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## Mental health benefits of outdoor adventures: Results from two pilot studies



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### ABSTRACT

This paper investigates potential mental health benefits of outdoor and adventure education programs. It is argued that experiences made in successful programs can increase self-efficacy, mindfulness and subjective well-being. Furthermore, programs may reduce feelings of time pressure and mental stress amongst participants. Evidence comes from two pilot studies: In the school project “Crossing the Alps” (Study 1), 14-year-old participants reported an increase in life satisfaction, mindfulness and a decrease in the PSQ Subscale ‘demand’ after a successful nine-day hike through the German, Austrian, and Italian Alps. In the university project “Friluftsliv” (Study 2) participants scored higher in life satisfaction, happiness, mindfulness, and self-efficacy and lower in perceived stress after having spent eight days in the wilderness of the Norwegian Hardangervidda region, miles away from the next locality. The findings suggest that outdoor education and wilderness programs can foster mental health in youths and young adults.

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### Introduction

The relationship between structured leisure activities and positive developmental outcomes is a major issue in research on youths and adolescents (e.g. Bradley & Inglis, 2012; Mahoney, Larson, Eccles, & Lord, 2005; Trainor, Delfabbro, Anderson, & Winefield, 2010). This paper addresses one particular form of structured leisure activities, namely outdoor adventure programs. The history of outdoor adventure programs dates back to 1941, when Kurt Hahn founded Outward Bound (which can be called the first version of adventure programming) in Wales (Priest & Gass, 2005). Hahn proposed Outward Bound as a way to combat perceived social ills resulting from industrialization, such as the decline of fitness, initiative, spirit of enterprise, and self-discipline (Freeman, 2011; Hopkins & Putnam, 1997; Priest & Gass, 2005). The first Outward Bound courses focused on seamanship and intended to impart the ability in young male seamen to survive harsh conditions at sea in the merchant marine during war time by teaching tenacity, perseverance, leadership and confidence (Kelly & Baer, 1969; Miner & Boldt, 2002). In subsequent years, however, the range of outdoor activities also included, for instance, backpacking, mountaineering and canoeing, and the program's goals were refined, with greater emphasis put on personal growth and self-discovery (Freeman, 2011).

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To this day, Outward Bound and similar programs are extremely popular and associated with social, recreational, developmental, educational and therapeutic aims. Most programs are designed to fit the needs of specific target groups, for instance delinquents (Brand, 2001; Brand & Smith, 1999; Bruyere, 2002; Gillis & Gass, 2010), drug addicts (Bennett, Cardone, & Jarczyk, 1998), combat veterans (Burke & Utley, 2013; Hyer, Boyd, Scurfield, Smith, & Burke, 1996), clinical populations (Autry, 2001; Cotton & Butselaar, 2013; Norton, 2010; Rosenberg, Lange, Zebrack, Moulton, & Kosslyn, 2014), business leaders (Bronson, Gibson, Kichar, & Priest, 1992), but also pupils and students (e.g. Ang, Farihah, & Lau, 2014; Cason & Gillis, 1994). Benefits of these programs are manifold, according to numerous evaluations, and include, for instance, a more positive self-concept and increased self-esteem (e.g. Belanger, McGowan, Lang, Bradley, & Courneya, 2013; Boeger, Dorfler, & Schut-Ansteg, 2006; Epstein, 2004; Fengler & Schwarzer, 2008; Gehris, Kress, & Swalm, 2010; Gillespie & Allen-Craig, 2009; Probst & Koesler, 1998; Schell, Cotton, & Luxmoore, 2012), improved cognitive autonomy (Margalit & Ben-Ari, 2014), reduced school truancy (Ang et al., 2014), more prosocial behaviour (Cook, 2008), the approval of nature protection (Martin, 2004; Palmberg & Kuru, 2000), increased group cohesion (Cooley, Burns, & Cumming, 2015; Greffrath, Meyer, Strydom, & Ellis, 2013), prejudice reduction (Wright & Tolan, 2009) and abstinence in regard to substance use (Carter, Straits, & Hall, 2007; Lewis, 2013). Reviews and meta-analyses show that the majority of studies have mostly concentrated on self-concept and group dynamics (Ewert & McAvoy, 2000; Gillis & Speelman, 2008; Hattie, Marsh, Neill, & Richards, 1997; Stott, Allison, Felter, & Beames, 2015). So far, only limited research has put mental health benefits and subjective well-being (SWB) at its core.

