Adventure therapy effects on self-concept – A meta-analysis

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Abstract

Purpose. Self-concept change has been proposed as a key driver of behavioral change through adventure therapy (Hans, 2000). Through exploratory moderator analysis we tried to identify process variables that influence the effect of adventure therapy on self-concept to contribute to a deeper understanding of why and when adventure therapy works.

Methods. This meta-analysis includes thirty studies (53 effect sizes, 1802 subjects) that report effects of adventure therapy programs on three constructs concerning self-concept: locus of control, self-efficacy, and self-esteem. Participants were either at risk or in treatment for behavioral or mental health issues.

Results. Short-term effect sizes of the impact of adventure therapy on self-concept were moderate for both uncontrolled effects (g = 0.51) and controlled effects (g = 0.56). There was no evidence for a difference between the effects on locus of control, self-efficacy or self-esteem. The revealed high heterogeneity of effect sizes could not be explained by any of the examined moderating variables. The follow-up effects confirmed a lasting self-concept change. No publication bias was found, but limitations and alternative explanations of the results are discussed.

Conclusions. Future research needs to focus on psychological processes involved in adventure therapy and strive towards high methodological quality.

Key words: Adventure Therapy, Self-Concept Change, Meta-Analysis, Moderators

Practitioner Points

- Adventure therapy programs strengthen clients' self-efficacy, self-esteem and internal locus of control irrespective of program type or participant characteristics.
- However, the gains in self-concept differ greatly between the programs. These differences could not be explained by the tested characteristics of program, participants or study.
- There is still a need for a theoretical model, which explains the working mechanisms of adventure therapy.

Adventure Therapy Effects on Self-Concept – A Meta-Analysis

Practitioners and clients value the adventure therapy approach and outcome research has shown its effectiveness for various clients. But there is a lack of an evidence-based theoretical model that explains why adventure therapy works. In particular, we need to better understand the psychological processes that occur during adventure therapy in order to strengthen the theoretical background (Norton et al., 2014). In line with this goal, the current meta-analysis examines the effects of adventure therapy on self-concept and its moderating variables.

Adventure Therapy

Adventure therapy is defined as "the prescriptive use of adventure experiences provided by mental health professionals, often conducted in natural settings that kinesthetically engage clients on cognitive, affective, and behavioral levels" (Gass et al. 2012, p. 1). Typically, adventure therapy is used for resistant youth who struggle with substance abuse or delinquency (Norton et al., 2014). These adolescents benefit from the unconventional setting and format of therapy, as it enhances their motivation to engage in the process (Gass et al., 2012). In addition, a variety of other populations are targeted by adventure therapy, including at-risk youth, families, people with disabilities or adults in

psychiatric treatment (Gass et al., 2012). As each population has distinct needs and characteristics, it is important to consider whether and how the effects of adventure therapy on self-concept vary among different populations.

Furthermore, the definition of adventure therapy integrates a variety of program types that could affect self-concept in a different way. The three main categories are (1) adventure-based therapy, (2) therapeutic camps, and (3) wilderness therapy (Gass et al., 2012). Adventure based therapy uses group activities, such as problem solving games, high and low rope elements, rock climbing and canoeing. They often take place in the front country or close to civilization and occur weekly in an outpatient setting. In therapeutic camps, participants stay overnight in tents or cabins and participate in sequenced adventure activities, often involving longer hikes. Wilderness therapy takes the clients on expeditions in remote settings, where they learn survival skills and are confronted with natural consequences of wilderness exposure (Gass et al., 2012; Gillis & Thomsen, 1996). Investigating the differences between program types is therefore important when examining the effects of adventure therapy on self-concept.

Foundations of adventure therapy.

Most adventure therapy programs are based on the *Outward Bound Process Model* which describes the process of experiential learning (V. Walsh & Golins, 1976, see Figure 1) and then adapted to therapeutic purposes: The clients find themselves confronted with an activity in an unfamiliar environment in a group of peers. The adventure activity consists of a specific set of problem solving tasks, designed to be challenging and to create a state of adaptive dissonance in the clients. When overcoming this state by solving the problem, clients experience mastery and understand the cause and effects of their actions (Mackenzie, Son, & Hollenhorst, 2014; V. Walsh & Golins, 1976).

The model resonates well with practitioners, but has not yet been thoroughly tested (Gass et al., 2012). Adapting this model of the experiential learning process to adventure therapy, the main difference to conventional therapeutic approaches becomes clear: In adventure therapy the activity and

the resulting experience take on the therapeutic role to initiate change in the client – not the therapist himself. Key characteristics are the *adventure activity* itself, the *physical environment*, the *social environment*, and the *role of the therapist* (Gass et al., 2012). These key characteristics are suggested to lead to the development of higher self-efficacy, self-esteem, and an internal locus of control (Hans, 2000; Sibthorp, 2003).

Prior research on adventure therapy.

The existing body of research on adventure therapy mainly consists of program evaluations, assessing outcomes without testing the theoretical foundations described above (Gass et al., 2012). Program models are rarely reported and the outcomes aren't well linked to psychological processes (Mackenzie et al., 2014). Therefore, there is still a lack of an evidence-based theoretical model outlining the working mechanism in adventure therapy (Norton et al., 2014).

Prior work has shown the general efficacy of adventure therapy for behavioral, clinical and self-concept outcomes. Table 1 lists findings from current meta-analyses supporting the general efficacy: Adventure therapy has a positive effect on the overall functioning and psychological well-being of participants. The latest meta-analysis on adventure therapy found a medium average effect of 0.47 across various outcome categories (Bowen & Neill, 2013). Gillis and Speelman (2008) found a medium average effect of 0.43 for high and low ropes courses. Findings for delinquent youth only showed small effect sizes for changes in locus of control (0.10) and self-esteem (0.30) (Wilson & Lipsey, 2000). Critics question the lasting effects of adventure therapy, since the adventure experience is so different from the day-to-day life and problems of the clients (Bell, Gass, Nafziger, & Starbuck, 2014). But some research showed a stable follow-up effect (see Table 1, Bowen & Neill, 2013; Hattie, Marsh, Neill, & Richards, 1997).

Further research needs to focus on the psychological processes to advance the understanding of the theoretical background for adventure therapy (Mackenzie et al., 2014; Norton et al., 2014). The

most researched psychological outcome in the existing body of literature is self-concept change, as it was proposed to be a key factor for behavioral change in adventure therapy (Hans, 2000).

Self-Concept as a Pivot Point

Self-concept is a pivot point between past and future behavior: Our perception of self is shaped by our life experience and in turn plays a big role in how we perceive and appraise our abilities, which then affects how we behave and feel in the future (Sagone & Caroli, 2014; M. A. Walsh, 2009). As general self-concept depends on contextual factors like mood or the situation, specific aspects addressed by the program need to be measured (Marsh, Richards, & Barnes, 1986). On the other hand, Hans (2000) found very homogenous results assessing change in locus of control and suggested a broader look at variables concerning personal control. Specifically affected aspects of the self are suggested to be self-efficacy, self-esteem and locus of control (Hans, 2000; Sibthorp, 2003).

Self-efficacy stems from Bandura's social cognitive theory (1977) and is a person's belief in her ability to perform a specific task. Originally, it indicated a belief about specific abilities like the alcohol abstinence self-efficacy scale (DiClemente, Carbonari, Montgomery, & Hughes, 1994). Sherer et al. (1982) developed a trait-like general self-efficacy scale describing the "belief about the ability to perform across a variety of different situations" (Judge, Erez, & Bono, 1998, p. 170). The specific and the general definition are currently used in adventure therapy research and were both included in the study.

Self-esteem is the general feeling one has about oneself. Thus, it is an affective state or trait, which concerns the evaluation of one's self worth. Currently, self-esteem is an important predictor for social outcomes, when it is applied at an adequate specificity level (for a detailed discussion, see Chen, Gully, & Eden, 2004 and Swann, Chang-Schneider, & Larsen McClarty, 2007). The two widely used measures are the Rosenberg self-esteem scale (Rosenberg, 1965) and the Piers and Harris self-concept scale (Piers, 2002), both of which were included in this study.

Locus of control is defined as a cognitive trait, that contains the general expectancies about future rewards, specifically concerning the control oneself has over the things that will happen in life (Peterson & Stunkard, 1992). Two dimensions of locus of control are commonly used (Rotter, 1966): Internal locus of control is associated with seeing one's own behavior as important, while external locus of control can lead to either seeing powerful others or chance as the cause for change in life. In this study, only the internal locus of control was included, as this is what the primary studies reported.

Even though the constructs stem from different conceptual backgrounds, some researchers question their distinction (Judge, Erez, Bono, & Thoresen, 2002). General self-efficacy and locus of control are highly correlated and both measure personal agency (Lennings, 1994; Sagone & Caroli, 2014). Judge et al. (2002) could not find discriminate validity amongst locus of control, self-efficacy, self-esteem, and neuroticism. They concluded that a higher order factor explains the positive relationship between the constructs (Judge et al., 2002). In the present meta-analysis, the specific constructs - self-efficacy, self-esteem, and locus of control - were therefore analyzed both individually and as an aggregated variable.

