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presented at the

43nd Annual International AEE Conference

Portland, Oregon, USA
October 22- 25, 2015

Welcome to SEER

Welcome to the 15th Annual Symposium on Experiential Education Research (SEER). The purpose of this symposium is to provide a formal setting for the reporting of research in the broad areas of experiential education. Toward that end, all the research presentations submitted to SEER were blind reviewed by a panel of referees, and the scores tabulated by the SEER co-chairs before final decisions were made and themed sessions assembled. Whether accepted or not, the authors who submitted material should be congratulated for their efforts.

As in past years, we are pleased to host both oral presentations and a SEER poster session as venues to hear about the many quality proposals accepted this year. SEER oral presentations are presented during two large blocks of time (Thursday and Friday afternoons at the AEE Conference) made up sessions that include several papers. We also continue to include a key points and summary of potential research topics discussions to each of the SEER sessions. We are delighted to open the 15th SEER with a short message from the Recipient of the Distinguished Researcher in Experiential Education.

Along with the researchers who submitted their work for review, we also wish to recognize other people for their efforts in making the symposium a reality. First, we would like to thank the AEE and staff members, including Cailtin Leahy and the 2015 Conference host team for their support and coordination of SEER, as well as the JEE editorial team and the AEE Council on Research and Evaluation (CORE) for ongoing support of SEER. We owe a great deal of gratitude to Lisa Brennan and Ryan Gagnon for editorial work with the abstracts. The scholars who graciously served as reviewers of the submitted abstracts are Drew Baily, Andrew Bobilya, Noël Cox Caniglia, Chiara D'Amore, Curt Davidson, Briget Eastep, Garrett Hutson, Pat Maher, Jillisa Overholt, Alison Rheingold, Keith Russell, Stacy Taniguchi, Anita Tucker, and Tiffany Wynn.

We would like to especially thank all of you attendees of this year's Symposium. It is your interest that ultimately drives the research and practice relationship in the AEE. We prepare and host SEER because of the continued need for us to understand how and why experiential educational practices work to make a positive difference in people's lives.

Thanks to all of you for being a part of this year's SEER.

Denise Mitten, Chair

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  - Jim Sibthorp, Jonathan E. Butner, Shannon Rochelle, & John Gookin, co-authors

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  - Cass Morgan, John Gookin, Tim Ruder, & Amber Christensen, co-authors

4:50P-5:00P = Key Points and Research/Practice Implications, Philip Mullins

A Brief History of the Symposium on Experiential Education Research (SEER)

Keith Russell (SEER Co-Chair 2006-2008)
Stacy Taniguchi (SEER Co-Chair 2011-2014)
Denise Mitten (SEER Co-Chair 2012-Present)

The Symposium on Experiential Education Research (SEER) is a research symposium providing an outlet and venue for researchers in the fields that use experiential education to present, share, dialogue, and further develop their research ideas.

The first SEER took place at the Association for Experiential Education's (AEE) 2001 International Conference in Charleston, West Virginia. Fittingly, it was Dr. Alan Ewert of Indiana University who conceived of and led the effort to establish that first SEER. A widely published researcher and author in the field of adventure-based education, Dr. Ewert is also known for his distinguished career in academia, three decades as an Outward Bound instructor, as holder of the Patricia and Joel Meier Outdoor Leadership Chair, past editor of the *Journal of Experiential Education* (JEE), and as fellow and past president of the prestigious Academy of Leisure Sciences. In providing the leadership to launch SEER, Dr. Ewert gave back to the field he has helped develop throughout his academic and professional career.

The symposium occurs concurrently with the International AEE Conference each year and involves the presentation of research papers from leading international scholars who use and research experiential education practices. The process by which papers are selected for SEER begins in the spring, when a call for papers is released in the *JEE*, on listservs, and other outlets, asking researchers, graduate students, and practitioners to submit their abstracts to a blind, peer-reviewed process facilitated by the co-chairs of SEER. After receipt of the abstracts, the affiliations are stripped from each paper and they are sent out for blind review to a panel of researchers in the field. Abstracts are reviewed for relevance to experiential education theory and practice, research methodology, and logic and clarity in writing. The papers are ranked, and the top abstracts are selected for oral or poster presentation at the Annual International AEE Conference. In addition to the presentations, the abstracts are published as a proceedings booklet, which is distributed at the conference (since 2013 via electronic media). For about 10 years, the spring edition of the *Journal of Experiential Education* published these abstracts as a way to make them available to a wider readership. Currently, AEE publishes the abstracts online. Reading these abstracts is a great way to glimpse current research interests and innovative research methodologies used for experiential education research.

In Little Rock, Arkansas (2007), the SEER program was modified to 90-minute, theme-based sessions. In this way, papers were grouped by topic in order to better promote SEER to practitioners and other conference attendees so they could attend sessions of interest.

Each presenter is allotted 20 minutes to present her/his research, which typically includes an introduction, a description of the methods employed, and the results and conclusions developed from the research. In addition to the papers presented, discussant remarks have been offered each year by leading scholars, practitioners, and leaders in experiential education theory and practice. This has provided a unique opportunity for substantive dialogue around current research.

Beginning in 2008, SEER partnered with the Council on Research and Evaluation (CORE) to explore ways to support the needs of AEE members and expand research about experiential education. As the use of experiential education philosophy and methodologies continue to grow and evolve in social, political, and economic contexts, research will play a vital role in helping maintain and further the mission of experiential education in helping children, youth, families, and communities. To this end, research in educational, therapeutic, recreational, and other experiential learning settings are all welcome in SEER.

In 2011, SEER Co-chairs Jayson Seaman and Alan Ewert initiated a research poster session for those important research studies that needed to be disseminated, but could not fit into the oral presentation schedule of SEER.

At the 12th Annual SEER held in Madison, WI, Co-chairs Alan Ewert and Stacy Taniguchi replaced the summary discussant at the end of each session with an open discussion concerning the relative nature of the studies presented and questions for further research. Graduate students were invited to lead these discussions.

In 2012, SEER welcomed Dr. Denise Mitten as a Co-chair with Dr. Taniguchi. Dr. Mitten's long dedicated service to AEE and experiential education research was a valuable asset to increasing the visibility of the SEER call for proposals.

At the 13th and 14th SEER, Co-chairs Dr. Mitten and Dr. Taniguchi continued with the SEER format of the previous year and re-introduced the SEER poster session. They also decided to go totally digital for the *Proceedings of the Symposium of Experiential Education Research*, making these available online through AEE's website. Utilizing a QR code, all attendees could access the Book.

At the 15th Annual SEER, Dr. Mitten worked with Dr. Taniguchi to create a method to review proposals that addressed conceptual topics, in order to complement those about empirical research.

Beginning in 2011 the AEE award committee named an annual Distinguished Researcher Awardee. The recipient of the Distinguished Researcher Award offers an opening address before the first SEER session. Awardees include 2011 Mike Gass, 2012 Keith Russell, 2013 Alan Ewert, and 2015 Denise Mitten. It is our hope that SEER will be one of the many mechanisms for helping further AEE's mission in the years to come.

In the continuation of furthering our understanding of the positive impact of experiential education, this year's 15th SEER should be engaging and inspiring for researchers and practitioners alike.

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ABSTRACTS IN THE ORDER WITH ORAL PRESENTATIONS FIRST FOLLOWED BY POSTERS PRESENTATIONS

USING DYNAMICAL SYSTEMS THEORY IN OUTDOOR EXPERIENTIAL EDUCATION

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Jonathan E. Butner, Ph.D., University of Utah
Shannon Rochelle, MS, The National Outdoor Leadership School
John Gookin, Ph.D., The National Outdoor Leadership School

Introduction

Outdoor experiential education (OEE) programs are often comprised of multiple components that work synergistically to produce participant outcomes. Studying OEE programs is often very challenging because of the many confounding variables that may influence the results of a single variable (Ewert & Sibthorp, 2009). Many have recognized that OEE programs are comprised of multiple components that interact with one another, such as the physical environment, activities being taught, leadership qualities, and small group structure, which all lead to the emergence of particular outcomes (McKenzie, 2000; Walsh & Golins, 1976). The numerous components in OEE programs make it difficult to suggest outcomes are a result of single variable effects. Traditional research and statistical methodologies use a reductionist approach and may be unable to capture the complexities of OEE. One theoretical framework that may be useful to handle the complexities of OEE research is dynamical systems theory (DST). The purpose of this paper is to explain the theoretical foundations of DST and show one way DST can be statistically modeled.

Dynamical Systems Theory

Dynamical systems theory is a developmental theoretical framework that recognizes the complex interactions between multi-component systems and seeks to explain the temporal patterning of such systems (Vallacher, Read, & Nowak, 2002). The focus of DST is not to explain cause-effect relationships; rather it uses mathematical equations to describe the qualitative changes of a system (Thelen & Smith, 2006). One of the foundational premises of DST is the notion of self-organization, which is the process by which global patterns (system level properties), also known as order parameters, emerge from the interactions of the parts of the system (DiDonato, England, Martin, & Amazeen, 2013).

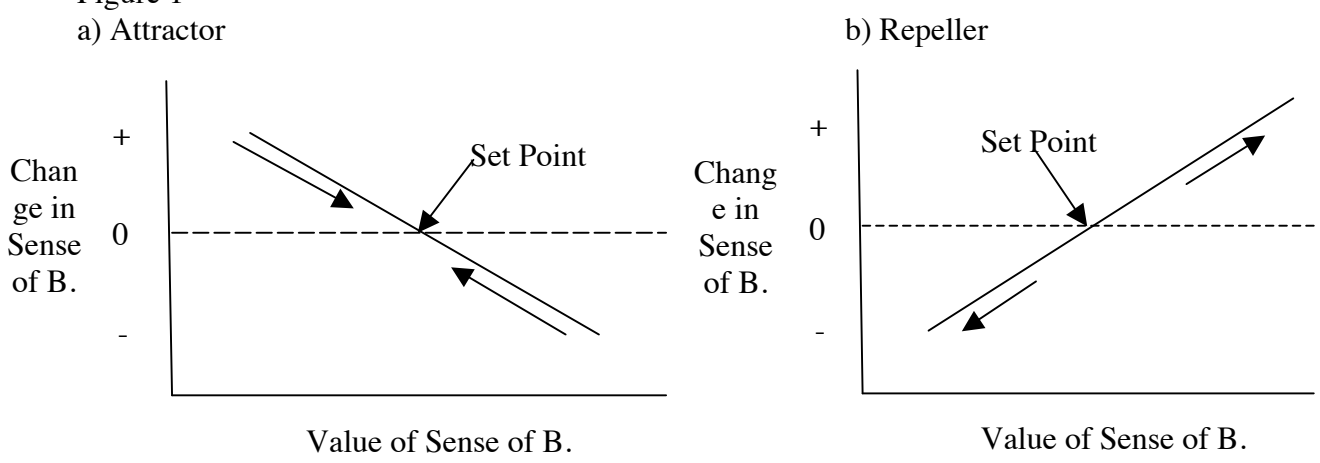
Another key assumption is that systems generate stable patterns. System theorists recognize that all systems are open systems, meaning that "energy" is constantly coming into and out of the system at a given time. This notion recognizes that systems are constantly changing and may vary from one moment to the next, but particular types of stability occur in order for the system to be most efficient. Two particular terms are used to represent the stability of the order parameter. Attractors represent where the order parameter tends to gravitate toward, whereas repellers represent where the order parameter tends to not gravitate toward. Attractors represent these stable states where there is not any change, also termed set points, and are used to describe the behavior of the system. Control parameters can be likened to independent variables, however, a control parameter is a component within the system that has the ability to alter the position of attractors and repellers and the level of attraction or repulsion (Butner, Gagnon, Guess, Lessard, & Story, 2015). For example, students on OEE trips develop a sense of belonging with others

over time. Dynamical systems theory tracks the temporal trajectory of this development and suggests that there is a level of belonging where students will stabilize. Control parameters, such as goal conflict or instructor support, can alter the trajectory of the order parameter by making it more/less stable and changing the set point value. The following is one method that can be used to measure and model dynamical systems.

Change as Outcome Modeling

There are a number of methodological considerations that need to be taken into account when using DST. First, DST is a developmental theory, meaning that longitudinal data is needed. Second, DST is interested in understanding change and therefore change in some variable becomes what is being predicted (the dependent variable). Third, DST posits that the trajectory of a system can be determined by its initial states (Thelen & Smith, 2006). That is, the current state of the system can predict future trajectories. A graphical representation of an attractor and repeller are shown in Figure 1. Notice that change is the dependent variable and the current value of the variable is being used to predict that change. The slope of the line also indicates attractive (negative sloping lines) or repulsive (positive sloping lines) behavior. Although there are many ways data can be analyzed using DST, the following will provide one example of how DST data can be analyzed using well known regression equations.

Figure 1



Sibthorp and Jostad (2014) developed a model of the social system using a systems theoretical framework. Their model recognized many of the main components in the social system and how they might interact with one another. Using this model as a framework, data were collected for the first nine days from two National Outdoor Leadership School (NOLS) semester courses during the spring of 2015. Of interest was how students on these courses socially connected with one another at the beginning of their courses, which was measured using the Feeling of Social Belonging Scale (Richer & Vallerand, 1998). Representing the goal and instructor components of their model, one question written by the authors was used to measure goal conflict, and the instructor support sub-scale of the Classroom Life Scale (Johnson, Johnson, Buckman, & Richards, 1985) was used to measure instructor support.

Because the interest of DST is on understanding change, it is necessary to create a change variable. While there are a number of ways change variables can be computed, difference scores were used by computing the difference between each time point for each participant. That is, the difference between time one, time two, time three, and so forth were computed to generate the change variable. These differences now represent the change in the order parameter, which in

this study is sense of belonging. Multilevel modeling techniques allow for missing data and help with the dependent nature of the data (Raudenbush & Bryk, 2002).

