

A STUDY OF THE BARRIERS TO OUTDOOR PHYSICAL ACTIVITY IN

MARYVILLE COLLEGE STUDENTS

A Report of a Senior Study

by

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ABSTRACT

There are numerous mental and physical health benefits to outdoor physical activity (PA). Outdoor PA participation has declined over recent years especially in college students. The purpose of this study was to evaluate the barriers to outdoor physical activity in college students on Maryville College Campus. Participants were 102 Maryville College students that reported their current outdoor behaviors, affinity to nature, barriers from engaging in outdoor PA, and awareness of outdoor programming on campus. Participants reported engaging in outdoor PA 356.4 ± 435.0 min per week while the majority of participants reported high affinities for nature. The majority of participants (89.1%) reported that they enjoy being outdoors. The two highest reported barriers to outdoor PA were lack of time (46.2%) and weather (39.0%). Flyers were the highest reported advertisement tool for Mountain Challenge programming (56%). Results also showed that participants with a higher affinity to nature spend more time each week outdoors in comparison to participants who reported low affinities to nature. Current exercise behaviors show that MC students engage in above average outdoor PA time; however, programming can be developed to combat barriers to outdoor PA such as time and weather. Future studies can evaluate outdoor participation barriers based on gender and perceived physical ability.

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CHAPTER I:

INTRODUCTION

American adults require 150 min/week of moderate-intensity physical activity (PA) to promote health and wellness according to the Physical Activity Guidelines for Americans (Center for Disease Control and Prevention [CDC], 2018). Regular moderate exercise is beneficial because it decreases the risk of numerous physical and mental illnesses. According to the U.S. Department of Health and Human Services, more than half of adults are not active enough (CDC, 2008). Research has shown that people who regularly engage in physical activity tend to be healthier and live longer lives (Hug, Hansmann, Krütli, & Seeland, 2008). Most Americans do not engage in the adequate amount of physical activity (CDC, 2008); therefore, many Americans are suffering from various negative health outcomes such as obesity, unhealthy levels of blood glucose and insulin, heart disease, and more (Owen et al., 2012). Specifically, reports from the Office of Disease Prevention and Health Promotion [ODPHP] show that 21.5% of traditional college students—ages 18-24 years old—are engaging in no form of leisure time physical activity (2017) and are far too sedentary in their day-to-day lifestyles. A study that researched the effects of sedentary time found that decreasing or at least breaking up

sedentary time with some sort of movement could help minimize the harmful physiological effects of being sedentary (Stephens et al., 2011).

Furthermore, most people tend to live highly sedentary lifestyles that are most often spent indoors. Due to this type of lifestyle, depression, anxiety, and stress have become a common mental issues from which many people suffer (Pretty, Peacock, Sellens, & Griffin). To combat lifestyle related physical and mental illnesses, exercise that takes place specifically in an outdoor environment has shown to have important benefits on physical and mental health (Pretty, Peacock, Sellens, & Griffin, 2005). Due to the decrease in outdoor recreation, people are not obtaining the numerous health benefits that outdoor workouts provide (Andre, Williams, Schwartz, Bullard, 2017). Most people live in urban environments and are not spending adequate amounts of time in nature (Andre, Williams, Schwartz, Bullard, 2017). Increasing outdoor fitness would be beneficial because it increases PA while also allowing people to obtain the benefits of being outdoors. Since studies have shown that outdoor physical activity boosts mental health and mood while decreasing stress levels (Hug, Hansmann, Monn, Krütli, & Seeland, 2008), it is apparent that people who engage in outdoor workouts (green exercise) are likely to attain the necessary amount of physical activity while also obtaining the mental and physiological benefits that green exercise specifically provides.

Moreover, there are many benefits to outdoor or green exercise. A study performed in 2005 tested how people respond to a variety of workout environments (Pretty, Peacock, Sellens, & Griffin). The researchers exposed the participants to various types of scenes while they were running on a treadmill in a laboratory setting. The results showed that overall there were significant decreases in blood pressure for each of the

scenes which supports the claim that in general, moderate intensity physical activity is physiologically beneficial (Pretty, Peacock, Sellens, & Griffin, 2005). However, the researchers found that the participants who viewed rural, pleasant scenes during their workout had the greatest decreases in blood pressure (Pretty, Peacock, Sellens, & Griffin, 2005). These findings show the benefits of even just viewing the outdoors while being physically active and its positive effect on the body.

