

# GREEN EXERCISE FOR HEALTH AND WELL-BEING

Jan NEUMAN, Ivana TURČOVÁ, Andrew J. MARTIN

## **Abstract**

*In Czech, turistika activities have historically involved active movement on foot through the countryside. More recently the English term ‘Green Exercise’ (GE) has referred to physical activities that take place in nature, in a park or in natural exercise areas. A research project established by a team at University of Essex in the UK, headed by Professor Jules Pretty (Pretty, Griffin, Sellens, & Pretty, 2003), during the last twelve years has implemented a multi-disciplinary approach to examining and quantifying the benefits of GE activity for health and well-being. Their research team used different techniques to explore the mechanisms underpinning the psychological and physical benefits of GE using both laboratory studies and in field-based approaches. This article reviews this recent research on GE, its impact on the policies and practices of a number of health and environmental organisations, and provides implications for the Czech context and internationally.*

**Key words** : Green exercise; Health; Well-being;

## **1 Introduction**

### **1.1 Green exercise’: Physical activity in nature**

Global issues of declining or stagnant sport participation (Vail, 2007) and obesity as an epidemic (Blair, 2009) have highlighted the importance of promoting increased family and community physical activity to encourage healthier behaviours and enhance overall well-being (Mummery & Brown, 2009). Physical exercise is well known to provide physical and psychological health benefits. There is also good evidence that viewing, being in, and interacting with natural environments has positive effects, reducing stress and increasing the ability to cope with stress, reducing mental fatigue and improving concentration and cognitive function. More recently, the concept of ‘Green Exercise’ (GE) has been appearing more and more often in the English written literature. GE is

defined as physical activity undertaken in natural environments, i.e., motor activities, which take part outdoors, in parks or natural exercises areas. Staff at the University of Essex in England, led by Jules Pretty and Jo Barton, have been foremost in researching the concept of GE since the turn of the new millennium (e.g. Barton, Hine & Pretty, 2009; Barton, Griffin & Pretty, 2012). Their extensive programme of research has quantified the benefits of GE both for physical health and mental well-being.

The GE Research Team consists of experts in the areas of exercise physiology, psychology, public health, environmental sustainability, community engagement and behaviour change. Their team has examined where, when and why GE brings health and well-being benefits, including close cooperation with a number of health and environmental organisations. Various forms of GE based interventions, which

promote health and well-being outcomes for vulnerable groups, were investigated as well. The research concept of GE has potentially far reaching implications for both public health and environmental agenda at a local, national and international level. The GE project has also focused on rediscovering the relationship between nature and culture. For this reason, the project also includes traditional food, crafts and customs in the different regions of the country. The project team has also tried to capture the benefits of developments in ecotourism, encouraging learning by living in the wild, skills in handling tools, simple forms of cooking and the use of medicinal plants. They have also observed the positive effects of nature on volunteers involved in environmental programs and projects (Pretty, J. et al 2007, Barton, J., Griffin, M., Pretty, J. 2012).

## **1.2 Turistika: More than physical activity in nature**

The Czech educator Comenius (Jan Amos Komenský, 1592–1670) highlighted the importance of active movement outdoors and playing games in nature some 400 years ago. His work can be understood as a basis for the roots of ‘experiential education’ (výchova prožitkem) and ‘education in nature’ (výchova v přírodě) (Spinka, 1943). His holistic approach was based on the ideals of the Greek holistic philosophy of education, *kalokagathia*, involving educating the mind, body and soul through activity in nature using all the senses. He also believed in the use of games, play and travelling in achieving educational outcomes particularly for improving youth self-esteem and interpersonal relationships (Comenius, 1632/1907).

Scandinavia’s traditions of *friluftsliv*, also involve active movement in nature and are strongly connected to a journey (Henderson & Vikander, 2007). In Czech, *turistika* activities historically involved active movement on foot through the countryside (i.e. walking, hiking), but now include cycling, canoeing, skiing and mountaineering. However, *Turistika* is more than just physical activity, it also involves other outdoor and cultural activities (e.g. local history, art, music and entertainment, mushroom and berry picking) (Martin, Turčová & Neuman, 2007, 2016). While some tourism definitions involve travelling away from local environments (Mason, 2003), the term *turistika* is culturally unique and specific to the Czech context and environment (Turčová, Martin & Neuman, 2005). Scouting activities and stays in nature connected with camping can also be included as *turistika* (Guth-Jarkovský, 1917/2003).

