

## Investigating the Effect of Trails on Mental Health Outcomes

Community Partner: Upper Valley Trails Alliance

Nigel Alexander

Darryl Avery

Andrew Lemkuil

Aaron Svendsen

Momi Tolentino

Soc 11: Research Methods

Dartmouth College

## Literature Review

Mental health is a topic of discussion that has gained significant popularity in the last few decades. Previous to current times, mental health and the personal issues that arose because of poor mental health was almost taboo. In the unlikely event that someone spoke up about the struggles they were enduring in relation to their mental health, that person was often looked down upon, avoided, or in extreme circumstances, exiled from communities in which they made their home. Though this was not common practice in every setting, the stigma surrounding mental health as well as speaking up and out about mental health was not widely performed or accepted. In today's day and age, the stigma around mental health and mental illnesses is seen at a lesser degree because there has been more conversations as well as more acceptance of people who struggle with it. This acceptance gave way to more awareness and action in stigmatized and unstigmatized communities for combating certain issues. Over time, people discovered that not everyone who struggles with poor mental health or mental illnesses benefits from the same intervention, coping mechanism, or treatment, thus the literature surrounding mental health has expanded immensely over the next few years.

On a national level, a large portion of the U.S. population struggles with poor mental health. Statistics gathered and analyzed by the World Health Organization in 2014 reveal that every 1 in 5 adults has a mental health condition, adding up to almost 40 million American citizens. Furthermore, over 1.7 million of America's youth with major depressive episodes currently lack the resources to obtain treatment for their conditions (WHO 2014). These statistics reveal that there is a huge unmet need in the mental health community not only for adults but also for children and that more attentions needs to be paid in addressing these mental health conditions through various methods. Since so many methods

According to the World Health Organization (WHO), health is defined as the state of being physically, mentally, and socially well and not necessarily the state of existing in the absence of disease or illness. Additionally, they go on to state that mental health is defined by three criteria: the ability for an individual to recognize his or her own potential, cope with the stresses or day to day life, as well as function efficiently and provide contributions to his or her community (WHO 2014). In order to combat mental health issues, researchers, clinicians, physicians and the like have offered up interventions, treatments and action plans that they believe are the most effective. Because mental health as a concept is so robust and has a number of nuances like the degree to which someone is struggling with their mental health as well as the feasibility of certain options used to combat those issues. That being said, the mental health arena is extremely large and there have been significant studies and experiments that have been carried out in relation to what is the best method for alleviating, or even eliminating, mental health stressors. Research suggests the some of the best options for alleviating stressors and illnesses associated with mental health include lifestyle modifications.

### Exercise for Mental Health

Majority of the literature that analyzes the link between exercise and mental health posits that exercise has had significant positive effects on improvement of mental health outcomes. One meta-analysis conducted by Guskowska help to confirm that those who suffer from serious disorders or conditions often benefit the most from lifestyle behavioral changes like exercise because there is more for improvement. The study looked to compile data from a number of similar studies to find a general consensus on the effect of exercise on mental health outcomes. This allowed researchers to see who benefitted most from lifestyle modifications like exercise as well as how effective these changes were on a larger scale (Guskowska 2004)

In a study conducted in 2014, researchers Wolf and Wohlfart looked to carry out a multidisciplinary assessment of the health and wellbeing benefits linked to walking, hiking, and running in Australian parks. Through the use of survey-data and GPS tracking, researchers were able to see that those who were hiking through the parks experienced higher energy expenditure levels than those who were merely socializing or casually strolling, however, they noted that more casual activities like the latter should not be discredited for their positive effects on health. They utilized this idea of public green spaces, which encompass any space out in nature that is used by the public for recreational or leisure activities in order to further categorize their results. Their study revealed that being out in public green spaces can allow people to distance themselves from stressful situations or routines to re-energize and re-center themselves (Wolf 2014).

### Nature for Mental Health

Nature in general has proven to be a viable option for improving quality of life for those who engage in that space. For example, within Hawaiian communities, nature is pivotal to their way of living and the amount of time spent in and appreciating nature can affect a person's overall health and well-being. Research on the link between nature and mental health outcomes is not as developed as other topics and methodologies, however, there are few pieces of literature that can be used to reinforce the notion that exposure to nature can have a positive effect on mental health outcomes.

