Multiple Methods for Identifying Outcomes of a High Challenge Adventure Activity

Curt Davidson¹, Alan Ewert¹, and Yun Chang¹

Abstract
The purpose of this study was to provide insight into what occurs in moments of high challenge within participants during an outdoor adventure education (OAE) program. Given the inherent risk and remote locations often associated with OAE programs, it has remained challenging to measure selected psychological constructs while the program is taking place. This study utilized qualitative methods including in situ data collection techniques and quantitative inquiry methods to identify and determine what is happening to participants before, during, and after a high challenge activity—rappelling. The results of this study identified five salient themes that emerged as important constructs for OAE participants and are useful to consider as researchers and OAE practitioners design and implement high challenge activities. Further analysis and discussion about the importance of these themes are discussed at length.

Keywords
adventure education, in situ research, high challenge activity, qualitative research

Introduction
Given the inherent risk often associated with outdoor adventure education (OAE) experiences, it has remained challenging to measure selected psychological constructs in the moment of participation in an adventure activity. To date, data collection has typically consisted of a pre–post format, that is, usually immediately before and after the activity. This research study sought to identify the perceived gains in levels of

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resilience, empowerment, restoration, achievement, and social support (RERAS) in students engaged in a high challenge activity—rappelling.

OAE is believed to enrich individuals in a myriad of ways (Bowen & Neill, 2013). Many scholars have suggested a multitude of psychological health benefits from participation in OAE programs (Ewert & Yoshino, 2011; Hans, 2000; Sibthorp & Jostad, 2014). Furthermore, Ewert, Overholt, Voight, and Wang (2011) suggested that OAE programs contribute to the enhancement of students’ levels of perceived RERAS and can be facilitated by close interaction with natural environment and participation through “intentionally designed experiences” (IDEs). The use of IDEs has been a common practice of administrators who design programs with specific benefits for their students (Sheard & Golby, 2006). Applying IDEs in the natural environment is thought to benefit OAE programs. Furthermore, Ewert, Mitten, and Overholt (2014) proposed that the benefits of nature could be purposefully planned and implemented in designed experiences, and hence, enhance certain gains of desired outcomes in participants like those comprising the RERAS model.

This study utilized an in situ data collection method to capture real-time responses as well as changes in selected variables during a high challenge activity experience, rappelling off a 100-foot cliff. A pre–post questionnaire survey was also administered immediately before and after rappelling in an attempt to measure changes in five constructs related to participants’ psychological health outcome variables, namely, achievement, resilience, empowerment, restoration, and social support (RERAS). Within this context, Ewert and Voight (2012) argued that these outcome variables are ordered in that, from an interaction with natural settings and IDEs, a sense of achievement is developed, which can be considered a first-order variable. On experiencing a sense of achievement and once again, through IDEs, second-order outcome variables that emerge are resilience, empowerment, restoration, and social support. It is from these second-order variables that a host of other outcome variables typically associated with OAE programs can then emerge such as trust, communication, problem-solving, self-awareness, confidence, and so on (see Figure 1).

As little is known about the medium in which personal growth and psychological health variables, such as RERAS, are achieved while OAE students are actually participating in the adventure experience (Bowen & Neill, 2013), this study was designed to enhance our understanding among the dynamic process participants experience during high challenge activities. Through the use of multiple methods, this study sought to identify outcomes and the medium which conducts those outcomes in a typical high challenge activity which commonly occurs on an OAE experience. This study will contribute to the field’s understanding of the processes and methods in which OAE outcomes are achieve historically referred to as the “black box” (Allison, 2014; Ewert, 1989).