Furthermore, studies have been performed to specifically test the difference in benefits between indoor and outdoor physical activity. One study in particular looked at the effects of an indoor walking workout and compared it to forest walking (Selhub & Logan, 2012). The researchers found that participants who engaged in forest walking had lower blood pressure and cortisol levels in comparison to the participants who engaged in an indoor walking workout (Selhub & Logan, 2012). Moreover, the participants who walked in the forest setting reported having a more elevated mood and felt less fatigued in comparison to the participants who walked indoors (Selhub & Logan, 2012). Similarly, the same researchers evaluated runners and compared runners who ran outside in a green, forest setting to those who ran indoors on a treadmill. The research showed that the participants who ran in outdoor settings felt less anxious and less fatigued than the runners who ran in an indoor setting (Selhub & Logan, 2012). Also, a study performed on middle school students found that middle schoolers who engaged in regular hiking activities had favorable health outcomes in comparison to middle schoolers who did not hike or engage in an outdoor physical activity (Drăgoi, 2014). This study established that hiking is a beneficial activity for growing adolescents to partake in regularly. Overall,

these and many other studies show how green exercise is more beneficial for the body than exercise performed indoors.

Furthermore, there are numerous mental and emotional benefits of outdoor physical activity. The authors of a study performed in South Korea in 2017 concluded that regular forest walking decreases depression and promotes relaxation in college students (Bang et al.). The study consisted of a control group and then an experimental group of college students who agreed to engage in a forest walking program. The results showed that the experimental group had better physical activity, eating habits, stress management, and spiritual growth scores in comparison to the control group (Bang et al. 2017). This study promotes the benefits of green exercise in various areas of wellness including mental, physical, and emotional wellness. Additionally, a literature review showed that the presence of living things makes people feel better (Pretty, 2004). Natural spaces have been shown to help provide relaxation and stress relief (Pretty, 2004). Some more specific restorative mental health effects obtained from green exercise are decreases in stress, mental fogging, worry of everyday hassles, and a perceived increase in physical wellbeing (Hug, Hansmann, Monn, Krütli, & Seeland, 2008). Also, participants in the study chose to exercise more in an outdoor environment than a traditional indoor gym setting (Hug, Hansmann, Monn, Krütli, & Seeland, 2008). This is beneficial for all people—not just people with diagnosed illnesses. Also, in a study that examined the cognitive function of children in different environments, the children who lived with nearby access to green spaces reported a higher cognitive functioning (Pretty, 2004). The exercise with views of the outdoors also boosted people’s self-esteem and self-confidence (Pretty, Peacock, Sellens, & Griffin, 2005). This could mean that green exercise enhances

mood and self-value more than physical activity done without access to nature. These mental health benefits combined with the physical health benefits of exercise make outdoor fitness essential.

According to the Outdoor Industry Association, in 2018, many people chose to not engage in outdoor physical activity. Their reports showed that 51% of the US population ages six and above did not engage in any type of physical activity in 2018 (Outdoor Industry Association). Regarding the other 49%, this group only engaged in at least one outdoor activity in 2018 (Outdoor Industry Association). Furthermore, according to the research done by the Outdoor Industry Association, adults who were exposed to the outdoors as children were more likely to engage in some type of outdoor activity throughout their lives (2018). This gross lack of involvement in the outdoors could be due to various reasons.

First, a barrier to engaging in green exercise could be accessibility. The University of Oregon built an outdoor playground and made it accessible to their faculty, staff, and students to engage in outdoor PA and to also see how many people would use the area (Cameron, 2018). The author concluded that students and staff opted for the outdoor fitness area over the indoor fitness even on days when it rained (Cameron, 2018). This is an example of an outdoor fitness area that was provided and utilized by the surrounding community. Another barrier to outdoor physical activity could be weather. According to a study done to measure the effect of environmental factors on outdoor PA, trail user counts were lower in extreme cold temperatures and also warm temperatures when over the temperature of 84-degrees Fahrenheit (Wolff & Fitzhugh, 2011). The

researchers gathered from this study that there is a strong connection between outdoor physical activity and weather conditions (Wolff & Fitzhugh, 2011).

