectual growth*" (p. 362). As occupations, outdoor activities are ways of doing; and they are ways of knowing. As occupations, outdoor activities are positioned on the same plane as school subjects, which are also occupations. Knowledge works within occupations via application, in ways of being-doing-knowing (Quay, 2015), and life, also, works with occupations.

References

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The impact of an outdoor-based program on the development of social competencies of youth

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[2] Karlsruhe Institute of Technology, Karlsruhe, Germany

Background
Outdoor-based youth programs provide potential for the development of social competencies of youth. Outdoor-based camps are well known as a context for informal learning, physical activity and outdoor experience (Bialeschki et al., 2016). Garst et al. (2011) noted that, "*organized camp experience is set as a social institution in which more than in any other programs except for schools adolescents participate in*" (p. 73). Camp experience fosters several developmental outcomes youth can benefit from and a "*high-quality camp experience is uniquely suited for youth development*" (Thurber et al., 2007, p. 243).

Aim
The impact of an outdoor-based program on the development of social competencies of youth was investigated. The aim was to examine the potential impact on the development of social competencies through the outdoor-based camp experience.

Methods
(1) A literature review defined core constructs of youth development of social competencies that are beneficially influenced by the participation of an outdoor-based program.
(2) A survey was carried out with a standardized self-reporting questionnaire with 123 randomly chosen German youth participating in an outdoor-based program in Sweden.
(3) Guided interviews followed by a group discussion of participants of the same outdoor-based program (2) were carried out. Results were evaluated by a qualitative content analysis regarding the impact on the development of social competencies through the outdoor experience.

Results
First, the literature outlines positive identity (e.g. independence and problem solving competence), social skills (e.g. teamwork), physical and thinking skills (affinity for nature and sport) and positive values (e.g. perceived competence) as core constructs of social competency development. Second, the results outline that youth generally experience outdoor-based program positively and report significant improvement in the core constructs. Correlation of development of social competencies is significant ($p \leq .01$) and correlation coefficients show results from low (independence, $r = .43$) to high (problem solving confidence, $r = .71$) correlations. Third, results of the qualitative content analyses assume a subjectively reported impact of an outdoor-based program on the development of social competencies of youth. Interviews were carried out this summer and results will be available by October.

Conclusion
Results indicate that outdoor-based programs in an out-of-school setting foster developmental potential for youth in positive identity, social skills, physical and thinking skills and positive values. Outdoor-based programs offer sustained and engaging experiences for multidimensional growth. Further, research is needed into program planning to implement outdoor-based programs for positive youth development in the field of outdoor education and physical education.

References

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Changing motivational values in the light of *friluftsliv* experiences

G. LIEDTKE[1], B. GHAFFARI[1]

[1] Universität Hamburg, Hamburg, Germany

Background
A lot of interventions, for example in educational and health related settings, with the aim of initiating or implementing a change of behaviour fail in their intention to create long term effects for their participants. Positive effects last often only for a short time. To create long lasting effects – so the idea of this project – it could be helpful to initiate a change of motivational values, which are the foundation of human behaviour, although motivational values are often regarded to be stable in adults (Schwartz, 2012).

Aim
The investigation will explore if *friluftsliv* is a way to realize intense experiences of nature and combined with self-reflection can lead to changes in motivational values.

Methods
From 2015-2017 six *friluftsliv*-trips to Southern-Norway with a total number of N=58 participants (age M=26,2; SD=5,6; sex: 55% female; students from University of Hamburg) were evaluated. The trips lasted 8-10 days. Changes in motivational values were recorded on the basis of the standard questionnaire PVQ 21 (Schmidt et al., 2007). The results were compared with a control group (N=52; age: M=25,9, SD=3,1; sex: 47% female; students from University of Hamburg). In addition, 12 participants of the *friluftsliv*-group were interviewed 6-8 weeks after the trip. Interview data was analysed by qualitative content analyses.

Results
According to the questionnaire PVQ 21, the participants of the *friluftsliv*-trips showed, in relation to the control group, positive group effects (values become more important) for self-transcendence (universalism, humanism), and a negative effect (values become less important) for self-enhancement (power, achievement). After three months the changes were no longer detectable. Interview data showed that *friluftsliv* experiences had great meaning for the participants and resulted in personal changes e.g. in dietary behaviour, time spent outdoors, range of motion, time spent alone or time spent without activity. Interview data showed also that the transition from *friluftsliv* experience to everyday life was difficult for many participants.

Conclusion
Friluftsliv, and the experience of nature combined with self-reflection, can initiate changes in motivational values which can then lead to changes in everyday life behaviour. These changes are very individual and difficult to summarise by means of group statistics. However, changes which are initiated by special experiences (like *friluftsliv*) can being superimposed by experiences of everyday life after a while.

