

# The Effect of Wilderness Therapy on Adolescents' Cognitive Autonomy and Self-efficacy: Results of a Non-randomized Trial

Daniella Margalit · Amichai Ben-Ari

Published online: 2 February 2014  
© Springer Science+Business Media New York 2014

## Abstract

**Background** Adolescents participate in decision-making processes involving risky behaviors. Management of these important decisions may be promoted by enhancing adolescents' self-efficacy beliefs and cognitive autonomy.

**Objective** In order to elucidate the value of wilderness therapy to the successful management of decision making processes among adolescents at risk, this study aims to examine the effect of wilderness therapy participation on cognitive autonomy and self-efficacy.

**Methods** The sample consisted of 93 male adolescents at-risk aged 14–16 who study at boarding schools in Israel. Participants took part in a full wilderness therapy intervention, a partial one, or a control condition. Allocation was not randomized. Assessments included the cognitive autonomy and self evaluation inventory and the potency scale and were administered in 3 waves: pre-intervention, post-intervention, and at 5-month follow-up.

**Results** The intervention group showed a significant increase in cognitive autonomy following wilderness therapy participation when compared to controls in wave 2 and wave 3. Partial wilderness therapy participation engendered a significant increase in cognitive autonomy when compared to no participation. An identical pattern of findings was found for self-efficacy.

**Conclusion** This is the first report of significant cognitive autonomy benefits among male adolescents following wilderness therapy participation. Findings suggest that wilderness therapy may provide adolescents with the capacity to tackle decision-making dilemmas in a successful, constructive manner.

**Keywords** Wilderness therapy · Adolescents · Cognitive autonomy · Self-efficacy · Israel

---

D. Margalit · A. Ben-Ari (✉)  
Department of Behavioral Sciences, Ariel University, 40700 Ariel, Israel  
e-mail: baamichai@gmail.com

## Introduction

Wilderness therapy (WT) emerged in the 1920s as a rehabilitation program for adolescents at risk. WT programs involve expedition-based interventions in outdoor wilderness settings that aim to change maladaptive behaviors via experiential learning. A focus is placed on group aspects including promoting communication with peers, interpersonal abilities, reliance on peers and staff (Clark et al. 2004; Russell and Farnum 2004), supporting group initiatives and decision-making processes, and learning how one is perceived by others (Corey and Corey 2000; Newes and Bandoroff 2004). More information on the principals underlying WT can be found elsewhere (Becker 2010; Bettmann et al. 2013; Russell and Farnum 2004; Wilson and Lipsey 2000).

Wilderness therapy programs have various beneficial features. The outdoor setting of the program offers restorative benefits and utilizes adolescents' inclinations towards spontaneity and self-disclosure (Hill 2007; Russell and Farnum 2004). In addition, WT programs are based on a unique model that addresses communication difficulties among adolescents (Fletcher and Hinkle 2002) and are instrumental in overcoming adolescents' difficulties that stem in limited verbal abilities, emotional and cognitive openness, and sharing personal thoughts (Hill 2007). Finally, the possibility to actively help another person via group work serves to increase one's self-efficacy and self-esteem (Yalom 2006).

Three main stages to WT therapy programs have been described, namely, a cleansing phase, a personal and social responsibility phase, and a transition and aftercare phase (Russell 2006a). WT programs may differ in the process corresponding to these stages (Russell 2006a). One program format involves 10 preparation meetings, a backpacking trip, and two closure meetings (Davis-Berman and Berman 1994). In the current study, participants of the full WT program followed the above format. During the preparation meetings participants learn skills relating to basic orientation, camping, and backpacking. The objectives of this stage are to learn of the physical factors relating to survival, promote group social cohesion, check participants' suitability to the program, and establishing mutual goals. The duration of the backpacking trip in the second stage of the program varies in accordance with available resources, goals, and type of population. The two closure meetings involve emotional processing of participants' experiences in the program, focusing on promoting self-efficacy and generalizing individual gains from the program into real life.

Multiple benefits have been reported among adolescents following WT participation. Meta analyses of WT studies have reported benefits to personal development (e.g., enhanced self-concept, internal locus of control) and interpersonal development (e.g., social competence, interpersonal communication) following WT participation (Hans 2000; Hattie et al. 1997). Similarly, multiple reviews have reported increases in self-image, internal locus of control, interpersonal skills, and decreases in behavioral problems, anti-social behaviors, delinquent behaviors, and recidivism (Bedard et al. 2003; Cason and Gillis 1994; Wilson and Lipsey 2000). For example, improvements in emotional and drug and alcohol use among adolescents ages 13–18 with emotional, behavioral, and substance use problems have been reported following WT participation (Harper et al. 2007). In another study, indications of improved attachment to parents such as decreased anger and emotional disconnection towards one's parents have been shown following WT participation (Bettmann and Tucker 2011). Finally, WT benefits may be due to instilling particular coping-strategies and affecting decision making processes. For example, abstinence-focused coping strategies have been reported to be a significant predictor of mental health symptomology among WT participants (Bettmann et al. 2013).

