

Learning Outcomes of Engagement with Upper Valley Trails Alliance for Dartmouth Students

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The Upper Valley Trails Alliance (UVTA), in association with Tuck Builds, the Dartmouth Outing Club, and the Rivers Programs provide a number of opportunities for Dartmouth undergraduate and graduate students to get involved in the maintenance and development of trail systems in the Upper Valley. These programs, in addition to their Passport to Winter Fun program for elementary school students, constitute the core of their agenda for student outreach in the Upper Valley. In assessing the learning outcomes gained by Dartmouth students who engage with these programs, we turn to contemporary sociological and scientific literature, which firmly establish a connection between a multiplicity of health benefits and the types of engagements facilitated by the UVTA. Since these outcomes are multivalent in nature, we will look at the four most prominent categories affected: education, social skills, and mental and physical health. In establishing a connection to these positive learning outcomes, we then seek to provide the UVTA with a means of measuring the extent to which these outcomes benefit participants through a survey. This survey would allow the UVTA to provide concrete data of its contributions to students' lives Dartmouth, as well as garner support from donors.

Education

The programs and methods employed by the UVTA provide certain educational benefits which cannot be attained in a classroom setting. The methods employed by UVTA most closely recommend an educational strategy that previous literature has called Expeditionary Learning (EL). EL is an adventure and service-based education program known for its wilderness expeditions and style of intellectual engagement which emphasizes project and performance (Thomas 2000). In assessing the effectiveness of this model, prior work has shown that nine out of ten schools which implemented EL have shown significant improvements in terms of

academic achievement amongst students across the board (Thomas 2000). Being that this model very closely reflects the type of engagements Dartmouth students have with the UVTA, such data seems to clearly establish the transfer of certain skills which could prove useful in an academic environment.

While the UVTA's methodological approach to their programming provides academic benefits for their participants, recent literature also speaks to how the direct physical activity its programs provide yield learning outcomes of their own, which are relevant in academic environments. Physical activity has for years been associated with improved cognitive functioning and enhanced learning. More specifically, physical activity has been shown to correlate with improved spatial learning, improved knowledge retention, and reduced risk of brain degeneracy over time (van Praag 2005). Long-term voluntary exercise has also been shown to bolster certain learning processes associated with memory (García-Capdevila 2009).

Additionally, results show that the amount of exercise an individual gets should be noted when analyzing the effects of physical activity on learning and memory, or when planning a training schedule. This study provides a basis for further research into how much activity and what types of activity would lead to certain academic benefits. This could gauge different types of activities and programs as they relate to different aspects of physical activity. This lens will be important for distinguishing outcomes amongst various programs of the UVTA.

Lastly, in terms of the more practical and implementable data around physical education, recent literature has shown the plethora of cognitive benefits associated with physical activity programs specifically. Some research has shown that adding physical education in high-school curriculums produces small positive increases in academic performance. Other data suggest that time allocated to physical activity does not adversely affect academic achievement, even if this

time was previously allocated to other academic endeavors (Brusseau 2015). Additionally, some findings even suggested a relative increase in academic performance per unit of time (Brusseau 2015). Therefore, there is a practical need for programs like those offered by the UVTA both for high school students and academic institutions, in general, seeking to increase students' academic performance.

Social Skills

Interacting with nature and other outdoor programs, such as the Upper Valley Trails Alliance, also positively influences students' social lives. Prior work suggests that students who are involved in service learning programs may be more likely to become involved in community service than students who are not (Vogelgesang and Astin 2000). Furthermore, participating in community service strengthens students' ability to communicate with others and also strengthens social ties (Meyer-Lipton 1998). Service-learning has also been found to be an effective strategy in developing students' leadership skills and is a strong predictor of a commitment to civic participation (Furco & Root 2010). College students participating in community service have a heightened sense of happiness, which can lead to higher self-confidence and a more fulfilling social life (Meyer-Lipton 1998).