Potential Moderators of Change

Specific characteristics concerning the program, the participants, and the study can affect the change in self-concept. Potential moderators were derived from the key characteristics stated by Gass et al. (2012, italicized in the next paragraph) and prior findings. The latest meta-analysis on adventure therapy (Bowen & Neill, 2013) demonstrated a great heterogeneity in the effects of adventure therapy on self-concept. This suggests that it may be possible to find moderators that could explain this heterogeneity. Potential moderators however are restricted to variables that have been assessed in a sufficient number of studies. Often only the contextual factors and conditions were reported that are associated with the actual variable of interest.

Program characteristics.

The *adventure activity* is mainly determined by the program type: Adventure based activities, camping experiences, or wilderness expeditions (Gass et al., 2012). The role of the *physical environment* can be assessed by comparing different program locations which are wilderness, nature with some infrastructure and in-town. Group functioning is a frequently proposed moderator for the *social environment* (Gass et al., 2012; Paisley, Furman, Sibthorp, & Gookin, 2008). Since it is rarely directly measured, we considered context variables related to group functioning: group size, single gender groups, and group structure indicating a fluctuating or a closed group. Finally, the influence of the *therapist* and the client-therapist relationship were approached through assessing staff ratio, staff qualification and staff fluctuation.

Additionally, program length, daily duration (overnight vs. outpatient), and goal (primary, adjunctive or tangential) have been shown to have a positive impact for longer programs, overnight stays and a primary therapeutic goal (Hans, 2000; Paisley, Furman, et al., 2008; Scheinfeld, Rochlen, & Buser, 2011).

Participant characteristics.

Considering participant characteristics some studies found effects for age and sex (Bowen & Neill, 2013; Tucker, Smith, & Gass, 2014). The presenting issues of the participants were also taken into account. Highly resistant clients seem to especially benefit from the adventure therapy setting, as the challenges are fun and hands-on (Gass et al., 2012). At-risk and severe populations were tested through population type as a moderator variable.

Study characteristics.

Dissertations make up a considerable amount of the body of research on adventure therapy, referred to as grey literature (Gass et al., 2012). The methodological quality is often low, because random allocation and adequate control groups are missing (Newes, 2001; Norton, 2007). To avoid publication bias and represent the full body of research an effort was made to include dissertations as

well as published reports. Publication type and methodological quality were taken into account as moderators.

Research Questions

This meta-analysis examines the effects of adventure therapy on self-concept as measured by locus of control, self-efficacy, and self-esteem (see Figure 2 for the logic model). As the literature shows evidence for both a general interpretation of self-concept (Judge et al., 2002) and a specific distinction between the constructs (Chen et al., 2004; Peterson & Stunkard, 1992), we analyzed single effects as well as aggregated effects in this meta-analysis. Various moderators are examined in order to understand what characteristics explain the expected heterogeneity in the effects. With the third question we aim at deepening the understanding of the adventure therapy process and assess the Outward Bound Process Model.

The present meta-analysis considers the following research questions:

1) What are the effects of adventure therapy on self-concept as measured by locus of control, self-efficacy and self-esteem?
2) How lasting are the effects of adventure therapy?
3) What moderates the effects of adventure therapy?

Methods

The project is hosted on the Open-Science-Framework (https://osf.io/7z4kv), where one can also find the Online-Appendix.

Literature Search

In August 2015, the first author conducted a literature search in the Journal of Experiential Education and through EBSCO Host searching the databases PSYNDEX, PsycINFO, PsycARTICLES and PsycCRITIQUES. Title, abstract and key words were searched using a fixed term combining synonyms of *adventure*, *therapy* and *self-concept* (see Table 2 and Online-Appendix A for full syntax). The search was limited to publications after 1990, written in English or German. Additionally, the reference lists of two relevant meta-analyses were scanned individually for further eligible studies (Bowen & Neill, 2013; Hans, 2000).

Eligibility Criteria

For studies to be included, the core of the intervention had to be the therapeutic use of adventure activities with populations in need for therapy or support. Furthermore, the study had to report pre-post data for either locus of control, self-efficacy, or self-esteem for at least one group. Studies with or without control groups were included in the meta-analysis. Finally, the full text of studies needed to be accessible and the study had to report enough statistical information to allow for effect size calculation. We contacted authors to receive non-published studies, when their contacts were available. The criteria did not exclude single group studies or non-randomized trials to give a representative picture of the programs currently used in the field.

Coding

To extract the relevant data from included studies, the first author developed a coding manual and coding sheet based on the research questions stated above and based on the manuals used by Bowen and Neill (2013) and Hans (2000). The material can be found in the Online-Appendix B and C.

In a pilot phase, ten studies were coded by the author and a second coder so that intercoder agreement could be determined for the variables population type, program type and MQRS. The second coder was trained by the author. Intercoder agreement was satisfactory with Cohen's Kappa resulting in $\kappa = .82$ (population type) and $\kappa = .86$ (program type) and intra class correlation yielding *ICC* .79 (MQRS). Cases with disagreement have been discussed and were used to refine the coding manual with more specific descriptions. Finally, the author coded all studies with the resulting version of the coding manual.

Outcome categories.

Three personality constructs were coded as outcome variables: locus of control, self-efficacy and self-esteem. Each of them was measured by a range of different questionnaires. Table 4 depicts all measures used in studies of this meta-analysis. Questionnaires yielding to measure general self-concept were excluded from the analysis, since they could not be allocated to one of the constructs.

Study characteristics, program characteristics and participant characteristics.

The coding variables for study characteristics included authors, year, publication type, country of authors, type of control group and two ratings of methodological quality: (1) The Methodological Quality Rating Scale (MQRS; Littell, Corcoran, & Pillai, 2008) is as a summative scale, well fitted to evaluate outdoor intervention programs. It consists of 12 items judging study design, standardization, follow-up and dropouts amongst others. (2) The Cochrane Risk of Bias Assessment was applied, rating each study on the six dimensions of sequence generation, allocation concealment, blinding, incomplete outcome data, selective outcome reporting and other potential threats to validity (Higgins & Green,

2008). With this assessment of risk of bias each dimension is interpreted individually, which can result in low, high or unclear risk of bias.

Program characteristics were daily duration, delivery, location, funding, goal, philosophy, group structure, group size, number of staff, staff qualification, staff fluctuation, program components and length of program. A summative variable program type was built post-hoc to reduce complexity and strengthen statistical power. The five levels were camp, wilderness and activity short, middle and long (see Online-Appendix E, Table A2 for the characteristics).

Participant characteristics included sample size, age, sex, race and presenting issue as well as a population description. Dichotomized sex specifying single gender groups vs. mixed gender groups was also used as a program characteristic. The presenting issue of the participants was coded by at-risk, in residential treatment, adjudicated, substance abuse and clinical. Presenting issue and dichotomized age (youth vs. adult) were combined post-hoc to build population subgroups. Thus, three groups resulted namely youth at-risk, youth severe and adult severe. There were no studies in the sample which assessed youth in substance abuse treatment or adults at-risk, in residential treatment or adjudicated (see Online-Appendix E, Table A3).

Statistical Methods

All statistical analyses were performed using the packages *metafor* (Viechtbauer, 2010) and *robumeta* (Fisher & Tipton, 2015) written for the statistical software environment *R* (R Core Team, 2015). Negative scales were reversed so that higher scores indicate a more internal locus of control, higher self-efficacy and higher self-esteem.

Computing effect sizes.

All effect sizes were computed as Hedges' g, involving a bias correction as proposed by (Hedges & Olkin, 1985). Uncontrolled effect sizes (g_{UC}) were calculated as a pre-post standardized mean change using change score standardization (SMCC). Based on few reported pre-post correlations (ranging from

0.44 to 0.72; Bennett et al., 1998; Vissell, 2005) We used an imputed r_i 0.5 for the analysis. The controlled effect sizes (g_C) indicate the difference of change between the groups in the unit of standard deviation. Those were calculated as the difference of the uncontrolled effect sizes of the treatment group and of the control group (see Online-Appendix D, Table A1 for formulae and detailed descriptions). Base-pre and post-follow up effect sizes were calculated in the same manner.

Missing data.

For missing standard deviations, we contacted five authors via email and kindly asked them to provide the missing data. Two authors replied, so that their studies were included (Bennett et al., 1998; Minor & Elrod, 1994). In four cases, we computed missing standard deviations through reported t-scores, with $sd = \frac{xpost - xpre}{t} * \sqrt{N}$ (Blanchard, 1994; Fischer & Attah, 2001; Gillis & Simpson, 1991; Tucker, 2006). Missing reliabilities of scales were imputed by the median of the construct's reliabilities in the meta-analysis.

Random effects meta-analysis.