Adolescents participate in decision-making processes involving risky behaviors such as drug and alcohol use and sexual activity (Beckert 2005; Santrock 1995). Management of these important decisions may be promoted by enhancing adolescents' self-efficacy beliefs and cognitive autonomy (Jacobs and Klaczynski 2002; Wheeler 2010). For example, among female adolescents, high levels of self-esteem has been associated with a lower likelihood of substance use 1 year later (Wheeler 2010). Self-efficacy has been defined as one's belief in one's ability to organize and perform actions required for achieving future goals (Bandura 1977). Cognitive autonomy (Beckert 2007) relates to multiple facets of independent thought. Specifically, cognitive autonomy includes the ability to assess one's thinking process and to make logical deductions (Miller and Byrnes 2001), expressing one's stance (Reed and Spicer 2003), creating and considering different alternatives and their outcomes (Reyna 2004; Wells et al. 2004), conducting validating comparisons (Finken 2005) and self-evaluation and self-reflection skills (Peetsma et al. 2005). Thus, self-efficacy and cognitive autonomy tap complimentary self-beliefs and thinking skills that are integral to decision making processes.

Various benefits have been associated with self-efficacy among adolescents. For example, self-efficacy has been found to predict smoking cessation in adolescents (Van Zundert et al. 2010), high-school academic achievement (Caprara et al. 2011), and has been associated with health promotion intentions and knowledge (Goh et al. 1996). Self-efficacy promotion may be addressed by WT, which provides adolescents at-risk with the opportunity to engage successfully in various challenging activities. Such engagement has been described as instrumental in promoting self-efficacy (Bandura 1977; Ewert 1989). Indeed, increases in self-efficacy and self-concept following WT participation have been reported (Davis-Berman and Berman 1989; Hattie et al. 1997). Studies on adolescents' cognitive autonomy are limited, thus far focusing mainly on aspects of identity, emotion, and behavior (Beckert 2005; Lee and Beckert 2012; Lee et al. 2010).

Cognitive autonomy and self-efficacy are both integral to adolescents' decision-making processes. Thus, elucidating the value of WT participation in promoting cognitive autonomy and self-efficacy has important implications for the prevention of adolescent's participation in risky behaviors as well as its discontinuation. The question of what is the value of WT in promoting adolescents' thinking skills and self-beliefs, and how are these changes related to the successful management of decision making processes is yet to be answered. In order to begin answering this question, the current study aims to examine the effect of WT participation on cognitive autonomy and self-efficacy among adolescents at risk. To our knowledge, the relationship between cognitive autonomy and WT participation has not been previously examined. The WT program in the current study meets multiple characteristic of WT such as supervision by a mental health professional, one-on-one and group therapy sessions, monitoring medical status and well-being, and formal evaluation of treatment effectiveness (see Russell 2001).

It is hypothesized that:

1. Wilderness therapy participants would show a significant increase in cognitive autonomy following WT participation when compared those who did not participate in the program. Considering the effects of WT on self-concept development and locus of control (Hans 2000; Hattie et al. 1997), WT may comprise a valuable avenue for enhancing adolescents' cognitive autonomy.
2. Wilderness therapy participants would show a significant increase in self-efficacy when compared those who did not participate in the program. This is in line with previous investigations reporting increases in self-efficacy and self-concept following

WT participation (Davis-Berman and Berman 1989; Hattie et al. 1997). The study of the effect of WT on self-efficacy bears implications for the successful management of decision-making processes.

## Methods

### Participants and Recruitment

Participants were 93 male adolescents aged 14–16, studying in one male-only boarding school in Israel. Recruitment was facilitated by contacting the “Etgarim” association, which operates WT program in boarding schools. The “Etgarim” association contacted educational coordinators of boarding schools during May, 2008. The adolescents in the boarding schools come from families of low socio-economic background, have been identified as experiencing social or educational difficulties and as being at risk of mal-development and delinquency by Social Services, and have been referred to the boarding schools by Social Services. The adolescents resided in the boarding school for approximately 1.5 years prior to their study participation. Typically, participants reside in the boarding schools for a total of 4 years.

### Procedure and Design

The rehabilitative program for adolescents at risk was initiated by the “Etgarim” association and has been offered to various institutions such as hostels, boarding schools, day-care centers. Cooperation was obtained with three institutions, of which only one had a population of adolescents at risk. This institution is the boarding school under study and the current sample is comprised of adolescents at risk studying in this boarding school. The WT program was to be offered to all of the 9th and 10th graders in the boarding school, who studied in four different classes, and originated from 19 different educational institutions across Israel. However, due to budgetary constraints of the “Etgarim” association, it was decided to limit full participation in the program to a single class and to offer participation in a partial program format of 10 group sessions only to another class. Adolescents of 2 additional classes did not participate in any format of the program and served as controls. Control participants attended the same boarding school and were at the same grade level as intervention participants. Thus, comparability of control and interventions participants in terms of age, gender, and education was expected. There were no adolescents who refused participation or withdrew their participation at any stage of the study. The full and partial interventions were conducted at the same location and time. Three separate preparation meetings were held in parallel for participants of the full program and of the partial program (the latter including two distinct groups, as detailed below). The number of participants in each meeting corresponded to the number of participants in each condition. Control participants did not attend any preparation meetings. The regular therapeutic activity offered in the boarding school is a 1.5 h weekly group therapy session co-administered by a social worker and the group coordinator. This activity was offered to all of the 93 adolescents, regardless of their study allocation. The researchers initiated the contact with the “Etgarim” association. The program was funded by the “Etgarim” association in full, and was free of charge for the participants.

The study used a non-randomized, pre-post design with a control group. The educational coordinator and director of the boarding school were asked to allocate the four

participating classes to one of the conditions (full participation, 12 group sessions only, no participation) in random. However, this process was not monitored and therefore random allocation could not be guaranteed.