In a 2015 study conducted in Canada, a group of researchers wanted to analyze the effects of interaction of older adults with nature in order to prove that exposure to nature and natural outdoor settings can have a positive effect and play an influential role in the improvements of quality of life for older adults ages 65-86 (Finlay et. al 2015). They looked to monitor a person's self-rated quality of life before and after an encounter, or in some cases a few

encounters, with mental health. The study solidified the notion that landscapes in nature are often can provide improvements to the physical, mental, and social health and well-being of older adults (Finlay et. al 2015).

In order to solidify this idea that nature as a setting has a significant impact on improving mental health outcomes, we decided to look for literature that echoed that notion. In a study conducted in 2013, researcher Mitchell conducted a study that looked at interactions of those with poor mental health with non-natural environments to natural environments, ofentimes referred to as Green Spaces. Mitchell used the findings from his study to conclude that physical activity carried out in natural environments as opposed to non-natural environments caused a larger decrease in the risk for poor mental health outcomes. Furthermore, he posited that natural environments used for improving mental health outcomes through risk reduction should be protected at all costs and should be utilized more often in mental health interventions (Mitchell 2013).

By looking at the relationships between exercise for mental health as well as nature for mental health, we were attempting to understand and analyze two seemingly mutually exclusive entities (exercise and nature) in order to fill a gap in the literature. For the purposes of our research, we wanted to analyze the link between trail building and trail use, however, there was little to no literature that looked at that direct link. In a way, we operationalized this idea of trails, both maintenance and use, utilizing exercise and nature. By looking at these two categories, we hope to make some inferences and generalizations on the effectiveness of trails for improving mental health outcomes. The current literature helps to support our claim because each pillar of the current research shows that both exercising or being in nature as having positive effects on mental health outcomes. Our research hopes to fill a gap in the literature because trails are

extremely important to not only those who struggle with mental health or mental illnesses but also the Upper Valley in general.

The Upper Valley community has always been known for its lush greenery, dense forests, and the trails that interconnect and exist within those spaces. Trails are something that very much define the community that we live in, at least in Hanover. Institutions like Dartmouth College and Hanover High are located in an area surrounded by nature; they both offer up programs that allow students to get involved in outdoor recreational activities. This urge to participate in outdoor activities is something that defines the Hanover area but also the Upper Valley as a whole.

The Upper Valley Trails Alliance, which is our community partner for this program, has worked with the Dartmouth Outing Club to not only encourage usage and continued maintenance of trails but also to improve the quality of life for generations to come. The organization is committed to providing a resource for community members to utilize to find and use trails in the area at their leisure or for organized events.

### **Research Question**

The study at hand looks to investigate the relationship between trails (building and use) to improvement of mental health outcomes to find some association within the two. The literature discussed previously creates a basis of understanding on what is available on the effects of exercise and exposure to nature on mental health outcomes, however, as discussed previously, it reveals a gap in the literature that will be filled through the implementation of this study. Because of our methodology and structure of our proposal, we are looking to investigate association as opposed to a causal relationship.

### **Methods**

The primary tool utilized for this study will be a single survey, which UVTA will analyze quantitatively. UVTA will distribute surveys to respondents who use trails in the Upper Valley or who have participated in UVTA trail-based programs. The surveys will be delivered digitally via email or in person via a paper copy, whichever is more feasible and convenient at the time.

The independent variables, trail building/use, and the dependent variable mental health will be operationalized in a series of survey questions. Trail-use is defined as any physical activity which takes places on trails (e.g. hiking, running, bike-riding, trail-building etc.) Trial-use will be indicated by the amount of times participants have spent on trails in the last year. Special attention will be given to distinguishing trail-building and other forms of trial-use since UVTA has their own trail-building programs. Mental health will be measured by asking respondents about their perceived mental health on a scale of 1 to 5 and totaling all the results of each question for a total score between 3 and 15. Participants with higher scores will be considered to have better mental health.

We believe that there is a casual relationship between trail building/use and improved mental health, however the constraints of our research methods which will be discussed in more detail thorough the powrepoint will help us focus more solely on establishing an association between trail-use and mental health. While our research won't be able to fully prove causality, it could provide some evidence for correlation through the survey questions by building a quantitative relationship between trails and mental health.