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Student perceptions of safety and challenge: A case study of Outward Bound New Zealand

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Background
Recent fatalities that have occurred during the conduct of outdoor adventure activities in educational situations, the media's portrayal of outdoor activities as involving a high amount of risk, and heightened health and safety policies are all impacting how organisations working with outdoor adventure activities presently operate.

Aim
To examine student perceptions of safety and challenge and how incidents impact learning outcomes, and the learning from incidents in relations to changes to safety management at Outward Bound New Zealand (OBNZ)

Method
This case study of OBNZ utilises a mixed method approach involving analysis of incident reports, quality control forms, and pre- and post-programme evaluation questionnaires from short-course (8 days) and long-course (21 days) participants (n = 6,792) between 2009 and 2014. Analysis of interviews with senior management staff (n = 5) examined the learning from incidents in relation to changes to safety management at OBNZ.

Results
The findings indicate that while there has been an increase in safety management systems (SMS) and a more safety conscious culture at OBNZ, the OBNZ students' perceptions of both safety and challenge are high. A few medium-to-severe incidents have still occurred, but these incidents do not appear to detract from the students' overall learning outcomes and, in fact, the authors argue that incidents may have instigated opportunities to facilitate meaningful learning. It is therefore important that perceptions of risk in the outdoors do not restrict or overly control the experience diminishing the potential learning outcomes.

Conclusion
The findings suggest that OBNZ has responded to increasing compliance requirements through the review of standard operating procedures and multiple external and internal safety audits, developing a current industry best practice incident reporting system and a heightened sense of responsibility and supportive culture amongst instructors to keep students safe and facilitate high-quality courses. These findings have implications for other outdoor adventure education providers in their review of incidents and development of appropriate SMS that enhance safety, quality, and culture whilst still challenging students and achieving significant learning outcomes.

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On the interrelatedness of humans and nature

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Background:
The basic question of environmental philosophy concerns the relationship between humans and nature. Are people part of nature or not? If a part, is this a direct or indirect relationship? How is this relationship manifested in outdoor activities?

Aim:
I approach this question from the point of view of Kohák (1997), and we shall describe the types of nature-centeredness and human-centeredness, as well as the categories of nature-related facts and values. Then, starting with Aldo Leopold (1949), a second view of the relationship between humans and nature will be outlined, in which nature and civilization seem to belong to two realms. Later he denied this idea and considered humans as part of nature, belonging to one 'community of life'.

Method
This paper is based on qualitative research and aims to emphasize correlations and differences in relation to outdoor sports and environmental ethical problems.

Results
The interrelatedness of humans and nature is an extremely complex and difficult question. Kohák (1997) concluded that humans are part of nature, but due to the indirect nature of this relationship it is hard to detect and describe.

Conclusion
Duty and responsibility are both detectable in the relationship between humans and nature, but which of these comes first? Do we have duties because we are responsible, or, are we responsible, because we have duties? This question can be examined from both points of view and outdoor sports may represent the meeting point between these two directions.

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Learning decision-making in avalanche education in Norway

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Background
Avalanche terrain and the surrounding environment are known as dynamic and complex. The dynamic components are local variations that are in constant change (temperature, precipitation, wind), while the complex components are knowledge about many environmental factors (terrain, snow pack, weather and the human/group). Changes in the environment can rapidly occur and a wrong decision can cause fatal consequences. Recognition of a need for a decision is crucial; often described as a dual-process. Decision-making literature is generally consistent that there are two systems or processes in decision-making, one fast and intuitive (system 1), and one analytical, reflective and slow (system 2) (Kahneman, 2011). In avalanche literature, there is a consensus that novices and experts have different approaches to decisions in an avalanche environment (Haegeli, Haider, Longland & Beardmore, 2010; Hallandvik, Andresen & Aadland, 2017). A contrast to this knowledge is the focus on how decision-making is taught in avalanche education, as pin pointed by Stewart-Patterson (2014, 2016).

Aim
The aim of this study is to gain insight into how newly educated Norwegian Mountain Guides (International Federation of Mountain Guides Association, IFMGA), and newly educated *friluftsliv* educators with a specialization in alpine ski touring, and a Bachelor degree in *Friluftsliv*, describe learning of decision-making processes in their education programmes.

Methods
Data was collected through three focus group interviews with 12 men and women (aged 25 – 37), four Norwegian IFMGA Mountain Guides and eight new *Friluftsliv* educators with specialization in alpine ski touring, and a Bachelor degree in *Friluftsliv*. After completing their education, participants had 1-3 years of work experience in the field and avalanche environment. The analysis of the material is theme-centered through a systematic analysis process. The study was approved by the Norwegian Center for Research Data.