A big variety of programs, population and outcome measures built the data base for this meta-analysis. Thus, we expected a variation of the true effect, which is best represented by a random effects model. For the analysis of homogeneity Q statistics were computed to test this assumption. Additionally, τquantifies the variation of the true effect across studies in the unit of standard deviation. I^2 quantifies how much percent of all variation is due to the heterogeneity of true effects (Shadish & Haddock, 2009). Each analysis was conducted for uncontrolled (UC, including all adventure samples) and controlled (C, including only adventure samples with control groups) effect sizes.

Main analyses were performed for all outcomes combined and for each outcome by itself, to allow a good understanding of the effects on the three related constructs. For combined analyses we used the software *robumeta,* because it accounts for the dependency of effect sizes within samples via *robust variance estimation* (Hedges, Tipton, & Johnson, 2010; Tipton, 2015). A correlation of r = 0.7

between outcomes was assumed, based on the findings of Judge et al. (2002). Multiple samples from one study were treated as independent since they reported the data from different clients.

Additional Analyses.

Moderator variables were tested for all outcomes combined in order to have a higher statistical power. As the existing literature suggests many different variables as potential moderators, we conducted moderator analyses for most coded variables (except country, publication year and specific program components, see Online-Appendix F, Tables A4 and A5).

Publication bias was assessed by computing trim and fill tests (Duval, 2005), graphical analysis via funnel plots (Sterne & Egger, 2001) and a random-effects version of the Egger test (Sterne & Egger, 2006). Publication bias means that significant results have a higher chance of being reported and the overall effect would be overestimated (Iyengar & Greenhouse, 2009).

To examine the impact of assumptions, a sensitivity analysis tested the robustness of the results to changing values. Reliability correction for the effect sizes was calculated with the formula $g_{rel} = \frac{g}{\sqrt{crona}}$ and $v_{g,rel} = \frac{v_g}{crona}$ (Hunter & Schmidt, 2004, p. 51). For the pre-post correlation of each outcome we imputed $r = 0.3$ and $r = 0.7$ (default $r = 0.5$) and for the correlation across outcomes in the robust variance estimation we imputed $r = 0.3$ and $r = 0.9$ (default $r = 0.7$) as proposed by Deeks et al. (2008).

An a priori power analysis estimated the number of studies needed to detect a mean effect size of $g = 0.4$ (Pigott, 2012). Less than one study (k = 0.34) is enough to detect this effect size with a power of 0.8, an alpha level of 0.05 and an assumed sample size of $N = 25$ per group in each study and a set alpha level of 0.05.

Results

Obtained Studies

This meta-analysis included 30 studies with 39 adventure therapy samples and 21 control samples. In total, 53 uncontrolled effect sizes and 28 controlled effect sizes were computed. Study selection is documented in Figure 3. One outlier study was detected and excluded from the final analysis (see Online-Appendix G, Figure A1 and A2). Including control subjects, this analysis evaluated pre-post data of 1802 subjects and follow-up data of 712 subjects. Table 5 gives details on each of the studies included in this meta-analysis.

Study characteristics.

Most studies were carried out in the United States (83%) and equally included dissertations (53%) and papers published in journals (47%). Most studies received public funding (57%), while 27% where privately financed and 17% did not specify this information.

Study quality as measured by the MQRS followed a normal distribution with a mean of 7.47 and a standard deviation of 2.36 on a scale ranging from 0 to 16 (high scores indicate high quality). Figure 4 presents the results of the Cochrane tool for risk of bias assessment. The first three scales show that random allocation and blinding are rarely implemented in the studies. About half of the studies did not adequately address incomplete outcome data (56.7%) and other risks of bias (53.3%). Furthermore, 23% of the studies seemed to underlie a selective reporting bias. We did not exclude studies based on their risk of bias assessment, but the quality was considered during analysis and interpretation of results.

Participant and program characteristics.

Participants had a mean age of 18 years ($SD_{between}$ = 8.82) and the majority were male (69%). Most samples consisted of mainly white participants (43.6%), while 7.7% enrolled mainly minorities in the program and 20.5% of the groups had a mixed ethnical background. Almost half of the samples

consisted of youth at-risk (49%), one third consisted of youth with severe issues (33%) and 18% of adults with severe issues.

The program types, which were built post-hoc, were represented equally through the collected data (activity short: 13%, activity middle: 18%, activity long: 23%, camp: 28%, wilderness: 18%). The average program length was 49 days ($SD_{between}$ = 59 days), ranging from a half day to eight months. The different length of programs was considered by the variable program type. Groups consisted in average of 10 participants ($SD_{between}$ = 2.7; range: 5 to 17) with an average staff ratio of 5 participants per staff ($SD_{between}$ = 2.7). Staff qualification was high, since 36% of the staff were mental health professionals and 33% were professionals experienced with the population group. 13% were other professionals (e.g. teachers, probation officers), 10% were field staff or so called counselors without a formal qualification and for 8% it was not indicated. In 44% of the programs different staff were involved by rotating in and out of the field or by splitting up therapeutic and hard skill tasks (such as leading the adventure activity, e.g. rock climbing). For 36% of the programs the same staff led all parts of the program, enabling an intensive participant-staff relationship, and 20% didn't report this information.

Main Analysis

Many studies reported more than one outcome resulting in a mean of 1.36 outcomes per sample (range: 1 to 3). Analyses including all outcomes were calculated using robust variance estimation, in order to take the dependency of effect sizes into account.

Uncontrolled and controlled effect sizes for adventure therapy effects on locus of control, self-efficacy and self-esteem are reported in Table 6 with detailed information. Pre-post effects for each outcome showed a significant amount of heterogeneity through significant Q-Tests and medium to high I^2 values. This is supported by τ ranging from 0.32 to 0.46, while the effect estimates only range from 0.43 to 0.56. Only the model for controlled effects for locus of control showed homogeneity of effect sizes. Still, the assumption of random effects models is appropriate, because of the variety of programs

and populations included. There were significant, positive, medium pre-post effects for all outcomes combined ($\hat{\mu}_{UC}$ = 0.51 and $\hat{\mu}_{C}$ = 0.56). Self-esteem showed the highest mean effect ($\hat{\mu}_{UC}$ = 0.51 and $\hat{\mu}_{C}$ = 0.71) and locus of control ($\hat{\mu}_{UC}$ = 0.48 and $\hat{\mu}_{C}$ = 0.30) and self-efficacy ($\hat{\mu}_{UC}$ = 0.43 and $\hat{\mu}_{C}$= 0.49) had similar effects. The differences between self-esteem and locus of control were not significant for uncontrolled effects (all $p > 0.79$), but approached significance for controlled effects (self-esteem p = 0.06). Forest plots for the three outcomes are shown in Figure 5, 6 and 7.

Only a small number of studies reported baseline or follow-up information. Thus, baseline-pre calculations could not be made (k_S = 2) and post-follow-up effects were only calculated for all outcomes combined. The post-follow-up effect, describing the change in self-concept after the intervention ended, did not differ significantly from zero (see Table 6). The mean follow-up length was 5.5 months (171 days) and did not have a significant impact on the follow-up effect (uncontrolled: $b_{\text{fu\_length}} < 0.001$, p = 0.96; controlled: $b_{\text{fu\_length}} < 0.001$, p = 0.46).

Additional Analyses

Neither categorical nor continuous moderator variables showed a significant influence on the pre-post effects. The heterogeneity of effect sizes wasn't substantially affected by any moderator. Detailed information about each moderator can be found in the Online-Appendix F (Tables A4, A5).

The tests for publication bias indicated an even distribution of effect sizes, indicating no evidence for publication bias (for funnel plots see Figure 8, trim and fill indicated no missing studies).

Sensitivity analyses confirmed the robustness of the results. Reliability correction of effect sizes yielded slightly increased estimates for the main analyses ($\hat{\mu}_{UC}$ = 0.56 and $\hat{\mu}_{C}$ = 0.64). Altering the assumed pre-post correlation moderately changed the effects in a positive direction. The assumed correlation across outcomes didn't have any influence on the effect sizes (see Online-Appendix H, Tables A6, A7).

Discussion

This meta-analysis examined the effects of adventure therapy on self-concept, as measured by locus of control, self-efficacy and self-esteem. The purpose of this research was to better understand the process of adventure therapy.

The results confirm the general efficacy of adventure therapy for self-concept change. For both study designs (uncontrolled and controlled) and for combined as well as for single outcomes, there was a positive pre-post effect, that differed significantly from zero. The general uncontrolled effect size (0.51) of this meta-analysis is comparable to the findings of the latest published meta-analysis (0.47, Bowen & Neill, 2013).

The individual effect sizes differed substantially and showed a great amount of heterogeneity: The random effects mean effect sizes ranged from 0.43 to 0.56, with an estimated true standard deviation τ ranging from 0.32 to 0.46. Thus, for uncontrolled effects, 68% of the true effect sizes for individual programs on self-concept range from 0.13 to 0.89 and for controlled effects from 0.10 to 1.02. The high variety of different programs and populations led to a great amount of heterogeneity, so that moderator analyses are mandatory for the interpretation of results.