Similarly, participation in outdoor activities within schools is known to enhance students' socialization skills; schools tend to be useful agents for the socialization of students through physical activity (Vilhjalmsson and Thorlindsson 1998). Outdoor play, especially with other students, enhances healthy child development and socialization, which is important because the UVTA interacts with elementary school children in their Passport to Winter Fun program. Schools are an optimal place to promote outdoor physical activity, as they are generally regarded

as safe places for students to interact (Sharma-Brymer 2016). These interactions not only positively influence students' physical well-being but also encourage students to interact with one another in ways they normally wouldn't in the classroom, enhancing their social skills. These articles all suggest that outdoor physical activity and service learning programs, similar to the UVTA, promote student interaction and are helpful agents in creating significant social bonds.

Mental Health

Generally, mental well-being can encompass being aware of one's own potential and being able to cope with the daily stresses of life (Janssen and LeBlanc, 1998). Researchers have found that outdoor activity, both unstructured and structured, positively impacts mental well-being across different age groups (McCurdy et. al 2010). Even though the magnitude of the impact of outdoor activities is partially dependent on the general well-being of a person beforehand, outdoor activity proves to be influential nevertheless. A survey administered on behalf of the American Psychological Association in 2018 found that average reported stress levels for teens are 5.8 and 5.1 for adults on a 10-point scale. This is in contrast to the 3.9 that groups consider a healthy stress level (American Psychological Association 2018). The intensity of factors such as school workload, extracurricular commitments, and general life worries are prone to collectively contribute to high levels of stress (American Psychological Association 2018). In a study of 330 rural elementary school children, the effects of stressful life events and the amount of "nature" in each child's environment were evaluated. It was found that children who lived in rural settings with more nature experienced less psychological distress and restored

their capacity for attention, thus allowing them to think through their problems more successfully (McCurdy et al. 2010).

The positive impact of the outdoors on mental well-being extends to the realm of mental illnesses and disorders. Mental illnesses often put a strain on psychological health when the prolonged effort is exerted (Taylor et al. 2011). For example, children with ADHD experience “mental fatigue after prolonged concentration, characterized by having difficulty focusing on tasks, feeling irritable, and being easily distracted,” (Taylor et al. 2011). A 2001 study found that activities taking place in natural settings are able to reduce symptoms of ADHD more than activities in built outdoor settings or indoor settings (Taylor et al. 2011). The impact of outdoor activities can be a positive influence amongst people with psychological disorders, widening the range of its impact on mental health.

Physical Health

Based on previous research, we have found support for our hypothesis that interacting with nature and outdoor programs like the UVTA positively influences students’ physical well-being because it allows people to decompress and be healthy outdoors (Strong 2005). A multitude of research illustrates the importance of physical activity in the treatment and prevention of heart disease, vascular disease, arterial disease, etc. (Thompson 2003). Physical activity influences better overall health and prevention of disease. There is also evidence that exercise reduces the risk of other chronic diseases, including type 2 diabetes, osteoporosis, obesity, depression, and cancer of the breast and colon (Thompson 2003).

Based on studies of intense and moderate physical activities and their overall health benefits, we find that in order to achieve substantive health benefits the physical activity should

be at least of moderate intensity. Activities of vigorous intensity may provide even greater benefit. Aerobic-based activities had the greatest health benefit, other than for bone health, in which case high-impact weight-bearing activities are required (Thompson 2003). The studies indicate that different kinds of physical activity are needed for the most optimal health benefits. The UVTA seeks to implement these ideas of health through outdoor activities and exercise.

RESEARCH QUESTION

The UVTA is interested in learning how best to measure the learning outcomes of Dartmouth students that are involved in their programs. The UVTA advocates for the use, maintenance and development of trails in the New Hampshire Upper Valley Region with the goal of promoting active lifestyles, connecting people and places, and leading coalitions of local trail groups and advocates. The literature demonstrates that these goals are warranted; there is a clear relationship between outdoor physical activity or outdoor service-based programs and positive impacts on students' lives. The type and level of involvement of Dartmouth students vary. For example, Dartmouth students can and have engaged with UVTA through TuckBuilds. Involvement can also happen through the Dartmouth Outing Club, or more informally through personal outreach to the UVTA. Thus, the possibilities for assessing outcomes of involvement with UVTA are large and diverse.

As a result, the UVTA's program director, Randy Richardson points out that although they have generally seen an increase in student involvement with the work that they do on trails, they currently have no robust way of understanding how and why students are engaging with UVTA. Most importantly, they have no way of assessing how the involvement with UVTA

positively impacts Dartmouth students, specifically with learning outcomes such as an increase in physical, mental, and social well-being.