The tramping movement (Waic & Kössl, 1994), involving camping or hiking at weekends, is also a particular Czech historical and cultural phenomenon involving physical activity in nature. Tramping was influenced by the German romantic youth movement *Wandervogel*, British Scouting, American *Woodcraft* and the American culture of the Wild West (Seton, 1917). It provided young people opportunities for freedom in nature and to protest against imposed society rules and restrictions. Activities were adapted to the specific conditions of the country and are part of the creation of an indigenous Czech culture of *turistika* activities. Tramping is still popular in Czech society today (Martin, Turčová & Neuman, 2007, 2016).

In the Czech context, the concept of 'eubiotics' (in Greek eu = good; bios = life), life in balance with nature, was first published by Růžička (1926) and introduced in school physical education and youth lifestyle by the writer and teacher Eduard Štorch (1929). With the support of T.G. Masaryk, the first President of Czechoslovakia, Štorch rented a piece of land on the Prague Libeň Island in 1926, which was almost a wilderness at that time. He built an outdoor school for youth education with a focus on the concept of eubiotics, life in balance with nature. Štorch (1929) organised trips, encouraging learning by exploring local history, archaeological and work opportunities.

The link between GE, health and well-being specifically in the Czech context can be found in several recent conference publications and presentations (Neuman, 2010, Neuman, 2012; Neuman & Turčová, 2013; Neuman, 2014). Jo Barton (2014) and members of her team also presented aspects of their GE research at the 2014 International Mountain and Outdoor Sports conference held in Prague (Rogerson, Brown, Sandercock, & Barton, 2014; Wooler, Barton, & Micklewright, 2014).

## **2 Objectives**

The purpose of this article is to review research undertaken related to the English term 'Green Exercise', physical activity undertaken in natural environments, and its benefits for health and well-being and provide implications for the Czech context and the importance of turistika traditions and activity.

## **3 Review of recent 'Green Exercise' research**

The range of multi-disciplined funded research work of Jules Pretty and Jo Barton at the University of Essex has involved participants from many different cohorts including adults, young people and vulnerable groups such as those with mental illness (e.g. Pretty et al 2007; Barton, Hine & Pretty, 2009; Barton, Griffin & Pretty, 2012). The methods used have monitored individuals' changes observed as a result of their participation in different kinds of outdoor activities (walking, cycling, fishing, nature conservation, working in the woods, horseback riding, boating).

### **3.1 Psychological Research Methods**

- Self-esteem and self-confidence (self-esteem) was assessed using a 10 itemized range according to Rosenberg's (1965) Self-Esteem Scale (RSE);
- Assessment of the emotional state involved the Profile of Mood States (POMS) test for expressing the mood of last week and today, responses were assessed using a 5-point scale (McNair, Lorr & Droppleman, 1971).
- Well-being was assessed using the "Warwick Edinburgh Mental Well-being Scale" (WEMWBS), which has 14 items; each item is assessed on a 5-point scale (Tennant et al, 2007);
- To assess the relationship to nature selected questionnaires were used in the field of environmental psychology:

- a) Feeling emotionally connected to the natural world were assessed using a Connectedness to Nature Scale (Meyer & McPherson, 2004); the level of acceptance is evaluated on a scale from 1 to 5;
- b) Assessing individuals' relationship to the natural world involved the test of relatedness Nature Scale (Nisbet et al 2009), which has 21 items evaluated in three sub-scales assessing three kinds of relationships 'what I think', 'what it should be' and 'what I experienced'. The strength of the relationship is evaluated on a 5-point scale.

### 3.2 Anthropometric and physiological research methods

- Body Mass Index (BMI)
- Blood pressure
- Measuring changes in cortisol (saliva) - course of recovery after exercise.
- Variability of heart frequency is measured non-invasibly.
- The amount of physical activity measured using pedometers (accelerometers).

The data was also used to examine how people cope with stress (movement, new natural environment) and how fast they recovered.

## 4 Review of research results from the University of Essex

The following provides a summary of the findings related to health and well-being benefits from participation in GE from the different studies.

- Nature (parks, gardens, landscape and wild) provides benefits for mental health. In nature physical activities are ongoing joyfully and easily and contribute significantly to health.
- Outdoor activities are beneficial for all groups of the population (age, gender, social and ethnic groups), but they are more beneficial for vulnerable people, for sick and for people with special needs, including those with lower levels of mental health.
- All types of natural environments have a positive effect on health, whether living near or "on the border" with nature, or staying in the countryside or wilderness.
- Nature can act therapeutically, for people with serious illnesses, but for seriously depressed persons the researchers do not recommend activities in the countryside.
- Infants and kids are enthusiastic about learning and playing in nature, a fact that should be accepted by all educators, including parents.
- Due to active movement and games in nature self-esteem, social skills, and environmental knowledge are all improving.
- Active movement and games in nature have a positive impact on fine and gross motor skills of

children. A repeated recommendation is that learning in the outdoors should be implemented and engages more children. Teaching of children should take place continually throughout the year. In this context it is necessary to involve more parents.