Statistical Analysis

The first step with this approach is to understand where the attractors and repellers are in the system and the strength of each. So, the current scores of the order parameter can be used to predict the change that was calculated earlier. By setting change to zero (which represents the set point), the equation $-b_0/b_1$ can be used to identify the set point for sense of belonging (-0.11/ -.38 = .29). The place where we see no change is at a value of .29, and the value of the slope shows that this is an attractor and the strength of this attraction (-0.38). This model alone accounts for 15% of the variance in these data. Adding variance components on the intercepts and the slopes, which were both significant ($p < .01$), suggests students vary in their set points and their attraction toward these set points. To better understand why students vary in their set points or attraction, particular control parameters, or components of the system, can be modeled.

Two control parameters are used here to exemplify both level one and level two control parameters. First, goal conflict was modeled as a level one main effect and as an interaction with the current value of sense of belonging. Main effects can only change the position of the set point, while interactions have the potential to change both set points and the level of attraction. The results do not show a significant main effect but show a significant interaction ($\beta = -0.05$; p = .05), which suggests that for every one unit increase in daily goal conflict, the slope of a student's change becomes more attractive by 0.05 units. That is, students who have more goal conflict with one another gravitate toward a more stable sense of belonging than those with lower goal conflict. The set point in this model did not change significantly, meaning that goal conflict only influenced the rate students moved toward the set point and not the position of the set point itself.

Instructor support, a level two predictor, was also modeled as a main effect and an interaction. This model showed a significant main effect ($\beta = 0.20$; $p = .01$) but did not show a significant interaction. This result suggests that for every one unit increase in instructor support, the student increases their level of sense of belonging by 0.20 units. That is, students who felt more support from their instructors had higher levels of belonging.

Discussion

Outdoor experiential education programs are inherently complex systems that have many interacting components and DST is a theoretical and methodological tool that can help understand the developmental nature and processes of these programs. While the majority of studies within OEE do not often recognize the multiple variables that may influence the outcomes of research (Scrutton & Beames, 2015), DST provides a platform that recognizes the interactions of multiple variables that exist within much of the OEE research. The data presented in this example were chosen to illustrate a regression based approach to DST modeling and show how the ideas of attractors, repellers, order parameters, and control parameters can all be measured and modeled. Much of the phenomena that are studied in OEE develop over time, however, rarely do researchers measure these outcomes multiple times throughout the experience. By doing so, researchers can better understand the trajectories of development within a variety of phenomena in OEE.

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PATHFINDER: MEASURING EXPERIENTIAL LEARNING THROUGH NETWORK MODELING

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There are numerous barriers to measuring cognitive outcomes of experiential learning, including the highly individualized nature of the outcomes, the hard-to-predict variables of *in situ* learning environments, the inherently variable enactment of any given experiential education program, and the highly contextualized nature of the cognitive outcomes. An additional barrier has been the atomization of the learning process by researchers and policy makers to isolate manageable chunks that can be understood and measured. As Nardi (1996) reflects: "How can we confront the blooming, buzzing confusion that is 'context' and still produce generalizable research results?" (p. 39). There is an ever-present tension between complexity and parsimony and while it is usually necessary to subdivide the learning process into manageable units in order to understand it, we must continue to drive the field toward understanding learning within and reflecting that complexity.

To better examine experiential learning we must acknowledge the varied pathways through which knowledge can be developed as an individual interacts with the actors and objects within her environment. There are many tools for open-ended assessment, but they are typically labor intensive and can be difficult to assess against a standard or criterion (e.g., Ruiz-Primo & Shavelson, 1996). Students' knowledge often needs to be measured against standards for the purposes of certification, compliance with state education laws, meeting course outcomes, etc. However, there is bound to be a mismatch when a decontextualized test is used to assess highly contextualized knowledge. Most traditional measures of cognitive learning measure only a small fraction of the potential learning that may have occurred and these tests tend to identify more accurately what students have not learned rather than what they have.

Network Modeling of knowledge structures using the Pathfinder Algorithm (Schvaneveldt, Dearholdt, & Durso, 1988) is a tool to measure cognitive outcomes in a way that can be criterion referenced (Fesel, Segers, Clariana, & Verhoeven, 2015; Großschedl & Harms, 2013), is less limited by a-priori assumptions than are most traditional assessments (Burkolter, Meyer, Kluge, & Sauer, 2010), is open to multiple ways of understanding (Casas-García & Luengo-González, 2013; Sharara, 2011), and is not limited by the context in which the conceptual knowledge was learned (Giamellaro, 2014). As such, structural knowledge modeling with Pathfinder is well suited to measuring experiential learning outcomes. While the tool has been used and validated in other fields (e.g. Burkolter et al., 2010; Casas-García & Luengo-González, 2013; Fesel et al., 2015; Giamellaro, 2014; Sharara, 2011), I present the case that Pathfinder modeling is particularly well suited to evaluating and understanding experiential learning.

Structural Knowledge and the Pathfinder Algorithm

Pathfinder is a network analytical tool that can be used to measure students' concept knowledge structures before and after a learning event by comparing pre and post network graphs to an expert referent (Dearholt & Schvaneveldt, 1990; Großschedl & Harms, 2013). The underlying assumption behind measures of structural knowledge is that knowledge of a domain can be reflected by an understanding of the relationships between concepts important to the domain (Goldsmith & Johnson, 1990; Schvaneveldt, Durso, Goldsmith, Breen, & Cooke, 1985). This work is also founded on the idea that experts and novices organize their knowledge differently (Bradley, Paul, & Seeman, 2006; Schneider, Gruber, Gold, & Opwis, 1993) and therefore a snapshot of that organizational system provides some indicator of where a learner is on the novice-expert spectrum (Gammack, 1990). An assessment of

structural knowledge allows for an assessment of conceptual understanding that is minimally confounded by contextual differences between assessments and experiences (Giamellaro, 2014; Goldsmith & Johnson, 1990).

Pathfinder is a graph theoretic algorithm that considers either similarities or distances between a series of pairs of items in a matrix and arranges them into a *PFnet* graph (Dearholt & Schvaneveldt, 1990). These PFnets arrange all of the nodes of the network in an economical network graph such that (a) every *link* (edge) between two nodes is assigned a weight that reflects how closely associated the two nodes are; (b) the sum of the weights of the edges that must be passed through to move from one node to another is the *path weight* and therefore the lower the path weight, the closer the connection between two nodes; and (c) any edges are removed if the path weight between the two nodes is less when following an alternate route through the graph (Dearholt & Schvaneveldt, 1990). The resultant graph shows a pruned network of the most salient relationships identified by the respondent rather than a complete network of all possible connections. Though visually similar to a concept map, a PFnet is generated by the Pathfinder algorithm based on user similarity judgements rather than by the user himself. Figure 1 shows an example of a PFnet generated when a high school student in a winter ecology course was asked to judge the relatedness of each concept to every other concept shown. The resulting graph shows an approximation of how the student conceptualizes the domain of winter ecology. The student's graph is juxtaposed against an expert referent.

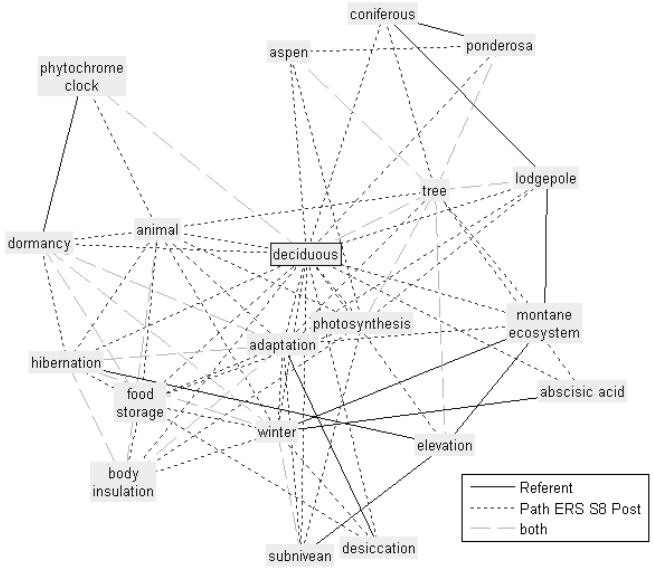

Figure 1. Graph shows a PFnet comparing the most salient conceptual connections between winter ecology topics (nodes) judged by a high school student following an experiential field course. Lines (edges) with long dashes show connections that agree with connections made by an expert referent. Short dashed lines were connections salient to the learner but not the experts. Solid lines show salient connections made by experts but not the learner.

PFnets can be quantitatively compared using *C*, a set theoretic measure used to determine the closeness between two PFnets by comparing the "neighbors" of each of the nodes in the two PFnets and thereby showing the degree of similarity between two PFnets (Acton, Johnson, & Goldsmith, 1994; Großschedl & Harms, 2013). In testing Pathfinder as a predictor for student test performance, Acton et al. (1994) compared students' PFnets representing their conceptual knowledge structure on a given topic to a series of different referent PFnets to determine which one was the best predictor of student test performance. They found that an average of experts' representations was the best predictor. Additional studies across a wide range of fields have confirmed the ability of PFnets to detect learning and degree of expert knowledge following experiences and learning events (Fesel et al., 2015; Giamellaro, 2014; Kim & Clariana, 2015; Resick, Dickson, Mitchelson, Allison, & Clark, 2010; Wildman, Salas, & Scott, 2014).

PFnets can also be used qualitatively to analyze the nature of, or subtleties within students' knowledge structures or as interview elicitation tools (Giamellaro, 2014).

Testing Pathfinder in Experiential Settings

Methods. To test the use of Pathfinder network modeling in the assessment of experiential learning, four case studies were conducted. Each case represented a different high school ecology class immersed for multiple days or weeks in an environment that was the focus of their studies. Two were in montane ecosystems during the winter, one group traveled by canoe through the Everglades, and the fourth did field work at a stopover location for migratory birds. Students were instructed in wilderness skills and science content. For each class a set of 15-20 concepts was pre-selected by the teacher and a researcher as representative of the key knowledge to be learned. Terms included both general and specific concepts (Figure 1). The assessments were administered to students before the learning experience and within three days after. Both pre- and posttests were compared to an expert referent generated from the averaged judgments of two ecologists and the class teacher. Finally, eight students in each class were interviewed using the student's own PFnets as elicitation tools. A researcher also shadowed one group during the learning experience to compare insider and researcher perspectives.

Results. All of the groups showed knowledge structures becoming more quantitatively similar to the experts' organizational structures following the learning experiences (Table 1) though some student did not show significant change. A correlation between the depth or duration of the students' experiences and learning was also found. It is important to note that although the students' PFnets quantitatively became more expert and reflected more sophisticated knowledge structures, they still reflected the unique ways that students came to understand the relationships shown in the PFnets and the way in which they had contextualized their understanding. Student interviews largely confirmed that the Pathfinder algorithm accurately captured student's understanding pre and post. Students were also able to articulate their conceptual change process in cases where the pre and post PFnets indicated that such a change had occurred.

Table 1

Wilcoxon Matched Pairs Test: Change in Students' PFnet Similarity to expert referents

	n	min *csim*	max *csim*	median[1] *csim*	SD	*W*	*Z*	*p*
Pre	55	-.01	.36	.1	.07			
Post	55	.02	.31	.15	.06			
Change		.03	-.05	**.14**	-.01	1012	4.24	***< .001***

[1] Wilcoxon test uses assigned ranks and median rather than mean

[2] For $n < 10$, Wilcoxon test uses exact sampling distribution

Conclusion. Pathfinder has much potential for the assessment of highly contextualized experiential learning. Changes in PFnets capture subtle but important differences in learners' knowledge structures that suggest changes in their path toward expertise. These data can be used to evaluate and adjust curricula, instruction, or programs.

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EXPLORING CULTURAL CONTEXT IN EXPERIENTIAL EDUCATION RESEARCH: EFFECTS OF AN OUTDOOR ORIENTATION PROGRAM ON SOCIAL PROVISION

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Introduction

Due to modern globalization, assessing cultural context is an important challenge in research and experiential education. Response bias influenced by cultural background is an especially important issue to consider in the use of psychological measurements (Chen, 1995). Response bias is the systematic tendency to distort responses to rating scales so that observed scores are unrelated to the true score of the individual by either selecting extreme or modest answers (extreme or modesty response bias) or a shifting of responses to either end of the scale (acquiescence response bias) (Fisher, 2004). Authors have experienced difficulties in understanding certain constructs of the translated psychological measurement in previous studies (Hayashi & Miyamoto, 2013), which could be caused by response bias. Concretely, the results of factor analyses of the translated Japanese version of the Social Provision (SP) Scale (Cutrona and Russell, 1987) indicated two factors; positively worded items and negatively worded items despite the meanings of items. Wu (2008) examined the wording effect among Chinese people and found that there were method effects of positively and negatively worded items in the Rosenberg Self-Esteem Scale for Chinese people. Wording could cause method effect, especially culturally response bias.

Weiss (1974) described SP as social functions or 'provisions', which may be obtained from relationships with others and that help people deal with stress and difficulties. Bell (2006) showed the effects of outdoor orientation programs on SP, which could be interpreted as a universal concept. However, in order to utilize the measurement in Japanese culture, authors felt the necessity to address the response bias. The purpose of this study was the reconstruction of the sub-constructs of the Japanese version of SP by assessing the wording effect of psychological measurements. This is the attempt to explore cultural context in experiential education research.

Methods

The translated Japanese version of the Social Provision Scale (SP) (Cutrona & Russell, 1987) was tested on Japanese college students who participated in an outdoor orientation program in previous research (Hayashi & Miyamoto, 2013). The exploratory factor analyses showed two factors within SP including negatively worded items and positively worded items instead of the original six factors including guidance, reliable alliance, reassurance of worth, attachment, social integration, and opportunity for nurturance. According to Quilty, Oakman, and Risko (2006), positively worded items usually do not involve a strong method effect and negatively worded items usually exhibit a strong and stable method effect associated with other stable personal characteristics. Therefore, negatively worded items were reworded into positively worded items and six factors with 24 items were explored in this study.