For the second research question, long-term effects of adventure therapy were confirmed. The post-follow-up effect sizes did not differ significantly from zero, indicating maintenance of the treatment effects over time. In addition, the meta-regression of follow-up length did not show a significant influence. The true standard deviation of the effects was also small (τ_{UC} = 0.22) or close to zero (τ_C = 0.03). This evidence opposes the common criticism that the effects are not maintained in real life situations (Bandoroff, 1989). However, it should be noted that these results are only based on ten to sixteen samples. It is possible that negative follow-up effects were not reported, which would lead to a reporting bias.

For the third question looking closer at the process of adventure therapy no specific moderators were found. The great heterogeneity of effect sizes could not be explained significantly by any of the hypothesized moderating variables. However, we will discuss descriptive tendencies and missing evidence. The three variables with the highest descriptive influence were daily duration, outcome category and program length. When programs included overnight stays they had a greater impact on self-concept as when they operated in an outpatient setting. This is in line with results from Scheinfeld's interviews and Hans' meta-analysis (Hans, 2000; Scheinfeld et al., 2011). Self-esteem almost significantly showed higher changes than locus of control. Finally, longer programs descriptively led to higher changes in self-concept, which was also suggested from prior research (Paisley, Sibthorp, Furman, Schumann, & Gookin, 2008; Scheinfeld et al., 2011).

Contrary to our expectations, there was no evidence for the influence of program types on self-concept change. Neither the aggregated variable program type nor the specific variables location or goal explained some of the heterogeneity in effect sizes, even though prior research had shown this effect (Gillis & Speelman, 2008; Hans, 2000; Scheinfeld et al., 2011). There was no evidence for an influence of group functioning or staff rapport, as tested by the contextual indicators. Since the variables themselves were not reported, it is plausible that hypothesized effects will not be found through indicators that are only related with the variable of interest, such as group size or staff qualification. For population type, there was neither an effect for age nor sex nor presenting issue. Previous evidence for age and sex has been contradictory too, by indicating different directions (for age see: Paisley et al., 2008, Bowen & Neill, 2013; for sex see Tucker et al., 2014). Study characteristics like publication type, funding and the methodological quality measured through the MQRS did not show a significant influence on self-concept change, even though that was hypothesized by others (Gillis & Speelman, 2008).

Publication bias analysis showed no systematic bias in the data base as it consists of a realistic diversity of effect sizes with corresponding standard errors. Furthermore, the sensitivity analysis

confirmed the robustness of the results even when assumptions like correlation of measurement points or outcomes was altered.

Alternative Explanations and Limitations

The observed results raise two main questions: (1) *Why was no evidence found for moderators, even though there was great heterogeneity of effect sizes?* and (2) *What other factors might have led to the heterogeneous results?* While the following suggestions will not fully answer these questions, possible alternative explanations and limitations of this study will be discussed:

The quality of the tested moderator variables could have blurred existing effects. First, only between-study moderators were tested, so that each effect size represented only one value of the variable. Therefore, these variables could be confounded with other characteristics and this would make it hard to distinguish specific effects (Wood & Eagly, 2009). Furthermore, the tested moderators were distant indicators for the real moderators of interest. This was the case, because studies mostly reported contextual variables, such as group size and staff qualification, instead of measuring the psychological aspects, such as perceived group functioning or client-staff relationship. It is possible that a better client-staff relationship leads to a higher self-concept (Horvath & Symonds, 1991), but the relationship is not necessarily better, when the staff have a higher qualification. This means that the investigation of more directly measured hypothesized moderating variables could better explain heterogeneity of the effects.

Another reason could be the broad scope of the research question. We consciously included a variety of programs and populations to be able to test the influence of these characteristics. This led to a complex database of programs and populations differing on many different levels, which might have led to confounded variables (Borman, Grigg, Cooper, Hedges, & Valentine, 2009). Single moderator analyses might not be sufficient to account for the complexity of the data, so that multifactorial or even multilevel analyses could be necessary.

In addition, the inclusion of three constructs concerning specific aspects of self-concept might have led to a greater heterogeneity and a blurring of the effects. The convergent and discriminate validity of locus of control, self-efficacy, and self-esteem are still discussed in current research (Judge et al., 2002). As there weren't enough studies for each construct to conduct statistically reasonable moderator analyses, we based the analyses on all constructs together. Furthermore, for each construct a great variety of questionnaires was used. This induces more heterogeneity, because the measures have different reliabilities and construct validities. It is important to put effort toward clearly defining the dependent outcome variables and using validated instruments. Carifio and Rhodes (2002) even suggest that self-efficacy and locus of control follow a state-trait model as proposed by Spielberger. This model distinguishes between a generally stable trait level and a specific state level of a variable that depends on the current situation. This raises the need to examine if specific situational or general aspects are measured by the different questionnaires and to develop a distinct inventory that can differentiate between the levels. It would be a valuable question to examine, if adventure therapy only affects self-concept on the state level or also on the trait level. In any case, the specificity matching principle should be considered in future primary studies: Using specific predictors for specific outcomes and more general ones for the general outcomes (Swann et al., 2007).

The effects might also remain unclear due to a low general methodological quality of primary studies. Methodological issues like test-retest effects or unequal, non-randomized groups can be responsible for unexplained heterogeneity (Higgins & Green, 2008). Future research should attempt to perform randomized, controlled studies using adequate measuring instruments and procedures. Finally, we call for more internationally diverse research, coming from different countries than the United States. This will give a more representative picture of the worldwide understanding and practice of Adventure Therapy.

Conclusion and Future Research

In this meta-analysis, adventure therapy significantly strengthened self-concept as measured by locus of control, self-efficacy, and self-esteem and the effects remained stable during follow-up. The effects differed notably in size, but no evidence was found for moderating variables. The great amount of unexplained heterogeneity limits statistical conclusion validity and questions the construct validity of the outcome variables. Thus, the calculated main effect cannot be generalized on all programs and populations. It rather gives an orientation for expected effects through the range of reported effects.

Based on the results we were not able to draw conclusions on the psychological process of adventure therapy. This emphasizes the importance to invest in more profound research to actually develop new evidence-based process models. So far only Sibthorp and Arthur-Banning (2004) published an assessment of the Outward Bound Process Model with an educational focus. Therefore, specific dismantling studies need to be conducted, testing for example the importance of group discussions. Specific influences, like the influence of the client-therapist relationship, can also be assessed through structural equation modelling.

While the meta-analysis leaves some questions unanswered, the uncertainty of results is a valuable guide for further research (Wood & Eagly, 2009), indicating where the field is in need for more clarity. As the construct validity of self-concept is questioned, this shows that more work needs to be done in the domain of self-concept assessment and theory. This meta-analysis attempted to meet the call for more specific aspects of self-concepts and still assess a notable amount of studies. As discussed above, it is necessary to clarify the interrelationship between the constructs as well as their theoretical foundation. Therefore, longitudinal studies and the measuring of proper psychological moderating variables need to occur. Doing outcome research along the way and tolerating it as a needed, but unpleasant duty will not help in understanding the processes (Gass et al., 2012). Policy makers and researchers need to invest in solid foundational research with a high methodological standard to gain more insight in this field. It also makes sense to connect adventure therapy research to the well-

established psychological research fields and use the available constructs and questionnaires (Mackenzie et al., 2014).

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Table 1

Findings from Previous Meta-Analyses Related to Adventure Therapy

Authors (Year)	Outcome	Pre-Post		Post-FU		Program	Population
		N_{ES}	ES	N_{ES}	ES		
Bowen & Neill (2013)	all	1785	.47	435	.03	Adventure therapy	all
	academic	132	.41	28	.05		
	behavior	223	.41	52	.21		
	clinical	137	.50	122	.01		
	self-concept	137	.43	115	-.03		
Gillis & Speelman (2008)	all	309	.45	81	.23	Ropes course	all
	academic	125	.26	-	-		
	behavior	34	.48	-	-		
	self-esteem/ self-concept	42	.37	-	-		
	self-efficacy	8	.26	-	-		
Hans (2000)	locus of control	30	.38	-	-	Adventure programming	all
Wilson & Lipsey (2000)	antisocial behavior	22	.18	-	-	Wilderness therapy	delinquent youth
	locus of control	7	.10	-	-		
	self-esteem	9	.31	-	-		
Hattie et al. (1997)	all	1062	.34	347	.34	Adventure	all

	academic	30	.46	9	.21	education
	self-concept	271	.28	149	.23	

Note. Selected outcomes are reported. See original papers for all outcomes; FU= follow-up; N_{ES} = number of effect sizes; ES = effect size.

Table 2

Cue Words that Build the Search Term for the Literature Search

Adventure	Therapy	Self-concept
adventure, outdoor, wilderness, nature, bush, rope*, expedition, experiential	therap*, psychotherap*, treatment, counsel*, healthcare	locus of control, self-efficacy, self-esteem, mastery

Note. Terms inside each column were linked with OR and terms across columns were linked with AND. For full syntax see Online-Appendix A.