Results
The findings show that newly educated Norwegian IFMGA Mountain Guides and new *Friluftsliv* educators learn decision-making processes in authentic and real situations. The pattern of learning the decision-making process was to quickly recognize and discover essential information from the surroundings (system 1). In addition, the informants learned analytical tools, such as trip planning, problems forecasted by the avalanche bulletin, and the systematic snow cover diagnosis, and the reflective part of decision-making (system 2). In system 2, the processes for the participants were slow, and the final decision demanding for the informants.

Conclusion
This study provides insight into how informants are learning a dual process in decision-making in avalanche education. The intuitive and fast system 1 to recognize important information was relative quickly to learn. The tools to gather information for the analytical, reflective system 2 was also relative quickly to learn, but to anticipate the outcome of the decision was more demanding to learn.

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A Legacy of Outdoor Learning: 60 years of Turistika Activities and Outdoor Games and Sports at Charles University, Prague, Czech Republic, 1958-2018

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Aim

To examine the development of *turistika* and outdoor games and sports at the Faculty of Physical Education and Sport, Charles University, Prague, Czech Republic from 1958 to 2018.

Discussion

The first college of physical education (PE) and sport, called the Institute of Physical Education and Sport (now the Faculty of Physical Education and Sport of Charles University – *UK FTVS*), provided the first tertiary outdoor educational programmes in Prague in the 1960s. Members of the Outdoor Sports department also helped to found Vacation School Lipnice in 1977 (from 1992 to 2017, part of Outward Bound Czech Republic). Jan Neuman led the development of these outdoor education programmes, and books for students and teachers were subsequently developed. PhD theses (e.g., Turčová, 2005) and further studies also aimed to inform pedagogy and the development of outdoor education theory and practice. At *UK FTVS* outdoor sports and activities are part of compulsory courses for students studying PE and sport, sport management and adapted PE for people with special needs. The foundation course '*Turistika* and Outdoor Sports' is compulsory for all students studying PE and sport. It introduces students to outdoor sports, such as orienteering, cycling, climbing and mountaineering, outdoor games, outdoor exercises, ropes courses, parkour and environmental activities. The course serves as a model for developing school outdoor education programmes. Students not only are introduced to different outdoor pursuits and activities but also learn how to lead outdoor games or a cycling trip with children. Since 2006 PE and sport students can also choose a specialised study programme, 'Outdoor Activities'. Staff of the Outdoor Sports department have recently prepared new degrees in outdoor education (a joint bachelor's degree in 'Physical Education and Sport – Outdoor Education' and a master's degree in 'Teaching Physical Education and Outdoor Education in Primary and Secondary Schools').

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A Wilderness Therapy project in the Czech Republic and Poland

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Background
Wilderness Therapy utilizing nature and the outdoors as therapeutic context has been specifically developed for at-risk adolescents and young adults. It has been shown to be effective in improving self-esteem, self-awarenes, communication and wellbeing in this population. Whilst Wilderness Therapy has been gaining popularity in other European countries, there is little understanding about its suitability in the Czech Republic and Poland.

Aim
This pilot study assesses the mid-term effect of Wilderness Therapy for both healthy and at-risk adolescents and young adults in the socio-geographic context of the Czech Republic and Poland.

Method
This research utilizes a mixed-method approach. 36 young people, 15-21 years old who took part in eight-day Wilderness Therapy intervention completed the Outcome star, self-report questionnaires and semi-structured interviews pre-, post- and 2-months post intervention. Key aspects were: Relationships with peers, physical health and well-being, mood, connection to nature, clear goal for the future, self-esteem, self-compassion, and self-awareness.

Results
Preliminary data suggests an improvement in self-reflection, awareness of strengths and weaknesses, openness and trust to other people, relationship to nature, teamwork and communication skills.

Conclusion
Our preliminary results suggest the suitability of Wilderness Therapy approaches for adolescents and young adults in the Czech Republic and Poland. Further large scale research into the effectiveness of the therapy is warranted.

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Optimisation of finger strength and endurance training

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Background
Sport climbing will make its Olympic debut at the Summer Olympics in Tokyo 2020. This will increase the competition and the demands upon sport climbers' preparation and will surely require monitoring and evaluating sport performance-limiting factors to optimize training workloads. To be useful, the tests for the assessment of climbers' physical fitness should provide reliable, valid, objective and comprehensive feedback. Therefore, these tests should meet a number of conditions. They should be standardized (i.e. some workload parameters; climbing hold size; body, arm and finger positions, etc.) and reflect the specificity of the sport. Sport-specific ergometers should be used and the test protocols should be developed according to the ability, they are intended to assess.