Review of the Literature

The following is a brief description of the individual components that formulate the RERAS instrument which were developed to serve as the constructs investigated.
Sense of Achievement

Sense of achievement is a key component in increasing a student’s self-efficacy both during the OAE experience and afterward (Hattie, Marsh, Neill, & Richards, 1997). This sense of achievement is most likely obtained by engaging the students in a variety of physically and/or emotionally demanding activities, and through perseverance and self-motivation. However, research has yet to determine the mediator in which this outcome is realized by the students in OAE programming. Unlike traditional sports, the OAE setting often involves non-physical activities in which the group relies on students for a particular skill that they possess. For example, a student who is not otherwise skilled at navigation may bring a valuable set of camp craft skills like cooking to the group. In this way, OAE can contribute to students sense of accomplishment by providing activities in which all participants can succeed regardless of physical ability.

Resilience

Resilience is an outcome thought to be enhanced by OAE experiences (Ewert & Yoshino, 2011). Resilience is defined as an individual’s capacity to mitigate factors

Figure 1. RERAS model for identifying outcomes of participation in Intentionally Designed Adventure Programs.
Source. Adapted from Ewert and Voight’s (2012) “Intentionally Designed Experiences and Human Health Outcome Model.”
that threaten his or her psychological health and well-being (H. B. Kaplan, 2002). OAE experiences can be effective in strengthening resilience because participants are faced with progressively more challenging tasks and are encouraged to master these tasks within the adventure setting. Furthermore, resilience becomes an important attribute for people when dealing with adversity and trying situations such as loss of a loved one, military service, changing work situations, or health problems later in their lives (Jackson, Firtko, & Edenborough, 2007).

**Empowerment**

OAE programs can instill students with a sense of empowerment (Walsh & Golins, 1976). An enhanced sense of empowerment for students, provided through the challenging activities of an OAE program, may help students improve their personal skills, experience success, and ultimately enhance their willingness to make positive contributions to society (Shellman & Ewert, 2010; Surrey, 1991). Diener & Biswas-Diener (2005) posited that empowerment cannot be enhanced without external factors acting on an individual. Furthermore, these external forces must increase sense of competence, excite, and embolden a participant to increase his or her perceived level of empowerment. Thus, rappelling is anticipated to be a logical moderator for enhancing this construct of the RERAS model (see Figure 1).

**Restoration**

Restoration, in this research, is borrowed from the larger framework of Attention Restoration Theory (S. Kaplan, 1995). This theory suggests that by exposure to a natural setting, such as that presented in an OAE, an individual’s attention span and cognitive functioning can be enhanced (Berman, Jonides, & Kaplan, 2008). These benefits are important when teaching students the value of living healthy lifestyles. A variety of other benefits involving restoration have also been found such as increased ability to focus and decreases in mental fatigue (Berman et al., 2008; S. Kaplan, 2001). Restoration in OAE programs is often achieved through a reconnection with the natural environment (Neill, 1997). In addition, it gives participants a unique way to contact an unusual place in nature that is otherwise unattainable within a more urbanized setting.

**Social Support**

Literature suggests that individuals who have a strong social support system are more likely to maintain a positive view of themselves and others, inculcate positive help-seeking habits, and provide higher levels of emotional support for others (Florian & Mikulincer, 1995). This positive social support can allow students to develop a stronger “sense of self.” Subsequently, this can aid in confirming new positive attributes that participants learned about themselves during their OAE experience. OAE participants have also been shown to build inter-relational social support such as that between
a father and son dyad (Davidson & Ewert, 2012). In addition, this can lead to changes in personal growth and development having long-term beneficial impacts to students.

**Method**

This study utilizes a multiple-method approach by employing survey data and semi-structured interviews to provide an in-depth understanding of what transpires psychologically within a subject during a high challenge adventure activity. The in situ portion of this study involved two data collection methods and five collection times. Findings for each method were then used to inform the collective results and to provide a bi-angled view of what is happening psychologically with the students and cognitively throughout the subject’s engagement in the rappelling experience. According to Stewart and Hull (1996), one of the advantages of in situ methods is that they “improve one’s ability to provide insight, and perhaps disentangle, the complex interactions of time, setting, and person” (p. 5).