Table 3

Eligibility Criteria deduced from Bowen & Neill (2013)

Inclusion Criteria	Exclusion Criteria
- Intervention meets adventure therapy definition[a] - Psychometric measure of locus of control, self-efficacy or self-esteem[b]	- General population[c] - Less than two times of measuring - No full text accessible - Missing statistical information (*M*, *SD*, *N*), after contacting authors and alternative calculation failed

[a] As used in this meta-analysis: the therapeutic use of adventure activities (Gass et al., 2012). [b] See Table 4 for specific measures. [c] No specific problems reported, such as at risk, delinquent, substance abuse, mental health problems.

Table 4

Measures Used in Primary Studies for Outcomes Self-Efficacy, Self-Esteem and Locus of Control

Measure	α	Studies
Self-Efficacy		
Alcohol Abstinence Self-efficacy[c]	.92	Clem, Smith, & Richards (2012)
Drug Abstinence Self-efficacy [c]	-	Clem et al. (2012)
Children's Self-efficacy for Peer Interaction Scale	.85	Combs (2001)
Children's Self-efficacy Scale	.92	Mularski (2006)
Questionnaire of Competence and Control Beliefs, subscale Internal Control, Efficacy (FKK-SKI)	.89	Wolf & Mehl (2011)
Perceived Competence of Functioning Inventory	.88	M. A. Walsh (2009)
Self-efficacy Scale[c]	.86	Kelley, Coursey, & Selby (1997); Knott (2004)
Generalized Self-efficacy Scale[c]	.83	Kelley et al. (1997)
Self-efficacy for Anger Management, Goal Setting and Interpersonal Communication[c]	.97	Knott (2004)
Potency Scale	.82	Margalit & Ben-Ari (2014)
Student Self-concept Scale, Outcome Confidence	.61	Mcgarvey (2004)
Self-Esteem		
Self Description Questionnaire II	.80	Bandoroff & Scherer (1994)
Camp Esteem Measure[a]	-	Allen (1992)
Culture Free Self-esteem Inventory	.78	Gillis & Simpson (1991)
Piers & Harris Self-esteem Questionnaire	.78	Romi & Kohan (2004)

Table 4 (*continued*)

Measure	α	Studies
Rosenberg Self-esteem Scale (RSES)[b]	.70 - .88	Bryson, Feinstein, Spavor, & Kidd (2013); Faulkner (2002); Kelley et al. (1997); Mann (2010); Mcgarvey (2004); Parker & Stoltenberg (1995); Richardson (2003); Vissell (2005)
Adult Self Image Scale[a]	-	Voruganti et al. (2006)
Behavior Assessment System for Children - Self Report (BASC-SRP)	.87	Faubel (1998)
Coopersmith Self-esteem Inventory (CSEI)	.80	Blanchard (1994); Combs (2001); Herbert (1998)
Self-esteem Scale (Adolescent Diversion Program)[a]	-	Fischer & Attah (2001)
Locus of Control		
Rotter Internal-External Locus of Control Scale	.70	Herbert (1998)
Hebrew version of Rotters I-E Scale[a]	-	Romi & Kohan (2004)
Pearlin Mastery Scale	.72	Mann (2010)
Nowicki-Strickland LOC for Children[b]	.64 - .78	Christensen (2008); Combs (2001); Martinez (2003); Minor & Elrod (1994); Parker & Stoltenberg (1995); Tucker (2006)
Questionnaire of Competence and Control Beliefs, subscale Perceived Control (FKK-PC)	.91	Wolf & Mehl (2011)

Table 4 (*continued*)

Drinking Related Locus of Control (DRIE)	.94	Bennett, Cardone, & Jarczyk (1998)
Multidimensional Measure of Children's Perception of Control	.60	Cross (1999)

Note. α= internal consistency for each study measured by Cronbach's alpha.

[a] Missing reliabilities were imputed by the constructs median (LOC: .70 and self-esteem: .80). [b] Cronbach's α was coded as it was reported in each study. Some studies assessed internal consistency in their own sample, others used the general reported values. Thus for the same scales different values were reported. [c] Multiple measures for the same outcome within studies were pooled to calculate a single effect size per outcome per study.

Table 5

Characteristics and Effect Sizes of Included Primary Studies

First author (Year)	N[a]	Outcome	g_{UC} (*SD*)	g_C (*SD*)	Population type	Program Type	Days
Allen (1992)	126/22	self-esteem	0.56 (.10)	0.59 (.23)	youth at-risk	camp	5
Bandoroff (1994)[1]	27	self-esteem	0.39 (.20)	-	youth at-risk	wilderness	63
Bandoroff (1994)[2]	39	self-esteem	0.87 (.19)	-	youth at-risk	wilderness	21
Bennett (1998)	13/18	LOC	0.10 (.28)	0.03 (.36)	adult severe	camp	3
Blanchard (1994)	20/20	self-esteem	1.15 (.29)	1.02 (.37)	youth severe	activity middle	21
Bryson (2013)	15	self-esteem	0.12 (.26)	-	adult severe	activity middle	42
Christensen (2008)	26	LOC	1.60 (.30)	-	youth at-risk	wilderness	57
Clem (2012)	9	self-efficacy	0.57 (.36)	-	adult severe	activity long	84
Combs (2001)[1]	6	LOC	-0.13 (.41)	-	youth at-risk	camp	28
		self-efficacy	0.25 (.41)	-			
		self-esteem	-0.13 (.41)	-			

Combs (2001)[2]	6	LOC	0.22 (.41)	-	youth at-risk	camp	28
		self-efficacy	0.01 (.41)	-			
		self-esteem	-0.38 (.42)	-			
Cross (1999)	17/17	LOC	0.90 (.29)	0.87 (.38)	youth at-risk	camp	5
Faubel (1998)	41/27	self-esteem	0.31 (.16)	1.12 (.27)	youth severe	activity long	123
Faulkner (2002)	28/36	self-esteem	1.40 (.27)	1.40 (.31)	youth severe	activity short	0.5
Fischer (2001)	23	self-esteem	-0.05 (.21)	-	youth severe	camp	7
Gillis (1991)	29	self-esteem	0.76 (.21)	-	youth severe	camp	56
Herbert (1998)	22/12	LOC	0.98 (.26)	0.81 (.39)	adult severe	camp	8
		self-esteem	1.25 (.28)	1.34 (.41)			
Kelley (1997)	50/19	self-efficacy	0.37 (.15)	0.74 (.28)	adult severe	activity long	63
		self-esteem	0.21 (.14)	0.57 (.28)			
Knott (2004)	82/66	self-efficacy	-0.15 (.11)	-0.20 (.17)	youth severe	activity middle	14

Mann (2010)[1]	17	LOC	0.77 (.28)	-	youth at-risk	camp	14
		self-esteem	0.76 (.28)	-			
Mann (2010)[2]	18	self-esteem	0.82 (.27)	-	youth at-risk	camp	14
		LOC	0.61 (.26)				
Margalit (2014)[1]	21/10	self-efficacy	1.63 (.33)	1.61 (.46)	youth severe	activity long	183
Margalit (2014)[2]	12/9	self-efficacy	0.37 (.30)	0.35 (.45)	youth severe	activity long	183
Margalit (2014)[3]	31/10	self-efficacy	0.53 (.19)	0.52 (.37)	youth severe	activity long	183
Martinez (2003)	222	LOC	0.32 (.07)	-	youth at-risk	camp	14
		self-esteem	1.14 (.09)	-			
McGarvey (2004)	29/14	self-efficacy	0.11 (.19)	0.34 (.33)	youth at-risk	activity middle	49
		self-esteem	0.32 (.19)	-0.14 (.34)			
Minor (1994)	22/23	LOC	0.02 (.21)	-0.06 (.30)	youth severe	activity long	92
Mularski (2006)[1]	25	self-efficacy	0.53 (.21)	-	youth severe	activity middle	35

Mularski (2006)[2]	25	self-efficacy	0.51 (.21)	-	youth severe	activity middle	35
Parker (1995)[1]	12/9	LOC	0.16 (.29)	0.08 (.44)	youth at-risk	activity short	2
		self-esteem	0.00 (.29)	0.27 (.45)			
Parker (1995)[2]	14/8	LOC	0.36 (.28)	0.28 (.45)	youth at-risk	activity short	2
		self-esteem	0.22 (.27)	0.49 (.45)			

Table 5 (*continued*)

First author (Year)	N[a]	Outcome	g_{UC} (*SD*)	g_C (*SD*)	Population type	Program Type	Days
Richardson (2003)[1]	11/11	self-esteem	0.15 (.30)	-0.18 (.43)	youth at-risk	activity short	1
Romi (2004)	36/33	LOC	0.27 (.17)	0.27 (.24)	youth at-risk	wilderness	14
		self-esteem	0.23 (.17)	0.90 (.26)			
Tucker (2006)	52	LOC	0.12 (.14)	-	youth at-risk	activity long	63
Vissell (2005)[1]	21	self-esteem	0.07 (.22)	-	youth at-risk	wilderness	21
Vissell (2005)[2]	18	self-esteem	0.54 (.25)	-	youth at-risk	wilderness	40
Voruganti (2006)	23/31	self-esteem	1.77	1.60 (.38)	adult severe	activity long	244

			(.33)				
Walsh (2009)	43	self-efficacy	0.42 (.16)	-	youth severe	wilderness	21
Wolf (2011)	104/53	self-efficacy	0.75 (.11)	0.56 (.18)	adult severe	activity middle	55
		LOC	0.69 (.11)	0.32 (.18)			

Note. g_{UC} = uncontrolled pre-post effect size; g_C = controlled pre-post effect size; [1], [2], [3] indicating different samples; LOC = locus of control;

[a] Sample size treatment group / control group.

