# Applying Meta-Analysis to Czech Outdoor Research

by Dusan Bartůněk, Jan Neuman & Andy Martin

### Overview

Providing evidence to support the value of the intangible aspects of outdoor education and the outcome based demands, particularly of corporate clients and funders, has become increasingly important to industry providers.

The efficacy and impact of outdoor educational programmes have been typically measured using quantitative surveys distinguished by a psychological layout measuring self-concept before and after the programme. More systematic and rigorous qualitative approaches have also been advocated. with the assertion that these methods provide an effective way of investigating the complex phenomena and many variables of outdoor education (people, processes, and outcomes).

The indigenous nature of the Czech turistika activities and the dramaturgy methods. of creative course design have attracted recent attention in the outdoor education literature internationally <sup>(1)</sup>. Using primarily qualitative methods the international program of Outward Bound Czech Republic was evaluated <sup>(2)</sup>, which illustrated some of the powerful learning experiences and images of transfer from descriptive accounts of participants. This paper focuses on a comparison of a meta-analysis of the major quantitative outdoor education research projects conducted in the Czech Republic over the past 20 years with the results of the five main meta-analyses in outdoor education research internationally.

### What is meta-analysis and the index ES?

Meta-analysis is the secondary statistical comparison and evaluation of a large set of primary analytical results from particular works. carried out for the purpose of integrating research conclusions. Individual studies are from a methodological point of view conceived differently and they express the results in a different way. To integrate these diversely conceived results it is essential to convert various statistical indexes into a common denominator.

Meta-analyses report results in terms of an effect size index (ES), which measure the difference between people's rating of the selves for different aspects at two different points in time (analysis before and after finishing the Outdoor Education program). In another words ES informs about a quantitative size of a change.

The index uses Hayes' coefficient  $\omega^2$ , which expresses a relative fraction of experimental factor on the effect size cone of dispersion. Contrary to other effects, especially the incidental or unknown ones, it is expressed as a percentage. The effect size ES is useful in meta-analysis methods. The 'size effect' can be figured out from the following relation:

$$ES = \frac{M_E - M_C}{S_C}$$

MC is the mean of a control group

SC is standard deviation from the control group

ME is the mean of an experimental group



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For a general interpretation an ES = 0 means a state without any change, negative ES means a decrease of the measured value and positive ES means an increase of the value. ES is proportional which means that ES = 0.4 represents a double change ES = 0.2.

Cohen <sup>(3)</sup> suggested that 0.2 is a small change, 0.5 a medium change and 0.8 is a significant change, although to generalise when interpreting an ES disregards information about whom and what is being measured. In this current research ES's were interpreted using Cohen's d. The results from each study were interpreted by mean, standard deviation, t-test and pair t-test.

#### Cohen's d

$$d = \frac{M_E - M_C}{S_{pooled}} \quad S_{pooled} = \sqrt{\frac{S_1^2 + S_2^2}{2}}$$

## Outdoor education research with the help of meta-analysis

There have been five pivotal meta-analyses in Outdoor Education research (4,5,6,7,and 8) – Table 1. The studies are broad both in their coverage and focus.

These five outdoor education meta-analyses indicate that the programs have small to medium effect, according to

#### Table 1

comprehensive educational and psychological norms <sup>(3)</sup>. The minimum average size effect is in American Camping Programs 0.20,<sup>(7)</sup> and the maximum average size effect is initiated within rope and obstruction track programs 0.55,<sup>(4)</sup>. Other research presents an overall ES = 0.38 (6), 0.34 <sup>(8)</sup> and 0.31 <sup>(5)</sup>.

The results of the most extensive studies focused on outdoor programs present the overall size effect between 0.3 and 0.4  $^{(5,8)}$ . The small size effect (0.20) of Camping Programs has assumptions that not all the camps are focused on personality and social development of the participants.

The Camping Programs that focused on personal development had ES = 0.41. The relatively high values effect size 0.55 <sup>(4)</sup> for the rope and obstruction track courses are based on only 15 surveys and they exhibited a wide scale of effect size. Another element that discourses against the reliability of this study is the fact that there was an inverse proportion found between the quality of the study and the size of effects. In other words, the less quality surveys had a rather higher size effect.

A conclusion of these five outdoor education metaanalyses is that outdoor programs have small or medium impact on generally monitored features such as self-respect, behaviour problems and teamwork. Hattie et al.<sup>(8)</sup> conclude that 65% of participants managed better after completing outdoor programs.

Study	Focus	d	N studies	N effects	N participants
Carson & Gillis (1994)	Adventure programming for adolescents	0,31	43	147	-7,030
Hattie et al (1997)	Adventure education and Outward Bound programmes	0,34	96	1,728	12,057
Hans (2000)	Adventure programming locus of control outcomes	0,38	24	30	1,632
Marsh, P.E (1999)	Camping programmes	0,20	22	37	
Bunting & Donley (2002)	Ropes Challenge Courses	0,55	15		