Mental health can be understood as the absence of mental disorders, but also more broadly as a state of subjective well-being, autonomy as well as psychological resilience in terms of stress and adversity, as defined by the World Health Organization (WHO, 2002). The literature on subjective well-being broadly differentiates (long-term) life satisfaction from (short-term) emotional well-being (Diener, Suh, Lucas, & Smith, 1999; Schimmack, 2008). Closely related to mental health, research on resilience has pointed to psychological characteristics that enable people to maintain a solid level of well-being even in face of adverse conditions. In this regard, research has focused on constructs such as sense of coherence, optimism, self-efficacy, hardiness (Stuart & Yuen, 2011) and, most recently, mindfulness (Keng, Smoski, & Robins, 2011).

On a theoretical level, this paper argues that outdoor adventures can have direct positive impacts on subjective well-being and perceived stress. Moreover, outdoor adventures can also foster at least some of the psychological concepts related to resilience, most notably, self-efficacy and mindfulness. However, empirical evidence for such an impact is rather scarce. We will fully elaborate on the state of research below. Moreover, it is widely criticised that many studies have flaws in terms of methodology as they suffer from small samples that are unable to detect statistical significance and often lack adequate control groups (Hattie et al., 1997). In particular, the lack of randomized controlled trials is specified as a major academic void and respective study designs are called for (Deane & Harré, 2013).

This article presents two studies, both investigating effects of outdoor adventures on young people's mental health and SWB. The first study (Study 1) took place in an Upper Secondary School, where 14-year-old pupils organised and mastered the outdoor challenge project "Crossing the Alps". In the second project "Friluftsliv" (Study 2), undergraduates from a German university learned to survive in the wilderness of the Norwegian Hardangervidda. The studies presented here are novel in several ways: First, both studies focus on several aspects of mental health, for instance, perceived stress, mindfulness, self-efficacy and happiness, hence on domains for which evidence on the effectiveness of outdoor adventures is limited. Second, both studies were designed longitudinally with repeated measurements and reveal statistically significant results. Third, in study 2, a control group was established and participants were randomly assigned to the outdoor and control group. Due to this research design, this study can deliver the most reliable form of scientific evidence.<sup>1</sup>

## Theory and literature review

Successful outdoor and adventure programs can be characterized by several features (cf. Deane & Harré, 2013; Ewert & McAvoy, 2000; Hattie et al., 1997; Sibthorpe, Paisley, & Gookin, 2007): (1) They take place in an unfamiliar *natural physical environment*, (2) consist of *challenging activities* with authentic and clear consequences that usually involve cooperation with others, (3) take place in a *small-group social setting*, (4) are guided by *experienced, skilled instructors* who ensure physical safety and emotional support during the program. The assumed psychological change process is based on experiential learning (Kolb, 1984; Panicucci, 2007). Moreover, many scholars agree that the experience of a psychological disequilibrium at the beginning of the challenge is a necessary condition for a program to be successful (e.g. Brown, 2008; Panicucci, 2007). Participants should attain a mental state in between the 'comfort zone' and 'panic zone', which was labelled "groan zone" (Luckner & Nadler, 1997). Being in this zone is equipollent to a state of high attentiveness and receptiveness for new experiences. Bradley and Inglis (2012) also highlight that leisure activities that are challenging, demanding and require effort and skills are most suitable to facilitate positive development and personal growth among participants.

In regard to possible outcomes of outdoor adventures, scholars have suggested several major domains likely to be affected by mastery and learning experiences (Catalano, Berglund, Ryan, Lonczak, & Hawkins, 2004; Deane & Harré, 2013; Sibthorpe

<sup>1</sup> Although randomized controlled trials (RCT) are considered the 'gold standard' in science by many, this notion has also found substantial critique. For instance, Cartwright (2007) has criticized RCT's for their weak external validity and narrow range of application. We agree with many of her arguments, however, as both studies presented here took place in real world and not artificial laboratory settings, the higher internal validity gained through RCT does not come at the expense of external validity.

et al., 2007), namely (1) a person's self-concept and identity, (2) group affiliation and connection to others, (3) acquisition of skills and competencies, (4) prosocial norms and behaviours, and (5) changes in outlook and attitude. Said domains were already object of scientific scrutiny, and research has provided ample evidence for the effectiveness of outdoor adventures (e.g. reviews from Cason & Gillis, 1994; Deane & Harré, 2013; Ewert & McAvoy, 2000; Gillis & Speelman, 2008; Hattie et al., 1997; Stott et al., 2015). Effect sizes reported in single studies are usually between 0.20 and 0.60 and can thus be considered small to medium (Hattie et al., 1997).

Whereas all of these domains may be related to some aspects of mental health, they do not directly capture mental health. Hence, this research explicitly aims at testing which, if any, mental health benefits are related to outdoor adventures. Specifically, four dimensions of mental health are at the core of this research: (1) perceived stress, (2) perceived self-efficacy, (3) mindfulness and (4) subjective well-being. The next section will establish a rationale for the effectiveness of outdoor adventures in regard to each of the four outcome variables.