Table 6

Uncontrolled and Controlled Random Effects Meta-Analyses by Time Comparison and Outcome

Outcome	k_E (k_S)	$\hat{\mu}$ Hedges' g	95% CI lower	95% CI upper	*p*	Heterogeneity I^2	Heterogeneity τ	Heterogeneity Q_e	Heterogeneity $p(Q_e)$
Pre-Post									
Uncontrolled Effects									
All[a]	53 (39)	0.51 ***	0.37	0.66	<.001	80.10	0.38	-	-
LOC	15 (15)	0.48 ***	0.27	0.70	<.001	77.34	0.34	47.57	<.001
Self-efficacy	13 (13)	0.43 ***	0.21	0.65	<.001	74.52	0.32	53.26	<.001
Self-esteem	25 (25)	0.51 ***	0.32	0.70	<.001	81.80	0.42	129.40	<.001
Controlled Effects									
All[a]	28 (21)	0.56 ***	0.31	0.81	<.001	69.50	0.46	-	-
LOC	8 (8)	0.30 **	0.09	0.51	0.004	0	0	6.33	0.502
Self-efficacy	7 (7)	0.49 *	0.11	0.87	0.012	69.95	0.41	21.88	.001
Self-esteem	13 (13)	0.71 ***	0.40	1.02	<.001	64.48	0.45	31.48	0.002
Post-Follow-Up									
Uncontrolled Effects									
All[a]	27 (16)	-0.12	-0.29	0.05	0.154	57.18	0.22	-	-
Controlled Effects									
All[a]	15 (10)	0.01	-0.32	0.35	0.935	0.60	0.03	-	-

Note. k_E = number of effect sizes; k_S= number of samples; $\hat{\mu}$= Estimate for random effects meta-analysis; CI= Confidence Interval; *p* = p-value for $\hat{\mu}$; Q_e = Test for residual heterogeneity; $p(Q_e)$ = p-value for Q-test.

[a] Analyses combining all outcomes were conducted with robumeta, which does not report Q-Tests of Heterogeneity.

* p<.05, ** p<.01, ***p<.001

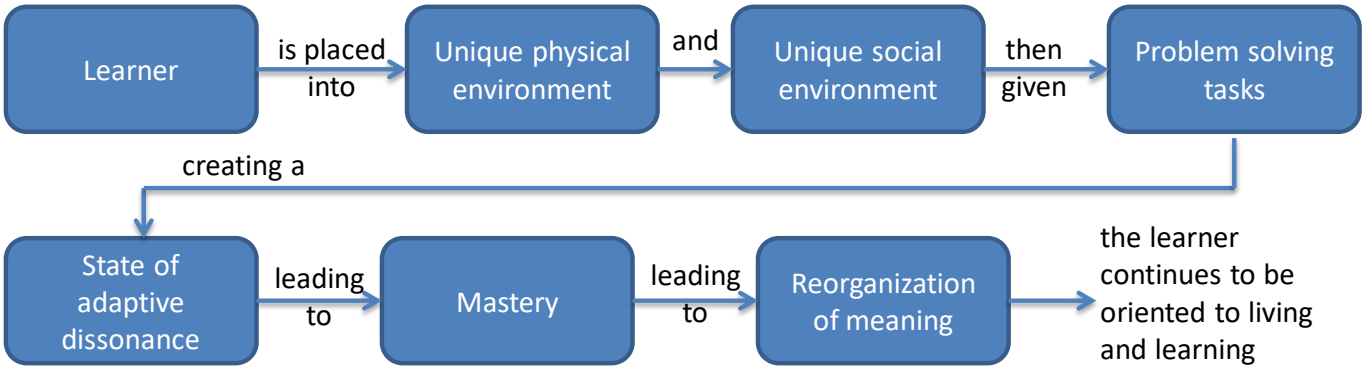


Figure 1. The Outward Bound Process Model from Walsh and Golins (1976). The model describes the process of experiential learning. Figure adapted from Gass et al. (2012), p. 71.

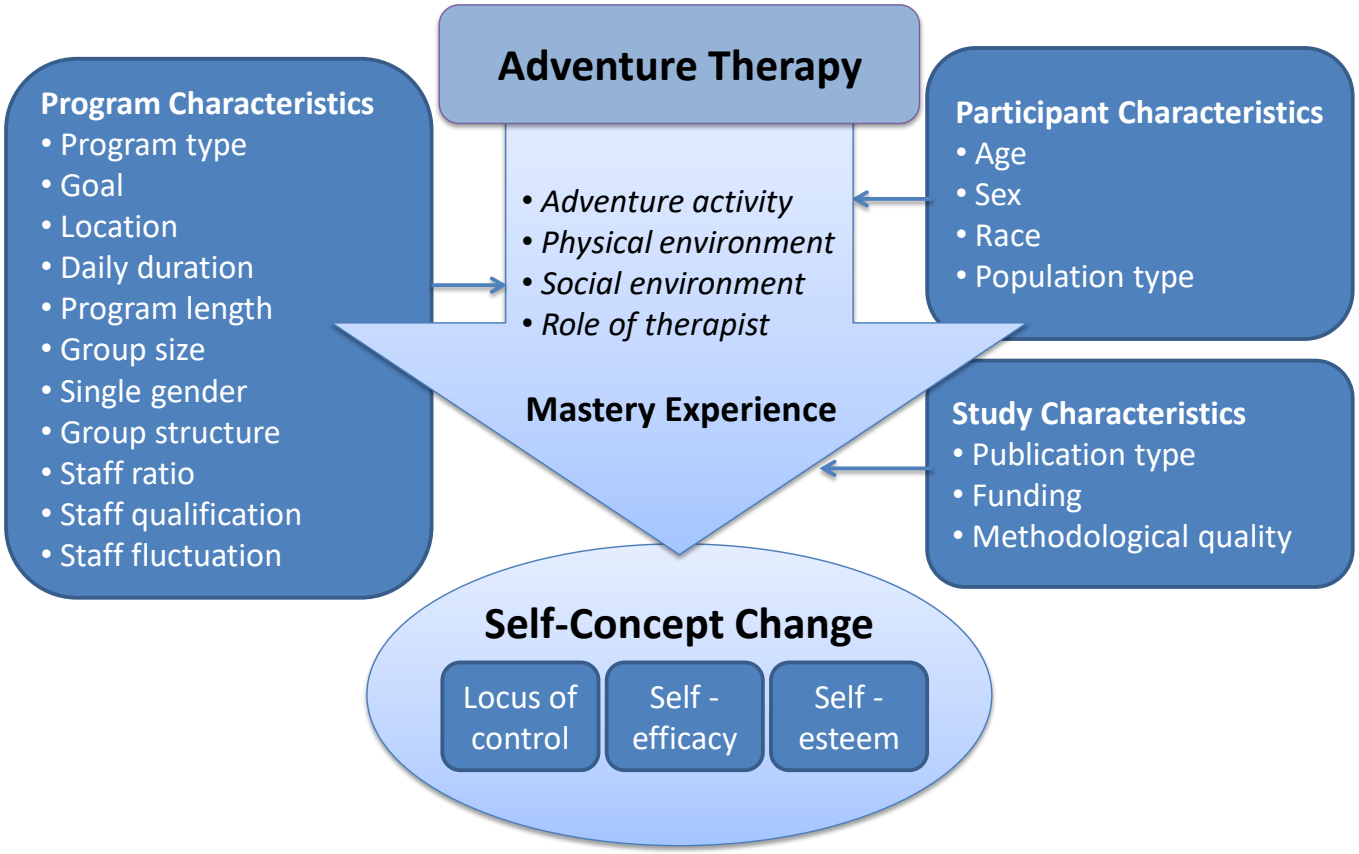
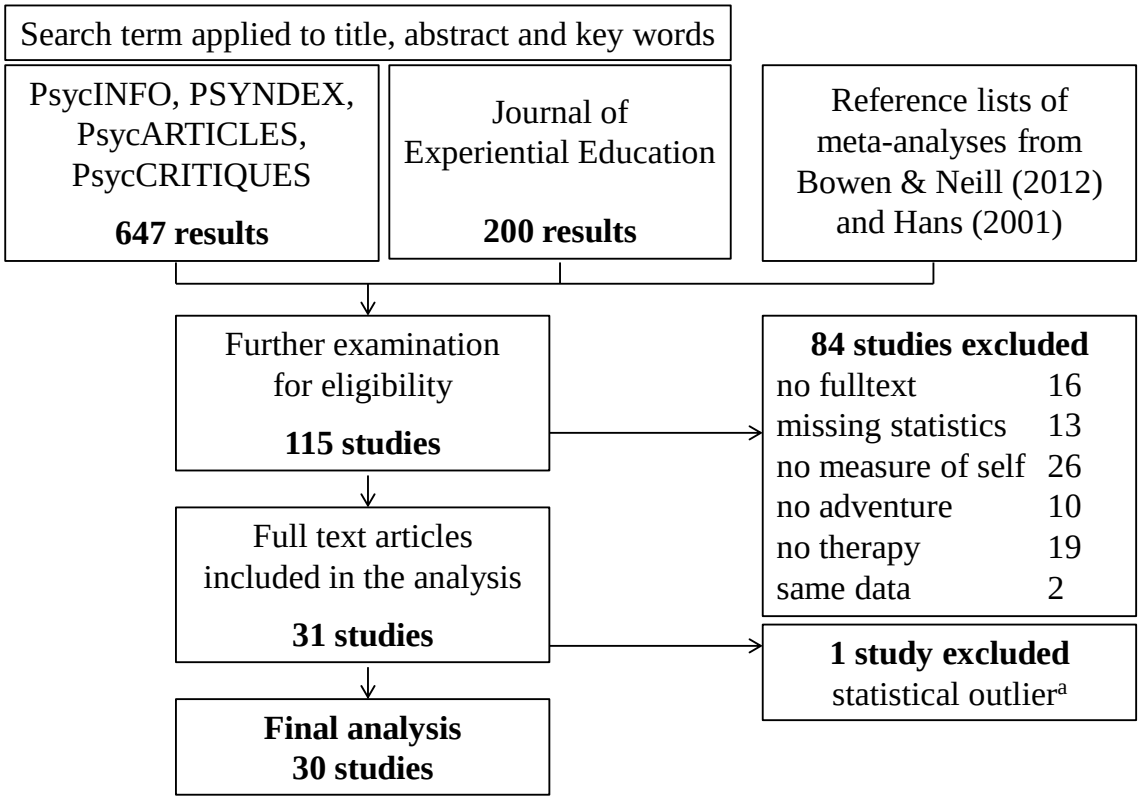