Both instruments were constructed using current literature from the fields of OAE, environmental health, and psychology and focused on expected psychological variables thought to be effected by a high challenge activity with an emphasis on the RERAS constructs (Ewert & Voight, 2012). First, a 20-item questionnaire containing the RERAS constructs was developed where each construct is represented by five items (questions). To capture the immediate response of participants’ experiences in an outdoor environment, this questionnaire was built into a portable electronic device, iPad mini, with waterproof protective case. Participants were instructed to take the pre-test while sitting in the “corral” waiting for their turn to rappel. After rappelling off the cliff and unhooking from the belay system, participants were asked to take the survey again as a post-test measurement. This portable device enables this study to collect data regardless of the weather conditions and instantaneously backup and upload the data using Apple’s Isurvey software.

Second, an in situ interview component was used to record students in the moment of the “high stress” activity; in this case, when they are engaged in the rappel. This video solicitation was accompanied by the use of a structured interview guide in which the subjects were queried three separate times using the same format to identify changes over time throughout the experience (see the appendix). The three collection points consisted of the edge of the cliff, halfway down, and once after completing the rappelling activity. Different researchers were stationed at each point and conducted the interview in this manner to check for changes overtime and throughout the experience.

While being videotaped, the subjects were questioned regarding the RERAS variables and their psychological and emotional state relative to the RERAS instrument. Qualitative data were coded and analyzed thematically using NVivo 10 software for themes that represent what the students were experiencing and how they perceived changes to the variables of interest before, during, and immediately after the activity (Silverman, 2006).
Researchers were stationed on top of the cliff, halfway down the rappel (50 feet above the ground), and at the bottom of the cliff. This allowed for three separate qualitative data collection times. Each moment was designed to capture student’s responses relative to themes or variables that they were experiencing at different phases of the activity. The edge was thought to provide a moment of high stress immediately as the student weighted the rope which was anecdotally thought to be the moment of the most stress. Halfway down the cliff, researchers waited on seats suspended from the top via independent rope systems to meet and re-interview the students. This moment was thought to query the students as they became comfortable and began to experience a sense of competency within the rappelling activity. Finally, the researchers on the ground interviewed the subjects a third time, after the activity, when it was anticipated that subjects would have a sense of accomplishment having completed the activity.

Findings and Discussion

The sample consisted of 18 subjects all of whom self-selected into a semester-long outdoor leadership program at a major Midwestern University. Subjects were primarily upperclassmen (juniors and seniors) and were evenly split in gender (nine males and nine females). Furthermore, this activity took place halfway through the student’s semester-long experience. Thus, these students began this activity with a knowledge of each other, the instructors, and the safety elements put in place by the program managers. This prior knowledge could result in confounding variables and have potentially led to different results than one would find in a group without these antecedents.

As will be discussed at length, the qualitative data and the quantitative data did not biangle as the researchers had hypothesized. More importantly, the findings of the quantitative analysis did not align with the predicted RERAS theory on which the quantitative instrument was developed. This led the researchers to look more independently at each methodology utilized and consider those findings somewhat independent of each other. This section will discuss each analysis type separately because of the incongruent results between methodologies.

Quantitative Results

A paired-samples t test was used to determine if the rappelling experience had an impact on the five constructs of RERAS. As shown in Table 1, there were no significant differences between the pre-test and post-test among the five constructs of RERAS ($p < .05$). These results suggested that the rappelling experience had no statistically significant impact on participants’ levels of RERAS, when measured immediately before and after the rappelling experience. On examining the pre and post means, increases in resilience and empowerment were observed and slight decreases were observed in restoration, achievement, and social support. Underlying reasons for decreases in these variables will be addressed in the discussion section.
Qualitative Results

Initially the data were coded, evaluated, and analyzed for themes relative to the RERAS constructs. However, on further investigation, the RERAS constructs were largely absent from the qualitative interview data. The framework of analytic induction was then adopted to provide a systematic typology for further analysis of the data (Katz, 2001). This switch to analytic induction allowed the research team to investigate the data without the use of pre-existing assumptions and examine the data for emergent themes. This led to the emergence of five primary themes: trust, control, excitement, novelty, and nervousness. These themes became evident through initial basic inquiry typologies such as word frequency queries (see Figure 2).