(1) *Stress*, according to established theories, is the result of an interaction between external challenges and internal capacities to cope with the challenges (Folkman, 2011; Lazarus & Folkman, 1984). In the case that an individual believes that internal capacities do not suffice to master a certain challenge, stress reactions are likely to occur. Outdoor adventures are supposed to generate a challenge and actually intend to impel participants out of their comfort zones (Brown, 2008; Panicucci, 2007). Hence, programs may actually increase stress (e.g. bodily tension, arousal), even if they do this in a controlled dosage and, at the same time, provide emotional and instrumental support. Stress research, however, has pointed to different types of stress like, amongst others, daily hassles (Kanner, Coyne, Schaefer, & Lazarus, 1981). Daily hassles, for instance, include time pressure, pressure to perform, work hassles, environmental disturbances (noise, traffic), financial worries, and many others (Kanner et al., 1981). These forms of stress may stem from the hectic pace of modern life, its demands, troubles and worries, and are closely related to negative psychological health outcomes like depression, negative emotions and poor well-being (e.g. Chung, 2012; Falconier, Nussbeck, Bodenmann, Schneider, & Bradbury, 2015; McIntosh, Gillanders, & Rodgers, 2010; Schönfeld, Brailovskaia, Bieda, Chi Zhang, & Margraf, 2016; Wrzus, Luong, Wagner, & Riediger, 2015). During a trip in the outdoors, these types of stress are usually reduced or even completely omitted. Hence, it can be assumed that outdoor adventures may have beneficial effects on the demand and worry components of stress.

**H1.** *After successfully completing an outdoor adventure, youths and young adults report lower levels of stress, particularly with regard to troubles and demands.*

(2) *Self-Efficacy* in outdoor adventures is likely to increase, given that participants in these programs experience that a task, which at first glance was considered as challenging, had been accomplished successfully. These authentic mastery experiences are sometimes perceived by practitioners to 'speak for themselves' (Outward Bound USA, 2007: 185). Others, however, assumed that the feeling of mastery achieved during the outdoor experience can only make an enduring change in the participants' attitudes and minds, if it is enhanced by feedback and reflection: "The process of reflection encourages abstract generalizations, that is, the transference of lessons learned from the adventure experience to other situations in the participants' daily lives" (Deane & Harré, 2013: 300). The need for reflection is considered as vital for initiating a psychological change process after an activity. Only through feedback by others and their own reflections participants will fully realize and internalize the meaning of the experience (Kolb, 1984). Given that reflection was a crucial part of both programs evaluated in the present study, increases in self-efficacy are an expected outcome.

**H2.** *After successfully completing an outdoor adventure, youths and young adults report higher levels of self-efficacy.*

(3) *Mindfulness* refers to the awareness and acceptance of present-moment experiences (Kabat-Zinn, 1994; Siegel, Germer, & Olendzki, 2009). In outdoor adventures, individuals may be in a state of heightened arousal, due to the novel, unpredictable environment and the challenging tasks to be completed. Outside of their usual routines, they are generally more open for the present-moment experience and leave the "auto-pilot" mode, typical for routinized daily actions (Panicucci, 2007). Moreover, in the wild nature there is little room for distraction as participants are far away from the (shallow) amusements, stimulations and hustles of their ordinary, mediated life-worlds. This may help individuals to self-direct more attention (as usual) to their own feelings and thoughts as well as to the beauty of the surrounding natural environment. Lastly, most outdoor adventures require long distance walking in mountainous and rough terrain, which not only slows down the speed of going, but is also an activity which involves repetitive movements, regular breathing, and a steady alertness. Similar qualities characterize bodily activities that also foster mindfulness, for instance long-distance running (Salmon, Hanneman, & Harwood, 2010) or tai chi (Caldwell, Emery, Harrison, & Greeson, 2011).

**H3.** *After successfully completing an outdoor adventure, youths and young adults report higher levels of mindfulness.*

(4) *Subjective well-being* (SWB) is usually considered to have a cognitive and an affective dimension (Diener et al., 1999; Schimmack, 2008). Life satisfaction ratings are supposed to capture the cognitive component of SWB and are supposed to be based on evaluations of the long-term life achievements of a person. The affective dimension, however, is a more cursory phenomenon, highly depending on the present-moment emotions of an individual in a given situation. The latter dimension can be measured with questions referring to momentary happiness and momentary emotions. In fact, both constructs, momentary happiness and life satisfaction, are closely correlated (Mutz & Kämpfer, 2013), however it still seems worthwhile to treat them as separate outcome variables, given the aforementioned theoretical considerations. Hence, outdoor adventures are likely to impact an individual's momentary happiness and evoke positive emotional reactions, be it through mastery

experiences, the beauty of the natural environment or the social support received from the group. Moreover, mastery experiences may also have an impact on a person's global satisfaction with life. If successfully accomplished challenges in the wilds of nature, may it be the challenging climb of a mountain or the completion of a wearisome long-distance hike, are cognitively reflected as exceptional life achievements, satisfaction ratings are supposed to increase.<sup>2</sup> Hence, based on these theoretical considerations, a fourth hypothesis can be derived:

**H4.** *After successfully completing an outdoor adventure, youths and young adults report higher levels of momentary happiness and life satisfaction.*

## Methodology

### *Design of study 1: "Crossing the Alps"*

Participants were 12 pupils in a German Upper Secondary School. As part of the school curriculum, pupils had to organize a so-called "challenge project". These projects, conjointly developed by a group of pupils and one teacher, were meant to confront pupils with a physical, intellectual, or organizational challenge. A small group of 8th graders decided in favour of the project "Crossing the Alps", a nine-day hike aimed at crossing the Alps from the northern to their southern tip. The core educational ideas of these projects are based on the values of self-direction, initiative, leadership and personal responsibility. The projects were prepared over the course of one school year and included planning and funding activities, developed and carried out by the pupils. After successfully securing funds of about 3500 € for their project, the pupils started the hike in July 2015, accompanied by two teachers and two experienced adult volunteers. The trip went from Oberstdorf in the Allgäu Alps (Germany) via the Lechtal and Ötztal Alps in Austria to Merano (Italy). The hike mostly followed the popular E5 trail (European long distance path) and had an overall length of approx. 175 km. Daily stages included 8 h of walking and overcoming 1000 m of altitude, on average. Nights were spent in lodges of the Alpine clubs, located close to the trail. Some of these huts only provided basic facilities and simple meals, while others were well-equipped and, for instance, offered Wi-Fi so that pupils were tempted to use the Internet. Most of the time during the trip, pupils had sole responsibility for their activities, which was in line with the projects' core educational goals. However, teachers and volunteers stimulated short self-reflections at the end of each day. The group was homogeneous in terms of age (14 years) and consisted of five female and seven male pupils. All participants successfully completed the hike.

A longitudinal research design was applied where pupils were questioned at two different points in time. The first assessment was carried out one week prior to the hike ( $t_1$ ). The second assessment took place on a school day, four days after the return from the hike ( $t_2$ ). On this day, a reflection workshop at school was scheduled for the participants as well as the presentation of the challenge project to a school-wide audience by the pupils. All participants were questioned at both times, resulting in a longitudinal sample of  $N = 12$ .

### *Design of study 2: "Friluftsliv"*

Participants were 15 undergraduates enrolled in the B.A. program Sports Sciences in a mid-size German University. Taking part in at least one summer excursion is mandatory for students in this respective program. The course 'Friluftsliv' was offered amongst various other summer excursions. 'Friluftsliv' expresses a Norwegian culturally grounded phenomenon aimed at experiencing and exploring the 'wild' nature, either by oneself or within a social community. Originally 30 students were interested in participating and came to a preliminary discussion of the course. From those interested, 15 participants (the maximum group size allowed) were randomly selected for the course. The outdoor excursion then took place in the first week of August 2015 and was operated by two experienced lecturers. The excursion started and ended in the valley of Vestfjord at the most southern part of the Hardangervidda region. This region is famous for its great outdoors, lack of civilization and faunal biodiversity. During the excursion students spent eight days in the wilderness engaging mainly in the following activities: hiking with backpacks (ca. 10 miles/day), climbing, fishing, picking berries, swimming in mountain lakes and streams. The course aim consists of learning a better orientation and how to 'survive' in the nature as well as an improved understanding of flora and fauna. During the excursion the students had to face living conditions which can be considered uncomfortable and challenging, such as staying outdoors the entire week, sleeping in small tents without having showers, toilets, electricity and, most of all, without any access to media, e.g. mobile phones or computers. Furthermore, the nutrition was strictly rationed and water was only available from the streams and lakes. All assignments during the day (e.g. 'leading the group', 'finding an adequate campsite', 'organise cooking') were carried out by the students, whose commitment to the tasks and rules of conduct was high at any time. At the end of each day, participants reflected on their experiences and

<sup>2</sup> This is more likely to happen when participants of such programs are youths (and not adults), because young people cannot perceive the typical domain-specific living conditions in terms of, for instance, income, occupation, and family life, which are supposed to underlie global life satisfaction ratings, as their own achievements. Thus, one single outdoor adventure which is reflected on as an own achievement can potentially have a stronger impact on life satisfaction.

discussed pedagogical ideals associated with the “Friluftsliv” concept. The travelling group consisted of undergraduates from 19 to 25 years, including 7 female and 8 male students.