Subjects of this study were college freshmen who participated in the four-day freshmen orientation program called Freshmen Camp (FC) in April of 2012. FC was required subject for all first-year students to help them transition into college life through developing interpersonal relationships with other freshmen students and faculty members as well as to enhance personal growth. It was designed based on the theory of experiential education, especially, adventure education, and activities included outdoor living experience, initiative games, outdoor recreational activities, mountain climbing, camp fire, and reflective activities under the

supervision of faculty members and student leaders. FC was offered twice in the exact same format with almost the same staff members in order to provide all first-year students with the same program experience. Utilizing these two groups, a waiting list control design, a type of quasi-experiential design, was used to examine the effect of the program. At the test 2, Group A has experienced FC, but Group B did not, therefore, the difference between groups can be interpreted as the effect of the FC. A total of 199 complete sets of data from four tests including before and after the FC, six months later, and two years later were used for the analyses.

As the development of SP was expected to contribute to school adjustment, degree and tendency of students' school adjustment was also measured using the School Adjustment (SA) Scale (Okubo, 2005). The four factors exist within the 30 items of the SA scale which include "sense of comfort," "existence of task and purpose," "feeling of acceptance and trust," and "absence of feeling of inferiority."

Results and Discussions

The total scores of SP in both groups over two years were analyzed to examine the effect of FC using an analysis of variance by SPSS (Table 1). Since the interaction effect appeared to be statistically significant, post-hoc analyses revealed that SP of Group A significantly increased after the FC and its increase had been maintained over two years. And, after the FCA (before FCB), the SP score of Group A was significantly higher than that of Group B. These results were similar to the previous study (Hayashi & Miyamoto, 2013).

Table 1. Means (SD) of SP scores and ANOVA results

	PreFC	PostFCA PreFCB	6M	2Y	*F*		
					Group	Time	Interaction
GroupA (n=101)	71.06 (17.40)	81.41 (15.80)	84.19 (13.73)	83.07 (13.52)	3.02n.s.	62.10***	4.32**
GroupB (n=98)	69.33 (17.40)	74.40 (14.88)	81.79 (13.82)	82.63 (12.55)			
					*p<.05, **p<.01, ***p<.001		

Exploratory factor analyses at the test 1 in order to obtain constructs of SP without wording effect revealed two factors named "existence of trustable others"(13 items, α=.96) and "existence of others relying on myself," (6 items, α=.92) in spite of six factors reported in the original. Confirmatory factor analyses were also performed using Amos, based on the two factors of SP at the test 1. The model was marginal to generally well fit to test 1 (χ^2=384.67, df=151, p<.001, GFI=.83, AGFI=.78, CFI=.93, RMSEA=.09), and the two sub-constructs of SP in Japanese version were confirmed.

The analyses of variance were operated again for each sub-construct of the Group A. In the results, although both changes were similar to the total score, some characteristics of each sub-construct were revealed. For example, "existence of trustable others" had increased gradually through and after the FC, while "existence of others relying on myself" had increased quickly through the FC (Figure 1).

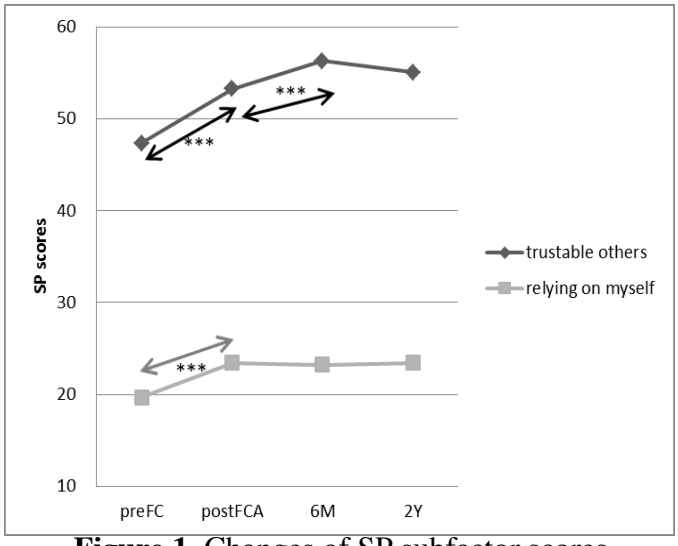

Figure 1. Changes of SP subfactor scores

Table 2 shows the correlations of SP/ SP sub-constructs with SA/SA sub-constructs, health and academic records. While SA totals were positively correlated with both sub-construct, "No inferiority of SA" and health were positively correlated with only trustable others, and Academic

records were positively correlated with relying on myself.

Table 2. Correlations of SP/SP sub-factors with SA/SA sub-factors, Health, and Academic record

	n	SA total	Subfactors of SA				Health	Academic Record
			Comfort	Purpose	Acceptance	No inferiority		
SP total	199	.770**	.781**	.637**	.720**	.195**	.179*	.100
Trustable others	199	.752**	.782**	.647**	.627**	.205**	.204**	.062
Relying on myself	199	.666**	.636**	.550**	.791**	.128	.100	.156*
						*p<.05, **p<.01, ***p<.001		

This study attempted to reconstruct the sub-factors of SP by dealing with wording effect and found the two sub-factors which can be interpretable in the meaning of social provision in Japanese cultural setting. From the results of the changes and relationships with other concepts, some characteristics of the sub-factors were also understood. These can be used to address the methodological issues caused by cultural context in experiential education research. However, Bell (2006) found the three subfactors of SP from his study about the wilderness orientation program in the US, and the construct of SP needs further study to explore content validity so that it may be developed as an international research tool.

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Fractal Bodies: Experiential Approaches for Teaching Deep Sustainability Education Using Embodied and Complex Biomimicry

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One of the innovative directions in sustainability education indicates creative, embodied, immersive, and experiential engagements can produce the paradigm-level changes needed during a time of great necessity. Selby and Kagawa (2015) emphasize the importance of experiential education approaches in sustainability education, requiring "lively and messy…emotional, imaginative, and creative entanglement with the world" (p. 278) and involving deep immersion in nature (p. 279) to generate critical, transformative sustainability education.

My research question centered on finding out how the participants perceived these experiential approaches and the impact these approaches had on their sustainability innovation process.

Paper Overview

This paper highlights the use of experiential methods in research design for sustainability education. Over a two-year period, with more than forty participants, my research demonstrated participant preference for experiential approaches in order to innovate sustainability solutions.

Literature Review

Sustainability educators understand the need for using experiential methods. The movement for imaginative, "creative, expressive modes" (Walker, 2013, p. 461), through which "the intuitive, tacit, creative design process can make important contribution to understandings and knowledge" includes how "propositional design …artifacts can encapsulate and synthesize ideas and indicate new possibilities and new realizations through nonverbal, visual means" (p. 460). Other constructs affirming experiential sustainability education include the use of hands-head-heart models (Sipos, Battisti, & Grimm, 2008; with echoes to 4-H).

For the purpose of this study, experiential education in sustainability design education involves cycles of theorizing, designing, and reflecting (Walker, 2013, p. 450) including methods nurturing the purposeful engagement with the learners "in direct experience and focused reflection in order to increase knowledge, develop skills, clarify values, and develop people's capacity to contribute to their communities" (AEE, n.d., para 2) and in alignment with the twelve stated criteria for AEE (AEE, n.d., para. 3). Dance professor Olsen in *Body and Earth: An Experiential Guide* (2002) makes the case for using movement in order to better embody the experiential sustainability learning: "we attend to the body as the medium through which we experience the earth" (p. 3). The need this study fulfills is to see what specifically moved the participants.

Methods

The research methods included trialing different experiential educational approaches for embodied and immersive engagement with biomimetic patterns from nature to catalyze

innovative thinking about sustainability challenges. The researcher-facilitator was informed by the experiential education teacher-as-midwife model (Warren, 1996). Five groups used experiential approaches to explore sustainability solutions using biomimicry, complexity, and natural patterns. The groups ranged from six to twenty-five participants in size and from one to twenty-two hours each in contact time. The groups spanned one day to two years in duration. Methods of data collection included transcription of recorded sessions, participant narrative reflections, participant self-report about the efficacy of the experiential techniques, participant pre- and post-assessment of feelings of hopefulness, creativity, inspiration, and connectedness, and processes of researcher reflection via analytic memos. Methods of data analysis included pattern-sensing via first and second cycle coding and second-order memos (Miles, Huberman, & Saldaña, 2014).

Results and Discussion

Research into effective techniques for teaching sustainability demonstrated that embodied and experiential approaches were preferred by participants. Experiential education methods included identification of the sustainability design patterns inside of the somatic awareness of each learner (e.g., learners contacting their fontanels or fingerprint, which represent somatic spirals). Some participants also worked in dyads enacting design patterns (e.g., swirling like vortices). Additional experiential education engagement included participants holding branches of plants (which represented branching pattern) or playing interactive design pattern games making connections using metaphorical, poetic, and connective modes. Landscape walks inspired small teams of participants to observe and extend patterns in landscape ecologies towards their sustainability education designs. Additionally, ecofractal design charettes invited participants to personify a pattern from nature to catalyze possibility thinking (deBono, 1985) for collaborative emergence (Sawyer, 2010).

Participants ranked movement and embodied poem-making activities highest. Participants' strongest significant evaluations [mean score rated between "definitely" (5) and "strongly" (6)] included descriptors such as enjoyment, fun, feeling energized, an increased experience of how earth connection can be regenerative, feeling more creative, thinking in new ways, experiencing creative momentum, understanding new approaches that will be helpful, feeling intellectually and creatively restored, and generating creations that were more regenerative and earth-aligned by taking these approaches, with positive group momentum. The researcher has elsewhere detailed the increase in innovation, ethics, collaboration, and regenerativity of designs from this approach (Hauk, 2013, 2014 , 2015). [Tabular and visual depictions of findings are available from the author.]

Significance

The research found that participants had a strong preference for experiential engagements while learning and applying natural fractal patterns and found such experiential approaches effective, enjoyable, and energizing, bringing increased creativity and new ways of thinking along with increasing group momentum. Experiential experiences restored participants personally while catalyzing regenerative thinking and innovating sustainability designs. Kimball noted how

empowerment in experiential education could result from empowering processes (2014, p. 24). Imaginative and ecological approaches to teaching do foster holistic, interdisciplinary experiential learning with a "pedagogy that is learner-centered, collaborative, discovery-based, and authentic;" such approaches are required to break away from an industrial model of education and cultivate the critical and creative capacities necessary for a sustainable future (Judson, 2015, p. 210).

Potential limitations and caveats include the exploratory nature of the research. It is unclear if the results are generalizable, due to small sample size, small number of experiments, and high level of education of participants. Nevertheless, the participant evaluations and differential in pre-post participant scores is significant and merits further study.

The findings of this exploratory study strongly suggest adoption of experiential and embodied engagements in sustainability education. It is not sufficient to learn *about* sustainability. Deep engagement with natural pattern and biomimetic, regenerative sustainability praxis requires experiential engagement to catapult learners to actualize "decidedly different minds…networked, agile, intuitive, risk and novelty seeking, creative, collaborative, failure resilient, analytical, playful, and problem focused…for breakthrough research, …sustainable innovation, and transformative, large-scale global change" (Marshall, 2010, p. 49). Some biomimicry risks pattern extraction that ignores context to exploit nature to further cultures of consumption (Mathews, 2011). Experiential approaches to deep biomimicry and deep sustainability have ethical impacts to deepen moral respect in order to cultivate "a bio-synergetic ethics" (p. 21) in which the parliament of nature can mutually shape human ends (Mathews, 2011). Embodied experience supports development of this mutualistic ecological consciousness, what Sterling (2009) described as a connective cultural consciousness necessary for the storms ahead (p. 82).

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KURT HAHN WAS REALLY A HEDONIST: A CRITICAL INTELLECTUAL HISTORY OF 'PERSONAL GROWTH' IN ADVENTURE EDUCATION

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Introduction

Advocates of adventure education have championed personal growth as a main programmatic aim since the mid-1960's, splitting from the earlier Hahnian emphasis on character training (Freeman, 2011; see (Arnold-Brown, 1962; Hahn, 1949; Outward Bound Trust, 1959). Historians such as Armstrong (1990), Freeman (2011), Millikan (2006), and Warren (1998) argue that this shift is part of a larger rupture within Protestant institutions; once a bulwark against moral decay, the new concern with personality undermined classical foundations in muscular Christianity and its appeals to duty and willful subordination. What started as a vehicle for citizenship training for "King and country, and Christ through all" (Hahn, 1949, p. 8), Hahn's signature programs morphed into experiences through which an individual can take charge of "the meaning or significance of his [sic] experience or existence, and the ability to direct the course of subsequent experience" (Walsh & Golins, 1976, p. 13).

According to this line of analysis, a moribund Protestant ethic became culturally untenable and gave way to a more permissive morality; 'personal growth' could now be pursued without reference to any specific social, religious, or political loyalties. Accounts of this transformation are convincing and abundantly supported, yet three questions arise: First, what provides the continuity across such disparate conceptions of adventure education that these different periods can appear in any way continuous, besides insensitivity to historical context in the literature? Second, without appeal to Christian duty, what underwrites 'personal growth' as a normative ideal? Finally, what hazards exist in maintaining an uncritical adherence to 'personal growth' discourses?

Our analysis maintains that the secularized idea of personal growth through adventure should be understood not in contradistinction to Hahnian commitments, as Freeman (2011) argued, but rather as their inevitable, modern extension. Our argument depends on dual lines of critical analysis. The first examines conceptions of self-development in two consequential periods in adventure education's history: 1) Hahn's alignment with Romantic-era *Allgenmeinbildung* (Klafki, 2000), within which traditional Germanic and English educational philosophies provided the initial justification for self education through adventure, and 2) the appropriation by advocates of adventure education of human potential ideologies in the mid 1960s to 70s – what Hammerman (1980) called the "period of experiential education" (p. 126). While the dominant rationales during these periods differed radically in their ideals for character formation, they shared what might be called *autotelic philosophies of development;* this quality provides one element of continuity between the two periods. Our second line draws heavily on Campbell's (2005) Weberian thesis that the rise of capitalism owes as much to a "Romantic ethic" as a Protestant one. The inclusion of Romanticism as a crucial element of adventure education's history (see Roberts, 2011) provides the second element of continuity; it also reveals the potential for 'personal growth' discourses in contemporary times to function less as an engine of social change and more as another pillar in consumer capitalism.