These themes were extracted using word frequency queries and coding for emergent themes utilizing the analytic induction typology (Berg, 2004). This technique is the systematic identification of broad categories and sub-categories across time and subjects. The five themes listed occurred most frequently between subjects and provided rich supplemental data for the quantitative findings (Table 2). Multiple researchers took part in the coding and analysis process to ensure internal reliability. Furthermore, informal member checking sessions took place to address validity concerns (Creswell & Miller, 2000). The quantitative findings in this study were limited in scope due to a small sample size. Although the data from the quantitative RERAS instrument resulted in statistically insignificant findings, they suggest that during high challenge activities, participants may experience increases in resilience and empowerment and corresponding decreases in restoration, achievement, and social support as they doubt their abilities and/or are confronted with the fears associated with high challenge activities. According to Dillon and his colleagues’ work among the evidence

### Table 1. Results From Paired-Sample t Test (p< .05).

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of outdoor learning, they pointed out that fear and concern about health and safety could be one of the notable barriers that affect learning which takes place in outdoors (Dillon et al., 2006). In addition, students’ prior knowledge and experience may also lead to insignificant results in learning outcomes.

Ewert and Sibthorp (2009) proposed that prior knowledge and experience can have positive as well as negative influences on participants’ learning outcomes. They referred this type of influences as “precursor confounding variable” that participant “brings into” the experience (Ewert & Sibthorp, 2009, p. 378). One way to control participants’ prior knowledge and experience in a study such as this may be to include only subjects who have not engaged in the activity beforehand. Practitioners could utilize this information and consider altering activities in which a student has engaged previously in that activity. For example, using rappelling as an example, a student with considerable past experience could be lowered via a rope system to make the experience for him or her novel.

The absence of the RERAS variables from the qualitative data was a striking finding for the research team. This fact may be because the constructs of interest are
affected by the larger OAE experience and not necessarily by a single high challenge activity. On reflection, the fact that variables like social support actually decrease, fit into the framework because rappelling is an independent activity. These variables should still be considered important by the programmers and practitioners, but they should further consider what types of activities lead to what types of outcomes. For example, an individualistic activity like rappelling probably does not lead to group cohesion due to the structure of that activity. With this in mind, programmers can design experiences with specific activities built in to achieve predetermined outcomes.

Utilizing the RERAS theory may have limited the scope of the study. For example, utilizing the lens of the RERAS model caused the researchers to look for specific outcomes when in fact, the findings suggest alternative outcomes may be more significant to the participant experience. This limitation to the study should be addressed in future study designs and a more exploratory stance may benefit in providing a less biased approach.

As stated, the researchers shifted to a more emic qualitative analysis approach, where coding for analytic procedures is generated from the data itself and not based on preconceived themes derived anecdotally or from the literature (Guba & Lincoln, 1994). This allowed for a more rich description and better understanding of what participants were experiencing during the high challenge activity. These themes were extracted because of the frequency of which they emerged both within and across subjects. As shown from the thematic analysis, excitement was the most common emotion experienced as students’ energy levels were high in anticipation of going over the cliff. Similarly, subjects reported being anxious but eager to try a new activity.

I think any new experience is gonna strengthen me as a person. This was a good experience. (Interview transcription, Participant G, lines 67-68)

This emotion is thought to provide a learning platform for students as they engage in high challenge activities. Feeling excitement to participate in activities can create investment and motivation which has been shown to be an important component in student learning (Ames & Archer, 1988; Entwistle, 1988).

Also, control over the experience was an important theme that emerged from the qualitative data. Control was interpreted by the research team as the individual’s ability to control the outcome of the activity (i.e., their relative safety). This is an important component in OAE programs which often seek to provide increases in self-efficacy in students.

I am in control, like I know that but it’s a little nerve-wracking because I’ve never done this before, or like lowered myself over the side of a cliff. (Interview transcription, Participant I, lines 14-16)

Mastery of an experience is thought to be one of the four main contributors in increasing student’s efficacy (Bandura, 1977). Activities such as rappelling may have
a distinct advantage over other OAE activities such as hiking where students likely do not experience as strong “sense of control”. Providing these types of activities may enhance outcomes dependent on student’s perception of skill mastery or autonomy.