These methods lend themselves to a deductive approach. As explained in the literature review, a vast amount research already exists supporting the positive benefits of exercise and outdoor activity. However, few studies address these exercises in the context of hiking, and more specifically trail-building. Therefore, this study will apply existing literature to the unique combination of elements which make up various forms of trail-use. In other words, this study

will connect known literature on exercise and well-being to UVTA's programs. We chose a deductive quantitative method for that reason. We are not trying to develop a new theory with qualitative research. Instead we want to strengthen pre-existing well-established theoretical frameworks which show that exercise and exposure to nature improves mental health and use a quantitative approach to test whether this relationship is also found in trail-use.

We also want to give UVTA the most useful information possible which will help UVTA in their organizational goals. Inductive research could open up new questions to be studied, however they would not be able to provide a link between UVTA's programs and mental health. Creating this connection is essential in demonstrating the value in UVTA's work.

Surveys were chosen for several reasons. UVTA operates under a number of constraints: limited funding, limited man-power, limited access, and limited expertise. These constraints influenced every aspect of our design. Since funding and time are major constraints for UVTA, more expensive and time-consuming research methods would be unrealistic. Surveys offer a cheap and well-tested method for establishing connections between variables such as UVTA's trail programs and possible health outcomes.

UVTA will use written and electronic surveys. Other methods that could build quantitative data including experiments or extensive observational field research could also address this topic in a quantitative manner (e.g. a controlled study about UVTA's High school trails program, or observational research on UVTA maintained trails). However, these approaches require more time, manpower, money, and expertise to execute. Therefore, they would be out of UVTA's reach.

Surveys are inexpensive and time-effective in comparison. Written and electronic surveys were chosen over face-to-face surveys and phone surveys for several reasons. UVTA programs affect a small population which is limited to the Upper-Valley region of New Hampshire and

Vermont. UVTA is also closely connected to the population they want to survey, namely people using their programs and trails. Therefore, UVTA can distribute these surveys during the programs that they operate without adding an extra financial burden. Written and electronic surveys can be given directly to our relevant respondents.

Therefore, the possible advantages of online and phone surveys are limited compared to their cost. Written surveys will have some limitations. Since our study will be non-probabilistic, the results will be less generalizable. Written surveys also have the disadvantage compared to online surveys that researchers must enter the data manually. However, since the sample size will be relatively small (fewer than 200 respondents), this doesn't present a large disadvantage. It will also take time to hand out surveys. However, since UVTA is active in trail maintenance, the cost should be minimal.

We will be focusing on studying local residents in varying age groups to encompass the feel of the whole community. Generally, the age groups would be split into three parts, We plan to use non-probability sampling for this study with convenience or snowball sampling as our primary sampling technique. This is appropriate since it would be difficult to guarantee everyone in the population has equal opportunity for selection as a subject. Non-probability sampling via convenience or snowballing is the most effective and cost-efficient way to reach our target population. As previously stated, a disadvantage of our potential method is that through this, our generalization will be restricted. Our sample is also more likely to be biased and we will not be able to determine representativeness via this method. Also, aforementioned, the benefit of non-probability sampling via convenience or snowballing is that it is vastly more cost-efficient and time efficient. These methods are best suited for our predicted timeframe and will be most effective.

We plan to gather our participants via references from our community partner as we recognize there are a number of databases that UVTA as well as other community organizations has on trail use and maintenance. We will inform our participants that they are participating in a survey study on their perceived overall health. This information will be conveyed via on paper as well as in person depending on the decided canvassing technique. We will use verbal consent and supervised participation to ensure participation in the study.

This will be a cross-sectional study as we will be assessing our research question at one point in time throughout different types of groups. We predict to collect data at differing trail heads as well as canvassing local high schools.

Our study will have low generalizability due our sample being a non-probability sampling but will have high reliability since the survey is self-reported by participants. The validity of our study may be low due to misinterpreted questions or false answers. Since mental health is a sensitive topic, respondents may be embarrassed or disappointed in themselves to answer truthfully. Therefore, we maximized the validity in our study by starting the survey with basic questions to ease the respondent in. These general questions will make the respondent feel more comfortable while taking the survey, so they will be more likely to answer truthfully. The questions at the end of the survey will be more specific and personal, so hopefully by the time the respondent has reached those questions, they will be comfortable to answer truthfully.