Another common potential barrier could be lack of time. In 2018, over half of American adults reported spending five hours or less of outdoor time each week (The Nature of Americans). Alongside this, 25% of Americans are spending less than two hours outside each week and report being unsatisfied with this small amount of time spent outdoors (The Nature of Americans, 2018). This lack of time spent outside will definitely decrease the likelihood of engaging in outdoor PA while also disconnecting many Americans from the natural environment. Exposure to nature as a child can have an effect on outdoor activity participation. Children spend an average of four to seven minutes playing outside and nearly seven and a half hours in front of electronics in an indoor setting (NRPA, 2017). This establishes a disconnect from nature in people starting at a young age.

More possible barriers to outdoor PA could be safety, electronic devices, or way of life. According to a study done by The Nature of Americans, young adults are likely to say that the outdoors is unsafe (2018). This could be a large reason to why many people choose to opt out of outdoor physical activity. In fact, nearly 40% of Americans are saying that the lack of safety in outdoor settings is a significant barrier to spending time in nature (Nature of American, 2018). Furthermore, the youth, particularly females, are not engaging in outdoor physical activity for reasons such as busy schedules, social media influences and distractions, indoor activity options, and their preconceived way of life (Sackett, Newhart, Jenkins, & Cory, 2018).

Research shows that outdoor physical activity is beneficial for both physical and mental health reasons. Furthermore, many people are not engaging in outdoor physical activity for various potential reasons. Therefore, this study will examine three primary aims:

Specific Aim 1: To examine the barriers that keep college students from being physically active outdoors.

Specific Aim 2: To evaluate college students' awareness of outdoor physical activity options on campus.

Specific Aim 3: To evaluate ways to increase awareness of outdoor physical activity programs on campus.

CHAPTER II:

REVIEW OF LITERATURE

REQUIREMENTS FOR PHYSICAL ACTIVITY

The Centers for Disease Control and Prevention states that American adults need at least 150 minutes of moderate-intensity physical activity (PA) or 75 minutes of vigorous PA a week to achieve the health benefits of being physically active (Centers for Disease Control and Prevention [CDC], 2018). This can be broken down into smaller physical activity sessions done throughout the week. Muscular strength training should be done at least twice a week and should account for all major muscle groups (CDC, 2018). Physical activity is important for warding off diseases such as heart disease, obesity, and other lifestyle-caused diseases (Hug, Hansmann, Krütli, & Seeland, 2008). In addition, studies have shown that active people tend to live longer, healthier lives (Hug, Hansmann, Krütli, & Seeland, 2008). Guidelines for adolescents are increased with the recommendation for children to engage in at least one hour of physical activity every day. This includes aerobic, muscle-strengthening, and bone-strengthening physical activities (CDC, 2018). It is important to encourage children starting at young ages to engage in PA

so that patterns of optimal health and wellness can be developed at a young age and carried into adulthood.

RISKS OF SEDENTARY LIFESTYLES

Adults and children should both try and avoid sedentary lifestyles. Unfortunately, most people tend to live highly sedentary, indoor lifestyles. Along with this, Americans do not engage in near enough PA (CDC, 2008). More than 80% of adults do not meet the guidelines for both aerobic and muscle-strengthening activities (U.S. Department of Health and Human Services [HHS], 2017). At the same time, more than 80% of adolescents do not engage in enough aerobic PA to meet the guidelines for children (HHS, 2018). It is apparent that people do not engage in enough physical activity. Because physical activity guidelines are not being met by most Americans, many people are susceptible to various negative health risks. These risks include things like increased waist circumference, unhealthy levels of insulin, glucose, and fat in the blood, heart disease, and even some cancers (Owen et al., 2012).