Trust in self and others emerged as important themes. These themes indicate that the students are conscious of their safety being somewhat reliant on themselves and their abilities in addition to external factors. Trust in others is an important component to developing social support (Alesina & La Ferrara, 2002; Lynch, Jonson, & Dibben, 2007). This is an important consideration in both developing rapport between staff and student and developing social support within the OAE group.

I always knew I was going to do it but there was still in the back of my mind, I’d get to the wall and say no, um, so I think I took that out of it, just ah trust the people around you . . . (Interview transcription, Participant B, lines 121-123)

Nervousness and anxiety were other emotions strongly expressed throughout the activity. These variables have continually found to be important components in OAE programming (Davis-Berman & Berman, 2002; Drebing, 1987). Experiencing an elevated sense of nervousness or fear is congruent with anecdotal knowledge of watching people rappel for the first time. This heightened state of anxiety may provide valuable learning opportunities for students engaged in the challenging experience such as overcoming their fear of heights. Successful completion in the activity despite having high levels of nervousness may lead to increases in confidence among OAE participants.

It’s a little scary and once I get to the bottom, I can say that I’ve done it and just have that kind of experience pushing through and any kind of fear or anything that happened, on my way down. Not that anything is going to happen.(Interview transcription, Participant I, lines 26-28)

Finally, learning emerged to be an important component for subjects. Participants frequently expressed enthusiasm in learning new skills or gaining new insights about themselves for the activity. This component is thought to engage the students in the high challenge activity thus creating engagement and investment in their student experience. This could lead to a more beneficial overall OAE experience with significant learning and take-aways that transfer back to the student’s lives. Moments of high challenge are thought to be cornerstones of the OAE experience in which moments of learning provide great leaps forward for students engaged in the activity.

Learning about rappelling and rock climbing . . . um . . . learning how I deal with being in this situation and heights and harnesses. (Interview transcription, Participant B, lines 75-76)

These data provide insights into some of the emotions/thoughts that are going through a student’s mind as he or she engages in a high challenge activity. These
findings can be useful for programmers or facilitators hoping to facilitate a positive, life changing experience for their students or clients through exposure to high perceived risk activities. Through these findings, the picture of what students are thinking about as they experience a high challenge activity becomes clearer. This is useful for starting to think about the process in which students make meaning from these high challenge activities.

There are implications from this study for both researchers and practitioners. From a research standpoint, this study shows there are creative and effective ways to implement technology in the data collection process. The GoPro helmet mounted cameras were easy to use and capture both audio and video using one device. Furthermore, it was shown that the use of these technologies can make previously unreachable areas or processes available for study. This technology was shown to be a reliable and convenient way to collect and analyze data, albeit somewhat costly. Further analysis investigating the strength of relationships between themes and across time is needed to understand how subjects perceive and interpret benefits as they move past the highest stress portion of the activity (going over the edge). The results across times of subjects (at the various interview times) were not found to be significantly different and thus that analysis was excluded from this study. It is hypothesized that the participants became complacent with the repetition of the questioning or did not have enough time to make meaning of their experience and answer the questions in a different way.

Much consideration was given to the impact this study would have on the student’s experience. This technique had yet to be utilized in the OAE literature and little was known about the impact it may have on the students’ feeling of autonomy and empowerment during the process. Therefore, data were collected when the students completed the experience and were asked to evaluate the impact the process had on their activity. A few students indicated that the process was slightly invasive and expressed not enjoying stopping and answering the questions. This was mostly due to discomfort felt with their harness required for the activity. However, other students indicated that they enjoyed this process and it helped them assess their learnings while they were engaged in the activity. No significant impact from any of the participants was expressed.