The dependent variable was WT participation and the independent variables were cognitive autonomy and self-efficacy. Assessments were administered in 3 waves. Wave 1 took place at the beginning of the program, on September, 2008. Wave 2 took place at the end of the program, on March 2009. Wave 3 took place at 5-month follow-up. Assessments were administered in person using an individual format by the researcher after gaining the approval of the “Etagarim” association and of the boarding schools management. The study was approved by the ethical committee of Ariel University, Israel. Informed consent was obtained from the participants and from their parents. It was made clear to participants that the completion of the assessments is voluntary and anonymous, and that they may partially complete them or quit their completion at any time. The approval of the Travels Directorate of the Ministry of Education of Israel to conduct a wilderness expedition has been obtained by the “Etagarim” committee.

The study sample was divided into 4 groups: intervention ( $n = 21$ ), partial intervention (re-allocated) ( $n = 12$ ), partial intervention ( $n = 31$ ), and control ( $n = 29$ ). The intervention group initially included 33 participants who took part in the complete WT program, i.e., 12 group sessions and a backpacking trip. Of these 33, 12 participants did not participate in the backpacking trip due to the budgetary constraints of “Etagarim”, and were re-allocated (by the educational coordinator and director of the boarding school as detailed above) to the partial program consisting of 10 group sessions [henceforth: partial (re-allocated)]. Another group was of 31 participants allocated to the partial program (henceforth: partial). Thus, 43 participants took part in the partial program. However, these participants took part in two separate groups of preparation meetings, and are thus separated in the analysis. The control group included 29 participants which took no part in the WT program in the year of the study or during the previous year.

### Intervention

The objective of the program is to provide participants with an empowering experience that will serve to enhance participants’ self-esteem and self-efficacy and will have a positive effect on their life-trajectory. The program includes 10 preparation meetings, a 4-day backpacking trip, and two closure meetings. The program incorporated behavioral elements such as modeling, positive and negative reinforcement, and problem-solving alongside therapeutic elements administered by a mental health professional. The first 10 weekly preparation meetings include outdoor experiential activities such as camping, outdoor training, navigation, and constructing devices. The meetings are conducted in group format and participants are required to help and support one another, and take part in group tasks that require cooperation, under the premise that these elements contribute to the development of interpersonal skills. All of the participants of the full program participated in the same 4-day backpacking trip. While in other countries longer backpacking trips are customary, the typical length of these trips in Israel is 4–5 days. This may have to do with the need to keep Sabbath. Due to the size of the full program group, participants were divided to 3 sub-groups, each operating on a distinct designated area. The daily schedule on the trip included personal tasks such as building a hideout and looking for a source of water, group (2–3 persons) tasks such as navigation, rock climbing, and setting a fire by natural means. Each day started with a group meeting led by the head supervisor. In these morning sessions, participants shared in turns their experiences from the previous

night activity and their lessons from it, then the schedule and tasks for the day were introduced, and finally a group conversation on the daily activities was held, focusing on participants' emotional experience, difficulties, coping manners, and empowerment. These conversations were held in a group setting in order to facilitate reciprocal and reflective learning. In addition, staff members (both supervisors and social worker) held personal conversations with each participant offering support, positive reinforcement, and encouragement to facilitate one's self-esteem and sense of accomplishment, and monitoring each participant's well-being. These conversations took place throughout the day as made possible by the setting and schedule, and considering individual participants' affinity to a specific staff member (or members), ensuring that each of the participants receives personal attention and care. The two closure meetings, conducted after the backpacking trip, focused on processing the experience using group-therapy techniques. The program and its activities including the preparation meetings were administered by supervisors that have been trained by the "Etgirim" association including theoretical training and in-practice training of wilderness workshops, first as an accompanying observer and later as a facilitator under the guidance of a veteran facilitator. Therapeutic aspects of the intervention were directed by a social worker who holds a Master's degree in Social Work (MSW), received clinical training, and had 4 years of therapeutic work experience in the "Etgirim" association. This included participation in the preparation meetings, the morning group sessions, personal conversations with the participants, and providing support throughout the duration of the wilderness trip. In addition, the social worker was provided emotional support, guidance, and advice to the supervisors of "Etgirim".

## Measurements

*Demographic background* included age, education and gender.

*Cognitive autonomy* was measured via the cognitive autonomy and self evaluation (CASE) inventory (Beckert 2007). Double-back translation (Brislin 1986) into Hebrew was performed. The CASE includes 27 items that tap evaluative thinking (8 items; e.g., "I think about the consequences of my decisions"), voicing opinion (5 items; e.g., "When I disagree with others I share my views"), decision making (6 items; "There are consequences to my decisions"), self-assessing (3 items; "I am best at identifying my abilities") and comparative validation (5 items; e.g., "I need my views to match those of my friends"). Participants were asked to rate their extent of agreement with each item of a 5-point scale ranging from 1 (never) to 5 (very often). The total score is the sum of these ratings (range 27–135). A higher score represents a tendency towards higher cognitive autonomy. Alpha Cronbach of the total scale was 0.85 in a sample of high school students (Beckert 2007), and 0.84 in the current sample. Concurrent validity had not previously assessed because of the lack of other published measures of cognitive autonomy (Beckert 2007).