Aim
Climbing workload will be characterized and biomechanical and physiological aspects will be outlined, which are important to be taken into consideration when developing informative tests for the assessment of key indicators of climbers' training state. A new evidence based methodology for the assessment of sport-specific finger strength and endurance in climbers will be presented.

Method
This methodology was developed after conducting several studies. It comprises of a combination of strength and muscular endurance tests performed on a specifically developed force measuring device with real time feedback and the ability to prescribe and control workload parameters.

Results
Test parameters (maximal and average force, test time, and force-time integral) were highly reliable with the exception of the rate of force development from the maximal strength test and the fatigue index from the all-out test. Therefore, climbers should endeavor to perform these tests correctly and should repeat them to increase the reliability of the measurement. It was observed that arm fixation during finger flexor testing provides slightly higher test–retest reliability. However, the scores from the tests without fixation correlated more strongly with climbing ability compared to scores from tests with arm fixation. Arm fixation compromised climbing specificity and testing without arm fixation is recommended. Construct validity evidence was provided through principal component analysis and calculation of the relative energy system contribution during the performance of each test from the test battery.

Conclusion
These methods showed how much information provides each test and test parameter on strength component, aerobic and anaerobic lactic capacity. The newly developed testing device and methodology ensure a comprehensive evaluation of both physical qualities and physiological functions at a local muscle level and can serve to optimize the training process of climbers which may further the development of rock climbing.

The determination of finger flexor critical force in rock climbers: background, methods and implications of its use

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Background

Rock climbing requires repeated isometric contractions of the finger flexors, responsible for flexion of the metacarpophalangeal and interphalangeal joints. These contractions cause regular periods of ischemia in the forearms; the extent of this ischemia and the subsequent recovery from it has been shown to differentiate ability groups of rock climbers (Fryer et al., 2017a), differ between disciplines (Fryer et al., 2017b) and is likely to be a trainable characteristic (Giles et al., 2017). As such, the fatigue resistance of the finger flexors is considered one of the most important factors in climbing performance. However, while methods for the determination of maximal finger flexor strength have been described in the literature (e.g. Baláš et al., 2014), as yet there are no tests to determine functional aerobic metabolic capacity, delineating steady and non-steady state.

Aim

The presentation will discuss the theoretical background of CF, methods for its determination in climbing populations, interpretation of results and future avenues.

Method

A literature review was conducted.

Results

A test of Critical Force CF provides an approximation of two parameters: the CF, and the Anaerobic Work Capacity (AWC) (Monod & Scherrer, 1965). CF is the maximum isometric force that a (synergistic) muscle group, in this case, the finger flexors, can maintain for an extended duration without fatigue. The AWC is the total amount of work that can be completed above CF (Poole et al., 2016). While CF is limited by the availability of oxidative substrates (glycogen), hyperthermia and central fatigue, AWC is limited by progressive depletion of high-energy phosphates and accumulation of metabolites associated with peripheral fatigue (Jones et al., 2008).

Conclusion

The determination of CF is important in rock climbers for: 1) understanding exercise tolerance, 2) determining optimal training prescription and 3) accurate monitoring of performance. As such, it is likely that determining both CF and AWC would be of value to coaches, climbers and researchers.

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Effects of four-week fingerboard local electromyostimulation training on wrist strength and endurance

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Aim
Electromyostimulation (EMS) has been defined as the stimulation of the nerves and muscles over the skin in superficial form at different frequencies (Hz) and intensity (mA). The purpose of the research was to investigate the effects of four-week fingerboard local electromyostimulation training on wrist strength and endurance.

Methods
A total of 16 physically active, non-climber adults (9 male and 7 female) participated in the study voluntarily. The participants were divided into two groups as EMS and NonEMS. Each group performed the same training program for about 25 min a day, 3 days a week for four weeks. The EMS application was performed with a Bosch TENS+EMS Dual Therapie (Stuttgart, GERMANY) device with a signal width of 260 ms and a frequency of 60 Hz. Before and after training, isokinetic force measurements were done with Biodex brand System 4 Promodel (NY, USA). Wrist strength and endurance was recorded during flexion and extension at 60 and 180 °/sec. The parameters used in the research were Peak Torque (Nm, PT), Peak Torque/Body Weight (%, PT/BW), and Average Power (W,AP).

Results
The only significant increases observed in the NonEMS group were in the right and left wrist AP parameters during flexion at 180 °/sec ($p<0.01$). However, the EMS group showed statistically significant changes in all of the parameters ($p< 0.01$ and $p< 0.05$) except in the left wrist AP parameters during flexion and extension at 180 °/sec. Another substantial finding of the research was that both groups showed enhancements in all of the strength and endurance parameters recorded.