METHODS

Our research will be primarily quantitative by nature, with the opportunity to also offer some qualitative data. We plan on using a survey for individuals who have engaged with UVTA (Appendix A & B). This survey will be administered through an accessible online platform. It will consist of mostly closed-ended questions, with an open-ended question that allows participants to share their experiences in a more personalized manner thus allowing for the opportunity for our study provide qualitative data as well. There is already robust and detailed literature that informs us of the positive effects that programs like UVTA, which encourage outdoor physical activity, have on young adults and adults. Therefore, we are not necessarily interested in proving that UVTA has a positive impact. Instead, we want to gather the specific positive outcomes and narratives relative to those that have participated with UVTA. We find that a survey will be more suitable for the UVTA's goals of presenting the different magnitudes of the positive impact of engaging with their programs.

There are various advantages to using survey research. Firstly, and most importantly, in the case of our research, surveys have the potential to be versatile and cost-efficient. They are able to cover a wide range of topics in a timely and personalized manner, something that is convenient for the UVTA. We will be able to craft our survey questions according to the specific interests of the UVTA. The simple versatility of a survey allows us to create different kinds of questions that will help us gauge an understanding of the UVTA participants. Furthermore, surveys are also an optimal option for generalizability. The survey itself can be implemented into

other groups or programs within or outside of the UVTA. For example, the UVTA's program director is interested in also measuring how similar programming through the Dartmouth Outing Club positively impact Dartmouth students. Although our current draft of the survey is specific to UVTA, with minor alterations in language, we expect that our surveys can be used for Dartmouth Outing Club related programs as well. More specifically, we intend to administer an online survey instead of a paper or telephone survey. We believe that an online survey will be less time-consuming and have higher response rates. It will also be easier to analyze once data is received.

We recognize that there are limitations to our preferred method. Surveys are oftentimes subject to response bias. If we as experimenters fail to construct a discrete survey, we risk being leading and receiving information that is not truly representative of honest responses. We expect that since the survey will be administered online, we will mitigate response bias to some extent since the participants will not feel pressed to answer a certain way from having us there. A different method like an interview can yield similar data to the one we're looking for, that is on the positive impacts of engagement with UVTA programs. However, this data will be qualitative and more complicated to dissect; it will be more time consuming, expensive, and overall less convenient for UVTA as the interview process requires more effort to execute and analyze. Additionally, even though the data that will come from the interview will be more useful for providing clear insight into the causal relationship between outdoor physical activity and its various positive impact on young adults and adults, per the literature and UVTA's goals, we do not need to prove this causal relationship.

Thus, for this study, the main independent variable is the amount of time a student spent engaging with the UVTA related programs. The dependent variable is the learning outcomes of

the students. We conceptualized UVTA participation as actual time spent engaging with UVTA in different styles or capacities for a certain amount of time. We conceptualized learning outcomes by identifying the different ways in which UVTA can impact a student (i.e. mental health, physical health, social skills). Our independent variable, time spent engaging with UVTA programs, will be operationalized according to how many hours a month the participant sees themselves engaging with partnered programs within the UVTA. Our dependent variable, UVTA's impact, will be operationalized by identifying the different indicators of changes in mental health, physical health, and social skills. Given that "learning outcomes" is very general and can encompass a wide range of topics, we find that the best way to measure learning outcomes for UVTA is through asking questions that prompt reflection on the different aspects of students' well-being. These indicators of health, academics, and social skills stand to be the most important aspects of a student's life and contributes to an expected overall positive result from engaging with UVTA.