Again, a longitudinal research design was applied. Participants filled out a questionnaire one week prior to the excursion ( $t_1$ ) and, again, on the day returning from the excursion ( $t_2$ ). Although participation in the study was voluntary, all participants of the excursion filled out the questionnaire. On the very same days, an online version of the questionnaire was sent to those 15 individuals, who had expressed their interest in participating in the excursion (at the preliminary discussion), but were not selected for the course. As the selection procedure was randomized, this group constitutes an ideal control group. All 15 of the non-participants were contacted by E-mail and were given 48 h to fill out the questionnaire. However, only seven of the 15 students answered the questionnaire both times and in the given period. Nevertheless, this enables us to compare the values of the Friluftsliv group ( $N = 15$ ) with values of a small, but comparable control group of  $N = 7$  individuals. The seven subjects in the control group did not participate in any other adventure program during this period and stayed, more or less, in their familiar surroundings.

## Measures

- (1) *Perceived Stress* was assessed with the *Perceived Stress Questionnaire* (PSQ, Levenstein et al., 1993). This instrument is designed to measure subjectively experienced stress in multiple dimensions. The German translation and validation of the original scale (Fliege, Rose, Arck, Levenstein, & Klapp, 2001) has demonstrated that PSQ items can be arranged into four subscales, “worry”, “tension”, “joy”, and “demand”. In the context of the present study two PSQ dimensions seem to be of relevance: The subscale “worry” refers to the perception of worries, inner conflicts, fear and other negative emotions (e.g. “Your problems seem to be piling up”; “You are afraid of the future”), hence to internal stress reactions in the individual. Apart from that, the subscale “demand” captures external demands that are addressed at the individual, for instance time pressure and work overload (e.g. “You have too many things to do”; “You feel you're in a hurry”).<sup>3</sup> PSQ scales are widely recognized in research on stress and well-being (Fliege et al., 2005; Kocalevent et al., 2007; Sanz-Carillo, García-Campayob, Rubiod, Santed, & Montoro, 2002).
- (2) *Self-efficacy* was measured with the *General Self-efficacy Scale* (GSES, Schwarzer & Jerusalem, 1995). This scale contains 10 items which refer to the belief of being capable to attain a desired outcome through actions of one's own. The GSES items (e.g. “I am confident that I could deal efficiently with unexpected events”) do not refer to a particular situation or domain, but measure generalized beliefs of a person's capabilities to act. The scale has been validated in national and international studies (Hinz, Schumacher, Albani, Schmid, & Brähler, 2006; Luszczynska, Scholz, & Schwarzer, 2005).
- (3) *Mindfulness* was assessed with the *Mindful Attention and Awareness Scale* (MAAS, Brown & Ryan, 2003). The scale captures mindfulness, that is, the awareness of the present moment and the acceptance of present-moment experiences (Siegel et al., 2009). The MAAS scale consists of 15 items that capture an individuals' tendency to be focused to momentary experiences in daily routines (“I find myself preoccupied with the future or the past”; “I tend to walk quickly to get where I'm going without paying attention to what I experience along the way”). The MAAS scale is widely recognized in mindfulness research (Brown, West, Loverich, & Biegel, 2011; Michalak, Heidenreich, Ströhle, & Nachtigall, 2008; Van Dam, Earleywine, & Borders, 2010).
- (4) *Subjective Well-being* was measured with two items. Long-term well-being was measured with the conventional, well established question, “On the whole, how satisfied or not are you with the life you lead” (*Life Satisfaction*). Short-term well-being was measured with a question that referred to the present emotional state of the respondent, “How happy are you in this moment” (*Happiness*). Both ratings were made on a 10-point rating scale with higher values indicating higher satisfaction with life and greater happiness.

## Analyses

To assess differences between pre-excursion scores ( $t_1$ ) and post-excursion scores ( $t_2$ ), paired-sample *T*-tests were run. Due to the small  $N$  in both studies, we do not solely discuss statistical significance, but put effect sizes (ES) to the foreground. Precisely, we calculate Cohen's  $d$ , that is the mean difference between  $t_1$  and  $t_2$  divided by the standard deviation of the difference scores. Given the small group setting which is a mandatory feature for the success of outdoor adventure programs, test power is always low and the likelihood of Type II errors high, accordingly. Hence, the magnitude of the change can be insightful, even if the threshold for statistical significance is missed. In study 2,  $2 \times 2$  General Linear Models (GLM) for repeated measurements were calculated additionally to test for the significance of the time \* group interactions, hence whether or not the changes in the outdoor group differ from the changes in the control group.

<sup>3</sup> The subscales “tension” and “joy” were excluded from the analysis. Outdoor programs are usually designed to produce challenges and thus may increase feelings of physical tension and excitement. The PSQ, however, is unable to differentiate between positive (motivating, stimulating) excitement and negative tension that results from demands which exceed an individuals' capacities. The subscale “joy” was excluded because more established measures for well-being were preferred.