In regard to the college student population, reports show that 21.5% of traditional college students—aged 18-24 years old—are engaging in no form of leisure-time physical activity (ODPHP, 2017). Although this number is better than the national average of all age groups (29.6%), there is still a large group of people who live highly sedentary lifestyles (ODPHP, 2017). Furthermore, even though 78.5% of college students do engage in some form of leisure time PA (ODPHP, 2017), this does not mean that these people are obtaining the full 150 minutes of moderate-intensity exercise recommended weekly for optimal health benefits (CDC, 2018). Therefore, this lack of PA can cause adverse health effects in the young adult and college student populations.

Sedentary behavior often leads to various negative health effects. One study in particular showed that when inactive time is broken up by even small amounts of PA, the negative effects of the sedentary time are decreased. The study compared a day of minimal standing and maximal sitting to a day of maximal standing and minimal sitting in fourteen healthy men and women (Stephens, Granados, Zderic, Hamilton, Braun, 2011). The results of the study showed that decreasing or at least breaking up sedentary time with some form of movement or physical activity may help minimize the harmful metabolic effects of a mostly sedentary lifestyle (Stephens et al. 2011). Therefore, strategies for daily living should include breaking up or decreasing inactive behavior (Stephens et al., 2011).

Furthermore, many people also suffer from mental issues such as stress, anxiety, and depression (Pretty, Peacock, Sellens, & Griffin, 2005). Nearly 1 in 5 adults in the U.S. suffer from some type of mental ailment (National Institute of Mental Health [NIH], 2015). This means that 43.8 million at or above the age of 18 suffer from mental illnesses annually (NIH, 2015). Although PA cannot cure mental ailments, it can help treat the symptoms and promote mental health. One study in particular used exercise as an intervention in patients who suffer from anxiety, eating disorders, substance abuse disorders, schizophrenia, and mild cognitive impairment (Zschucke, Gaudlitz, & Ströhle, 2013). Evidence from this study suggests that regular PA can stimulate improvements in physical, mental and disorder-specific clinical outcomes (Zschucke, Gaudlitz, & Ströhle, 2013).

PHYSICAL EFFECTS OF GREEN EXERCISE

Now that the benefits of PA have been established, the significance of PA performed in an outdoor setting should be recognized. PA that takes place in an outdoor setting is referred to as green exercise (Pretty, Peacock, Sellens, 2005). The benefits of green exercise have been tested throughout many studies. One study performed in 2005 tested the effects of various workout environments on physical health (Pretty, Peacock, Sellens, & Griffin). Participants were asked to perform a treadmill workout while being exposed to four different types of scenes shown on a large screen. The following scenes were presented to the participants: rural, pleasant scenery; rural, unpleasant scenery; urban, pleasant scenery; and urban, unpleasant scenery. The results showed that there were significant decreases in mean arterial blood pressure post-exercise for each condition tested (Pretty, Peacock, Sellens, & Griffin, 2005). However, the participants who viewed rural, pleasant scenes during their workout had the most significant decreases in blood pressure (Pretty, Peacock, Sellens, & Griffin, 2005).

Further research shows that exercise performed in the outdoors has numerous positive health effects on the body (Selhub & Logan, 2012). Walking in an outdoor or forest setting has been proven to lower blood pressure and cortisol levels compared to an indoor walking workout (Selhub & Logan, 2012). Also, forest walking has been shown to elevate mood and not tire out participants as easily in an outdoor environment in comparison to an indoor environment (Selhub & Logan, 2012). Furthermore, in a study done on runners in the outdoors, results showed that the runners who ran outside felt less anxious and less fatigued in comparison to runners who ran inside (Selhub & Logan, 2012).