Given that previous literature establishes a clear causal relationship, we do not wish to test the causal relationship between time spent engaging with UVTA and the positive learning outcomes. Instead, we are proposing a method that will generate the type of data that will help UVTA demonstrate the aforementioned causal link within their own programs specifically. This data will allow them to illustrate how effective their program is in regards to providing positive learning outcomes. This being so, our study will be primarily deductive, as our proposed method is linked to a hypothesis substantiated by the clear results of previous research. Additionally, our data is more quantitatively oriented aimed at gaging the degree to which existing factors appear rather than producing newly contented which would develop existing conclusions in the field

We will specifically study Dartmouth students who are involved with UVTA programs. In order to accomplish this, we will employ the use of non-probability sampling. Non-probability sampling will allow us to choose students that are appropriate and useful for our study. Since we anticipate not having a reliable and robust sampling frame of students that have engaged with UVTA in different ways, we will mostly rely on purposive and snowballing non-probability sampling. We believe that this will allow us to gather the largest and best sample size since we will be sampling in a subjective manner; specifically, one that will yield information that is just in line with the goals of the UVTA. This sampling method is advantageous for our research in that it is appropriate for analytical research that seeks to produce data in a quick and cost-efficient manner. We recognize that in proposing to employ non-probability sampling, certain groups/data may be excluded. However, we hope that this is a tradeoff that UVTA is willing to accept.

There are various options available in regard to our employment of purposive and snowballing non-probability sampling. We are aware that Dartmouth students are involved with UVTA in different ways through Tuck Builds, the Dartmouth Outing Club, and leisure hikes in the Upper Valley. Thus, we intend to reach out to both Tuck Builds and the Dartmouth Outing Club in order to get a potential list of names of students that have engaged with the UVTA partnered programming. We will then reach out to these students to both request their participation in the study and to refer us to other students that they know may have engaged with UVTA.

Our study will be a longitudinal panel study. We intend to survey different groups of students that have engaged with UVTA in different years or iterations of the programs. We would like to administer the online survey to every participant in our sample twice, before and

after engagement with UVTA. Administering the survey twice would be optimal as it will allow us to assess the different levels of mental, social, and physical levels that students are at before participating. As a result, it will provide us with a basis for comparison and accurate evaluation of the results of the post-engagement survey. Ideally and conventionally, the surveys would be administered right before engaging with a UVTA specific program and after engaging with them. However, for this specific research design, we propose that the different points at which the survey will be administered are flexible. This is because, given that involvement in the UVTA happens in so many different ways, and in certain situations in an inconsistent or informal manner, it would be difficult to follow the timeline for those two specific points of engagement. Therefore, we have crafted the surveys in a manner that is not only flexible enough to be administered to Dartmouth students that have engaged with UVTA to different capacities but also so that UVTA can use them according to how students engage.

We have fashioned our research methods to be specific to our research question, but also broad enough so as to apply to the general goals of the UVTA in general. We took this approach in hopes of maximizing the generalizability of our study; we hope that our study can serve as a blueprint for how to evaluate outcomes of other UVTA programs and at different times if needed. Along the same lines, validity is crucial for our study in light of the fact that we are studying the effects of UVTA on Dartmouth students and we are assuming that there is some type of relationship present, to begin with. In order to solidify this validity, our survey will contain questions intentionally fashioned to elicit information that relates directly to perceived improvements in health and the UVTA programs. Lastly, in order to ensure reliability, our research questions are fashioned to give us information to draw substantive conclusions by asking participants to speak to different aspects of their experience and well-being, but also

flexible enough (i.e. an open-ended question) so that participants can provide us with their input and are comfortable sharing their true opinions about their engagement with the program. This online survey itself is designed to take about 5-10 minutes to complete. It includes a range of closed-ended questions as well as one open-ended question with mostly nominal and interval-ratio variables. The survey is designed in this way in order to maximize response rates by providing a simple and straightforward experience for the participants.

Once we begin to receive data, there are various options for analysis and interpretations. Since the data will be quantitative, it will most likely be useful to use a statistical program such as STATA or R. Recoding and running the data through these programs, with the appropriate commands, will provide the UVTA with models (graphs, correlations, regressions, etc) that are able to show possible correlations and their strength between the independent and dependent variables. Additionally, in order to handle the qualitative information from the open-ended question, there would need to be a consistent coding scheme; the process for analysis here would look similar to that of coding an interview but on a much smaller scale. This analysis of the data will offer the UVTA with an approachable manner to keep track of and present the positive effects of their programs. As a result, the UVTA will have accessible data to answer their particular research question. Given that recent literature establishes an association between physical outdoor activity and positive mental, social, physical and academic outcomes, we are hopeful that the data will offer support for UVTA programs that Dartmouth students are involved with. That is, it will show that students that engage with UVTA an increased mental, physical and social well-being spectrum.