Conclusion
Although the participants were physically active individuals, training on a sport specific plate, such as fingerboard, improved their wrist strength and endurance in the both EMS and NonEMS groups. The EMS group showed significant increases in almost all of the parameters. Being one of the basic components of rock climbing, muscular fitness has an essential role in climbing performance. This study's findings suggest that EMS training on fingerboards could be used to enhance climbing performance. Future studies could include measuring the isokinetic strength and endurance of muscle groups not placed with EMS in order to understand whether EMS is effective only in the muscle groups in which it is placed.

Acute effects of kinesio tape application over wrist flexor muscles on grip strength and sports climbing performance

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Background
Kinesio taping is a commonly used intervention in sports. Kinesio tape applications became popular within recent sports climbing and bouldering competitive events. Kinesio tape application is suggested to positively influence the muscle's ability to maintain strength during fatigue. Applications over wrist flexors have already been shown to reduce muscle fatigue during repeated concentric muscle actions. However, evidence of the effect of kinesio tape applications on grip strength and endurance is still controversial and there is a lack of existing studies with high applicability for sport disciplines.

Aim
The aim of this study was to evaluate the immediate effects of kinesio taping on muscular strength and endurance of wrist flexor muscles in sports climbers.

Method
In a randomized crossover design, twenty recreationally trained active sports climbers (10 men, 10 women) aged 28.5 ± 10.6 years performed one familiarization trial and subsequently two test trials either with (TAPE) or without (CONTROL) kinesio tape application over the flexor digitorum superficialis muscles. Test trials consisted of three performance measurements (hand grip strength and endurance, finger hang on a 3.5 cm ledge, and lap climbing) at intervals of 48 hours in a randomized order.

Results
We observed no significant differences in the parameters hand grip peak force (TAPE: 374.8 ± 80.1, CONTROL: 370.1 ± 75.1 N), fatigue index (TAPE: 27.6 ± 6.4, CONTROL: 28.0 ± 6.9 %), ledge hang time (TAPE: 44.9 ± 18.4; CONTROL: 46.7 ± 18.5 s), lap climbing distance (TAPE: 63.9 ± 38.2, CONTROL: 58.6 ± 26.6 m) and lap climbing time (TAPE: 8.7 ± 5.0, CONTROL: 8.0 ± 5.0 min), and maximum blood lactate values after lap climbing (TAPE: 6.6 ± 2.5; CONTROL: 6.5 ± 2.0 mmol/L) between both test trials ($p < 0.05$). In addition, the participants' UIAA climbing ability was significantly correlated with the maximum edge hang time (TAPE: $r = 0.540$, $p = 0.014$; CONTROL: $r = 0.667$, $p = 0.001$) and peak lactate concentration after exhausting lap climbing ($r = 0.521$, $p = 0.019$) in the CONTROL trial.

Conclusion
Kinesio tape applications over the flexor digitorum superficialis muscles did neither enhance hand grip strength and muscle endurance nor sports climbing performance parameters. The use of kinesio tape applications for a performance improvement in sports climbing could not be confirmed

within this study and should therefore be considered with caution when applied to athletes competing in sports climbing and bouldering events.

Tactical decisions in bouldering after failures

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Background
In boulder competitions, athletes have to solve a boulder problem within a climbing period. The time available for one climbing period is limited, usually five minutes in the semi-finals and four minutes in the finals, respectively. However, the number of attempts is not restricted, though, in case of a tie, athletes with fewer attempts in the number of tops and zones will be ranked higher.

Aim
After a failure in an attempt, the boulderer has to decide whether to change the climbing tactic or retry the boulder in the same manner as before. The aim of our study is to investigate if, in the grand mean, it pays off to invest time to find a new solution or if athletes are better off with sticking to their previous solution.

Methods
We analysed the video footage of the finals of 6 men and women boulder world cups in 2017. Additionally, an expert climber and licensed route setter independently analysed 2 of the world cup finals.

Results
Overall, in 1005 attempts of 288 climbing periods, the average number of attempts was 3.5 per climbing period. A change in climbing tactics was stated if the athletes used an obviously visible different solution and was counted as such in the two following attempts as well. A change includes using holds in a different sequence, using different grip techniques or positions or changing from a dynamic to a static solution. Cohen's κ was run to determine if there was an agreement between two raters' judgement on whether the boulderers maintained or changed their solution based on the analysis of two competitions. There was good agreement between the two raters´ judgements, $\kappa = .80$, 95% CI [.729, .871], $p < .001$. In 231 climbing periods, the boulderer failed on the first attempt. On the second attempt, the athletes changed their tactic in 62 climbing periods and stayed with their strategy in 169 climbing periods. The conditional rate of success in all changed attempts was 30% and 6% after a stay. Notably, regarding the 4th and later attempts, conditional rate of success in all changed attempts was still 17%, while it dropped to 2,1% after a stay.