*Self-efficacy* was measured via the potency scale (Ben-Sira 1985). Potency has been defined as one's enduring confidence in one's capacities and social environment, including his/her commitment to the latter, and is manifested in the extent of one's self-evaluation, sense of control over one's life, commitment to society, and perceiving society as having a just social order (Ben-Sira 1985). The potency scale taps the domains of self-confidence (e.g., "I am able to do things as well as most other people"), mastery, alienation, and anomie. Due to the comparability of potency-efficacy and self-efficacy beliefs, potency is henceforth discussed in terms of self-efficacy. Double-back translation (Brislin 1986) into Hebrew was performed. Participants were presented with 15 items and asked to rate their level of agreement with each

item on a 5-point scale ranging from 1 (never) to 5 (very often). A higher score represents greater potency. Items number 4, 6, 7, 8, and 11 were reversed. Alpha Cronbach was 0.86 in a sample of Israeli Arabs (Lev-Wiesel and Al-Krenawi 1999), 0.87 in a sample of Israeli Jewish persons (Lev-Wiesel 1998), and 0.82 in the current sample.

### Statistical Analysis

Data analysis was conducted using SPSS 14.0. We examined differences in demographics between the 4 groups via *t* tests. In order to examine cognitive autonomy and self-efficacy differences between the groups in wave 1, one-way ANOVA was conducted for each of these variables. In order to compare levels of cognitive autonomy, and levels of self-efficacy, across the 4 research groups and 3 waves of study, two repeated measures multivariate analyses of variance (MANOVAs) were conducted; one analysis with the mean CASE score as the dependent variable, and one analysis with the mean self-efficacy score as the dependent variable. The between-subject variable was the research group, and the inter-subject variable was the wave of study. Subsequent analyses included multiple comparisons using Bonferroni adjusted alpha levels of 0.008 per test (0.05/6). The reported differences in the multiple comparison analyses represent a level of significance of 0.05. All confidence intervals (CIs) represent a 95 % interval.

### Results

No significant differences were found between the four groups on education and gender (the sample included males only). Mean (SD) age scores by group are presented in Table 1. Significant age differences were found between the groups, as follows. Intervention participants were significantly older than partial intervention participants,  $t(50) = 2.43$ ,  $p < 0.05$ , and significantly younger than control participants,  $t(48) = 3.17$ ,  $p < 0.01$ . Partial intervention participants were significantly younger than partial (re-allocated) participants,  $t(41) = 6.89$ ,  $p < 0.00$ , and control participants,  $t(58) = 11.09$ ,  $p < 0.00$ . Partial (re-allocated) participants were significantly younger than control participants,  $t(39) = 3.49$ ,  $p < 0.01$ . There were no significant age differences between the intervention group and the partial (re-allocated) group.

In wave 1, no significant differences were found between the four research groups on cognitive autonomy and self-efficacy. Significant correlations between cognitive autonomy and self-efficacy were found in wave 1 ( $r = 0.93$ ;  $p < 0.001$ ), wave 2 ( $r = 0.84$ ,  $p < 0.001$ ), and wave 3 ( $r = 0.86$ ,  $p < 0.001$ ). In addition, cognitive autonomy scores in wave 2 correlated significantly with self-efficacy scores in wave 3 ( $r = 0.71$ ,  $p < 0.001$ ).

### Cognitive Autonomy and WT Participation

Participants had medium–high level of cognitive autonomy in wave 1, and high levels of cognitive autonomy in wave 2 and wave 3 (Table 1). Figure 1 presents the mean cognitive autonomy levels of the four groups in waves 1, 2, and 3. A significant increase in cognitive autonomy across the 3 waves of study was found,  $F(2, 180) = 94.54$ ,  $p < 0.001$ ,  $\eta^2 = 0.51$ , as well as a significant difference between the study groups,  $F(3, 90) = 65.04$ ,  $p < 0.001$ ,  $\eta^2 = 0.68$ . In addition, a significant interaction between the waves of study and the research groups was found,  $F(6, 180) = 20.91$ ,  $p < 0.0001$ ,  $\eta^2 = 0.41$ . Subsequent analyses showed significant differences in cognitive autonomy between the intervention group and the partial

**Table 1** Cognitive autonomy and self-efficacy scores across groups and waves of study

	Age		Cognitive autonomy			Self-efficacy		
	M	(SD)	Wave 1	Wave 2	Wave 3	Wave 1	Wave 2	Wave 3
Intervention	15.32	(0.89)	2.94 (0.53)	3.81 (0.50) <sup>b</sup>	3.86 (0.49) <sup>b</sup>	2.92 (0.50)	3.94 (0.67) <sup>b</sup>	3.81 (0.56) <sup>b</sup>
Partial intervention (re-allocated)	15.47	(0.17)	2.88 (0.66)	3.15 (0.67) <sup>a</sup>	3.61 (0.49) <sup>a</sup>	2.87 (0.66)	3.19 (0.89) <sup>a</sup>	3.37 (0.74) <sup>a</sup>
Partial intervention	14.91	(0.26)	2.91 (0.43)	3.17 (0.41) <sup>a</sup>	3.20 (0.39) <sup>b</sup>	2.88 (0.40)	3.15 (0.55) <sup>a</sup>	3.15 (0.45) <sup>b</sup>
Control	15.92	(0.43)	2.90 (0.45)	2.95 (0.45)	2.98 (0.41)	2.89 (0.43)	2.90 (0.57)	2.93 (0.47)

<sup>a</sup> Differences in comparison to wave 1 ratings of the same group were statistically significant on a  $p < 0.05$  level

<sup>b</sup> Differences in comparison to wave 1 ratings of the same group were statistically significant on a  $p \leq 0.001$  level