#### Table 2

Year	Author	Торіс	n	Age of participants	Instrument	Amount of surveys	Amount of factors
1980	Peter Hloec, Vladimir Smékal	Educational aspects of controlled recreational activities	138	15-25	self-image questionnaire	7	16
1985	Jiří Brtník	Educational-instructional aspects of controlled touristic/hiking/camping activities for adolescents	550	14-18	self-image questionnaire	2	16
1999	Antonin Mrhálek	Appraisal of impacts of outdoor activities and personal and social development	60	20-22	SPARO FIRO-B	2	5
2000	Petr Šlechta	Support of team effectivity: What are outcomes of team-cooperation courses?	396	26-55	Sociometric test, FIRO-B	2	5
2005	Jiří Horálek	Influence of adventure programmes for adolescents	40	15-19	DOPEN D- S-L, I-P-H	3	6





## A meta-analysis of outdoor education research in the Czech Republic

Five statistical studies from 1980 to 2005 were analysed  $^{(9,10,11,12,13)}$ . These studies represented 1184 participants (mainly adolescents but also adults), 16 sub studies, and 48 factors influenced the ES (Table 2 < previous page).

Categorisation of some results from each study presented some difficulty, due to the objectivity of the studies or interpretation of results. The final six categories were made up from 48 different factors which influenced the ES. This meta-analysis was not large, but objective and accurate (Table 3). The results show that the main influence of these outdoor programs on participants is on their selfrealisation and life ambition ES=0.79 which is regarded as a significant change. A medium ES=0.48 was evident for locus of control. These programs were also good therapy

#### Notes:

- 1) Martin, Franc & Zounková, 2004
- 2) Martin & Leberman, 2004
- 3) Cohen 1977
- 4) Bunting & Donley, 2002;
- **5**) Cason & Gillis, 1994;
- 6) Hans, 2000;
- 7) Marsh, 1999;
- 8) Hattie, Marsh, Neill, & Richards, 1997
- 9) Brtník, 1986;
- 10) Holec & Smékal, 1980;
- 11) Horálek, 2005;
- 12) Mrhálek, 1999;
- **13**) Šlechta, 2002

#### References

Brtník, J. (1986). Výchovné vzdělávací aspekty organizované turistiky ucnovské mládeze (Kandidátská práce). Praha: Univerzita Karlova FTVS.

Bunting, C. J., & Donley, J. P. (2002). Ten Years of Challenge Course Research: A Review of Affective Outcome Studies. Poster presented at the 6th Coalition for the Education in the Outdoors Research Symposium, January 11-13, Bradford Woods, IN.

Cason, D., Gillis, H. L. (1994). A meta-analysis of outdoor adventure programming with adolescents. Journal of Experiential Education.

Cohen, J. (1977). Statistical power analysis for behavioral sciences (Rev. ed.). New York: Academic Press.

Hans, T. (2000). A meta-analysis of the effects of adventure programming on locus of control. Journal of Contemporary Psychotherapy.

Hattie, J., Marsh, H. W., Neill, J. T. & Richards, G. E. (1997). Adventure Education and Outward Bound: Out-of-class experiences that have a lasting effect. Review of Educational Research.

Holec, P., & Smékal, V. (1980). Vychovné aspekty řízené rekreační cinnosti - dotazník Sebehodnocení – vyzkumný úkol 12-2-23 MŠ CSR, Praha. for pathological behavioural aspects, ES = -0.54. Selfconfidence has a very similar result ES = 0.07 or 0.16 – after 3 months, as with other meta-analyses.

The research concludes that the meta-analysis of Czech outdoor education program research shows a significant ES for participant's self-concept, and medium ES for participant's behaviour and locus of control.

These results compare favourably with the other outdoor education meta-analyses presented. The results may emphasise the value of measuring effect size for monitoring and comparison of the effectiveness of outdoor education programmes, but providing both meta-analysis and the qualitative approaches illustrated at the beginning of this paper results in a mixed method approach that leads to a bigger picture of experiential education linked to turistika activities and the natural environment of the Czech Republic. ■

#### Table 3

Focus	Amounts	ES	
Locus of control	7	0,48	
Self-confidence	12	0,07 /0,16*	
Personality	9	-0,09	
Relationship	14	0,19	
Self-realisation, life ambition	7	0,79	
Self-realisation, life ambition	3	7	
Pathological behavioural		-0,54	
* after 3 months			

Horálek, J. (2005). Vliv dobrodružných programu na rozvoj osobnosti žáků středních škol. (diplomová práce - ved. Doc. PhDr. Jan Neuman, CSc.), Praha: UK FTVS.

Marsh, P. E. (1999). What does camp do for kids? A meta-analysis of the influence of organized camping experience on the self constructs of youth. Unpublished Master of Science thesis, Department of Recreation and Park Administration, Indiana University, IN.

Martin, A., Franc, D., & Zounková, D. (2004). Outdoor and Experiential learning – An Holistic and Creative Approach to Program Design. Hants: Gower Publishing.

Martin, A. J., & Leberman, S. I. (2004). Adventure the Czech way. New Zealand Journal of Outdoor Education, 1(3), 65-85.

Mrhálek, A. (1999). Posouzení vlivu sportů a aktivit v přírodě na některé osobnostní charakteristiky a ukazatele tělesné výkonnosti (Diplomová práce). Praha: UK FTVS.

Šlechta, P. (2002). Využití sociometrického testu pri hodnocení pracovních skupin. Psychologie v ekonomické praxi, Praha, 37(1-2), 87-90. [Application of the sociometric test to the assessment of work groups].

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