Conclusion
We are aware that the number of possible solutions is dependent on the features of the boulder problem. However, on the grand mean, our investigation suggests changing the climbing tactic no later than after the third attempt. Otherwise, the probability of success drops dramatically and presumably does not compensate the degree of fatigue that comes along with multiple attempts.

The effect of the psychomotor abilities level on the result in speed climbing of young climbers 1-2 years of study

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Background
The elementary stage of climbing training should focus on the calisthenics of future climbers. Harmonious development of all physical qualities contributes to the creation of a basis for further improvement. The calisthenics include not only the development of strength and flexibility, but also psychomotor abilities. However, the modern system for the elementary stage of climbing training does not pay attention to the development of psychomotor abilities.

Aim
To determine the effect of psychomotor development level on the speed climbing result.

Methods
The research was conducted from October 2015 to February 2017 with the Youth Sports School of Olympic Reserve (YSSOR). The research contained 3 stages:
(1) Identification of the most significant psychomotor abilities for speed climbing from a group of 15 climbers with 5 years experiences: reaction on moving object, reaction on sound, build of segments, individual minute, taping test. Reliable results were obtained using the correlation analysis between the speed climbing result and certain psychomotor abilities.
(2) The development and implementation of methodology for the development of psychomotor abilities for elementary level climbers at the YSSOR: exercises for attention and speed of reaction (exercises with balls and special equipment), realizable with game and competition methods.
(3) Experimental verification of the implementation efficiency of the methodology. 36 elementary level climbers were separated arbitrarily into 2 groups: control and experimental. The methodology of psychomotor ability developing was applied to the experiemental group. The control group has trained with common program. Before and after experiment a speed climbing competition was conducted, considering time and stability of climbing.

Result
The average climbing time the experimental group before the experiment was 44,04 secs, and after 34,97 secs, a significant decrease of 28,7%. In the control group there was no significant changes. The number of wrong attempts (falsestart and falling) in the control group didn‘t changed, while in the experimental group they decreased by 33,3% - from 15 to 10. Also the stability of climbing in the experimental group increased, which is expressed in the reduced time with each new try on the route. Before the experiment only 3 of 10 showed the reduction of time on each new try, after the experiment 6 of 10 demonstrated a better time after each try.

Conclusion
(1) Model characteristics of the level of psychomotor abilities for elementary level climber were identified.

(2) Methods for psychomotor abilities were developed, which were tested and included in YSSOR program.
(3) The relationship between speed climbing result and level of psycomotor abilities development was revealed.

Climbing specific training methods and its effect on performance

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Aim

The aim of all our three intervention studies has been to investigate the effects of different climbing specific training methods on performance. We have conducted training interventions on core-, basic- and finger strength in climbers with different skill levels.

Method

(1) 19 advanced and elite climbers (IRCRA grade 19) were randomized into a dynamic (DCT) or isometric (ICT) core training group and trained twice weekly for ten weeks. The climbers were tested using two climbing-specific core tests (body lock-off and body-lift) and four non-specific core strength tests—one dynamic (superman) and three isometric (trunk flexion and trunk rotation left and right).

(2) We compared the effects of different strength training intensities on climbing performance and climbing specific tests. Thirty lower grade and intermediate-level climbers participated in a 10-week basic strength training program. The participants were randomized into three groups: high resistance–few repetitions training groups (HR-FR), low resistance–high repetitions training groups (LR-HR) and a control group (CON) which continued climbing/training as usual.

(3) Twenty-five climbers with climbing ability ranging from intermediate to elite level (IRCRA grade 10 to 20) were randomized into a control group (CON) or a hang board training group (HBT). HBT completed a program on the Beastmaker 1000 series hang board twice a week for 10-weeks. The "BeastMaker" training app was used to standardize the training protocol. Grip endurance was measured performing finger hang on 23mm list, while isometric grip strength (peak- and maximal average force) and rate of force development (RFD) were performed on both the 23mm list and jug holds.

Results

(1) There were no differences between the groups at post-test ($p = 0.328–0.824$) and neither group demonstrated greater improvement compared with the other ($p = 0.300–0.926$). The ICT group demonstrated 10.8% and 29.6% improvement in trunk flexion and body-lift ($p = 0.029–0.037$ with no improvement in body lock-off and rotation ($p = 0.101–0.343$). The DCT group demonstrated 5.0–14.9% improvement in the core strength tests ($p = 0.012–0.043$), a non-significant 33.8% improvement in body-lift ($p = 0.100$), and no improvement in body lock-off ($p = 0.943$).