Another study was done to determine the effect that hiking has on middle school students particularly by looking at specific health markers (Drăgoi, 2014). The participants hiked, on average, once a week for 3-6 hours each time. During vacations, they hiked for 3-7 hours, 2-3 times a week. This took place over one whole academic year. The three fitness tests used to measure data were done at the end of the academic year. The major findings of this study were that the experimental group of hikers had improved fitness levels and better values of health markers measured by the three tests in comparison to the control group of non-hikers. This was true for both the boys and the girls. The authors concluded that the regular practice of hiking causes greater favorable health effects on growing adolescents in comparison to children who only performed regular physical education activities through their academic curriculum (Drăgoi, 2014). This study establishes that hiking is a beneficial activity for children to take part in often. It is implied that hiking is also a beneficial activity for anyone to perform often due to the favorable health outcomes (Drăgoi, 2014).

MENTAL AND EMOTIONAL EFFECTS OF GREEN EXERCISE

The authors of a study done in Seoul, South Korea concluded that forest walking decreases depression and promotes relaxation in college and undergraduate students (Bang et al., 2017). The purpose of this study was to determine whether a campus walking program helped decrease stress and promote relaxation in college students. Furthermore, this study established whether an outdoor walking program like this would

promote positive health behavior while also increasing physical activity. Participants in the experimental group scored higher for health promotion compared to the control group (Bang et al., 2017). They had higher records of physical activity and better nutrition, stress management, and spiritual growth scores after engaging in the forest walking program. Depression substantially decreased for the experimental group (Bang et al., 2017). The pre-test depression score for the experimental group was 7.86 ± 5.40 and the post-test depression score was 5.84 ± 5.00 (Bang et al., 2017). The control group depression score was 7.50 ± 5.34 for the pre-test and 7.38 ± 6.02 for a post-test measurement (Bang et al., 2017). Therefore, the participants who engaged in a forest walking program had a greater decrease in their depression scores in comparison to the control group. The experimental group showed higher levels of parasympathetic nerve activation (58.02 ± 9.20) than the control (54.07 ± 10.43) (Bang et al., 2017). This study promotes the benefits of green exercise while promoting helpful ways to incorporate physical activity into one's lifestyle while also encouraging relaxation and decreasing stress. This is prevalent because lack of physical activity and high rates of anxiety and depression are common all across the nation (NIH, 2015). An interesting aspect of this study is that the students who partook in the study had accessibility to a forest setting on campus.

Moreover, results of another study showed that outdoor environments promote the reoccurrence of PA in comparison to indoor environments (Hug, Hansmann, Krütli, & Seeland, 2008). This is due to people finding more enjoyment working out in an outdoor setting which makes them more apt to return to the outdoor setting to be physically active. People who performed fitness activities in the forest environment reported that

they looked forward to their next workout more than when they worked out indoors (Hug, Hansmann, Krütli, & Seeland, 2008). Also, when engaging in green exercise, participants were more reluctant to leave in comparison to when they worked out inside. Lastly, people reported that they felt a better restorative effect when exercising outside (Hug, Hansmann, Krütli, & Seeland, 2008). The authors concluded that the outdoor environment is a better fitness environment based on the participants' responses to the questionnaire. Overall, after any form of exercise, participants felt more mentally balanced, relieved from stress, and perceived a substantial increase in their personal wellness (Hug, Hansmann, Krütli, & Seeland, 2008). However, it is apparent that all of these factors are increased when the exercise is performed in an outdoor environment (Hug, Hansmann, Krütli, & Seeland, 2008).

Furthermore, the prevalence of people's connectedness to nature was discussed in a literature review done on the effect of nature on physical and mental health. The text references several studies and discusses how the presence of living things make people feel better and well-nourished (Pretty, 2004). Green spaces provide mental relaxation and stress reduction which people in urban cities tend to have less access to due to the lack of quality, green outdoor spaces. There are three different levels of contact with nature: viewing nature, being in the presence of nearby nature, and active participation and involvement with nature (Pretty, 2004). More contact with the outdoors may decrease some of the most prevalent illnesses across the nation—stress and poor mental health (Pretty, 2004). Children who lived in neighborhoods with nearby access to nature reported higher levels of cognitive functioning (Pretty, 2004). Also, patients reported feeling physically and mentally improved after sitting in a healing garden provided from

a children's hospital in California (Pretty, 2004). Even sitting in a room with trees caused patients to have a healthy decline in blood pressure (Pretty, 2004). One study in particular looked at the effect of nature on adolescents. In the study, the children who were exposed to both indoor and outdoor environments with flora were less stressed and more able to recover from stressful events than those who did not have access to green spaces in their homes and backyards. These findings show that green spaces and access to nature decreases stress, promotes mental clarity, and mental health (Pretty 2004).