Figure 2. Logic model of the present meta-analysis. Potential moderators that impact the relationship between adventure therapy and self-concept change are shown. Mastery experience is the underlying process relevant for change, as elaborated by Gass et al. (2012).



[a] Freedman (1996) reported implausibly high effect sizes with studentized deleted residuals > 3 for each sample.

Figure 3. Process of study inclusion and exclusion during literature search.

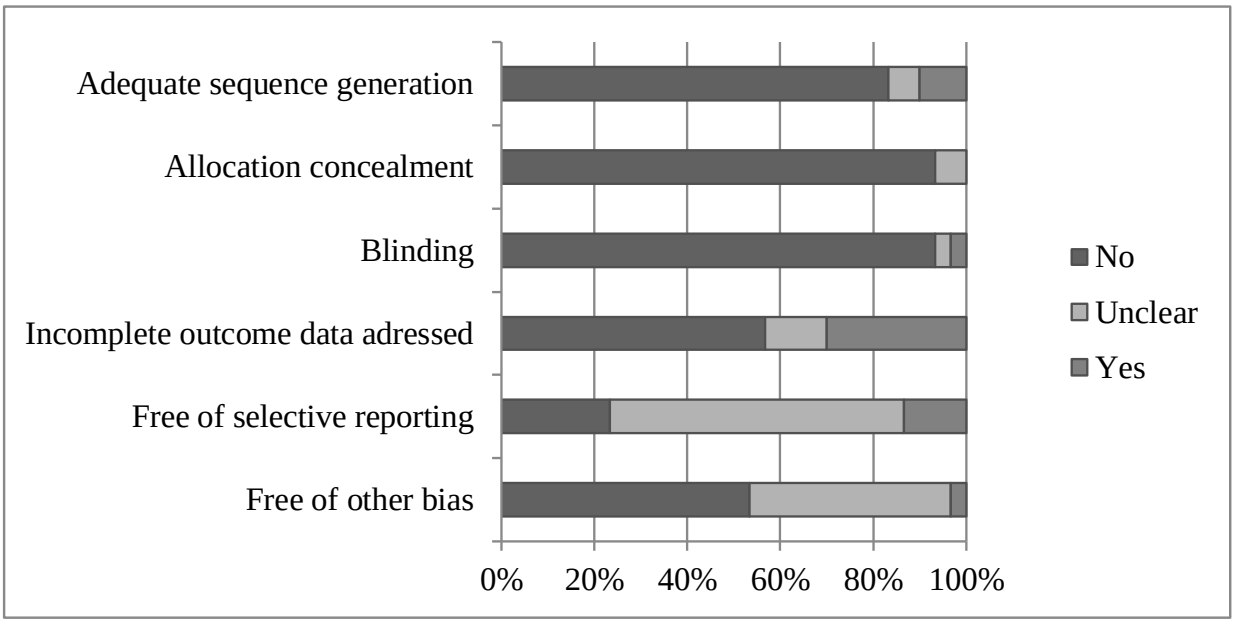


Figure 4. Risk of bias assessment of studies included in this meta-analysis. Each bar shows the relative distribution of studies with a high, unclear and low risk of bias. *No* indicates a high risk of bias; *Yes* indicates a low risk of bias. *Unclear* was coded when not enough information was available to rate the risk of bias.

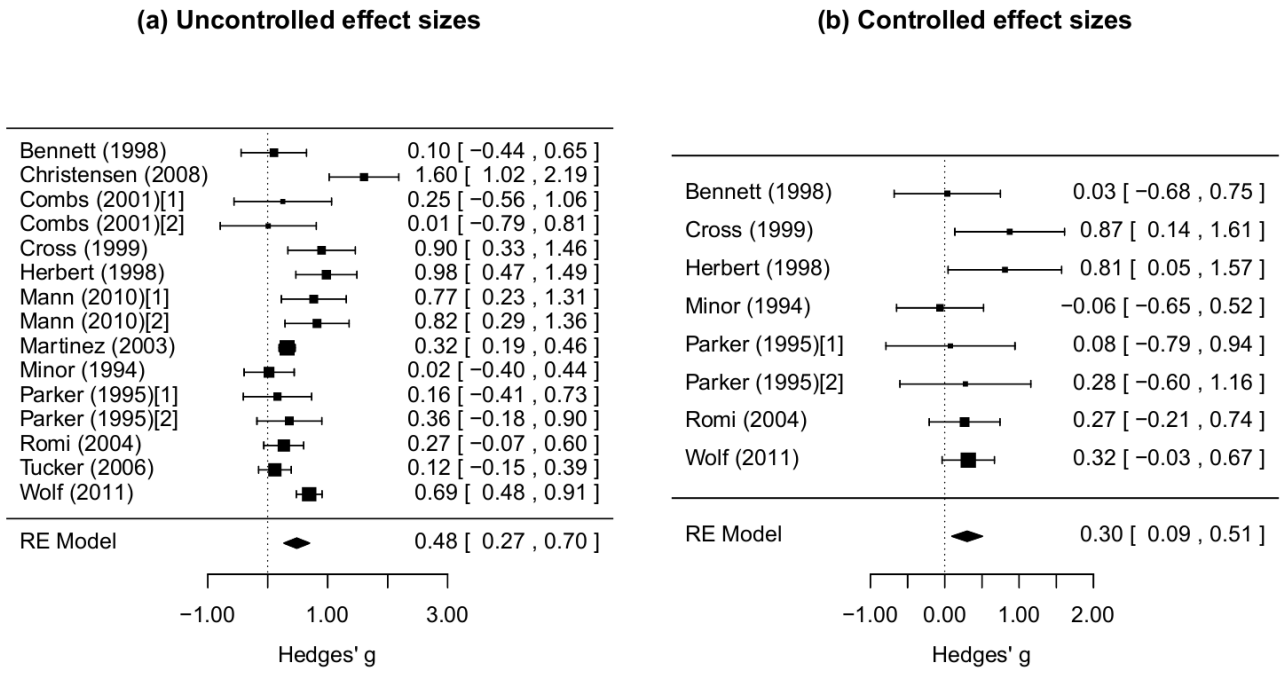


Figure 5. Forest Plots for Locus of Control with (a) Uncontrolled and (b) Controlled Effect Sizes. Hedges' g [95% confidence interval] are reported. The size of the square illustrates the relative weight each effect size had in the analysis.