Stated above, the research instrument for the UVTA is a digital survey via email or a paper-copy survey deliverable in person. The surveys will be sent out on a weekly basis to users of the trails, and each survey should take respondents 5-10 minutes to complete. The survey will also be stringent upon confidentiality as survey answers will only be seen by the research team at the Upper Valley Trails Alliance. Surveys are also anonymous, and respondents are not required to provide their name. There will also be a consent form at the beginning of the survey which

will allow respondents to read what kind of study the UVTA will be doing and why they are doing it. This way, respondents will be able to make a decision on whether or not they would like to participate in the study. Our observations will focus on what people say. Therefore, we have to be careful about our data being susceptible to reactive measurement effects. We will be observing the differences and changes in the answers of our survey questions of individuals who regularly use trails in the Upper Valley.

The data from our survey will be answers to questions surrounding reactions to natural environment, and physical health, and their effect on mental health. Based on the results, our community partner can generalize this info to be used to determine whether or not trail usage will positively affect mental health. For example, if the data shows that an increased amount of physical exercise and exposure to nature lead to better mental health, he will be able to show that trail use will also have a positive impact on mental health, being that trail building and use are an intersection between exposure to nature as well as physical exercise. This data can then be presented to different health organizations in New Hampshire in order to persuade them to give more funding. Our hypothesis is that an increased exposure to nature and an increased amount of physical exercise will lead to higher mental health. There is already data that shows that physical exercise will lead to increased mental health, and that exposure to nature has positive effects on mental health. If this data holds true in our survey, it will be an effective way to show that trails should be maintained and utilized in order to maintain good mental health.

We decided to use a survey primarily due to its ability to reach a large group of people and be cost effective. We understand that the UVTA has limited resources, and we did not want to use too many resources in our study. A survey has the ability to reach a large group of people, which is necessary for providing a large amount of data in order to strengthen the case for UVTA when they are petitioning for funds. Weaknesses that we can encounter include is low internal

validity as well as reactive measurement effects. It will be difficult to rule out other variables that lead to their evaluation of mental health in our surveys. In addition, some people will possibly try to portray themselves in a better light simply because they are answering the survey and want to be seen better. A way that we might combat this is by holding an anonymous survey which would take away some of these reactive measurement effects.

### **Ethical Considerations**

The survey that we are conducting will be asking persons to release their personal information, by answering questions pertaining to their physical and mental health. The most pertinent ethical issue that we have to be aware of is misuse of personal information. The information that the people who participate in our survey should only be seen and interpreted by those conducting the survey. This falls under beneficence in the Belmont report, because we have to protect them from harm by ensuring that their personal information is kept secure and not accessed by the general public. There are not any benefits that will come from this research, so justice will not be a factor. When it comes to respect for persons, we are giving each person the same survey, which is voluntary, so each person has a choice as to whether or not they will complete the survey.

In order to ensure that each person's information is protected, we will be conducting an anonymous survey. While we will still have data collected from each person, we will not be aware of who the data comes from, only the age and location of the person being surveyed. This will protect the persons from any type of negative impact that could come from a leak in data.

In addition to this, we will ensure that each person is voluntarily participating in this survey, by first providing them with an informed consent sheet that will make the person aware of the survey they are about to participate in. In addition, we will provide an information sheet providing data about the Upper Valley Trails Alliance, and what the data from this survey will be

used for. This will ensure that the subjects are fully knowledgeable of the survey that they are about to undertake.

### **Feasibility and Significance**

When doing background research on our community partner we found that their mission was to increase the well-being, mental health, and physical health of people through trail building and trail maintenance around the Upper Valley. The Upper Valley Trails Alliance (UVTA) advocates for the use, maintenance and development of trails in the region through education, outreach & stewardship to promote active lifestyles and mental health through trail use, connect people and places from these trails, and lead a partnership with local trail groups and trail-building advocates. After meeting with our community partner in class, we had a better understanding of our role in helping to accomplish these goals. Our role is to research and provide data that shows the benefits of trail building, so that donors will fund UVTA projects. We decided that the best way to do this was by showing the positive mental health effects that trail building had on individuals.

Our proposed experiment design is a single survey which will be distributed both in person and digitally via email to individuals who use the trails in the Upper Valley and individuals who have participated in UVTA trail-based programs. This experiment design is feasible because it allows us to send surveys to a large number of people, and our community partner is requiring for us to reach a database of 25-30 thousand people. Since one of the UVTA's goal is to be closely connected with the community, the study being conducted will be a non-probabilistic sample. The survey that we have designed will facilitate our community partner's goals by providing survey data from individuals who directly use the hiking trails in the Upper Valley.