Another study addressed how unpleasant urban and rural settings had negative effects on participant's emotions during exercising (Pretty, Peacock, Sellens, & Griffin, 2005). However, the environment that appeared pleasant (environments with water, greenery, etc.) had a positive effect on the participant's mood and self-esteem (Pretty, Peacock, Sellens, & Griffin, 2005). Overall, 62% of participants experienced an increase in self-esteem following exercise. The biggest increase in self-esteem was from the participants who ran with the pleasant, rural condition. Overall, pleasant outdoor environments might have a greater affect than just exercise alone on mood and self-esteem (Pretty, Peacock, Sellens, & Griffin, 2005). It is apparent through this study and others that nature makes people feel salubrious. Green exercise could help increase the benefits of PA while also decreasing the symptoms of life-style related mental illnesses. Furthermore, if there is an increase in green exercise, people may be encouraged to make positive long-term changes for the health of the environment and the health of the nation (Pretty, Peacock, Sellens, & Griffin, 2005).

CURRENT OUTDOOR EXERCISE BEHAVIORS

Current outdoor exercise behaviors have declined in the U.S. Statistics show that many people did not engage in any type of outdoor PA in 2017. Almost half (49.0 %) of the US population ages 6 and above participated in an activity outside at least once in 2017 (Outdoor Industry Association, 2018). Furthermore, outdoor PA participants engaged in a total of 10.9 billion outdoor outings in 2017, which is a decrease from 11.0 billion in 2016 (Outdoor Industry Association, 2018). Researchers have been looking for reasons to explain this decline in green exercise. It was found that adults who were exposed to the outdoors as children were more likely to engage in an outdoor physical activity in comparison to people who grew up without exposure to the outdoors (Outdoor Industry Association, 2018). On the other hand, participation in the outdoors have increased across several ethnic groups over the past five years. Specifically, there was a 1% increase in Hispanics and a 0.9% in Asians populations who chose to engage in outdoor PA (Outdoor Industry Association, 2018).

BARRIERS TO OUTDOOR PARTICIPATION

People can be deterred from engaging in outdoor physical activity due to various barriers. These barriers could include accessibility, weather, time, etc. Also, perhaps lack of exposure to nature as a child keeps them from engaging in outdoor PA as an adult. Whatever the specific barrier may be, barriers can keep people from fostering healthy lifestyles through keeping people from being physical active outdoors.

ACCESSIBILITY

Accessibility can be either a promotor or barrier to engaging in outdoor PA. The University of Oregon built an outdoor fitness area called the “Playground” in hopes to encourage people to engage in fitness outdoors (Cameron, 2018). The “Playground” consisted of cross-fit type workout options with moveable outdoor workout equipment including squat racks, different size pull-up bars, large tires, and several other whole-body workout options (Cameron, 2018). The outdoor space also provided areas to take an outdoor fitness class like yoga (Camron, 2018). Participation in the playground was observed throughout the study. There were students working out at the “Playground” on nice, warm days as well as cold, rainy days which was surprising to Campus Recreation. This showed that people like to engage in outdoor fitness to the extent that they would choose it from an indoor gym even when there was inclement weather. The author concluded that outdoor fitness areas are beneficial to individuals because of the obvious physical benefits as well as highlighting the environment and connecting the individual to nature (Cameron, 2018). Making use of the outdoors in such a positive and restorative way benefits the university on a large scale. Outdoor fitness areas like the “Playground” should be adapted by other universities because it has more benefits than indoor workout areas (Cameron, 2018). In addition, in a study discussed previously, accessibility may have been a factor in outdoor PA participation. In the outdoor walking study, the students who partook in the study had accessibility to campus woods to engage in their outdoor walks (Bang et al., 2017). Participation may not have been that high if the experimental group did not have immediate access to an outdoor space to be physically active.