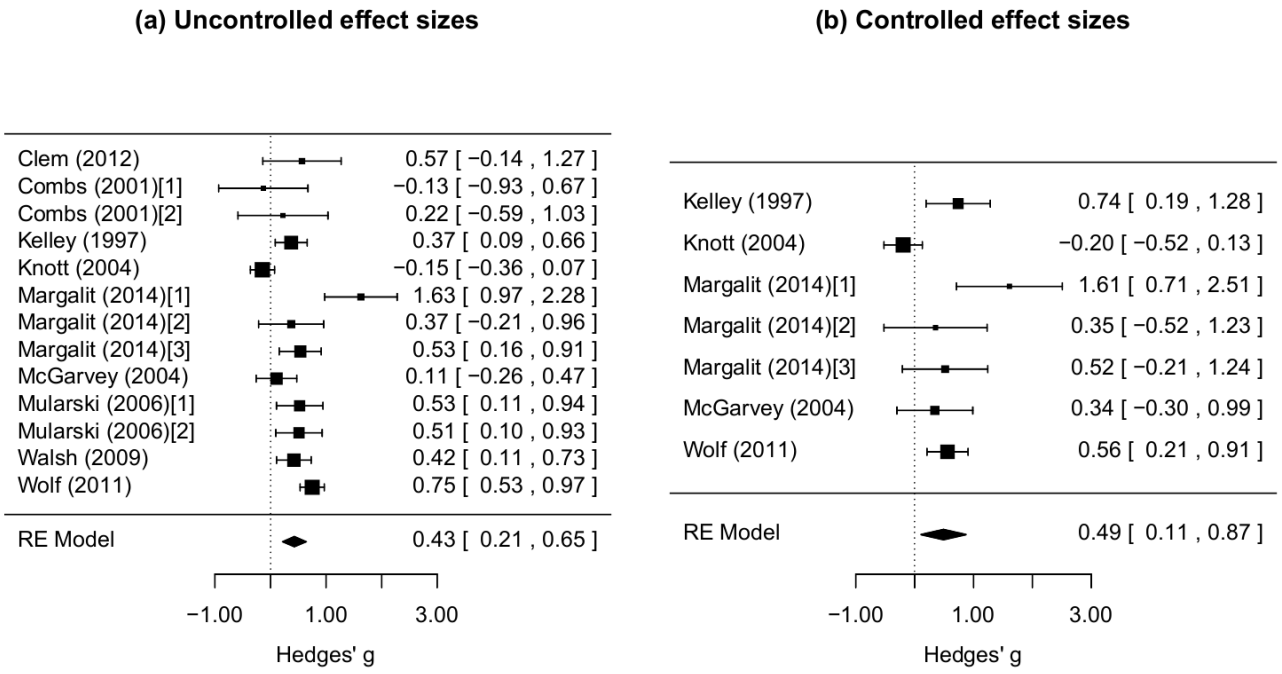


Figure 6. Forest Plots for Self-efficacy with (a) Uncontrolled and (b) Controlled Effect Sizes. Hedges' g [95% confidence interval] are reported. The size of the square illustrates the relative weight each effect size had in the analysis.

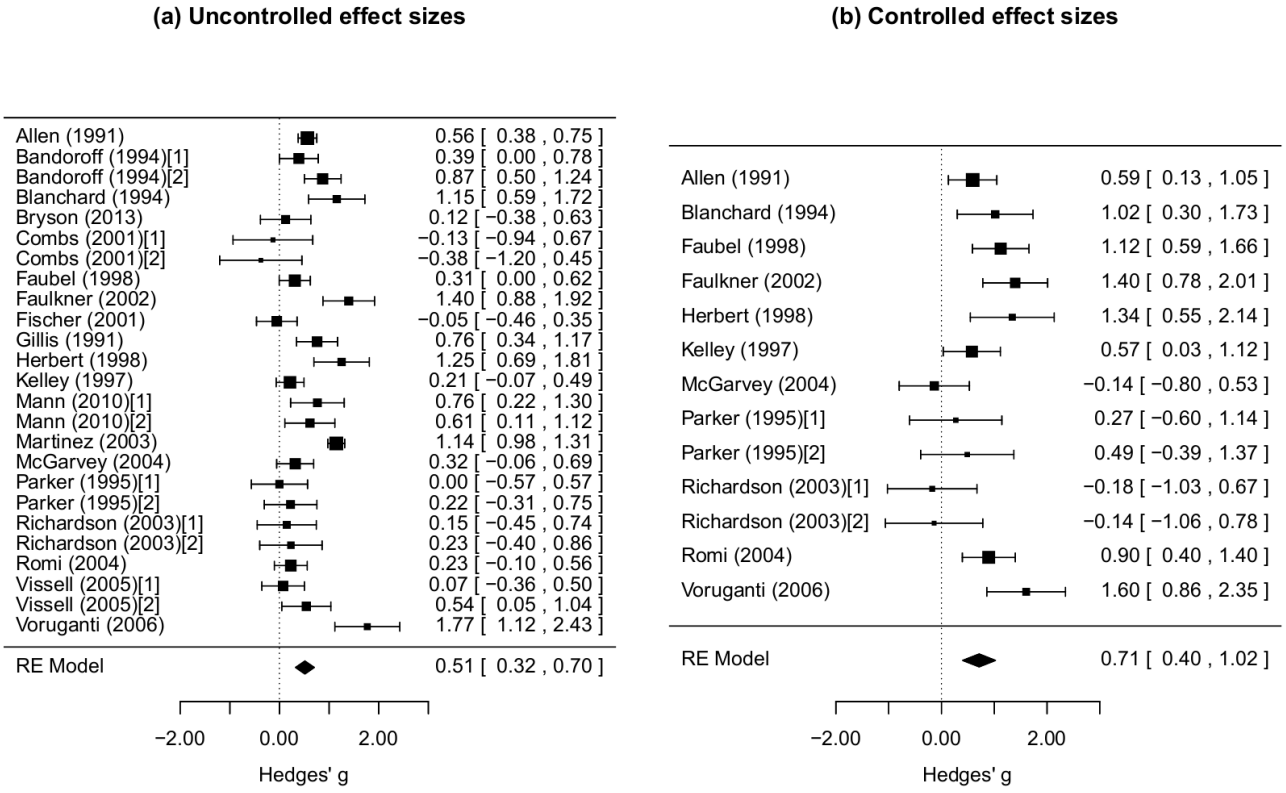


Figure 7. Forest Plots for Self-esteem with (a) Uncontrolled and (b) Controlled Effect Sizes. Hedges' g [95% confidence interval] are reported. The size of the square illustrates the relative weight each effect size had in the analysis.

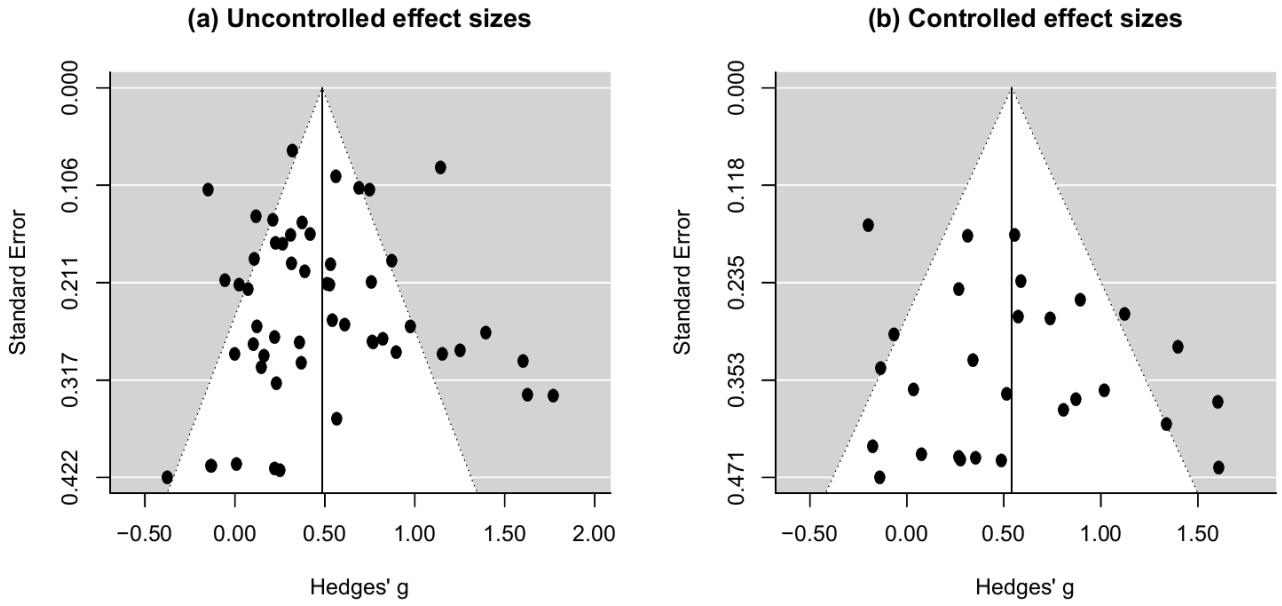


Figure 8. Funnel Plots for (a) Uncontrolled and (b) Controlled Pre-Post Effect Sizes.