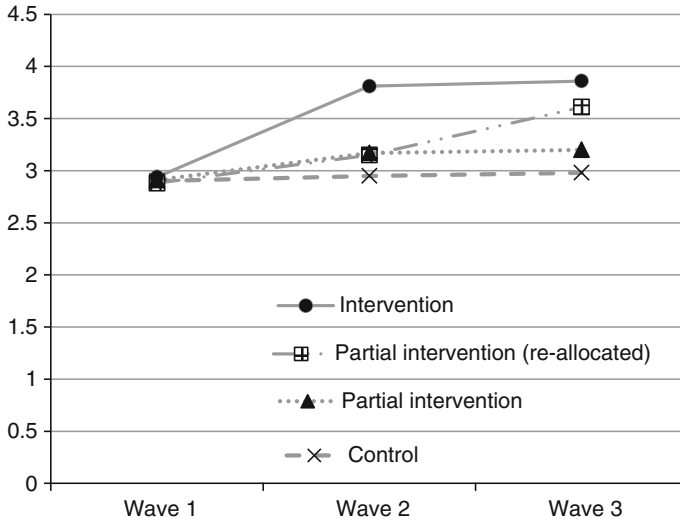
(re-allocated), partial, and control group (CI 0.575–0.280, 0.554–0.324, 0.709–0.475, respectively,  $p < 0.001$ ). Also, significant differences were found between the partial (re-allocated) group and the control group (CI 0.305–0.025,  $p < 0.05$ ), and between the partial group and the control group (CI 0.258–0.048,  $p < 0.001$ ). Finally, cognitive autonomy ratings in wave 1 were significantly different in comparison to wave 2 (CI  $-0.274$  to  $-0.455$ ,  $p < 0.001$ ) and in comparison to wave 3 (CI  $-0.351$  to  $-0.516$ ,  $p < 0.001$ ). The differences between wave 2 and wave 3 only approached statistical significance (CI 0.005 to  $-0.143$ ,  $p = 0.075$ ). Cognitive autonomy ratings among intervention participants were significantly higher in wave 2 when compared to wave 1 (CI 0.729–1.003,  $p < 0.001$ ), and in wave 3 when compared to wave 1 (CI 0.782–1.055,  $p < 0.001$ ). Cognitive autonomy ratings among control participants did show significant differences between wave 1 and wave 2, and between wave 1 and wave 3.

### Self-efficacy and WT Participation

On average, participants had medium–high levels of self-efficacy in wave 1 and high levels of self-efficacy in wave 2 and wave 3 (Table 1). Figure 2 presents the mean self-efficacy levels of the four groups in waves 1, 2, and 3. A significant increase in self-efficacy was found across the three waves of study,  $F(2, 180) = 78.83$ ,  $p < 0.001$ ,  $\eta^2 = 0.47$ , as well as a significant difference between the study groups,  $F(3, 90) = 57.14$ ,  $p < 0.001$ ,  $\eta^2 = 0.66$ . In addition, a significant interaction between the waves of study and the research groups was found,  $F(6, 180) = 21.44$ ,  $p < 0.001$ ,  $\eta^2 = 0.42$ . Subsequent analyses showed significant differences in self-efficacy between the intervention group and the partial (re-allocated), partial, and control group (CI 0.585–0.238, 0.628–0.359, 0.786–0.512, respectively,  $p < 0.001$ ). In addition, significant differences were found between the partial (re-allocated) group and the control group (CI 0.402–0.073,  $p \leq 0.01$ ) and between the partial group and the control group (CI 0.278–0.033,  $p < 0.01$ ). That is, a significant increase in self-efficacy was found in the intervention group when compared to any of the other groups. In addition, partial participation in the WT program engendered a significant increase in self-efficacy when compared to controls. Self-efficacy ratings in wave 1 were significantly different than those in wave 2 (CI  $-0.299$  to  $-0.511$ ,  $p < 0.001$ ) and in wave 3 (CI  $-0.339$  to  $-0.508$ ,  $p < 0.001$ ). The difference in self-efficacy between wave 2 and wave 3 did not reach statistical significance. Self-efficacy ratings among intervention participants were significantly higher in wave 2 when compared to wave 1 (CI 0.866–1.172,  $p < 0.001$ ), and in wave 3 when compared to wave 1 (CI 0.766–1.001,  $p < 0.001$ ). Self-efficacy ratings among control participants did show significant differences between wave 1 and wave 2, and between wave 1 and wave 3.

### Discussion

This study examined the effect of WT programs on adolescents' cognitive autonomy and self-efficacy. The intervention group showed a significant increase in cognitive autonomy following WT participation when compared to controls. This pattern persisted at 5-month follow-up. Partial WT participation engendered a significant increase in cognitive autonomy when compared to no participation in the intervention. An identical pattern of findings was found for self-efficacy. Thus, the two study hypotheses were confirmed. Findings indicate that WT programs serve to promote thinking skills and self-beliefs among

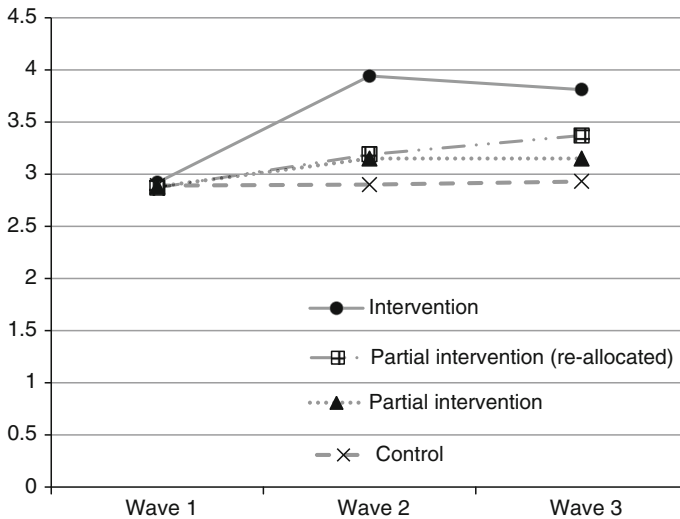


**Fig. 1** Mean cognitive autonomy levels of the four groups in waves 1, 2, and 3

adolescents at risk, and suggest that WT programs may contribute to successful management of decision-making processes.