WEATHER

Another barrier to outdoor PA could be weather. One study measured the effect of environmental factors on outdoor physical activity trail counts. These factors were examined on an urban greenway in East Tennessee. Results showed that physical activity trail counts were lower in winter compared to summer. December had the lowest mean counts (104.1 ± 49.0) and June had the highest (302.7 ± 86.0). The study showed that max temperature had the largest effect on outdoor physical activity number by increasing 10 trail counts every 1-degree increase in temperature. Every 1-degree increase above 84-degrees Fahrenheit decreased trail counts (decrease by 4 counts per day). Therefore, people are more likely to engage in green exercise if the weather is warm, but not too hot. Regarding rain, for every inch of precipitation, trail counts decreased by a substantial amount (decrease by 70 counts per day). This means that people tend to not like to be outside when it is raining. Another factor affecting trail counts is max wind speed. Every 1 mph increase in wind speed decreased daily trail counts by 1.9 counts per day. There is a strong connection between outdoor physical activity and weather conditions (Wolff & Fitzhugh, 2011).

TIME

Another prevalent barrier to outdoor PA is time. Adults report not spending much time outside each week. Over half of American adults are reporting five hours or less of time spent outside each week (The Nature of Americans, 2018). Around 25% of Americans are spending less than two hours outside on a weekly basis (The Nature of

Americans, 2018). Due to this small amount of time spent outside, people feel disconnected from nature. Also, over half of American adults are satisfied with their small amount of weekly outdoor time (The Nature of Americans, 2018). Most people do not spend a substantial amount of time outside. In fact, over 60% of people are spending less than ten hours outside every week. At the same time, people are satisfied with not spending enough time outside (The Nature of Americans, 2018). This is interesting because since outdoor time is so beneficial, why are people not making outdoor time a priority (The Nature of Americans, 2018)?

CULTURAL AND SOCIETAL ASPECTS

The amount of exposure that people have at a young age to outdoor, green spaces may have a large impact on outdoor PA. According to the National Recreation and Park Association, the amount of time that children spend outside daily has significantly declined over the years (NRPA, 2017). Rather, most children are living sedentary lifestyles that are mostly spent indoors (NRPA, 2017). Children spend an average of four to seven minutes playing outside and nearly seven and a half hours in front of electronics in an indoor setting (NRPA, 2017). This sedentary lifestyle and prevalent disconnect to nature bring about concern for the health of future generations in terms of economy, health, and wellness. Improving the amount of time children spend playing outdoors would greatly improve the health of future generations (NRPA, 2017). Furthermore, one in four military applicants are rejected because of obesity (NRPA, 2017). Incorporating

more outdoor play and a healthy lifestyle starting at a young age can help to promote health and fitness long term and decrease health issues brought on by lifestyle choices (NRPA, 2017).

Another prevalent barrier to outdoor PA could be feeling unsafe in outdoor environments. According to a study done in 2018, young adults in their 30s are likely to say the outdoors is unsafe (The Nature of Americans: Outdoors is unsafe is a likely barrier for younger adults). Perceived barriers like safety concerns can prevent people from engaging in outdoor PA all together. According to the data, younger adults are likelier to think the outdoor is unsafe (The Nature of Americans: Outdoors is unsafe is a likely barrier for younger adults, 2018). Nearly 40% of American adults are saying that the lack of safety in the outdoors is a significant barrier to spending more time outside (The Nature of Americans: Outdoors is unsafe is a likely barrier for younger adults, 2018).