Kurt Hahn, Hedonist

Hahn's ubiquitous maxim *"plus est en vous: there is more in you"* expresses the essence of a 'self' that was to be brought forth through education. In his sermons, Hahn regularly cited classical German humanists such as Goethe to express his belief in proper conditions for self-development, understood as *bildung* (Klaus, 2003). For Hahn, this was to be achieved through repeated encounters with demanding situations; youth would be "impelled" initially by a charismatic leader but then

propelled autonomously toward norms of acceptability as evidence of their proper, internalized moral character.

At face, nothing appears less hedonistic than the kind of sexually repressive asceticism Hahn promoted in his schools and programs (Flavin, 1996; Worsley, 1985). Campbell (2005), however, shows that extracting symbolic meaning from material situations in the way Hahn intended hinges on the ability to (a) independently seek out situations with "stimulative potential" that would (b) dependably produce sensations "in excess" of those necessary for survival. It is this same superfluity of emotional sensation that historically provides the initial basis for hedonistic pleasure. Once Romanticism made this sensibility available, it became possible for individuals to achieve "emotional self-determination" and to control the meaning they ascribed to sensations. Hahn thus drew not only on widely circulating Protestant notions about entering the kingdom of heaven through earthly conduct, but on Romantic traditions of hedonism, which introduced the intentional pursuit of sensory experiences for emotional stimulation and personal interpretation of meaning.

Romanticism and Human Potential: The Self as an Endless Project

Soon after Outward Bound started in the U.S. in 1962 (Miner, 1980) its champions embraced humanistic psychology (Vokey, 1987) and encoded it in popular models of experiential learning (Kolb, 1984) and adventure programming (Walsh & Golins, 1976). For instance, in their firsthand 1968 account of Outward Bound, Katz and Kolb urge greater incorporation of encounter group methods from the human potential movement (see also Lewicki, 1975). Greater emotional expressiveness and personal disclosure in adventure programs, they argued, would lead to "self-confrontation" and, ultimately, self-actualization (Maslow, 1962, in Katz & Kolb). The purpose of adventure – including the generation of interpersonal conflict (Walsh & Golins, 1976) – became to generate excess emotion and process it as information about the self (Eddy, 1971; Tuckman, 1965; cf. Vernon, 2013).

Analysis

Learning to envision and then seek to attain a more satisfying 'self' through sensory experience emerged in early 18th century Romanticism, and echoes can be observed in experiential learning discourses from the 1960s forward. With religion bereft of its authority, Romantics maintained "it is possible for individuals who are spiritually aware to possess direct intuitive knowledge of what is good and right" (Campbell, 2005). They thus sought "pleasure which accompanies benevolent emotions and their ensuing acts of kindness," producing a new "altruistic form of emotional hedonism." Demonstrating proper emotional sensitivity by seeking "intense worldly activity," and gaining social approval from peers, would confirm one's status as one of the elect. It thereby became possible to infer one's virtue from one's ability to generate then ascribe proper meaning to emotions.

Being "Outward Bound oriented to living and learning" (Walsh & Golins, 1976) has come to mean demonstrating an ongoing commitment to introspection and general emotional concern independent of any specific social, religious, or political loyalties. On the one hand, Campbell (2005) claims the hedonist's perpetual state of dissatisfaction, combined with a quasi-religious sensibility that orients one to the prevailing moral context, can spur actual good deeds; this feature likely substantiates claims to morality in adventure education. On the other hand, Campbell shows how this same Romantic influence also generates a preoccupation with an ideal but never attainable identity through the unyielding pursuit of self-defining experiences, which not only risks emotional self-indulgence, but produces constantly evolving symbolic preferences. Adoption of 'personal growth' as a normative ideal, without reference any specific religious, social, or moral anchor, therefore also establishes a deep reserve of motives that fuels capitalist consumption.

Summary and Discussion

Character training in the Hahnian period derived its meaning against the prevailing backdrops of interwar Europe and mainline Protestantism, when senses of duty and moral urgency

were acutely felt especially among elites. By 1965, Hahn reluctantly endorsed the new preoccupation with and language of *personality* (Armstrong, 1990; Freeman, 2011). Pedagogies of self in education have since become "so central to contemporary…cultural beliefs and practices that it can be difficult for us to see them as anything other than natural or desirable" (Tobin, 1995, p. 233). However, 'personal growth' as an educational ideal should be seen as historically conditioned and not eternal, culturally universal, or unproblematically good (Baumeister, 1987; Matusov & Smith, 2012; Mead, 1934/1950). Our analysis suggests that discovering the supposed moral underpinnings of 'personal growth' in adventure education requires historical scrutiny, and also reveals links with modern consumerism.

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The Impact of Wilderness Therapy on Physical and Emotional Health: Utilizing an Integrated Care Approach in Outdoor Behavioral Healthcare

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The prevalence of adolescent mental health problems has become a growing concern, with 17% having one or more mental health or substance abuse disorders (O'Connell, Boat & Warner, 2009); yet mental health treatment for adolescents has been incredibly siloed, focusing only on behavioral health, and largely ignoring the physical health conditions that are often interrelated (Kutcher, Davidson, & Manion, 2009). In addition, because of the high prevalence of obesity among adolescents (Huh, Stice, Shaw, & Boutelle, 2012), research has also begun to utilize an integrated care approach by examining the relationship between body mass index and mental health. In particular, findings show that youth experiencing obesity are more likely to also experience depression, anxiety, behavioral and social problems, and substance abuse (Bjornelv, Nordahl, & Holmen, 2011; Pasch, Velazquez, Cance, Moe, & Lytle, 2012).

For this reason, interventions are needed for adolescents with high behavioral and physical health risk factors, such as mental illness, substance abuse, and unhealthy body composition. Outdoor Behavioral Healthcare (OBH), also known as wilderness therapy, is an innovative approach to behavioral health treatment that has been used to address some of these high risk levels (Russell & Phillips-Miller, 2002). Extant OBH outcome research has found it an effective intervention for decreasing mental health symptoms for both adolescents (Bettmann, Russell & Parry, 2013; Lewis, 2013; Tucker, Zelov & Young, 2011) and young adults (Hoag, Massey, Roberts, & Logan, 2013). Minimal research however has looked at the intersection of physical and mental health improvements in OBH participants. This study sought to fill the gaps in the literature by answering the following questions:

1. How does OBH participation impact the physical health of young participants?
2. Is there a relationship between youth with different Body Mass Indexes at intake and mental health improvements post treatment?
3. Is there a relationship between physical health improvements and mental health improvements in OBH participants?

Methods

The study sample included 415 adolescent clients between the ages of 13 and 18 (M = 16.2, SD = 1.2) who enrolled in an OBH treatment program between January 1, 2011 and December 31, 2013. A majority of the clients were male (70.0%) with most clients falling in the normal BMI weight range at intake (68.0%). The average length of stay for participants was 79.8 days (SD = 24.2). Data for this study was gathered at an OBH program that uses a continuous flow wilderness trek model. In this model, participants receive their mental health, substance and general healthcare while they are immersed in a wilderness living setting.

Participants' general health was monitored by calculating their Body Mass Index (BMI) and body composition. Mental health was also assessed using the Youth Outcomes Questionnaire 2.0 Self Report (YOQ-SR). The YOQ-SR 2.0 is a global measure of adolescent functioning. The instrument measures overall client functioning that includes six subscales. Mental health data and physical health data were gathered at admission and discharge.

Findings

Youth who had BMIs considered underweight, overweight or obese at intake, showed healthy changes in their physical health at discharge. Underweight youth ($n = 22$) significantly gained weight, BMI, and lean body mass ($p < .01$). Overweight ($n = 78$) and Obese ($n = 33$) youth, had significant decreases in weight, BMI, fat mass and body fat percentages ($p < .01$). In terms of BMI changes, 45.5% of Underweight youth moved to Normal weight at discharge, 61.5% of Overweight youth moved to Normal weight at discharge and 69.7% of Obese youth were considered Overweight at discharge. Overall, 97.9% of Normal weight youth ($n = 212$) remained at this level at discharge.

To see if there was a relationship between youth with different BMIs at intake, pre-post mean changes in the YOQ and its subscales were compared across all four BMI groups. Independent samples t-tests with Bonferroni corrections revealed that youth in Normal, Overweight and Obese groups at intake, on average significantly improved at discharge across all YOQ scores ($p < .001$) with large effect sizes ($d > .82$). In addition, although Normal, Overweight and Obese youth were functioning at acute levels at intake, these scores decreased enough to be considered within normal ranges of functioning at discharge, as measured by clinical cut-offs. Youth who were Underweight at intake, however, only showed significant improvements on the Intrapersonal Distress subscale ($p < .05$) at discharge, with no significant improvements on the other six measures. When change scores were computed, a two-way ANOVA of gender (male, female) and BMI at intake found no main effects for BMI, no interaction effects, but main effects for gender with females reporting significantly higher levels of YOQ improvements than males ($p < .001$). Despite no main effects for BMI, post hoc analyses revealed that Obese youth had significantly larger improvements on YOQ Total scores than both Overweight ($p = .024$) and Underweight ($p = .029$) youth.

Finally, this study was interested to see if physical improvements were related to YOQ improvements. Bivariate correlations between changes in Total YOQ, weight, BMI, lean body mass, and body fat were conducted and compared across BMI groups. For youth who were Normal, Overweight, and Obese at intake, there were no significant correlations found between physical changes and mental health changes; however for Underweight youth, it seems that higher YOQ changes were positively correlated with gains in BMI ($r = .524, p = .045$) and gains in fat mass ($r = .762, p = .004$).

Discussion

This study begins to fill this gap in the literature and supports the idea that OBH can improve both the physical health and mental health of its young participants. On average youth in the sample moved to a more healthy weight and BMI or were able to maintain at a healthy level and showed significant improvements in their mental health functioning. These changes were especially true for youth who entered the program considered Obese, as well as female participants. Given both the adolescent obesity crisis (Huh et al., 2012), along with adolescent female challenges with body image (Smolak, 2004), these results show that OBH is a promising intervention. Though a positive correlation between physical and mental health changes was evidenced only for Underweight youth, the overall findings of this study validate the relationship between physical and mental health (Goodwin, 2003), and can help guide practitioners to consider the whole person when referring clients towards a specific intervention.

Finally, though this study did not examine the therapeutic components of the continuous flow wilderness trek model of OBH specifically, the positive outcomes of this study demonstrate that OBH is uniquely suited to apply an integrated care approach, which may be due to components of the intervention such as time spent outdoors (Thompson Coon, Boddy, Stein,

Whear, Barton, & Depledge, 2011), physical activity (Penedo, & Dahn, 2005) and positive social interaction (Cohen, 2004), all of which are documented in the literature to have both physical and mental health benefits. Future research on integrated care in OBH should examine the relationship between these therapeutic variables and changes in physical and mental health.

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H.J. ANDREWS FOREST DISCOVERY: A CONCEPTUAL FRAMEWORK FOR INTERDISCIPLINARY INTERPRETATION AND EMPATHY DEVELOPMENT

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Introduction

The H.J. Andrews Experimental Forest (HJA) in the Oregon Cascades is one of 24 sites in the Long-Term Ecological Research (LTER) Network. Currently hosting 85 research projects on forests, watersheds, natural resources management, and the humanities, the HJA also offers experiential training for undergraduate and graduate students, professional development for teachers, and programs for K-12 students. Since much of the terrain at the HJA is steep or occupied with sensitive research materials, school visits are limited to tours given by HJA staff or to designated areas within the forest.

The HJA Discovery Trail was developed in 2011 as a place for visitors (~1800 in 2014) to explore the forest from site headquarters, but it is not yet amenable to unguided educational exploration. An interpretive learning trail and fieldtrip support framework for the Discovery Trail would provide new opportunities for visitors to learn about the forest, site research, and personal responsibility for ecological systems. It would also facilitate more student visitors and provide teachers with the resources and confidence to take advantage of experiential learning opportunities in the forest.

Project Description

We have designed a conceptual framework for an interpretive learning trail and field trip support framework (pre-trip curriculum suggestions, field trip activities, and post-trip curriculum and integration suggestions) (Rebar, 2010) that draws upon the long-term scientific and humanistic inquiry at the HJA. Research on ecological disturbance, resource management, and hydrology is woven with creative writing from the Ecological Reflections program (www.ecologicalreflections.com) and paired with personal reflection (Kolb 1984) and creative inquiry (Buddle, 2014). The trail is currently wired for intranet wifi access; content and assessment will be delivered by digital media (e.g., iPads).

Interactive trail stops will enable students to engage with the forest, ask questions, and create artifacts from multiple perspectives. Each stop will feature elements from two distinct curricula: 1) conservation science research and inquiry, and 2) place-based literature, Native American story, reflection and creative inquiry. Educators will also have access to two in-depth lesson plans and activity kits that will extend the trail learning with more targeted Next Generation Science Standards content (NRC, 2011) than the trail can facilitate. We are interested in two questions: 1) What is the impact of the reflective and creative curriculum on scientific learning, empathy for the forest, and personal responsibility for stewardship behavior? 2) How do the in-depth lesson plans impact student learning and empathetic shifts? Our objective is to increase students' knowledge about place and conservation science, while guiding them to reflect upon their own relationships with place and personal responsibility for stewardship behaviors.