- Unpleasant cityscapes (not green) increase blood pressure, reduce self-esteem, and worsen mood. People living close to nature and with access to nature are generally healthier. Blocks of new buildings diminish citizens' use of local green spaces. The closeness of nature, e.g. small parks in cities, is a major source of health and is of great importance for society.
- There is a relationship between knowledge, memory and commitment - people knowing nature are in a better state in this sense. Memory is influenced by personal experience of places or of gaining experience from stories. Sustained, meaningful stays in nature changes people and creates lasting memories. Short stays naturally produce similar therapeutic mental health outcomes; however, longer stays in nature has positive effect on various emotions and lasting memories ( Pretty,J. et all 2003, Pretty,J. et all 2005, Pretty, J. et all 2007 Barton, Hine & Pretty, 2009; Barton, Griffin & Pretty, 2012).

## 5 Discussion

GE and stays in nature brings people together and creates social capital. Creating this capital is the main reason for the increase of the range of outdoor

activities generally in post-modern society (walking with dog, fishing, group walks, etc.), but there are people who would rather stay alone in nature for health benefits and well-being. For therapeutic applications, exercise and outdoor activities, for most people, improve mood, reduce depression and fatigue, and encourage participants to be more active. The findings also indicate that GE is successful in increasing self-esteem. Wellness specialists should reflect the impact of outdoor activities on personal development, correcting of behaviour, on emotional control and increased self-esteem. The researchers from University of Essex found that in the UK there are slowly diminishing health and safety protections against free play in nature (Thomson Coon et all 2011, Barton, J., Griffin, M., Pretty, J. 2012, Barton, J. 2014).

A very important part of the GE research was collaboration with various institutions. They have good relations with forest managers and foundations for wildlife, with schools and institutions for people with special needs. GE has also impacted internationally, for example in an Australian context MacKay and Neill (2010) evaluated the effect of GE on state anxiety and the role of exercise duration, intensity, and greenness. In 2010, Finnish author Laukkanen undertook a comprehensive analysis of 36 studies and 890 abstracts of scientific articles from the years 1970-2009 in the topic "Green exercise". Brief conclusions of this study can be summarized as follows:

- Outdoor activities affect health at three levels: looking at nature, residing close to nature or in the countryside, growing outdoor activities;

- Outdoor activities are primarily influenced by the level of self-esteem and improve mood;
- Recreation in nature brings joy and protects against the effects of everyday stress;
- The natural environment, which is characterized by the term "outdoor" can be characterised as healthier than "indoor";
- Outdoor activities improve health, sense of well-being, improve social relationships, increasing independence and rich aesthetic experience;
- Nature can be considered a "gold mine" for health promotion;

Laukkanen (2010) recommends a Nordic concept of so-called health "Outdoor fitness" and believes in the synergy effect of physical activities that are performed directly in the natural environment (GE). There are a growing number of people involved in organizations for the natural environment and wilderness and an increasing number of visitors in natural landscape areas. With the growth of national and international ecotourism as well as sports and organizations in the countryside GE continues to have important public and environmental health consequences.

## 6 Conclusions

The potential role of GE in bio-psycho-social well-being has attracted increasing attention particularly through the research work of Jules Pretty and Jo Barton at the University of Essex. Their research work has involved participants from many different cohorts including adults, young people and vulnerable

groups such as those with mental disability. Their findings have indicated that GE has an important influence on general health and well-being. A fitter and healthier population costs less in state spending. Increased support and access to GE for more of the population should produce substantial benefits for general health and well-being. Interacting with the natural environments has other positive effects, such as reducing stress and increasing the ability to cope with mental fatigue. The concept of GE has therefore grown out of well-established areas such as attention restoration theory within environmental psychology, which have tended to focus on the psychological and physical effects of viewing nature (Kaplan & Kaplan, 1989) and the well-recognised work about the psychological benefits of physical exercise.

In an international context, indigenous examples of GE have been highlighted through the Scandinavian concept of friluftsliv and in Czech the range of turistika activities. It is important that these cultural activities continue to be promoted to enhance the populations' health and well-being. Similarly GE activities need to be increasingly promoted in other countries to address global issues of declining or stagnant sport participation (Vail, 2007) and obesity as an epidemic (Blair, 2009). Clearly organization initiatives that develop GE activities are important to help promote and increase community physical activity, and encourage healthier behaviours and enhance overall well-being (Mummery & Brown, 2009).