Since studying the well-being of an individual is subjective, the data can only come from the subject itself. There is no way to observe an individual's well-being or mental health just from observations. The data comes from the individual's responses to how they are feeling emotionally and physically. Therefore, a survey-based experiment is the best method to use to provide data for our community partner. The survey will also allow us to translate these subjective questions and answers into quantitative data that our community partner can analyze and come to conclusions based on the survey results.

This research is significant academically and practically because it provides data to an area of study that has not been researched extensively. Although there is a large quantity of data supporting the positive benefits physical activity and outdoor activity, there is not much data to support the mental health benefits of hiking trails specifically. Some of the positive benefits from the existing literature on physical activity will definitely apply to our study, however our surveys, which will specifically study the effects of hiking trails, may provide new insights and build on existing data.

The data from our surveys is significant academically because it will provide our community partner with data that is limited in the academic world. The data that will be acquired from this study will be specific to trail building through activities such as hiking. Once this data is acquired, the UVTA will be able to use it to directly present these findings to possible funders for their projects. Our study will be significant practically because the UVTA's ultimate goal is to solidify sustained funders to promote their projects. With more funding, the UVTA will be able to provide people who suffer from mental health issues or other disabilities with programs through trail-building that will increase their well-being.

## Appendix

### UVTA Consent Form for Survey

You are invited to participate in a web-based online survey on the effects of physical exercise and exposure to nature on mental health. This is a research project being conducted by the Upper Valley Trails Alliance. It should take approximately ten minutes to complete

#### Participation

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 particular question you do not wish to answer for any reason.

#### Benefits

You will receive no direct benefits from participating in this research study. However, your responses may help us learn more about how trail usage and trail building can affect mental health.

#### Risks

There are no foreseeable risks involved in participating in this study other than those encountered in day-to-day life.

OR

There is the risk that you may find some of the questions to be sensitive.

OR

There is the risk that some questions may cause emotional discomfort.

OR

Some of the survey questions ask about mental health and may be distressing to you as you think about your experiences.

OR

The possible risks or discomforts of the study are minimal.

### Confidentiality

For confidentiality reasons, your survey answers will only be seen by the researcher at the Upper Valley Trails Alliance. In addition, the surveys are anonymous, and you are not required to provide your name. Therefore, your responses will remain anonymous. No one will be able to identify you or your answers, and no one will know whether or not you participated in the study.

### Contact

If you have questions at any time about the study or the procedures, you may contact my research supervisor.

If you feel you have not been treated according to the descriptions in this form, or that your rights as a participant in research have not been honored during the course of this project, or you have any questions, concerns, or complaints that you wish to address to someone other than the investigator, you may contact the Upper Valley Trails Alliance. CONSENT: Please select your choice below. You may print a copy of this consent form for your records. Checking the agree circle means you are fully willing to participate in this study.

Please check the circle as it applies:

- You have read the above information
- You voluntarily agree to participate

- o You are 18 years of age or older or you have consent from a parent or guardian
- o Agree
- o Disagree

### **Upper Valley Trails Alliance Survey**

§ What would you rate your physical health on a scale from poor to excellent?

- o Poor
- o Fair
- o Good
- o Very Good
- o Excellent

§ What would you rate your overall mental health on a scale from poor to excellent?

- o Poor
- o Fair
- o Good
- o Very Good
- o Excellent

§ What would you rate your mental health on a scale from poor to excellent?

- o Poor
- o Fair
- o Good
- o Very Good
- o Excellent

§ On, average, how many hours do you spend outdoors a week?

- >1 (less than one)
- 1-2
- 3-4
- 5-6
- 7-8

§ Do you think that being in nature helps you relax?

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

§ How do you feel after spending time in nature?

§ Physical activity in nature will improve my overall well-being

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

§ How many hikes or other trail activities do you go for in an average year?

- 0 hikes
- 1-3 hikes
- 4-10 hikes
- 10-20 hikes
- 21+ hikes

Have you worked on a trail building team in the last year?

- Yes
- No

§ Are you aware of your local trail organization?

o Check one answer:

- Yes
- No

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