(2) There were climbing performance improvements in the HR-FR and LR- HR ($p = 0.088–0.090$). The HR-FR and LR-HR improved their time in both Dead-hang ($p = 0.004–0.026$) and Bent-arm hang ($p < 0.001–0.002$). No differences were observed in the CON group in any of the tests ($p = 0.190–0.596$), except for improvement in Bent-arm Hang ($p = 0.018$). No differences between groups were observed in any of performance tests ($p = 0.507–1.000$). The training groups reduced their climbing sessions during the intervention compared to the CON group ($p = 0.057–0.074$).

(3) The results revealed significant improvement for the HBT group in peak force on 23mm list (21%), maximal average force in both jug holds (9%), and 23mm list (15%) and grip endurance (15%). However, no statistical differences were observed between groups in any of the tests.

Conclusion

(1) Both dynamic and isometric core training improved climbing-specific test performance. Dynamic training was slightly more favorable, although not significantly.

(2) The HR-FR and LR-HR training program demonstrated an 11% and 12% non-significant improvement in climbing performance despite a 50% reduction in climbing sessions, but improved the results in strength and climbing-specific tests.

(3) The hangboard training program can increase grip endurance and isometric finger strength.

Recovery in climbing: A literature review

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Background
Three types of recovery are distinguished in sport climbing: 1) recovery between intermittent contractions during an ascent; 2) recovery between ascents; 3) recovery after training.

Aim
The aim is to present an overview of the current research related to recovery methods in sport climbing.

Method
A literature review was conducted of research related to recovery methods in sport climbing.

Results
Early research suggested the beneficial effect of active recovery over passive rest after difficult climbs (Draper, Bird, Coleman, & Hodgson, 2006; Watts, Daggett, Gallagher, & Wilkins, 2000). The specificity of active recovery is still under discussion (Valenzuela, De la Villa, & Ferragut, 2015). Recently, shaking during climbing was found to speed up recovery during intermittent contractions (Baláš et al., 2016). The hot topic in recovery strategies after difficult climbs is muscle cooling (Heyman, De Geus, Mertens, & Meeusen, 2009; Kodejska, Balas, & Draper, 2018).

Conclusions
The use of cooling, its imitations and application will be presented. Finally, recovery strategies after training methods will be discussed.

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Physiological responses to indoor wall climbing and climbing on the treadwall

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Aim
The aim of the study was to compare physiological responses of indoor wall and treadwall climbing in intermediateand advanced climbers.

Methods
Eighteen male intermediate and advanced climbers participated in the study.Climbers completed two identical routes,one in the climbing gymand the other on the treadwallat two velocities (4 m/min and 6 m/min respectively) on two separate visits. A portable gas analyser was used to assess the physiological responses during the climb and the 10 min recovery.

Results
There were no significant differences for oxygen consumption between climbing on the treadwall (1.71 ± 0.40 $L \cdot min^{-1}$ for 4$m \cdot min^{-1}$ and 2.05 ± 0.42 $L \cdot min^{-1}$for 6 $m \cdot min^{-1}$)and climbing in the gym (1.78 ± 0.38 $L \cdot min^{-1}$for 4 $m \cdot min^{-1}$ and 2.09 ± 0.45 $L \cdot min^{-1}$ for 6$m \cdot min^{-1}$). However, climbing in the gym induced higher heart rate (139 ± 26 beats$\cdot min^{-1}$for 4$m \cdot min^{-1}$ and 149 ± 26 $b \cdot min^{-1}$ for 6$m \cdot min^{-1}$) than treadwall climbing (132 ± 26 $b \cdot min^{-1}$for 4$m \cdot min^{-1}$ and 144 ± 25 $b \cdot min^{-1}$ for 6$m \cdot min^{-1}$). Greater increase in heartrate was noted for intermediate climbers. There was significant higher energy cost during climbing in the gym (8.9 ± 1.88 kcal$\cdot min^{-1}$) than on the treadwall (8.39 ± 2.01 kcal$\cdot min^{-1}$) at 4 $m \cdot min^{-1}$ when the recovery period was included, the energy cost at 6 $m \cdot min^{-1}$ was 10,82 ± 2.64 kcal$\cdot min^{-1}$ (indoor wall) and 10,59 ± 2.49 kcal$\cdot min^{-1}$.

Conclusion
Based upon these results, the heart rate responseduring climbing in the gym is more elevated than on the treadwall and the differences are related to climbing experience. The energy cost during climbing in the gym is significantly higher when O_2 deficit is calculated.