## 7 References

- Barton, J., Hine, R.E., & Pretty, J. (2009). The health benefits of walking in greenspaces of high natural and heritage value. *Journal of Integrative Environmental Sciences*, 6(4), 261-278.
- Barton, J., Pretty, J. (2010) What is the best dose of nature and green exercise for improving mental health? A multi-study analysis. *Environ. Sci. Technol.* 44,3947-3955.
- Barton, J., Griffin, M., & Pretty, J. (2012). *Exercise, nature and socially interactive based initiatives improve mood and self-esteem in the clinical population. Perspectives in Public Health*, 132(2), 89-96.
- Barton, J. (2014). *Green exercise : Health benefits of outdoor activities*. In L. Nováková, A. J. Martin, & J. Baláš (Eds.), *Abstracts from the 7th International Mountain and Outdoor Sports Conference* (p. 25). Praha: UK FTVS.
- Blair, S. N. (2009). Physical inactivity: The biggest public health problem of the 21st century. *British Journal of Sport Medicine*, 43(1), 1-2.
- Comenius, J. E. (1632/1907). *The great didactic of John Amos Comenius /translated into English and edited with biographical, historical and critical introductions by M. W. Keatinge* (2nd ed.). London: Black.
- Gladwell, V. F., Brown, D. K., Wood, C., Sandercock, G.R., Barton, J.L. (2013) The great outdoors: how a green exercise environment can benefit all.. *Extreme Physiol Med* 2, 3-6.
- Guth-Jarkovský, J. (1917/2003). *Turistika. Turistický katechismus*. Praha: Baset.
- Henderson, R. & Vikander, N. (Eds.). *Nature first: Outdoor life the Friluftsliv way*. Toronto: Natural Heritage.
- Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective*. Cambridge: Cambridge University Press.
- Laukkanen R. (2010). *Green exercise and health-scientific evidence on outdoor recreation and exercise based on selected studies*. Report to FRIFO, Copenhagen.
- MacKay, G. J., & Neill, J. T. (2010). The effect of 'green exercise' on state anxiety and the role of exercise duration, intensity, and greenness: A quasi-experimental study. *Psychology of Sport and Exercise*, 11(3), 238–45.
- Martin, A. J., Turcová, I., & Neuman, J. (2016). Turistika activities and games, dramaturgy and the Czech outdoor experience. In B. Humberstone, H. Prince. & K. Henderson, *International Handbook of Outdoor Studies* (pp. 297-306). New York, NY: Routledge
- Martin, A. J., Turčová, I. & Neuman, J. (2007). The Czech outdoor experience: Turistika and connections to friluftsliv. In R. Henderson & N. Vikander (Eds.), *Nature first: Outdoor life the friluftsliv way* (pp. 197–208). Toronto: Natural Heritage.
- Mason, P. (2003). *Tourism impacts: Planning and management*. Oxford: Butterworth Heinemann.
- McNair, D. M., Lorr, M., & Droppleman, L. F. (1971). *Manual for the profile of mood states*. San Diego, CA: Educational and Industrial Testing Services.