It will be beneficial to conduct this type of research design because the UVTA is geographically-specific to the Upper Valley and is interested in discovering how their program is

affecting specifically Dartmouth undergraduate and graduate students. Thus, our research design will focus on the UVTA's goals by giving them their own personal data on Dartmouth students that they can use for their own benefits and implement throughout some of their other programs. However, one of the current weaknesses of our method is that we do not know the timeline of when Dartmouth students participate and have participated in UVTA programs. Therefore, we are unable to administer a pre-survey. The pre-survey would essentially provide us with data on the participants' baseline well-being before going into the UVTA. This would allow us to analyze the participants beforehand. We see this as a significant issue given that we only receive data on participants after they have gone through the UVTA, and as a result, we do not know if the outcomes stem from the UVTA or other factors related to the respondent's' personal lifestyle.

ETHICAL CONSIDERATIONS

The Belmont Report states three ethical principles that act as basic guidelines to assist in resolving the ethical problems that may arise in conducting research with human subjects. The first principle, respect for persons, states that individuals should be treated autonomously, and we must respect individuals with diminished autonomy, who are entitled to protection. Our study takes this into account since the survey will be confidential. We will need participants' information on the individual level to link pre- and post-survey, however, after all, waves of data have been collected and analyzed, we will be able to remove personal identifiers -- we are more interested in the quantitative data rather than personal identifiers. We will thus inform and ensure the participants of this before participants. The second principle, beneficence, states that we must not harm our participants in any way and we must maximize the possible benefits and minimize the potential harms. Though our survey touches on a few sensitive topics, there are very few

harms associated with our study because we are not looking to use participant's personal information in the narrative form in our data, we are only looking for numerical data. Further, we intend to inform the participants that even if they have had a negative experience with the UVTA, there will be no way to connect those experiences back to them. The last principle, justice, defines how burdens and benefits should be distributed based on the basic principle that all individuals should be treated equally. Further, justice demands that the selection of research subjects must be analyzed to determine that there aren't any selection biases in terms of class, race, gender, etc. – must be accessible to all and must be systematically selected. This will not be a problem for our study given that our ideal participant is anybody that has interacted with the UVTA, regardless of their class, race or gender.

FEASIBILITY AND SIGNIFICANCE

Randy Richardson, a faculty member of the UVTA, has expressed the shared concern of the organization in regard to the effective assessment and accomplishment of both their goals and consequential learning outcomes of general engagement with UVTA programs. In seeking to address these concerns our study provides not only an extrapolation of potential learning outcomes from the types of activities provided by the UVTA but also provides a means of accessing the presence of these outcomes in connections to UVTA programs specifically.

The implementation of our established project would allow participants to self-report perceived benefits as they align with the findings of the literature, by participating in a pre and post survey which would gauge the different dimensions of learning outcomes and the degree to which these outcomes were experienced by participants. This method is low cost, time efficient, and does not require resources or high levels of sociological expertise in its interpretation.

Additionally, this survey could be easily incorporated into existing UVTA programs at the times of entrance and exit of participants.

While our referenced literature establishes strong connections between the activities sponsored by the UVTA and positive outcomes, there is an obvious need for the application of these findings to not only the specific programs of the UVTA but the specific participants as well to fully integrate these conclusions into a body which the UVTA could use to present to donors. In attempting to attain as much data as possible in these regards, our project sacrifices some detail for generalizability across a number of the UVTA programs so that we might assess broadly the effectiveness of the UVTA as a whole. This, however, could be addressed by further work, as suggested by Randy, which would incorporate qualitative data obtained by in-depth interviews of participants in regard to their more immediate responses to their participation.

In all, this assessment of the UVTA's learning outcomes amongst its participants is significant in that it links multiple studies of various aspects of well-being into a single framework which will be used to more holistically analyze how certain projects and activities can be experiences of both learning and development upon multiple levels while simultaneously providing skills which can transfer to social and academic environments. Being able to gauge mental, physical, social and academic benefits individually will allow for an in-depth look at the takeaways which participants receive from their interaction with the UVTA and certain activities in general. While literature shows that certain benefits result from the activities of the UVTA little work exists which connects these multiple benefits to each other. Ultimately this study hopes to provide a basis for the importance of such programs as the UVTA which are underrepresented in contemporary educational institutions while also providing an impetus for

the expansion and further development of programs which would provide students with skills that they would not receive in traditional learning environments.