I think it was kind of distracting because it makes it less for me and more for this research. And I can see how these questions could be useful, but if they were really intended to help me process this experience and be like alright . . . you know really, fully take in the experience. And these questions were kinda in that area but I think they were more distracting then that. (Interview transcription, Participant B, lines 131-135)

Insight into what students may be thinking about while engaging in a challenging activity with high levels of perceived risk may have wide reaching implications. This study suggests that these experiences, to be impactful for students, should contain an element of novelty to increase their effectiveness. Likewise, practitioners should take note of the emergent variables to use as a platform for facilitating and enhancing student learning about those particular themes.
Recommendations for Future Studies

Replication of this study is needed due to the relatively small sample size. Also, the dissimilarity between the expected versus emergent themes warrants further investigation to confirm the emergent variables. Increase in sample size is another recommendation to verify that these themes are salient and relevant. In addition, this study should be repeated with participants with varying levels of experience to determine the role “level of experience” plays as a mediator to other psychological variables that emerged. Future researchers should also consider duplicating the study with different populations to determine if these emergent themes are experienced across different ages, genders, races, and so on. In addition, only utilizing one “high-impact activity” may also limit the scope of the findings. Future studies should consider examining rock climbing, whitewater paddling, or high ropes course activities with the same or similar in situ methods.

GoPro helmet mounted camera opens up a range of possibilities for researchers to collect rich data. The cameras, whether underwater, underground, or in any type of weather continue to function well and provide a great alternative to observation and audio recording of data. Researchers should consider utilizing this technology to access subjects where recreation and leisure activities take place. The richness of the data provides opportunities for audio analysis as well as video analysis of all types of recreation activities.

Furthermore, the mixed finding in RERAS model reveals that for high challenge adventure activity to be effective, factors such as student’s fears, and participant’s prior knowledge and experience should all be taken into account when planning and developing adventure programs. These components may be necessary antecedents for students to have an impactful course where personal growth and development are achieved.

Appendix

Semi-Structured Interview Questions

1. Have you felt supported by your group members?
   If yes, tell me specifically how.
2. Tell me about your excitement/energized levels.
3. How much do you feel in control?
4. What physiological changes are you experiencing?
5. What emotions are you experiencing?
6. Do you think this is strengthening you as an individual? Why or Why not?
7. Is doing this rappel an important achievement for you? Why?
8. Was this a risk worth taking?
   If yes, tell me what you’ve gained from it.
9. What are you learning from this experience?
10. On a scale from one to 10, with 10 being riskiest, how risky do you think this actually is?
11. Other Thoughts?
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Curt Davidson, MS is a doctoral student at Indiana University studying the intersections of cognitive health, outdoor adventure, and social support. He has taught several courses at Indiana University relative to these topics, including the graduate level Behavior Management and Adventure Education Facilitation courses. In addition, he has held positions as an outdoor instructor with over 12 programs over 10 years including Outward Bound and Summit Adventure. His expertise in facilitation has led him to conduct multiple workshops and consultation and training seminars for a variety of programs.

Alan Ewert, PhD, is a distinguished and titled Professor at Indiana University. He is the holder of the Patricia and Joel Meier Endowed Chair in Outdoor Leadership, and serves as the Chair for the Department of Environmental Health in Indiana University’s School of Public Health. Dr. Ewert has authored over 200 articles and research presentations including articles in the *Journal of Leisure Research*, *Leisure Sciences*, *Environment and Behavior*, *Journal of Park and Recreation Administration*, the *Journal of Adventure Education and Outdoor Learning*, the *Journal of Experiential Education*, and the *International Journal of Health, Wellness, and Society*.

Yun Chang, is currently a visiting lecturer, in the School of Public Health, Indiana University Bloomington. She received her MBA with a concentration in Recreation and Leisure Industry Management from National Taiwan Sport University, Taiwan, in 2008. Her passion in outdoor adventure education has led her to study abroad for the pursuit of a doctoral degree. She is now a PhD candidate in Indiana University majored in Leisure Behavior. She has assisted several pioneering studies and workshops in the use and application of biomarkers in outdoor adventure education research.