## Results

### Study 1

A paired-sample *T*-test for mean comparisons between *t*<sub>1</sub> and *t*<sub>2</sub> was run and revealed some changes associated with participation in the excursion (Table 1). Perceived stress has partially decreased after spending nine days in the Alps. The PSQ subscale on “worries” did change substantially, but failed to reach significance, according to conventional levels ( $ES = -0.47$ ,  $p = 0.069$ ). A moderate to large change is demonstrated for the PSQ subscale “demand”, where participants report significantly lower values after the completion of the hike ( $ES = -0.66$ ,  $p = 0.022$ ). Results also reveal a large increase in mindfulness ( $ES = 1.32$ ,  $p = 0.001$ ) among participants. Self-efficacy scores changed only marginally ( $ES = 0.26$ ,  $p = 0.188$ ) compared to the baseline measure. Furthermore, SWB was affected substantially by the excursion: The mean life satisfaction score increased significantly ( $ES = 0.58$ ,  $p = 0.034$ ). The increase in happiness was also considerable, but failed to reach significance by a narrow margin ( $ES = 0.47$ ,  $p = 0.064$ ). Hence, the experience of spending nine days on a challenging, but successful trip in the German, Austrian and Italian Alps had positive impacts on some aspects of mental health among 14-year-old pupils. All measures point into the expected direction and most effect sizes can be considered as moderate at least, according to Cohen’s rule of thumb.

The major limitation of study 1 is the lack of a control group. Due to this limitation, it may be argued that the results are caused, at least to some degree, by selection effects of the participants or by test-retest effects, which may occur when the same questionnaire is answered more than once. Moreover, it cannot be ruled out that it was not the outdoor adventure itself, but simply the interruption of usual school routines for nine days that may have caused the effects. Study 2 avoids these difficulties by establishing a control group.

### Study 2

In a first step, paired-sample *T*-tests were run separately for the outdoor group and the control group to assess whether the means for one or both of these groups changed significantly from *t*<sub>1</sub> to *t*<sub>2</sub>. Results for the outdoor group reveal moderate to large changes in almost all aspects of mental health measured (Table 2, upper half): First, participants indicate reduced stress according to the PSQ subscales “worries” ( $ES = -0.53$ ,  $p = 0.030$ ) and “demand” ( $ES = -0.92$ ,  $p = 0.002$ ). Moreover, participants scored higher in mindfulness ( $ES = 0.54$ ,  $p = 0.027$ ) and self-efficacy ( $ES = 0.90$ ,  $p = 0.002$ ) after the excursion. The mean life satisfaction score also increased significantly by 0.67 points ( $ES = 0.68$ ,  $p = 0.010$ ). Finally, participants reported a large gain in momentary happiness after the excursion ( $ES = 1.48$ ,  $p < 0.001$ ).<sup>4</sup> Hence, the “Friluftsliv” excursion which involved spending eight days in the Norwegian wilderness had remarkably large, positive effects on mental health among the participating undergraduates. Despite the small sample of  $N = 15$  in this excursion, all changes are significant with  $p < 0.05$ .

The control group of those students who were not assigned a place in this excursion were questioned in the same period and in general did not report remarkable changes (Table 2, lower half). Mean values in the two PSQ dimensions “worry” and “demand” as well as mean scores in mindfulness, self-efficacy and life satisfaction did change only marginally from *t*<sub>1</sub> to *t*<sub>2</sub>. One exception is the change in happiness scores which was substantially higher at the second interview compared to the first ( $ES = 0.56$ ,  $p < 0.112$ ), but did not reach significance.

Additionally, a  $2 \times 2$  General Linear Model (GLM) for repeated measurements was run. This procedure tests for the significance of time \* group interactions, hence whether or not changes in the outdoor group from *t*<sub>1</sub> to *t*<sub>2</sub> differ from the changes in the control group. Despite the weak test power of the GLM procedure that results from the small  $N$  in both groups, the GLM procedure reveals a significant time \* group interaction for two outcome variables, the PSQ subscale “demand” ( $F = 6.221$ ;  $p = 0.021$ ) as well as the self-efficacy scale ( $F = 4.643$ ;  $p = 0.044$ ). In these two dimensions of mental health, a significantly larger change can be shown in the outdoor group compared to the control group (Figs. 1 and 2). For the other four outcome variables time \* group interactions failed to reach significance.