Cognitive autonomy significantly increased in WT participants when compared to controls. To our knowledge, this is the first report of the favorable effect of WT programs on adolescents' cognitive autonomy. In a large study of Taiwanese adolescents, lower family income was associated with lower cognitive autonomy and higher scores of identity diffusion, which may be due lesser opportunities for exercising cognitive autonomy and involvement in identity exploration (Lee and Beckert 2012). In line with this, outdoor pursuits have been suggested to engender a successful identity formation (Gillis 1995). The current increase in cognitive autonomy among adolescents at risk who come from a lower socioeconomic background suggests that WT successfully addresses a developmental gap associated with one's background characteristics in this population. This should be examined in future studies, as no objective measures of socio-economic status were taken in the current study. In addition, Lee and Beckert (2012) reported peer attachment and ego resiliency facilitated higher cognitive autonomy scores in adolescents. While these variables were not examined in the current study, WT programs highlight elements of peer bonding and ego enhancement and these elements may serve as mediators of cognitive autonomy increases. In a study of 96 adolescents aged 14–17 who participated in a 7-week WT program (Bettmann and Tucker 2011), no significant differences in perceptions of peer attachment as assessed by the Inventory of Parent and Peer Attachment (Armsden and Greenberg 1987) were found following WT participation. However, as the bulk of participants had a diagnosis of substance abuse or dependence (84.3 %), or of oppositional defiant disorder (76 %), generalizability of these findings may be limited. Future studies should examine if cognitive autonomy increases may be mediated by increased peer attachment or ego resilience.

It is particularly interesting to consider the context of the current increase in adolescents' cognitive autonomy. As long-term residents of a boarding school and as WT participants, the participants in the current study were placed under highly structured and restrictive conditions. Such conditions may increase the potential for coercion (Koocher 2003). In line with this, according to WT staff reports, adolescents approach WT with



**Fig. 2** Mean self-efficacy levels of the four groups in waves 1, 2, and 3

feelings of fright, anger, and resistance (Russell 2006b). Thus, ethical issues such as consent and confidentiality are pertinent when considering youth care (Becker 2010). In the current study, participation was voluntary, there were no refusals to participation, there was no attrition, and participants' consent was gained. Considering this alongside the finding of an increase in cognitive autonomy suggests that the maintenance of ethical guidelines that respect an individual's autonomy (Becker 2010) enables the counterintuitive promotion of autonomy in a WT environment that is intrinsically restrictive.

Self-efficacy significantly increased in WT participants when compared to controls. This finding corroborates previous reports of increased self-efficacy among adolescents following WT participation (Davis-Berman and Berman 1989). The increase in self-efficacy may be attributed to actively assisting others in group-work (Yalom 2006), which is intrinsic to the WT program (Newes and Bandoroff 2004). Self-efficacy relates to one's belief in the possible achievement of future goals (Bandura 1977). Therefore, it seems likely that increased self-efficacy would be associated with readiness to change harmful behaviors such as substance abuse. It has been shown adolescents' readiness to change is not necessary for WT participation to effectively reduce mental health symptomology (Bettmann et al. 2013). It would be interesting to examine the effect of group activities and group-identification on WT participants' cognitive autonomy and self-efficacy as well as the interrelations between self-efficacy, readiness to change, and WT benefits in future studies.

Full participation in the WT program yielded significant increases in cognitive autonomy and self-efficacy when compared to partial participation, i.e., 10 group meetings without backpacking trip participation. This finding highlights the therapeutic value of participation in the backpacking trip following participation in WT group meetings. Indeed, the merits of intense physical activities such as group backpacking trips in WT programs have been reported (Wilson and Lipsey 2000). The increased therapeutic effect of such activities may be due to providing therapy continuously, across day and night (Bacon and Kimball 1989).

The current sample included only male adolescents and thus may be limited in terms of generalizability, particularly in view of reported gender differences in adolescents' cognitive autonomy (Lee et al. 2010). Significant age differences between the four groups were found in wave 1. However, cognitive autonomy and self-efficacy improvements did not progress (or regress) linearly with age. For example, the intervention group, which showed the greatest improvement on both measures, is younger than the control group (showing no improvement) and older than the partial intervention group (showing moderate improvement). Similarly, the youngest (partial re-allocated) group is the closest to the oldest (control) group in terms of improvement. In addition, the restricted age range (14–16) and the low SDs of the groups' mean age scores attest to limited age variability. Thus, while the current analysis was limited by data accessibility issues, age-effects on cognitive autonomy and self-efficacy are implausible. An additional limitation involves the significant correlations found between cognitive autonomy and self-efficacy ratings in the 3 waves of the study, attesting to the low discriminative validity of these constructs. These correlations may be due to similarities in the self-concepts tapped by the CASE (i.e., thought evaluation, voicing opinions) and the potency scale (i.e., self-confidence, mastery). Future studies should examine if these two scales may be better conceptualized as a single scale. The current study utilized only self-report measures, which may be limited in their accuracy. Future WT research should incorporate other methods of assessments. Finally, random assignment to treatment condition was not monitored, which limits the capacity to establish the efficacy of the intervention. It is noteworthy that detailed data on participants' risk profile was unavailable. In view of differences between adolescents from low-risk families to those from high risk family in terms of associations between expressions of autonomy and social functioning (Boykin McElhaney and Allen 2003), future studies of the impact of WT should take risk profile into consideration. A strength of the study is the use of a 5-month follow-up in which the pattern of the findings was unchanged. Nonetheless, as fluctuations in the effects of the program may occur over time (Davis-Berman and Berman 1994), research studies involving longer follow-up periods are warranted.