- Mayer, F. S. & McPherson Frantz, C. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology*, 24, 503-515.
- Mummery, W. K., & Brown, W. J. (2009). Whole of community physical activity interventions: Easier said than done. *British Journal of Sport Medicine*, 43(1), 39-43.
- Neuman, J. (2010). *Wellness a aktivita v přírodě*. In *Wellness jako odbornost sborník z mezinárodní konference 2009* (pp. 19- 27). Praha: Palestra,
- Neuman, J. (2012). Outdoor activities and health. In J. Baláš, & L. Nováková (Eds.), *Abstracts of the 5th International Mountain and Outdoor Sports Conference* (pp. 5-14). Praha: UK FTVS.
- Neuman, J., & Turčová, I. (2013). *Outdoor wellness – pohyb a pobyt v přírodě a jejich význam pro společnost, pro zdraví a životní spokojenost lidí*. Studijní materiál. Praha: Palestra, 79 str. Dostupné: <http://palestrawellness.webnote.cz/vystupy-projektu/studijni-opory-cj/>
- Neuman, J. (2014). Aktivita v přírodě a zdraví. In V. Hošek & P. Tilinger (Eds.). *Wellness, zdraví a kvalita života, mezinárodní konference 2013* (pp. 99-106). Praha: Palestra,
- Nisbet E. K. L., Zelenski J. M., Murphy S. A. (2009). The nature relatedness scale: linking individuals' connection with nature to environmental concern and behavior. *Environmental Behavior*, 41, 715–740.
- Pretty, J., Griffin, M., Sellens, M. & Pretty, C. J. (2003). *Green exercise: Complementary roles of nature, exercise and diet in physical and emotional well-being and implications for public health policy*. CES Occasional Paper 2003-1. University of Essex. Available at: <http://www.outdoorfoundation.org/pdf/GreenExercise.pdf>
- Pretty, J., Peacock, Jo., Sellens, M., Griffin, M. (2005) *The mental and physical health outcomes of green exercise*. *Int J Environ Health Res*. 15,319-337
- Pretty,J., Hine,R.,Peacock,J. (2006) *Green exercise: the benefits of exercise in green spaces*. *The Biologist* 53,143
- Pretty,J.,Peacock,J.,Hine,R.,Sellens,M.,South,N.,Griffin,M. (2007) *Green exercise in the UK countryside: Effects on health and psychological well-being and implications for policy and planning*. *J Environ Planning and Management* 50, 211-231.
- Rogerson, M., Brown, Sandercock, J., & Barton, J. (2014). Predicting green exercise health outcomes: Ecological valid sampling at parkrun events. In L. Nováková, A. J. Martin & J. Baláš (Eds.). *Abstracts from the 7th International Mountain and Outdoor Sports Conference* (pp. 29-30). Praha: UK FTVS.
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.
- Růžička, S. (1926). *Eubiotika*. Bratislava: Academia.
- Seton, E. T. (1917). *Woodcraft manual for boys: The sixteenth birch bark roll (Woodcraft league of America)*. Garden City, NY: Doubleday, Page & Co.
- Spinka, M. (1943). *John Amos Comenius that incomparable Moravian*. Chicago, IL: University of Chicago Press.



Štorch, E. (1929). *Dětská farma. Eubiotická forma školy*. Brno a Praha: Nákladem ústředního spolku jednot učitelských na Moravě a Dědictví Komenského v Praze.

Tennant R, Hiller L, Fishwick R, Platt S, Joseph S, Weich S, Parkinson J, Secker S, and Stewart-Brown S (2007). The Warwick-Edinburgh Mental Well-Being Scale (WEMWBS): development and UK validation. *Health & Quality of Life Outcomes*, 5(63), doi: 10.1186/1477-7525-5-63

Thomson Coon, J.T., Boddy, K., Stein, K., Whwear, R., Barton, J., Depledge, M.H. (2011) Does participating in physical activity in outdoor natural environments have a greater effect on physical and mental wellbeing than physical activity indoors? A systematic review. *Environ. Sci.Technol.* DOI:10.102/es102947t

Turčová, I., Martin, A. J. & Neuman, J. (2005). Diversity in language: Outdoor terminology in the Czech Republic and Britain. *Journal of Adventure Education and Outdoor Learning*, 5(1), 99-116.

Vail, S. E. (2007). Community development and sport participation. *Journal of Sport Management*, 21, 571-596.

Waic, M. & Kössl, J. (1994). The origin and development of organized outdoor activities in the Czech countries. In J. Neuman, I. Mytting & J. Brink (Eds.), *Outdoor Activities: Proceedings of International Seminar Prague '94 Charles University* (pp. 18–22). Lunenburg: Vela Edition Erlebnispädagogik.

Wooler, J., Barton, J. & D. Micklewright, (2014). Contribution of sight, sound and smell to the Green Exercise effect. In L.

Nováková, A. J. Martin & J. Baláš (Eds.). *Abstracts from the 7th International Mountain and Outdoor Sports Conference* (pp. 26-27). Praha: UK FTVS.

## 8 Contacts

### Correspondent author address

Assoc. Prof. PhDr. Jan Neuman, Ph.D.  
College of PE and Sport PALESTRA  
Pilska 9, 190 00 Prague  
Czech Republic  
Tel.:+00420/281 932 013  
E-mail: neuman@palestra.cz

### Co-authors:

PhDr. Ivana Turčová, Ph.D.  
Charles University, Faculty of Physical  
Education and Sport  
José Martího 31  
162 52 Praha  
Czech Republic  
Tel.: 00420/220 172 094  
E-mail: turcova@ftvs.cuni.cz

Assoc. Prof. Andrew Martin, Ph.D.  
Massey University, Palmerston North  
New Zealand  
Email: a.j.martin@massey.ac.nz