At this stage, our project is a scholarly discussion about interdisciplinary field-based science learning with a focus on place relationships and moral development. The theoretical contribution lies in the emphasis on affective learning variables, the inclusion of arts and humanities alongside environmental science content, the use of digital media for content delivery and assessment, and the opportunity to research learning and moral development through four distinct field trip experiences:

	Science and Reflective Curriculum	Science Only Curriculum
In-depth Trail Lessons	Group 1	Group 2
No In-depth Trail Lessons	Group 3	Group 4

Conceptual Framework

Literature in environmental and place-based education argues that direct experience with the natural world helps develop respect for nonhuman nature (Sobel, 2004). Scholarship in environmental philosophy emphasizes the importance of physical connections to the natural world to create appropriate relationships with the natural world (Moore, 2004), which are necessary for right action on behalf of the natural world. Further, Chawla (2009), citing Kals, Shumanacher & Mondtada (1999), explains that studies of adults and pro-environmental behavior show, "[T]ime in nature, often in childhood…, predicted emotional affinity with nature, which in turn predicted the intention to protect nature" (p. 12). When students explore their relationships with the natural world experientially, they can reevaluate these relationships in contexts where they matter, thereby developing the skills and awareness to manifest their values with action as stewardship behaviors. Environmental education scholarship refers to these actions as responsible environmental behavior (REB) (Marcinkowski, 1998) and their development requires both knowledge about natural systems and environmental issues, as well as care for these systems and a feeling that one can contribute to their wellbeing (Hines, Hungerford, and Tomera, 1986/87; Bamberg & Moser, 2007). Educating for REB requires an emphasis on both cognitive and affective learning objectives.

While field learning can develop cognitive skills (Dewitt & Storksdieck, 2008), so can the classroom, therefore bringing students to the field to focus on cognitive learning alone is not a wise use of resources. Field learning, however, does have a profound impact on affective learning (Proudman, 2002) and designing field experiences with a focus on the emotional and relational elements of environmental learning can facilitate the development of ethical decision-makers, who do not just know about environmental science, but also care about the natural world and are committed to acting on its behalf.

Literature Review

Behrendt and Franklin (2014) write, "[s]tudents who directly participate during a field experience generate a more positive attitude about the subject" (p. 235), while the National Research Council (2009) explains, "Informal science learning experiences are believed to lead to further inquiry, enjoyment, and a sense that science learning can be personally relevant and rewarding" (p. 11). In this way, field experiences can reinvigorate interest in science for underrepresented groups (NRC, 2009), as well as enhance student ability to understand ecosystems and impact student attitudes about nature (Kamarainen et al., 2012). Field learning contributes to: sharpened skills of observation and perception (Nabors et al., 2009), positive attitudes for learning and motivation (Hudak, 2003), greater interest in the outdoors (Hoisington, Savleski, & DeCosta, 2010), social skills (Michie, 1998), and empowerment (Farmer, Knapp & Benton, 2007). These are all important affective variables connected to the development of place and community relationships.

Chawla (2009) connects affective learning objectives—like empathy for other living beings (Berenguer, 2007), ecocentric perspective-taking (Schultz, 2000), or a sense of connection with nature (Hinds & Sparks, 2008)—to pro-environmental behaviors. This willingness and skill to act on behalf of nature connects affective learning variables to citizenship skills (Orr, 1991) and participatory virtues (Ferkany & Whyte, 2012), which in turn characterize ethical decision-making. Empathy is a participatory virtue tied to environmental decision-making (Berenguer, 2007) that is also associated with both natural history learning (Fleischner, 2011) and arts and humanities education (Gude, 2009; Schwartz et al, 2009).

Vucetich & Nelson (2013) define empathy as a "vivid knowledge-based understanding of another's circumstance, situation, or perspective" (p. 19). This is "a capacity that depends on objective, empirical knowledge...about the conditions and capacities of others." While often restricted to other humans, this kind of affective awareness is also possible with, and some might argue necessary for, wise action on behalf of the natural world (Chawla, 2009). Scholars link this kind of knowledge-based empathy to good ecological research that depends on a sensitivity to natural patterns and processes, an ability to listen to the natural world, and highly developed skills of observation, all of which are cultivated by place-based natural history learning (Cooper, 2000). These kinds of emotional connections to the natural world often manifest as inspiration, awe, and wonder (Dayton and Sala, 2011), responses that outdoor experiences facilitate (Agate, 2010) in ways rarely possible in the classroom. Creative inquiry also sparks similar affective responses to the natural world (Curtis, 2009), and when paired with scientific understanding, can enable knowledge-based empathetic relationships to place and nonhuman nature.

Stout (1999) writes, "The arts, with their inextricable ties to imagination, have the capacity to provide an unlimited source of possibilities for connecting self to other and for creating a disposition for sympathetic awareness" (p. 33). This ability to nurture the imagination is what allows arts and humanities learning to lead students to empathize with human and nonhuman others (Greene, 2008). Making and engaging art and stories, scholars argue, helps students connect to and express emotions, then prompts them to recognize the emotional lives of others and identify with the experiences of these others (Davis, 2008; Jeffers, 2009). The inclusion of art and story into scientific curriculum can have these same effects. Describing the use of visual art in the intern training program at a Los Angeles hospital, Reilly, Ring and Duke (2005) explain, "Incorporating the humanities in medical education has been shown to increase empathy, awareness, and sensitivity to the art of medicine….[and] offers participants a creative model for linking feelings with reasoned observations and for testing, articulating, and arguing these perceptions" (p. 251-252). In field-based science learning, this link to empathy and meaning-making enables students to both better understand and connect with place. Wattchow and Brown (2011) explain, "In doing art and creative writing, educators can guide learners in engaging knowingly with their subjective encounters with place," (195) so that, with student reflection, they might deepen participant connections to place. Place relationships, which facilitate empathetic awareness, can lead to pro-environmental behaviors (Walker & Chapman, 2003; Ramkissoon et al., 2012). For these reasons, our interpretive learning trail will incorporate art, ethics, and reflection alongside environmental science and natural history to educate about ecological systems, while also inspiring empathy and personal responsibility for these systems.

Methods and Assessment

The use of technology in the field is a relatively new and promising technique for cognitive experiential learning (France et al., 2013; Kamarainen et al., 2012). Digitally-delivered content and assessment will enable curriculum to be modified to reflect changes in audience, scientific knowledge, learning objectives, or forest dynamics over time. The technology also offers interpretive opportunities that traditional interpretation cannot, including (a) real-time and archived video, (b) audio, (c) long-term data sets, and (d) student participation. In addition to the iPad-guided activities, we plan to build non-screen-mediated participation with the forest, group members, and self-reflection into the interpretation to balance the benefits of technology with the affective and interpersonal value of sensory engagement.

Field trip learning assessment presents logistical challenges, as well as issues with identifying, isolating, and controlling the variables that impact what students learn during the field experience (Hofstein & Rosenfeld, 1996). Therefore we plan to employ a diverse assessment strategy to understand the broad student experience. Cognitive assessment will include an evaluation of conceptual learning according to the Framework for the Next Generation Science Standards (NGSS, 2013). Teachers will administer a pre-post summative learning questionnaire in the classroom, and we will collect formative assessment during the student experience. Interpretive stops will be designed in Google Forms as multiple choice or short answer (written or voice response) questions; students will also have opportunities to take photographs and draw pictures. We will archive responses for qualitative analysis.

Results will be provided to the teachers for use in curriculum planning and assessment, as well as used by the researchers to observe affective changes in sense of place (Wattchow & Brown, 2011); student empowerment (Hungerford, 1996); expressions of care or empathy for self, others, or nonhuman nature (Goralnik & Nelson, 2015); and statements of intended transference (Holman & McAvoy, 2005). Affective shifts will also be observed with personal meaning maps (PMM)(Falk et al., 1998) completed by students before the interpretive trail experience and revised after finishing the trail. Groups that participate with the in-depth activity kits will again revise the PMMs following this experience to understand how attitudes, knowledge, and emotions about the forest shift as a result of each activity. In addition, researchers will conduct telephone interviews with the teachers about the pre- and post-trip curriculum suggestions and the activities and concepts the teachers covered in their classes.

Conclusion

An interpretive trail and field trip framework in the HJA would allow students to learn about conservation science in a storied landscape where science is actively taking place. Field-based learning cultivates curiosity about and connections to the natural world; weaving arts and humanities into the field experience sparks imagination, facilitates empathy, and can develop pro-environmental behaviors. Digital

media provides exciting options for content delivery and assessment in the field learning environment.

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Day Hikers' Self-reported Effects of Hiking in the Arizona Wilderness

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Review of Literature

The wilderness of North America has changed and so have the people who explore it. Wilderness once 'needed' to be conquered, and now it is a destination for relaxation, revitalization, and recreation. White European settlers defined wilderness as uncontrolled, mystical, and evil, for they "feared what he [sic] did not control or understand" (Nash, 2001, p.8). The word, wilderness, has a root that seems

> to be 'will' with a descriptive meaning of self-willed, willful, or uncontrollable. The word wilderness is a quality or mood as suggested by the suffix 'ness'…while the word is a noun it acts like an adjective. There is no specific material object that is wilderness. (Nash, 2001, p. 1)

Therefore, wilderness means self-willed land (R.F. Nash, personal communication, May 6, 2013) and the feelings humans experience in the wild country create wilderness.

Investigations surrounding wilderness visitors came about through a desire to understand humans choosing to explore and experience the wilderness and addressed: What are visitors experiencing? How is the natural environment influencing the quality of the experience? What are the concerns for visitors, the environment, and how can managers and park officials contribute to this experiential learning? (Cole & Williams, 2012). Wilderness officials were also interested in *why* people ventured into the wilderness, and what *effects* the wilderness had on those who explored it. In 1956 and 1958, the first wilderness visitor research was conducted in the Quetico-Superior, now called the Boundary Waters Canoe Area Wilderness Area (Stone & Taves, 1956; 1958). This research continued to build and grow into the 1960s and 1970s. Monumental research published in 1962 provided detailed information about wilderness users, demographics, commitments, appeals, attitudes, interviews, and more (ORRRC, 1962) continues to drive management decisions and influences experiential educators' programming decisions. Little research about wilderness users was completed in the 1980s and 1990s, and virtually none has been completed in the last 20 years. Bittner (2013) initiated research in two wilderness areas, finding continuing trends of users being older and well-educated, with more female participation. Today's visitors may experience wilderness differently than our predecessors. Current management reflects the 'keep it wild' strategy (Landres, et al., 2008) calling on the four agencies managing wilderness areas to consider untrammeled, natural, undeveloped, and solitude or primitive and unconfined recreation in their management decisions. Does the current management emphasis reflect visitor needs and contribute to visitor satisfaction?

Methods

This study was an explorative phenomenological investigation to research the phenomenon that surrounds the wilderness experience and the effect the wilderness had on users. The research inquiry states: *What effects do wilderness users' report after their wilderness explorations?* The data collection took place on three weekends in March 2013 at three different trailheads located on the Wilderness boundaries of the Red Rock-Secret Mountain Wilderness and the Sycamore Canyon Wilderness. Over 200 participants contributed data, recruited at the trailheads as they embarked on their experiences. Participants were asked to sign a consent form, complete a demographic form (which is the topic of a different paper), and fill out a questionnaire as they entered the wilderness. Participants then responded to an open-ended

interview question as they left the area. The questionnaire inquired about ways in which the wilderness affected them physically, mentally, emotionally, and spiritually. The interview questions served as a prompt for participants to reflect and develop their thoughts on their experience. The interview was recorded on an audio recorder and then transcribed verbatim into text. The interviews were than printed out on paper and analyzed for significant statements. The significant statements were identified, listed, and than grouped into what Moustakas (1994) calls 'meaningful units', or themes. The meaningful units were analyzed and used to identify themes that described the "essence" of the participants' experiences. The data analysis method was modified from Stevick-Colaizzi-Keen's method of theme analysis (Creswell, 2007). The interview question responses were audio recorded rather than asking participants to write responses to help ensure robust responses. It provided space for visitors to speak about their experiences first-hand. The data contributed to understanding the essence of the *wilderness phenomena*.

Results

The interview information provided insight into the effect being in the wilderness had on people at Bear Mountain Trailhead, Fay Canyon Trailhead, and Sycamore Canyon on three weekends in March 2013. This information represents about 25% of the people hiking from those trailheads on those weekends. Approximately 1,110 significant statements were identified by trailhead, analyzed, and formulated into meaningful units. Bear Mountain had 102 meaningful units, Fay Canyon had 154 meaningful units, and Sycamore Canyon had 105 meaningful units. Meaningful units were used to identify themes that describe the essence of the participants' experiences. From the 361 meaningful units five themes emerged: spiritual connectedness, acknowledgement of physical beauty, emotional expressions of self, awareness of physical impact, and psychological translation of well-being. Twenty-five percent of participants commented on spiritual connectedness, 24% of participants commented on emotional expression of self, 19% of participants commented on psychological translation of well-being, 17% of participants commented on an awareness of physical impact, and 15% of participants commented on an acknowledgement of physical beauty.

Discussion

The data addressed the research inquiry: *What effects do wilderness users' report after their wilderness explorations?* This aspect of the research project strove to understand the participants' construction of their experience. Additionally, the interview served as a connection to experiential education by providing an opportunity and allowing time for the participant to reflect upon the experience. The results provided insight into the wilderness phenomenon and participants' lived experience. This information helps to understand the current relationship of wilderness users to the wilderness. When comparing the five emergent themes with the current keep it wild framework used to manage wilderness it seems that the management practices of helping visitors achieve solitude while engaging in primitive recreation in an untrammeled area complement the themes of spiritual connectedness, acknowledgement of physical beauty, emotional expressions of self, awareness of physical impact, and psychological translation of well-being. Helping to enhance these themes for visitors can translate into increased personal and societal benefits.

This information helps inform experiential programing as well as policy by offering insights about ways wilderness management can better serve the public. Overall, the results showed that spending time in the wilderness affected visitors in one or more of the following

ways: physical impact, psychological impact, emotional impact, a level of spiritual connectedness, and an appreciation for the physical beauty of nature. These effects differ for people, and investigation should continue in order to increase understanding about the effects the wilderness has on humans.