## Discussion

This paper presented two pilot studies that both demonstrate that outdoor adventures have mental health benefits for youths and young adults. In the school project “Crossing the Alps” (Study 1), 14-year-old participants reported an increase in life satisfaction, mindfulness and a decrease in the PSQ Subscale ‘demand’ after a successful nine-day hike through the German, Austrian, and Italian Alps. In the university project “Friluftsliv” (Study 2) participants scored higher in life satisfaction, happiness, mindfulness, and self-efficacy and lower in perceived stress after having spent eight days in the wilderness

<sup>4</sup> It has to be noted that happiness is rather high at *t*<sub>1</sub> in the “Friluftsliv” group which may be attributed to pleasant anticipations one week prior to the excursion. Happiness scores at *t*<sub>2</sub>, however, strikingly increased and – given that the questionnaires were filled out directly after the participants had successfully completed the excursion – may point to a post-excursion “high”. In the written course evaluations collected several days after the end of the trip by one lecturer, students commented enthusiastically on the excursion. In light of the very positive comments, the increased happiness scores should be ascribed to positive experiences and emotions triggered by the adventures of the trip. There is no support for the notion that happiness increased due to relief that the excursion was over.

**Table 1**  
Mental health scores before and after the “crossing the Alps” excursion.

	Mean comparison (t1 vs. t2)					<i>p</i> <sup>a</sup>
	t1	t2	Diff	SD <sub>diff</sub>	ES	
<i>Outdoor group (N = 12)</i>						
PSQ worry	1.99	1.62	−0.38	0.81	−0.47	0.069
PSQ demand	2.38	1.93	−0.44	0.67	−0.66	<b>0.022</b>
Mindfulness	4.41	4.81	0.41	0.31	1.32	<b>0.001</b>
Self-efficacy	2.80	2.88	0.08	0.31	0.26	0.188
Happiness	6.67	7.50	0.83	1.75	0.47	0.064
Life satisfaction	7.33	8.33	1.00	1.71	0.58	<b>0.034</b>

<sup>a</sup> Significance based on a one-tailed test. Bolded effects are significant with  $p < 0.05$ .

of the Norwegian Hardangervidda region, miles away from the next locality. In the latter study, stress reduction and gains in self-efficacy were significantly higher in the outdoor group compared to a control group. Despite the small *N*, a typical flaw in all evaluations of outdoor programs, both studies have shown that mental health benefits of outdoor adventures are significant. Moreover, the effects were of considerable magnitude with moderate to large effect sizes. It can be concluded from the findings that experiences from outdoor excursions foster those psychological factors which are associated with resilience, well-being and good health. Hence, the already long list of outcomes associated with outdoor adventures can be complemented in this regard.

Whereas the effects concerning self-efficacy are mostly in line with prior studies, other outcomes like mindfulness and perceived stress were not a core issue in prior outdoor evaluations. However, programs seem to have a high potential in this regard: Being in a novel environment, under simple conditions, far away from distractions of modern life and in a slowed-down mode which deeply contrasts present “high speed society” (cf. Rosa, 2003) has obviously almost automatically a positive effect on attentiveness, self-awareness and, at the same time, seems to reduce considerably a person’s feeling of being under the pressure of, for instance, time, deadlines, and social demands. The physical distance to a person’s daily routines seems to create a psychological distance, too. This effect is found in 8th graders and undergraduates, but it may be speculated that changes could even be more pronounced in those populations with a greater degree of permanent social and work-related stress.

As a matter of course, this study is not free from limitations. First and foremost, in both pilot studies, follow-up measures could not be collected. Due to the summer break participants (pupils and students alike) could not be approached in the two months following the excursions. Hence, it can only be speculated if the changes found immediately after returning from the excursions are permanent or just a short-term eruption of well-being and post-trip euphoria. However, the meta-analysis conducted by Hattie et al. (1997) has shown that follow-up effects after some weeks or even months are usually even greater than effects found immediately after the program. Secondly, the effects found in evaluations of outdoor excursions may always be due to particularities of the single excursion, at least to a certain degree. This applies to all evaluations of outdoor and adventure programs. Given that effects demonstrated in the present study are relatively strong, additional feedback was obtained from the instructors who operated the excursions. In both excursions, instructors stressed that all activities intended were realized. They referred to a very supportive atmosphere among the participants from the very beginning until the end of the program. Furthermore, they assessed the dosage of challenge and difficulty to be almost ideal for the participants. Hence, in both excursions it can be assumed that participants felt safe and confident in the group, but