Notwithstanding these limitations, the current study provides an important contribution to evidence regarding the therapeutic effects of WT programs. Specifically, to our knowledge, this is the first report of significant cognitive autonomy benefits among male adolescents following WT participation. The importance of this finding is highlighted due to the early participation of adolescents in decision-making processes involving risky behaviors. A promotion of adolescents' cognitive autonomy and self-efficacy via programs such as WT may provide adolescents with the capacity to tackle these dilemmas in a successful, constructive manner. Future investigations of the interrelations between cognitive autonomy, self-efficacy, and decision making processes among WT participants are warranted.

**Conflict of interest** None.

## References

- Armsden, G. C., & Greenberg, M. T. (1987). The inventory of parent and peer attachment: Individual differences and their relationship to psychological well-being in adolescence. *Journal of Youth and Adolescence*, 16(5), 427–454.
- Bacon, S. B., & Kimball, R. (1989). The wildness challenge model. In R. Lyman, S. Prentice-Dunn, & S. Gabel (Eds.), *Reinstall and inpatient treatment of children and adolescents* (pp. 115–144). New York: Plenum Press.

- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191–215.
- Becker, S. P. (2010). Wilderness therapy: Ethical considerations for mental health professionals. *Child & Youth Care Forum*, 39, 47–61.
- Beckert, T. E. (2005). *Fostering autonomy in adolescents: A model of cognitive autonomy and self-evaluation*. Paper presented at the American Association of Behavioral and Social Sciences, Las Vegas, Nevada.
- Beckert, T. (2007). Cognitive autonomy and self evaluation in adolescence: A conceptual investigation and instrument development. *North American Journal of Psychology*, 9(3), 579–594.
- Bedard, R. M., Rosen, L. A., & Vacha-Haase, T. (2003). Wilderness therapy programs for juvenile delinquents: A meta-analysis. *Journal of Therapeutic Wilderness Camping*, 3(1), 7–13.
- Ben-Sira, Z. (1985). Potency: A stress-buffering link in the coping-stress-disease relationship. *Social Science and Medicine*, 21(4), 397–406.
- Bettmann, J. E., Russell, K. C., & Parry, K. J. (2013). How substance abuse recovery skills, readiness to change and symptom reduction impact change processes in wilderness therapy participants. *Journal of Child and Family Studies*, 22, 1039–1050.
- Bettmann, J. E., & Tucker, A. R. (2011). Shifts in attachment relationships: A study of adolescents in wilderness treatment. *Child & Youth Care Forum*, 40, 499–519.
- Boykin McElhaney, K., & Allen, J. P. (2003). Autonomy and adolescent social functioning: The moderating effect of risk. *Child Development*, 72(1), 220–235.
- Brislin, R. W. (1986). The wording and translation of research instruments. In W. J. Lonner & J. W. Berry (Eds.), *Field methods in cross-cultural research. Cross-cultural research and methodology series* (Vol. 8, pp. 137–164). Thousand Oaks, CA: Sage Publications.
- Caprara, G. V., Vecchione, M., Alessandri, G., Gerbino, M., & Barbaranelli, C. (2011). The contribution of personality traits and self-efficacy beliefs to academic achievement: A longitudinal study. *British Journal of Educational Psychology*, 81(1), 78–96.
- Cason, D., & Gillis, H. (1994). A meta-analysis of outdoor adventure programming with adolescents. *Journal of Experiential Education*, 17(1), 40–47.
- Clark, J. P., Marmol, L. M., Cooley, R., & Gathercoal, K. (2004). The effects of wilderness therapy on the clinical concerns (on axes i, ii, and iv) of troubled adolescents. *Journal of Experiential Education*, 27(2), 213–232.
- Corey, M. S., & Corey, G. (2000). *Groups: Process and practice*. Pacific Grove, CA: Brooks/Cole Publishing Company.
- Davis-Berman, J., & Berman, D. S. (1989). The wilderness therapy program: An empirical study of its effects with adolescents in an outpatient setting. *Journal of Contemporary Psychotherapy*, 19(4), 271–281.
- Davis-Berman, J., & Berman, D. S. (1994). *Wilderness therapy: Foundations, theory and research*. Dubuque, Iowa: Kendall/Hunt Publishing Company.
- Ewert, A. (1989). *Outdoor adventure pursuits: Foundations, models, and theories*. Columbus, OH: Publishing Horizons.
- Finken, L. L. (2005). The role of consultants in adolescents' decision making: A focus on abortion decisions. In J. J. Jacobs & P. A. Klaczynski (Eds.), *The development of judgment and decision making in children and adolescents* (pp. 255–278). Mahwah, NJ: Erlbaum.
- Fletcher, T. B., & Hinkle, J. S. (2002). Adventure based counseling: An innovation in counseling. *Journal of Counseling & Development*, 80(3), 277–285.
- Gillis, H. (1995). If i conduct outdoor pursuits with clinical populations, am i an adventure therapist? *Journal of Leisureability*, 22(2), 5–13.
- Goh, D. S., Primavera, C., & Bartolini, G. (1996). Risk behaviors, self-efficacy, and aids prevention among adolescents. *The Journal of psychology*, 130(5), 537–546.
- Hans, T. A. (2000). A meta-analysis of the effects of adventure programming on locus of control. *Journal of Contemporary Psychotherapy*, 30(1), 33–60.
- Harper, N. J., Russell, K. C., Cooley, R., & Cupples, J. (2007). Catherine freer wilderness therapy expeditions: An exploratory case study of adolescent wilderness therapy, family functioning, and the maintenance of change. *Child & Youth Care Forum*, 36, 111–129.
- Hattie, J., Marsh, H. W., Neill, J. T., & Richards, G. E. (1997). Adventure education and outward bound: Out-of-class experiences that make a lasting difference. *Review of Educational Research*, 67(1), 43–87.
- Hill, N. R. (2007). Wilderness therapy as a treatment modality for at-risk youth: A primer for mental health counselors. *Journal of Mental Health Counseling*, 29(4), 338–349.
- Jacobs, J. E., & Klaczynski, P. A. (2002). The development of judgment and decision making during childhood and adolescence. *Current Directions in Psychological Science*, 11(4), 145–149.