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AN INTRODUCTION TO THE USE OF TECHNOLOGY AND BIOMARKERS FOR OUTDOOR ADVENTURE EDUCATION RESEARCH

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Introduction

Using evidence-based research to improve professional practice has been a critical impetus in Outdoor Adventure Education (OAE). Since the 1950s, there has been a long line of research conducted to study various impacts among OAE participants (Ewert & Sibthorp, 2014; Hattie, Marsh, Neill, & Richards, 1997; Neill, 2002). Outcome variables reported by researchers include self-esteem, self-confidence, locus of control, and a variety of others. Many of these research efforts have demonstrated that OAE experiences can be beneficial as well as influential to participants in many respects, yet, the majority of this data collection has relied almost entirely on self-report and psychological-based questionnaires. As a result, the immediate physiological and biochemical changes from participation in OAE activities remains in need of further examination. The overall purpose of this study was to utilize several innovative methods to provide for an *in situ* data collection process and to measure biochemical changes of participants during a rappelling experience. Methods used in the study examined changes in levels of stress while participating in the rappel included the use of (1) electronic devices (e.g. iPad, iHealth Wrist Monitor, and GoPro camera) and, (2) physical biomarkers (e.g. salivary cortisol, blood pressure, heart rate, etc.). Four data collection locations were used including the corral, the edge of the 100-foot rappel, half-way down the rappel, and immediately upon reaching the ground. This presentation describes the findings from those data and highlights implications for field practices and future research.

Literature Review

Technology and its application in OAE research

Until recently, modern technology has had little impact on the way that research was conducted in OAE. As first described by Collier (1967), the photo elicitation interview has been used in recent years, and along with other image based research, it is noted as being "undervalued and under applied" (Loeffler, 2004, p.504). Magnussen reported using a video camera to capture his experiences sea kayaking as part of his ethnographic research on the meaning that Norwegian sea kayakers make of their experiences (Magnussen, 2012). The use of wearable video technology for *in situ* OAE research at the time of this writing has yet to be found in the literature. Employing modern, lightweight, efficient, and portable/wearable digital audio/video recorders, activity monitors, and biofeedback recording devices such as heart rate monitors are creating new possibilities for capturing visual and biofeedback data (Coetzee, 2011; Norling, Sibthorp, Suchy, Hannon, & Ruddell, 2010).

Biomarkers in OAE research

In addition to electronic types of data sources, advances in biomarker research also presents important research potentials in OAE. To date, there are only limited studies that have evaluated biochemical responses among OAE. For example, Bunting, Tolson, Kuhn, Suarez, and Williams (2000) collected urine and saliva samples to examine participants' physiological stress responses during different adventure tasks. Their findings indicated that participants recorded the

highest urinary neuroendocrine responses during the advanced rock climbing and whitewater canoeing days. In addition, people with lower fitness level have shown greater stress responses toward more challenging physical tasks. Similarly, Coetzee (2011) found increased stress levels as measured by cortisol and heart rate variability among beginning scuba divers enrolled in a training course.

Methods

Data collection devices and samples

For this study, a number of electronic and biomarker (cortisol) data collection methods were employed including: iSurvey; GoPro Hero 4; iHealth Wrist Blood Pressure Monitor; and saliva samples. The iSurvey is a mobile device app that enables researcher to design and create questionnaire and collect data on smartphones, iPads, and Tablets. This study used a modified Perceived Stress Questionnaire (PSQ) that evaluates participant's self-report stress level when at the corral waiting for rappelling and upon reaching the bottom of rappel.

The GoPro Hero 4 is the latest high-definition personal camera that is designed for capturing motions during activities. This device also allows us to capture participants' *in situ* verbal and facial responses toward interview questions as well as their rappelling experiences.

The iHealth Wrist Blood Pressure Monitor device is an automatic wrist cuff blood pressure monitor that measures Blood Pressure (BP) and Heart Rate (HR). Through this device, participants' physiological responses to stress were recorded.

Salivary cortisol has been used as a biomarker for measuring physiological stress response (Hellhammer, Wüst, & Kudielka, 2009). In this study, participants were asked to provide 1-2 ml saliva samples immediately before and after their rappelling experience. These samples were marked with numbers and stored frozen in dry ice for later evaluation.

Data collection site

This study was conducted at a site that offered easy access and enhanced the researcher's ability to manage the rappelling data collection and safety of both the research team and subjects. There are a total of six timings of collecting data, including three days before the trip (T1), one day before the trip (T2), at the corral waiting for rappel (T3), at the edge of the rappel (T4), halfway down the cliff (T5), and at the bottom of the rappel (T6). T4, T5, and T6 comprised the *in situ* portion of the study.

Results

The sample consisted of 19 subjects who voluntarily participated in a semester-long outdoor leadership program at a Midwestern university. Subjects included 7 males and 12 females.

Salivary Cortisol Level

17 valid sets of cortisol samples were analyzed. In an attempt to examine the changes in participants' biochemical responses across four different timings, a one-way repeated measures ANOVA were conducted to determine whether there were significant differences in participants' levels of salivary cortisol across the four different timings, T1, T2, T3, and T6.

The results showed that participants' cortisol level differed significantly between time 1 and time 3, and also time 2 and time 3 ($F(1.14, 18.16)=6.579$, $p<.05$). According to Table 1, participants' cortisol level significantly increased from one day before the trip ($M=1333.49$, $SD=424.59$) to the time when they were waiting for rappelling at the corral ($M=2127.77$, $SD=473.15$). Participants' cortisol level during waiting for rappel were also significantly higher than a regular day ($M= 1531.71$, $SD= 452.64$). However, the cortisol level before and after the rappelling experience was not significant.

Table 1. Descriptive Statistics of Cortisol

	Mean	Std. Deviation
Time 1 – Regular Day	1531.71	452.64
Time 2 – One day before the trip	1333.49	424.59
Time 3 – at the corral waiting for rappel	2127.77	473.15
Time 6 – bottom of rappel	3356.71	2771.04

Heart Rate and Blood Pressure

For heart rate and blood pressure, a one-way within subjects ANOVA was conducted to compare the differences between participants' diastolic and systolic blood pressure and heart rate. The result showed that participants' diastolic blood pressure are significantly higher during the rappel experience (T3 & T6) than a regular day ($F(2.11, 29.5)= 3.89, p<.05$). In addition, participants' heart rates are also significantly higher during the rappel experience (T3 & T6) comparing to the day before and a regular day ($F(3,42)=8.78, p<.05$).

Perceived Stress Level

For psychological response, a paired sample *t*-test was used to determine the impact of rappelling on participants' self-report levels of stress measured by modified Perceived Stress Questionnaire. Among the four constructs of perceived stress, namely worries, demands, joy, and tension, the changes in feelings of tension before and after participants' rappel experiences reached statistical significance ($p<.05$). The results showed that the feelings of tension were reduced after the rappelling experience.

GoPro Camera - Audio and Video

Interviews were conducted three times during participants' rappelling experience recorded by GoPro camera at the edge of the rappel (T4), halfway down the cliff (T5), and at the bottom of the cliff (T6). The extracted audio files of these *in situ* interviews as recorded by GoPro have been transcribed. The most prevalent themes will be extracted through the analysis using NVivo 10. Further analyses in cross validating participants' facial expressions with verbally expressed emotions will be conducted. There is also potential for other uses of this facial expression footage such as retrospective recall, or video elicitation, regarding the participant's experience.

Discussion

These methods revealed a fascinating glimpse into what is happening with students who participate in a high-challenge activity like rappelling. Measuring both biochemical and psychological responses with the aid of GoPro camera opens up opportunities for researchers to triangulate what is happening psychologically and physiologically to students' bodies while they are engaged in an adventure activity. These methods are useful for a host of other adventure activities and can continue to provide insight into what transpires within a student. Furthermore, recording these processes lends itself to considering what students are learning from their experience and how that experience can be better facilitated by programmers and staff. The limitations of using technology and biomarkers in studying participants' physical response may include time, staff, power, cost, and restoring saliva samples.

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Exploring Student-Directed Experiential Pedagogy

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Introduction

The fourth-year, undergraduate Experiential Education course that I teach problematizes commonly-held assumptions in education and encourages student input and agency. That said, aspects of the course format reflect that of a typical ("traditional") university classroom. We meet for three hours a week, discuss readings, engage in experiential and community service-learning activities, and, in more recent years, co-negotiate aspects of the course syllabus and assessment rubrics. Students often identify the disconnect between the theory *of* the course and their experiences *in* the course, triggering my own long-standing concern about the gap between *what* I teach and *how* I teach.

Purpose

In light of students' questioning of the course and my ongoing self-reflection, two separate cohorts of students (2012 and 2014) and I engaged in a self-study designed to challenge the belief held by many feminist/critical theorists, including, for example, bell hooks and Elizabeth Ellsworth, who query whether dialogue, safe space, and agency are merely repressive myths within university classrooms. The purpose of the study was to explore students' and professor experiences with/in a student-directed experiential education elective course. What successes and challenges do students and the professor experience and how? What surprises, new learnings and pedagogical risks ensue?

Literature Review and Theoretical Framework

Experiential education is a "buzz word" on many university campuses. The Association for Experiential Education (2015) defines experiential education as a philosophy, that informs many methodologies, in which educators purposefully engage with learners in direct experience and focused reflection in order to increase knowledge, develop skills, clarify values, and develop people's capacity to contribute to their communities. In reflecting on experiential education classroom practices, Estes (2004) and others encourage educators to examine the incongruence between espoused values and values in practice within learning environments, claiming that experiential educators often teach about student-centered learning theories while remaining mostly teacher-centered themselves. Roberts (2012) calls for renewing the greater purpose of experiential education in schools, arguing that much of what passes as experiential education on university campuses today fails to address Dewey's (1938) caution against the reduction of experience just for experience's sake. Sakofs (2001) impels educators to engage students in only those experiential activities that are intentional, avoiding "handing out" these activities like candy. While sweet and desirable, "experiential education candy" lacks substance and meaning. This present study focused on exploring a deliberate and purposeful student-directed course, involving co-construction of the course syllabus, co-negotiated curriculum and assessments, self- and peer-marking, student-led initiatives, a community service-learning activity (schoolyard greening project), and facilitated critical reflection upon the course content and approaches.

John Dewey's pragmatism and Paulo Freire's critical pedagogy provide two foundational educational philosophies that ground this study. According to Deans (1999), Dewey "is such a compelling figure because his pragmatic philosophy ties knowledge to experience, his progressive political vision connects individuals to society, and his student-centered educational theory combines reflection with action" (p. 15). Stanley Aronowitz (1993) describes Brazilian liberatory pedagogue, Paulo Freire as "the Latin John Dewey" (p. 10). In *Pedagogy of the*

Oppressed, Freire (1970) emphasizes the need to critique oppressive structures and encourages the development of a conscientization (i.e. critical consciousness) that proffers people with the knowledge(s) and resources for them to work toward liberatory action. While there are many definitions and approaches to "doing" student-directed pedagogy, each reflecting particular contexts and ideological predispositions, I adopted one that aligns with Dewey and Freire's focus on social transformation and the development of conscientization.

Methods

Choices about methodology depend upon the questions being asked and also on one's epistemological leanings (Rasmussen, 2014). Given the study's purpose and my own experiential pedagogic disposition–transformative phenomenology serves as the methodological framework. Transformative phenomenology aims to "help the scholar-practitioner bring phenomenology to practice" (Rehorick & Malhotra Bentz, 2008, pp. 6-7) and acknowledges that studying a phenomenon holds inherent transformative potential. The study "site" consisted of two fourth year, 12-week (semester long) experiential education elective courses at a mid-sized Canadian University. There were 18 study participants in the class in 2012 (11 female and 7 male) between the ages of 20-25 years old. In 2014, there were 15 study participants of that age (7 female and 8 male), totaling 34 study participants, including me both years.

Congruent with phenomenological 'best practices', which identifies that people's reports about their lived experience can be expressed in many ways (Husserl, 1913/1931; vanManen, 1990), I employed both journals and focus group sessions to collect data. In light of the methodology and my own "critical" pedagogical praxis, I adopted Stephen Brookfield's "Critical Incident Questionnaire" to formulate the journal script (Brookfield, 1995). This questionnaire has been employed in several studies (Glowacki-Dudka & Barnett, 2007; Phalen, 2012) and seeks to capture the "vivid happenings" that occur in learning (Keefer, 2009). Students (and I) responded to the questionnaire (within 24 hours post-class in our journals) while also recording thoughts and new learnings related to each week's class. The 1.5 hour focus group sessions occurred two weeks after the end of each semester and were audiotaped. The focus groups provided a forum to reflect upon course content, successes, challenges, surprises, pedagogical approach, and knowledge transfer. The analysis of this phenomenological data adopted an emergent strategy with a focus on understanding participants' experiences (vanManen, 1990). Journal entries and focus group data was inductively analyzed and open coded (Berg, 2011) and then grouped into themes.

Results

The primary themes that emerged out of analysis with select quotes to highlight these include: 1) Perspective Changing; 2) Investment and Commitment; and 3) Questioning Student-Directed and Frustration.

Perspective Changing

About ½ of the class said that the course changed their perspective on teaching and learning. Maria said, "I struggled through traditional schools and for me a lot of the ideas that were brought up made me kind of hopeful for the future of other students going through school." Anthony added, [I learned from] "putting the whole experiential education thing into actual practice and seeing it first hand how it worked; that was really eye opening." Sally commented, "I can connect almost everything to experience and education now, like words that Dewey was writing. I sit in my other classes and I'm just listening to this crap, this monarch is talkin' but Dewey hit it on the head, like we've learned to manipulate ourselves, to better accommodate the teacher." Gloria concluded, "I want to say this class has really brought about life skills in

general; it's brought about us learning how to communicate as a group and it also taught us to really get out there and talk to the community to find out resources." Mark reported, "I want Montessori, I want experiential education, question-based learning. I want everyone to be able to experience this kind of thing and like it's really extremely changed me already."