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APPENDICES

Appendix A

You are invited to participate in a web-based online survey on student's learning outcomes. This is a research project being conducted by the Upper Valley Trails Alliance, an organization that promotes education, outreach, and stewardship in the Upper Valley. It should take less than 5 minutes to complete. Your participation in this survey is voluntary. You may refuse to take part in the research or exit the survey at any time without penalty. You are free to decline to answer any question you do not wish to answer for any reason. Your answers to this survey will be kept confidential and if they are used in survey data, there will be no way to connect your responses back to your identity.

UVTA Survey (Pre-Program Participation)

1. Have you interacted with the UVTA (Upper Valley Trails Alliance) before?
 - a. Yes
 - b. No

2. If you answered yes to the previous question, how often do you interact with the UVTA?
 - a. Never
 - b. Rarely (A few times a year)
 - c. Sometimes (~once a month)
 - d. Often (~once a week)
 - e. All the time (multiple times a week)

3. What program will you be participating in?
 - a. Passport to Winter Fun
 - b. Tuck Builds
 - c. Outdoor Odyssey High School Trail Corps
 - d. Dartmouth College related UVTA Program
 - e. Other UVTA involvement: (enter the name if applicable)

4. If a Dartmouth College related UVTA program, please specify which: (enter name)

5. Considering your age, how would you describe your physical health?
 - a. Poor
 - b. Fair
 - c. Good
 - d. Very good
 - e. Great

6. Considering your age, how would you describe your mental health?
 - a. Poor
 - b. Fair
 - c. Good
 - d. Very good
 - e. Great

7. How satisfied are you with the current state of your social life?
 - a. Very satisfied
 - b. Somewhat satisfied
 - c. Indifferent
 - d. Somewhat dissatisfied
 - e. Very dissatisfied

8. How satisfied are you with the current state of your academic life?
 - a. Very satisfied
 - b. Somewhat satisfied
 - c. Indifferent
 - d. Somewhat dissatisfied
 - e. Very dissatisfied

Appendix B

UVTA Survey (Post-Program Participation)

1. Which UVTA program did you participate in?
 - a. Passport to Winter Fun
 - b. Tuck Builds
 - c. Outdoor Odyssey High School Trail Corps
 - d. Dartmouth College related UVTA Program
 - e. Other UVTA involvement (enter name)

2. If Dartmouth College related UVTA Program, please specify which: (enter name)

3. How would you rate your experience participating in this program?
 - a. Poor
 - b. Fair
 - c. Good
 - d. Very good
 - e. Great

4. Considering your age, how would you describe your physical health?
 - a. Poor
 - b. Fair
 - c. Good
 - d. Very good
 - e. Great

5. Considering your age, how would you describe your mental health?
 - a. Poor
 - b. Fair
 - c. Good
 - d. Very good
 - e. Great

6. How satisfied are you with the current state of your social life?
 - a. Very satisfied
 - b. Somewhat satisfied
 - c. Indifferent
 - d. Somewhat dissatisfied
 - e. Very dissatisfied

7. How satisfied are you with the current state of your academic life?
 - a. Very satisfied
 - b. Somewhat satisfied
 - c. Indifferent
 - d. Somewhat dissatisfied
 - e. Very dissatisfied

8. How strong of an impact do you think your participation in the UVTA program has had on your:
 - a. Physical health?
 1. Large impact
 2. Somewhat of an impact
 3. Indifferent
 4. Little impact
 5. No impact
 - b. B. Mental health?
 1. Large impact
 2. Somewhat of an impact
 3. Indifferent
 4. Little impact
 5. No impact
 - c. C. Social life?
 1. Large impact
 2. Somewhat of an impact
 3. Indifferent
 4. Little impact
 5. No impact
 - d. D. Academic life?
 - i. Large impact
 - ii. Somewhat of an impact
 - iii. Indifferent
 - iv. Little impact
 - v. No impact

9. Are there any other reflections, thoughts, comments about how your experience with UVTA has affected any above categories: (enter)