- Koocher, G. P. (2003). Ethical issues in psychotherapy with adolescents. *Journal of Clinical Psychology*, 59(11), 1247–1256.
- Lee, C. T., & Beckert, T. E. (2012). Taiwanese adolescent cognitive autonomy and identity development: The relationship of situational and agential factors. *International Journal of Psychology*, 47(1), 39–50.
- Lee, C. T., Beckert, T. E., & Goodrich, T. R. (2010). The relationship between individualistic, collectivistic, and transitional cultural value orientations and adolescents' autonomy and identity status. *Journal of Youth and Adolescence*, 39(8), 882–893.
- Lev-Wiesel, R. (1998). Coping with the stress associated with forced relocation in the Golan heights, Israel. *The Journal of Applied Behavioral Science*, 34(2), 143–160.
- Lev-Wiesel, R., & Al-Krenawi, A. (1999). Attitude towards marriage and marital quality: A comparison among Israeli Arabs differentiated by religion. *Family Relations*, 48(1), 51–56.
- Miller, D. C., & Byrnes, J. P. (2001). Adolescents' decision making in social situations: A self-regulation perspective. *Journal of Applied Developmental Psychology*, 22(3), 237–256.
- Newes, S., & Bandoroff, S. (2004). What is adventure therapy. In S. Bandoroff & S. Newes (Eds.), *Coming of age: The evolving field of adventure therapy* (pp. 1–30). US: Association for Experimental Education.
- Peetsma, T., Hascher, T., van der Veen, I., & Roede, E. (2005). Relations between adolescents' self-evaluations, time perspectives, motivation for school and their achievement in different countries and at different ages. *European Journal of Psychology of Education*, 20(3), 209–225.
- Reed, V. A., & Spicer, L. (2003). The relative importance of selected communication skills for adolescents' interactions with their teachers: High school teachers' opinions. *Language, Speech and Hearing Services in Schools*, 34(4), 343–357.
- Reyna, V. F. (2004). How people make decisions that involve risk: A dual-processes approach. *Current Directions in Psychological Science*, 13(2), 60–66.
- Russell, K. C. (2001). What is wilderness therapy? *Journal of Experiential Education*, 24(2), 70–79.
- Russell, K. C. (2006a). Brat camp, boot camp, or? Exploring wilderness therapy program theory. *Journal of Adventure Education & Outdoor Learning*, 6(1), 51–67.
- Russell, K. C. (2006b). Examining substance use frequency and depressive symptom outcome in a sample of outdoor behavioral healthcare participants. Technical Report 1, Outdoor Behavioral Healthcare Research Cooperative: University of Minnesota, Minneapolis, MN.
- Russell, K. C., & Farnum, J. (2004). A concurrent model of the wilderness therapy process. *Journal of Adventure Education & Outdoor Learning*, 4(1), 39–55.
- Santrock, J. W. (1995). *Life-span development*. Madison, Wisconsin: Brown Benchmark.
- Van Zundert, R. M., Ferguson, S. G., Shiffman, S., & Engels, R. C. (2010). Dynamic effects of self-efficacy on smoking lapses and relapse among adolescents. *Health Psychology*, 29(3), 246–254.
- Wells, S. M., Widmer, M. A., & McCoy, K. J. (2004). Grubs and grasshoppers: Challenge-based recreation and the collective efficacy of families with at-risk youth. *Family Relations*, 53(3), 326–333.
- Wheeler, S. B. (2010). Effects of self-esteem and academic performance on adolescent decision-making: An examination of early sexual intercourse and illegal substance use. *Journal of Adolescent Health*, 47(6), 582–590.
- Wilson, S. J., & Lipsey, M. W. (2000). Wilderness challenge programs for delinquent youth: A meta-analysis of outcome evaluations. *Evaluation and Program Planning*, 23(1), 1–12.
- Yalom, I. D. (2006). *The theory and practice of group psychotherapy* (6th ed.). New York: Basic Books.