Investment and Commitment

Most students talked about the increased investment in time and their commitment to the teaching and learning process. Mac stated, "For me I felt more invested in this kind of class because the outcomes are different from a normal classroom, you're not just getting a mark, you're getting a project, you're getting a result out of it." Kat stated, "Mary, knowing that you're engaged in this as well, and like we want to put out something good for you and for everybody; you're invested in the class as compared to other teachers." This class is "a little gem," Mark said. "There was more feeling attached to this class given that it was student-directed and we centrally invested far more of our own energy and our own emotions into it," according to Johnny. "It [this course] brings out our vulnerability moreso than other [classes]," according to Donatello. Johnny added to that saying, "our vulnerability came from our ideas and putting forth ideas [in front of peers]."

Questioning Student-Directed and Frustration

Almost all of the students questioned how student-directed the course actually was. Jack concluded:

> I do think there is value to traditional school….it's really easy to jump to this idea of something new and different and more fun …but I think when you see it actually happen in a classroom setting as it did with this course, you can find that there are elements of it that don't work. I think that there is just as much problem with the new style as the older styles.

Sally commented,

> I really enjoyed our lecturettes. When you touched on Dewey right after we read Dewey, that was huge for me, cuz I, I guess that's how I learn, I need to read it alone, I need to reflect, I need to come in, have it taught to me, go home, do an assignment on it and now it's stuck with me for life….I need a teacher to lecture.

A number of students shared reports about frustrations with the course. Kate wrote, "I was surprised that the class doesn't seem to care or understand that time is of the essence and that by the time we choose an activity, the course will be done." A number of students noted, "we waste so much time without accomplishing anything." Jack said, "I found it very disengaging because I would invest my time, I would go out and I would read this book and then I would come back and hear that only a small portion of the class did." Nicole commented, "We would try to make answers out of the confusion and I think that like having a little bit more structure within the unstructured would have been more beneficial." Dana noted, "The course often gives me a bit of whiplash in the structure. We often go from full liberation to a complete lack of student involvement." I reported that I am always challenged by the structure/lack of structure continuum, explaining how hard student-centered pedagogy is "not knowing [in advance] who's going to come into the room and what the dynamics are going to be."

Scholarly Significance

This study confirms that student-directed experiential education can lead to a strong sense of accomplishment and holds transformative potential (Kiely, 2004; Kreber, 2013) while being simultaneously challenging and frustrating (Breunig, 2014; Harper, 2011; Millengah & Millspaugh, 2003). In keeping with transformative phenomenology, I focus here on how the results inform and transform practice (Rehorick & Malhotra Bentz, 2008). Many of the insights

gleaned from this study provide future considerations for experiential educators. Harper (2011) impels educators to not stifle the uniquely personal, intrinsic process that is necessary to experience the transformative value of learning – learning that expands beyond the institutional "norms" of extrinsic motivation and control, emphasizing the important role and value of student-directed pedagogy. Harper and these results emphasize the need for continued study relevant to the efficacy, successes, and challenges of "doing" student-directed pedagogy. How might I and other pedagogues committed to student-directed praxis be further informed by results and research from self-study? "Systematic, intentional study by teachers of their own classroom practice has proven its worth throughout the years" (Fichtman Dana & Yendol-Hoppey, 2009, viii). Do the insights and new learnings for students outweigh the challenges and tensions? Millenbah and Millspaugh (2003) remind educators that struggling through the learning process is acceptable and natural under the experiential education model. What is the minimum necessary structure for student-directed pedagogy? How do students negotiate the "new" given their vast experience with the "traditional?" As Breunig (2008) and Keesing-Styles (2003) remind us, there are no specific "recipes" for student-directed educative praxis. As such, the pedagogue needs to shape classroom practices around the lives of students, the classroom context, the professor's abilities, and the educative aims of the practice. Freire (1998) refers to this as a way of living within our educative beliefs and our educative practices. For me, it is a step to bridge the aforementioned gap between *what* I teach and *how* I teach.

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HOW DO OUTDOOR EDUCATORS MAKEMEANINGS OF THEIR SIGNIFICANT LIFE EXPERIENCES (SLEs)?

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Introduction

In the field of outdoor education research, development of relationships with 'self', 'others', and the 'natural environment' has been studied. In particular, the relationships with the 'self' such as, self-concept and self-efficacy, have been often studied as effects of the outdoor education programs. However, meanings of outdoor experiences themselves have not been explained enough.

In the field of environmental education, in order to examine factors that influence individuals' environmentally responsible behavior, the Significant Life Experiences (SLE) of environmental activists were examined by reflecting on the experiences (Chawala, 1988; Tanner, 1980). The SLE is described as experiences that lead to environmentally responsible behavior. Furthermore, SLE study is an approach to examine how environmental responsible behavior has been formed, and several studies revealed that many environmental activists have strongly impressive experiences in the natural environment in their childhood (Furihata, 2004). Authors assume the effects of SLE is not only environmental responsible behavior but also personal growth, and utilizing the SLE approach could help researchers understand the relationship between experiences of outdoor education and the personal growth of outdoor educators. The Research Question (RQ) of this study is "How do outdoor educators make meanings of their significant life experiences? " using SLE approach. This is an attempt to understand the meaning of outdoor experiences that also promote personal growth.

Methods and Results

This study is comprised of two studies that examine the Research Question (RQ), "How do outdoor educators make meanings of their significant life experiences? " and uses a mixed methods research design.

Study One

Japanese outdoor educators were asked to answer the questionnaire about their SLEs through the Survey Monkey from February to May, 2014. 152 complete responses out of 185 responses (82.2% including 115 males and 37 females.) were analyzed. The three major SLEs were described by each respondent and a total of 401 cases were obtained. The data was analyzed using content analysis (Kurippen et al., 2006) and KJ method (Kawakita, 1970). Major results include the following: (1) SLEs were obtained primarily during adolescence (164 cases, 41%), but also during adulthood (105 cases, 26%), and during childhood (97 cases, 24%); (2) The kinds of outdoor SLE include individual outdoor experience, outdoor educator experience, and outdoor leadership experience; (3) The meaning of outdoor SLE was divided into five categories and 12 sub- categories, and characteristic relationships between them are shown in ~~the~~ Figure 1.

Study Two

Eight experienced outdoor educators (6 males and 2 females, mean age 52.4) out of 185 respondents of Study One were asked to participants in semi-structured interviews about the details of their outdoor SLEs. The interviews were recorded using IC recorder,and contents were then typed in Word format from July to September 2014. The data was analyzed using Grounded

Theory Approach (GTA), and the results were explained using individual story lines and theoretical descriptions. Finally, the following seven themes were derived from interview data.

1) Proto-experienced in childhood became the foundation of personal value formation.
2) Values of outdoor experience unlike daily experience were recognized.
3) The relationships between people and nature were recognized.
4) A new recognition was born from the outdoor SLEs, which broke personal stereotype.
5) Outdoors is the place where participants reported growth.
6) Future direction as outdoor professionals was oriented by outdoor SLEs.
7) Individual beliefs have been constructed from accumulated outdoor SLEs.

Discussion

Five categories and 12 sub-categories of the meaning of outdoor SLE obtained from Study One were consistent with theory descriptions and the story-lines of individuals derived from the interview study. Therefore, it can be said that the validity of categories of outdoor SLE meaning were confirmed.

Developmental stages of making meaning from outdoor SLEs were suggested from the results of this study, while SLE studies in environmental education studies suggested as basic and general SLE. First, proto-experience in childhood like various daily outdoor experiences can be explained as "fundamental SLEs," which become the foundation of value formation. Next, in the adolescence, various meanings about self were obtained from Outdoor SLE, and it can be explained as "advanced SLE". Finally, through personal growths from SLEs, professionalism has grown. Therefore "professional SLE" can be the third stage of making meaning of outdoor SLEs. Most importantly, it is suggested that the accumulation of making meaning of SLE leads to construction of personal belief.

In this study, the hypothesis "Outdoor SLE is the component that its accumulation composes personal belief" was obtained. Future studies need to examine the hypothesis in order to take advantage for the programming and leadership training.

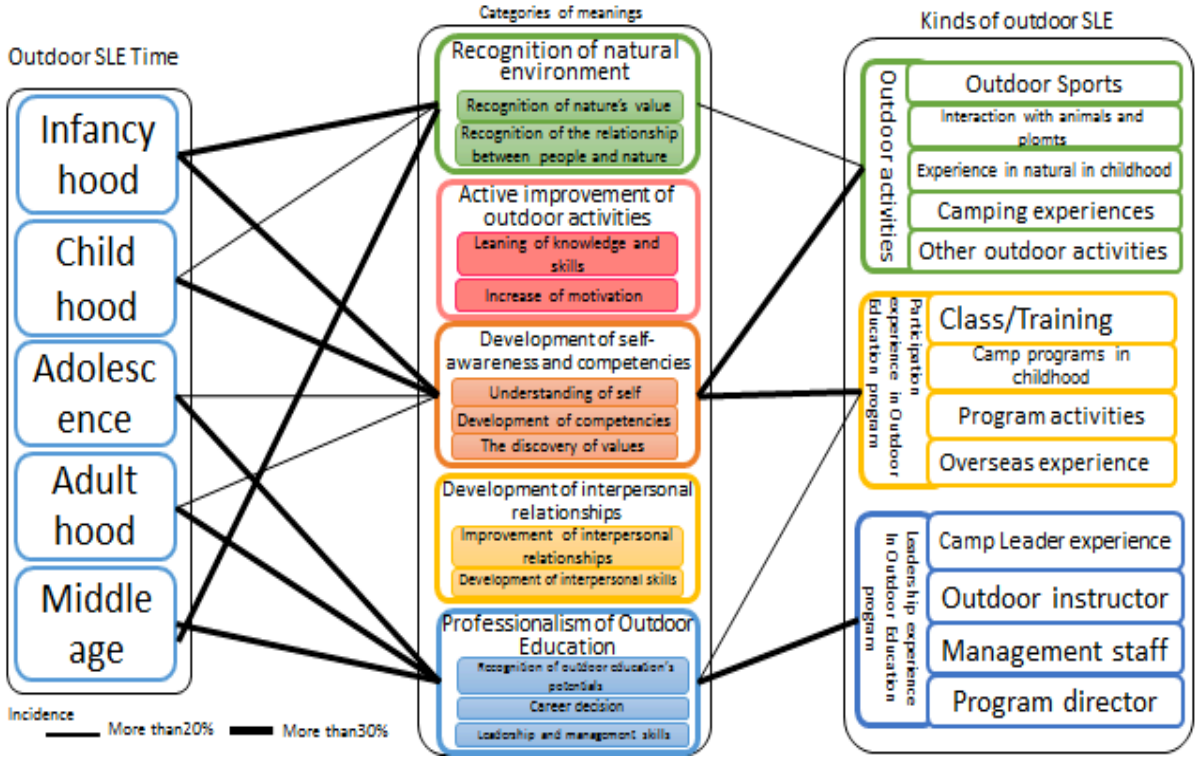

Figure 1: The relationships of the meanings of outdoor SLE with the timing and kinds of SLE

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ENERGY BALANCE: ASSESSING CHANGES IN BODY COMPOSITION DURING A NOLS EXPEDITION

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Review of Literature

Understanding accurate energy requirements within the backcountry is a critical element tied to the health, safety, and enjoyment of outdoor adventure experiences. Little research exists, however, that determines participants' nutritional needs and energy requirements in outdoor adventure programs. In 2012, the National Outdoor Leadership School (NOLS) conducted a study to identify the nutritional needs of their participants enrolled in 30-day and semester-long backcountry expeditions. NOLS found that some of their participants experienced both fat and muscle loss due to high levels of energy expenditure and insufficient energy intake (Ocobock, Moehler, Gookin, & Pojha, 2012; Pojha, Ocobock, & Gookin, 2014). Other research substantiates the idea that individuals on backpacking excursions frequently do not consume enough to mitigate the effects of high levels of energy expenditure (Hill, Swain, & Hill, 2008; Koehler et al., 2001). In fact, some researchers have shown that some outdoor athletes satisfy only 31% of their energy needs (Bourrilhon, Philippe, & Chennaoui, 2009). Further complicating these findings, however, are the utilization of body composition measurement tools like segmental body composition scales that may not provide the most reliable measures of fat and lean body mass for field based research (Dixon, Deitrick, Pierce, Cutrufello, & Drapeau, 2005; Sardinha, Lohman, Teixeira, Guedes, & Going, 2011; Shim, Cross, Norman, & Hauer, 2014). Air displacement plethysmography (Bod Pod) appears to provide greater accuracy and is frequently used as a reference method by researchers (Dixon et al., 2005; Kuriyan, Thomas, Ashok, & Kurpad, 2014; Peterson, Repovich, & Parascand, 2011; Sardinha et al., 1998; Shim et al., 2014). Therefore, the purpose of this study was to examine the effects of dietary intake during 21 to 30-day expeditions on NOLS participants' body composition utilizing food log data and air displacement plethysmography.

Methods

During the summer of 2014, researchers conducted a quasi-experimental pre-test/post-test study to determine changes in body composition. Participants from five different NOLS courses were recruited to participate in the study. Research subjects ($N = 39$) participated in a 21 to 30-day backpacking expedition. Approximately 74% of the subjects were male ($N = 29$) and 26% were female ($N = 10$) and were on average 22-years-old (SD = 4.4). Pre- and post-trip anthropometric measures assessed included body composition (measured via a Bod Pod), height, and weight. Blood markers included hemoglobin and hematocrit which were measured pre- and post-trip via a single finger prick. Additionally, each participant was asked to complete a food and activity log to record daily dietary intake and activity parameters during the NOLS course. A total of 34 food logs were completed and available for analyses. Food logs were analyzed using Food Processor Nutrition and Fitness Software. Changes in fat mass and lean body mass were calculated using pre- and post-test Bod Pod body composition measurements. Changes in

anthropometric measurements were analyzed using a Student's t-test. Pearson's correlation analyses were conducted to measure the relationship between dietary factors and anthropometric changes. Activity energy expenditure was estimated from distance walked and elevation gained (Terrain Method) added to resting metabolic rate and the thermic effect of food (Hill et al., 2008). Significance was set at $p < 0.05$.