Psychological benefits of indoor cycling while immersed in a virtual environment

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Aim
The purpose of the present study was to assess the psychological benefits (cognitive and emotional) of indoor cycling while immersed in a virtual environment: real outdoor video (natural stimuli) versus artificial video (artificial stimuli). According to previous literature, watching images of natural settings favors positive affect and enhances cognitive performance. We extend this view to an indoor controlled environment.

Methods
A total of 21 Sport Science students participated in the study. During session one, participants completed an incremental effort test in order to obtain their anaerobic power threshold. During session two and three, participants cycled for 55 minutes at 75% of their anaerobic power threshold under one of two conditions: video with natural or artificial stimuli. The order of presentation of the two sessions was counterbalanced across participants. Immediately after the cycling session, participants completed a psychological assessment that tapped cognitive and emotional functioning including inhibition, vigilance, working memory, anxiety, rumination, negative and positive affect. Additionally, heart rate variability (HRV) was measured while participants performed the physical effort, and the cognitive tasks.

Results
Preliminary results failed to support superior cognitive performance after performing physical activity exposed to natural, compared to artificial stimuli, and also did not support the benefits of this environment on subjective reports of emotional experiences. Our findings are in contrast with previous research suggesting that Attention Restoration Theory (ART) would allow the neural mechanisms to rest and replenish the directed attention, thus improving cognitive performance, or the Stress Reduction Theory (SRT) which states the impact of nature experience on affect and well-being. A more immersive virtual reality could allow us to see other results, taking into consideration the fact that we had a trend, but not statistically significant.

Conclusion
Future research should compare indoor cycling to a “green”, nature-based outdoors environment in order to assess what elements of the natural environment impact cognitive function and mental health, and which are the possible neural mechanisms responsible for these effects. This research is needed to enhance the understanding of the science behind this lifestyle factor, and to establish public health recommendations.

Individual effect of cold-water immersion on handgrip performance in rock climbers

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Aim
To determine the individual effect of cold-water-immersion (CWI) at two temperatures (8°C and 15°C) on repeat handgrip performance to failure.

Methods
A total of 29 participants completed 3 intermittent trials to failure on a climbing-specific handgrip dynamometer on 3 laboratory visits. For each visit, a different recovery strategy was employed: passive (PAS) recovery, CWI at 8°C (CW8), or CWI at 15°C (CW15). The force time integral (FTI: time of contraction multiplied by the force of contraction) was determined to assess handgrip performance. Minimum detection change (MDC) for FTI was taken as a criterion for individual assessment of CWI effect. At the end of the last CWI participants were asked to assess subjective perception of the procedure (agreeable, neutral, and disagreeable) and water temperature on a 7 grade scale (cold -3; neutral 0; warm 3).

Results
Individual responses to CW8 show that 8 males and 5 females increased their performance above MDC, and 7 males and 9 females performed inside the limits defined by the MDC (MDC 6322 Ns). Individual responses to CW15 show that 10 males and 5 females increased their performance above MDC, and 5 males and 9 females performed inside the limits defined by the MDC. CW8 was scaled as disagreeable for 27 and 21 participants and neutral for 2 and 8 participants after the first and second recovery period, respectively. On the other hand, CW15 was evaluated as disagreeable only for 3 and 7, neutral for 13 and 11, and agreeable for 13 and 11 participants after first and second recovery period, respectively.

Conclusion
Our data showed that the application of CWI should be prescribed individually. Future research should focus on the explanation of physiology mechanisms related with improved recovery.

The effect of passive recovery on repeated isometric performance and the relationship of the results to the observed data

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Aim

The aim of the study was to assess inter-individual variability of passive recovery after repeated isometric handgrip performance of finger flexors to exhaustion.

Methods

The study was attended by a group of climbers consisting of 16 men (aged 30.8 ± 7.2 years) and 18 women (aged 26.7 ± 4.5 years). Participants came in the laboratory, where three repeated intermittent handgrip isometric performance until exhaustion with passive recovery strategy were completed. The passive recovery consisted in seated rest for 20 min. Anthropometric, training and performance variables were related to the repeated performance changes using Pearson correlation coefficient.

Results

The average decrease in results was 17.9% with the range was from 0% to 49.3%. There was no strong relationship found between drop in performance and selected variables. Moderate relationship was found with the initial time to exhaustion ($r = 0.44$) and climbing hours per week ($r = -0.32$). No other relationship was found.

Conclusion

Passive recovery has a negative effect on repeated isometric performance to failure. There is a large inter-individual variability in the performance decrease. We found a moderate relationship between initial length of contraction and climbing hours per week. This might be connected with the use of anaerobic metabolic pathways and the level of fitness. However, other major factors must have influenced the speed of recovery.