**Table 2**  
Mental health scores before and after the “Friluftsliv” excursion.

	Mean comparison (t1 vs. t2)					<i>p</i> <sup>a</sup>
	t1	t2	Diff	SD <sub>diff</sub>	ES	
<i>Outdoor group (N = 15)</i>						
PSQ worry	1.83	1.55	−0.28	0.53	−0.53	<b>0.030</b>
PSQ demand	2.30	1.83	−0.47	0.51	−0.92	<b>0.002</b>
Mindfulness	3.93	4.18	0.26	0.48	0.54	<b>0.027</b>
Self-efficacy	3.06	3.24	0.18	0.20	0.90	<b>0.002</b>
Happiness	7.73	9.07	1.33	0.90	1.48	<b>&lt;0.001</b>
Life satisfaction	7.80	8.47	0.67	0.98	0.68	<b>0.010</b>
<i>Control group (N = 7)</i>						
PSQ worry	2.20	2.09	−0.11	0.32	−0.34	0.193
PSQ demand	2.46	2.54	0.09	0.43	0.21	0.692
Mindfulness	4.15	4.14	−0.01	0.55	−0.02	0.510
Self-efficacy	3.11	3.07	−0.04	0.28	−0.14	0.650
Happiness	6.00	6.83	0.83	1.47	0.56	0.112
Life satisfaction	7.71	7.71	0.00	0.82	0.00	0.500

<sup>a</sup> Significance based on a one-tailed test. Bolded effects are significant with  $p < 0.05$ .

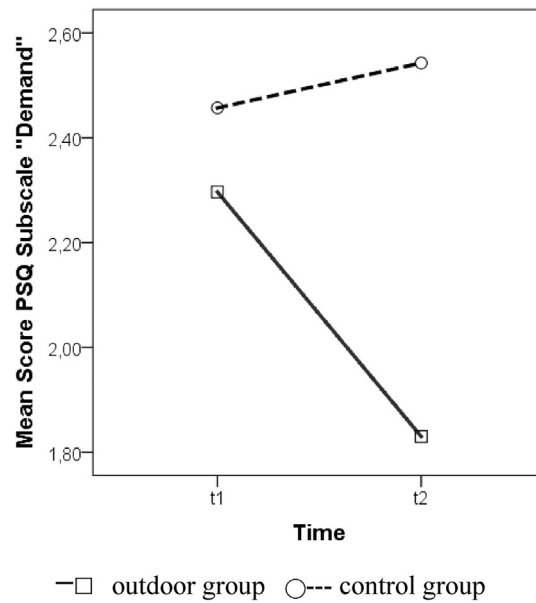


Fig. 1. Plotted time \* group interaction for PSQ subscale "demand".

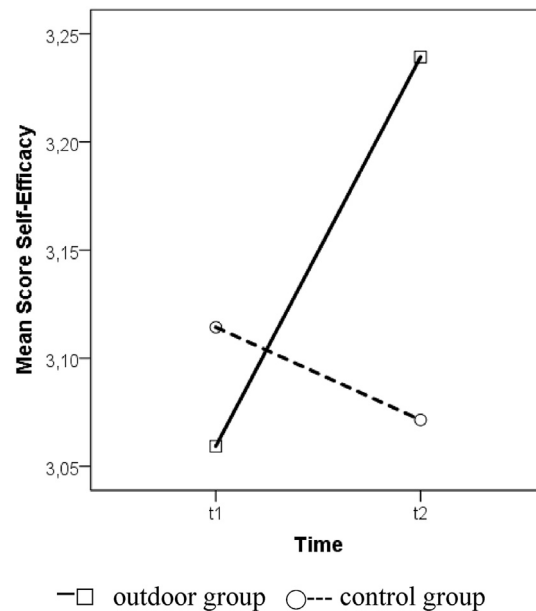


Fig. 2. Plotted time \* group interaction for the GSES self-efficacy scale.

were also in their 'groan zone' due to an optimal level of physical and psychological challenge. According to Bradley and Inglis (2012) social support and connectedness as well as the application of effort and skills are the main 'ingredients' of leisure activities to benefit personal development. It looks as if the mixture of risk and challenge on the one hand and social support on the other was almost optimal in the two programs investigated. Moreover, in the 'Friluftsliv' excursion the group was lucky at fishing, which provided some extra calories to the participants, and they enjoyed the Norwegian wilderness under relatively warm and sunny weather conditions. Lucky coincidences like these are definitely not the main story in the results, but may give some extra plausibility to the magnitude of the effects.

Results of this study suggest that outdoor adventures may facilitate well-being and resilience among adolescents and young adults. However, only those may benefit from such experiences who can take part in respective programs. In the two pilot studies presented here participants were either university students or pupils from Upper Secondary School. Hence, in



both programs subjects from well-educated families and socially privileged segments of the population were over-represented. Youths from less privileged social groups may have greater difficulties to take part in structured outdoor adventures, because such activities are not part of German school's core curricula and programs from commercial providers are costly. This argument seems even more striking in the case of youths from less developed countries and world regions. As these youths mostly live and grow up under adverse societal conditions, they are likely to profit the most from outdoor and adventure programs which aim at resilience and mental health. Hence, to improve the accessibility of outdoor experiences – in particular for adolescents from socially disadvantaged milieus – may be a valuable component of social policies. In particular, the integration of outdoor programs into the school curriculum, as for instance in Norway, may be a reasonable step to enhance accessibility.

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