Results

As shown in Table 1, participants experienced a significant amount of weight and body fat loss, along with an increase in lean mass, during the courses. This was, however, differentiated by sex as shown in Table 2. On average male participants experienced a loss of 7.5 lbs compared to .22 lbs for females from pre- to post-course ($p < .001$). Changes in the percentage of body fat were non-significant between males and females ($p = .106$). In contrast, females showed a significant difference ($p < .05$) in lean muscle mass gains (3.4 lbs) compared to males (0.7 lbs). Similarly, manner, there was a significant difference ($p < .01$) between males and females in the change of fat mass from pre-test to post-test. Males showed an 8.4 lb decrease in fat mass and females showed a decrease of 3.4 lbs from pre-test to post-test.

Average calorie intake was 2865.7 (SD = 691.9) kcal/day. Total carbohydrate intake averaged 378.4 (SD = 111.6) grams/day and comprised 52.7% of total calorie intake. Total protein intake averaged 94.3 (SD = 19.9) grams/day and comprised 13.2% of total calorie intake. Total fat intake averaged 112.5 (SD = 27.0) grams/day and comprised 35.5% of total calorie intake. Protein and carbohydrate intake were also determined based on bodyweight (calculated in kilograms). Bodyweight utilized to determine grams of protein and carbohydrate intake per kilogram of bodyweight (g/kg) was an average of the pre- and post-test weights for each participant. Average protein intake based on bodyweight was 1.3 (SD = 0.4) g/kg/day. Average carbohydrate intake based on bodyweight was 5.3 (SD = 1.7) g/kg/day. Percent of calories from carbohydrate, protein and fat were in line with dietary recommendations (Acceptable Macronutrient Distribution Ranges or AMDRs) of 45-65% of calories from carbohydrates, 10-35% of calories from protein, and 20-35% of calories from fat. Average protein intake of 1.3 (SD = 0.4) g/kg/day met the dietary recommendation of 0.8 g/kg/day for healthy individuals as well as the recommendations of 1.2-2.0 g/kg/day for endurance athletes and 1.1-1.4 g/kg/day for recreational athletes (Fink, Burgoon, & Mikesky, 2009). In addition, average carbohydrate intake of 5.3 (SD = 1.7) g/kg/day met the recommendation of 5-10 g/kg/day for athletes but did not meet the recommendation of 7-10 g/kg/day for endurance athletes (Burke, Cox, Culmmings, & Desbrow, 2001). Finally, average total energy expenditure was estimated at 2402.2 kcal/day.

Pearson correlation analyses were conducted to evaluate the relationships between calorie and macronutrient intake and changes in weight, body fat, lean mass, and fat mass. A significant moderate positive correlation was found between carbohydrate intake in g/kg/day and changes in lean mass ($r = 0.48, p = .004$) as well as changes in weight ($r = 0.43, p = .011$). Similarly, a significant moderate positive correlation was found between carbohydrate intake in g/day and changes in lean mass ($r = 0.54, p = .001$) as well as changes in weight ($r = 0.40, p = .021$). Finally, a significant moderate positive correlation was found between calorie intake and changes in lean mass ($r = 0.38, p = .028$).

Table 1. Anthropometric and Blood Marker Changes in NOLS Participants **(*N* = 39)**

Measure	**Pre-Test** *M (SD)*	**Post-Test** *M (SD)*	**Pre-Post Difference**	**P-Value**

Weight (lb)	162.8 (33.9)	157.2 (27.5)	-5.6	< .001
BMI (kg/m2)	23.8 (4.3)	23.0 (3.4)	-0.8	<.001
Body Fat (%)	18.2 (8.5)	14.8 (8.1)	-3.4	<.001
Lean Mass (lb)	132.3 (24.8)	133.6 (23.4)	1.3	.083
Fat Mass (lb)	30.5 (19.6)	23.6 (15.8)	-6.9	<.001
Hg (g/dL)	15.9 (1.6)	15.7 (1.4)	-0.2	.523
Hct (%)	46.3 (3.0)	46.9 (3.3)	0.6	.081

Table 2. Anthropometric Changes in NOLS Participants based on Sex

Measure	**Males (*N* = 29)** ***M (SD)***	**Females (*N* = 10)** ***M (SD)***	**P-Value**
Average Change in Weight (lb)	-7.5 (8.2)	-0.22 (3.6)	<.001
Average Change in Body Fat (%)	-3.8 (2.5)	-3.4 (2.4)	.106
Average Change in Lean Mass (lb)	0.7 (5.0)	3.2 (2.4)	.043
Average Change in Fat Mass (lb)	-8.2 (5.9)	-3.4 (4.2)	.014

Conclusions

Meeting the nutritional requirements of outdoor program participants is an important aspect to effectively managing the wellbeing and safety of participants while in the backcountry. Despite its importance, little research exists on participants' energy expenditure and intake and how that compares to changes in body composition. The results of this study show that NOLS participants' energy expenditure versus intake were largely in balance. Participants, on average, met or exceeded their nutritional requirements, as indicated by the retention of lean body mass. It is important to note that males showed a greater loss of fat mass than females. This may be due to a deficit in caloric intake, as males consumed close to the same number of calories on average (2,866 kcal/day, SD = 784.6) as females (2,864 kcal/day, SD = 337.5). That said, the intake and distribution of calories in carbohydrates, proteins and fat were consistent with dietary recommendations for all participants. Despite these findings, the results raise some critical questions about effective measurements of caloric intake, energy expenditure, and body composition in an outdoor environment. While our findings show different results from previous studies, this may be due to NOLS' implementation of a nutrition education project following Ocobock et al.'s (2012) findings. The project was designed to help staff better differentiate the nutritional needs of certain types of students, activities, and environments. Although some research shows that some outdoor athletes fail to meet their nutritional needs (Bourrilhon et al., 2009), which may compromise their ability to perform, this study indicates that despite the extensive nature of NOLS courses, students are effectively satisfying their nutritional needs while on course. It is important to note, however, the limitations of our research and the need for further inquiry.

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FAMILY – NATURE – CLUBS: GETTING PEOPLE CONNECTED AND COMMITTED TO THE ENVIRONMENT

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Introduction

The head of the U.S. Environmental Protection Agency has declared that we are facing two great environmental challenges: climate change and the growing divide between youth and nature. There is an important link between global environmental challenges such as climate change and the local disconnect between children and the natural world -- time spent in nature has been identified as potentially the most significant pathway for increasing the likelihood that people will engage in environmentally responsible behaviors, especially if the nature experiences begin at an early age (Chawla & Derr, 2012; Wells & Lekies, 2012). However, the decline of time spent in nature has increased substantially in the U.S. and other industrialized countries over the past several decades. In addition to spending time in nature, the company of a close adult that models comfort with, enjoyment of, and respect for nature helps children develop a positive, protective relationship with the environment (Chawla, 2009; James et al., 2010). Indeed, a close, loving relationship between children and their primary caregivers creates a secure base from which children develop the capacity for connection and care and the confidence to explore the world around them (Bowlby, 1988; Karen, 1994; Walant, 1999). With the solid foundation of ample opportunities to enjoy nature, at times in the presence of a close-adult role model, the third most influential experience for the development of active environmental citizenship is reoccurring participation in an organization that fosters direct engagement with and learning through action about the natural environment (Chawla, 2009; Chawla & Derr, 2012).

A unique and significant opportunity to fulfill all three of these life experiences that create the conditions for people to care about and take care of the natural world can be found in family nature clubs (FNCs). Coming in many shapes and sizes depending on their context, FNCs are community-based organizations that regularly bring families together to enjoy the benefits of time spent in nature. Some FNCs are small while others are quite large, some meet at the same place each week while others make a point of going to a new place for each gathering, some are focused on education while others are focused on free play, some are run by a parent volunteer while others are part of a larger organization's mission. FNCs can essentially be created by anyone in any community. What FNCs have in common in their structure is that the events occur outdoors, are geared towards full family participation, and are designed to develop positive connections with nature through direct experience and informal learning opportunities. There are over 200 FNCs across the U.S. registered with the Children & Nature Network, a leader in the movement to reconnect people and the natural world. FNCs are a previously unexplored and significant area of study due to their potential to have positive effects on both the environmental behavior and well-being of participants through informal, low-cost, community-based experiential education. This abstract reports on a subset of data from a larger study on FNCs, with a specific focus on the effects of FNC participation that are related to spending time in, learning about, connecting with, and taking care of the natural environment. This research is of direct relevance to the field of experiential education because FNCs offer direct, experiential, nature-based learning opportunities for entire families in diverse communities.

Literature Review

Over the past forty years over a hundred studies have been conducted to understand how people come to practice pro-environmental behavior (PEB). A review of this literature

consistently finds three primary personal factors that influence PEB--knowledge, self-efficacy, and affective motivations—and three primary life experiences that facilitate PEB— time spent in nature (especially during childhood), social support (especially role models for nature appreciation), and participation an organization that fosters experiential learning about the natural world through direct experience and collective action (Chawla, 2006; Chawla, 2009; Chawla & Derr, 2012; 2012, Cheng & Monroe Geller, 2002; Komus & Agyeman, 2002; Mayer & Frantz, 2004; Pruneau et al., 2006; Wells & Lekies, 2012). In their 2012 literature review, *Children and nature: Following the trail to environmental attitudes and behavior*, Wells and Lekies called for future research to include practitioner-researcher partnerships that increase methodological rigor by employing practices such as measurement before and after program participation and use of a comparison group that does not take part in the program. In *The Development of Conservation Behaviors in Childhood and Youth*, Chawla & Derr (2012) called for research to be guided by a theoretical framework and to include a concurrent mix of quantitative and qualitative methods, especially case studies and observational methods, which can help to validate the common reliance on self-reported data. Chawla & Derr (2012) also referenced a literature review by Zint (2012) that emphasizes the importance of using measurement tools that are established and reliable, controlling for experimenter expectancy by having a neutral person conduct analyses, and documenting how programs are implemented. This study was designed with these recommendations in mind, using: a theoretical framework (ecological psychology, attachment theory/family systems theory, and community psychology); both quantitative (pre- and post-surveys leveraging existing measures) and qualitative (interviews and direct observation) methods with a variety of participant groups (including a comparison group); third party analysis for interviews and select quantitative data; and an in-depth case study of a FNC that included implementation documentation. A primary research question was: *What are the effects of being a part of a FNC on individual, familial, social, and ecological well-being?*

Methods

The study population for this research was the leaders in and participants of FNCs registered with C&NN, including *Columbia Families in Nature (CFIN)*, which I started in my community in Maryland as the action research portion of this study. With the C&NN family nature club population, leaders were invited to complete a survey and be interviewed and participants were invited to complete a survey. With the CFIN population, direct observation, pre- and post-surveys, and interviews were used. The quantitative data gathered from the surveys used for this research include measurement scales, checklists, and demographics. Two tailed, type three t-tests were conducted to determine any statistical significance in the responses between study participant groups on questions related to nature experiences, relationships, and social and environmental behavior. Python was used for regression analysis and t-tests. Qualitative data include surveys (narrative responses), in-depth interviews, and observations. Using Excel, qualitative survey data regarding motivations for participating in a FNC and the most significant change or effect from FNC participation were explored for a priori and emergent themes, excerpted and coded, and assessed for deeper patterns within commonly coded excerpts and the relations between differentially coded content. Looking across the survey and interview data, seven categories of significant change were identified, under which there were twenty specific changes. These results were tested via a brief verifications survey distributed to all study participants. The data analysis process included triangulation across the data gathered from the different methods to determine whether they support the same conclusions and use of the theoretical framework referenced in the literature review for data interpretation.

Results

The results of this study include data from: 47 family nature clubs, 348 unique in-depth surveys, 48 in-depth interviews, 190 effect validation survey responses, direct observations of 133 families that participated in 31 CFIN outings in 2014, and my experience of designing, launching, and leading a new family nature club. This abstract reports on a subset of this larger study, with a specific focus on the effects of FNC participation that are related to spending time in, learning about, connecting with, and taking care of the natural environment. The following are the relevant responses to the effects validation survey, in which the percentage reflects the number of people that selected 'strongly agree' or 'agree' when given the prompt "As a result of my family's participation in a family nature club I/we have:"

- Learned about places to go in nature (97%)
- Learned about the natural world (92%)
- Learned from leaders and/or other families (92%)
- Been spending more time in nature (90%)
- Developed a greater sense of connection with nature (87%)
- Fewer barriers to getting out in nature (more prepared, experienced, etc.) (82%)
- An increase in environmental awareness and/or behavior (81%)

To quote a participant: *"There are immeasurable benefits from our participation in this club, but the broadest is that we are spending so much more time in nature and directly learning about the interconnectedness of the world around us. My children have acquired meaningful knowledge of nature, become adept at exploring their environment, and developed solid leadership skills.*

The amount of time families spent together in nature before, during and after their FNC participation was captured in the surveys and linear regression was used to determine if there was a relationship between family time spent in nature and other key study variables. A statistically significant relationship was found between family time in nature and connection to nature ($p = 0.007$), environmental action ($p = 0.021$), and social action ($p = 0.027$). These data show a very significant correlation between the quantity of time a family spends together in nature, in hours per week, and the responding parent's sense of connection with nature, the family's household environmental behavior, and the responding parent's social action.

Discussion

These results suggest that participating in a FNC provides participating families with the opportunity to learn about the natural environment through direct experience, which results in greater quantities of time spent in nature, an increased sense of connection with nature, and increased environmental awareness and/or behavior. Strong support was found for a positive relationship between the amount of family time spent in nature and the parent's connection to nature as well as their pro-environmental behavior and social action. This effect on adult behavior is important given that parents are the decision makers in their household. Given the body of research on the importance of youth experiences in nature for adult pro-environmental behavior, the results of this study also bode well for the long-term effects on the children in these households where there is more family nature time. Overall, FNCs provide a unique opportunity for entire families to regularly spend time together immersed in learning about the natural world.

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