Another study examined the perceived barriers that young girls have about the outdoors. The goal of this study was to determine the barriers that keep people from engaging in outdoor physical activity (Sackett, Newhart, Jenkins, & Cory, 2018). Assessing potential barriers could direct researchers on how to encourage the youth, particularly females, to go about participating in outdoor activities. The researchers in this study used a qualitative participatory research method called photovoice (Sackett, Newhart, Jenkins, & Cory, 2018). There were six perceived barriers that were found prevalent in the study. These included the following: very busy schedule, social media, health concerns, indoor activity instead of outdoor activity, electronic devices, and way of life (Sackett, Newhart, Jenkins, & Cory, 2018). The most prominent theme is the very

busy schedule which referred to the participant's view of not having enough time in their packed schedule to engage in physical activity outdoors (Sackett, Newhart, Jenkins, & Cory, 2018). The next perceived barrier the participants gave was social media. The girls said that "...if they put it [their phone] down, they're afraid they're going to miss something" (7). Therefore, because this generation is so immersed in social media, they are not spending as much time do other activities like spending time in nature or being active. The third prominent theme was health concerns (Sackett, Newhart, Jenkins, & Cory, 2018). The girls reported that instead of health concerns being a barrier to the outdoors, they were aware that most Americans are not engaging in enough physical activity and are suffering physically because of that. The girls reported that they felt like young adults and children are so addicted to electronics and media that they are not engaging in enough physical activity, obtaining proper amounts of sleep, or spending enough time outside (Sackett, Newhart, Jenkins, & Cory, 2018).

Furthermore, the participants discussed the fourth prominent barrier being that people are choosing to engage in indoor activities instead of outdoor activities. For example, one participant said, "kids don't bring like really heavy jackets to school, and so you can't go outside in those really thin jackets ... and it's just warmer to play the sports inside" ((Sackett, Newhart, Jenkins, & Cory, 2018). Another participant reported that they picked indoor activity over outdoor activity because they wanted to follow the norm. The fifth barrier discussed among the participants was electronic devices which compete for people's attention (Sackett, Newhart, Jenkins, & Cory, 2018). The sixth barrier and final theme discussed was Way of Life (Sackett, Newhart, Jenkins, & Cory, 2018). This discussion primarily covered modern American society's involvement in electronics and

social media instead of physical activity and time spent outside. One participant said, “...you’ll miss the fun activities that you have to do outside with your family and friends because you’re too busy on electronics and watching TV and video games” (Sackett, Newhart, Jenkins, & Cory, 2018). The participants all agreed that everyone should take time out of their day to experience nature (Sackett, Newhart, Jenkins, & Cory, 2018).

CHAPTER III:

METHODS

STUDY PARTICIPANTS

Participants for this study consisted of students currently enrolled at Maryville College. Maryville College is a private school located in Maryville, Tennessee, right in foothills of the Smoky Mountains. This liberal arts college has a population just shy of 2,000 students both commuter and those that live on the campus. Approximately 56% of Maryville College is female and the other 44% is male. Additionally, 30% of the entire population are student athletes. The survey was completed by 102 Maryville College students. The majority of the students were Sophomore (39.6%), but each class was reflected in the results. Students from six different academic divisions participated in this study, however, the Division of Health Science and Outdoor Studies was the largest represented division (56%).

DATA COLLECTION

Data were collected beginning in August 2019 and ending in October 2019. To complete the data collection, a questionnaire on Google Forms was used. The

participants who voluntarily signed up for this survey were asked to complete the survey using a phone, tablet, or laptop. The total time required to complete the survey was approximately 10 minutes. The survey consisted of specific research questions in which the answers were analyzed in this thesis. The questions can be separated between those asked about participant outdoor physical activity and time spent in “wild nature.”

To gather specific information on the participants’ demographics, six questions were asked. These questions asked for height, weight, academic year, housing (commuter or resident student), job status (full-time or part-time) if applicable, and whether or not the participant was an athlete. To examine outdoor physical activity and time spent outside, four questions were used. The first asked “How often do you spend time outside each week?” The participants were provided a space to answer in how many minutes. The next question asked, “How often do you spend time in nature each week?” A space was then provided to enter in the average number of minutes. The next question asked, “How often do you choose to voluntarily spend time outside each week?” A space was provided for participants to input how many minutes were spent voluntarily outside each week. Two similar questions and response methods were provided to gauge physical activity specific to the outdoors. “On average, how many days per week do you spend engaging in physically active outdoor time (ex. running, walking)?” Participants had the option to select 1-7 days or 0 days. If 1-7, participants were asked “On average, how many minutes do you engage in physically active outdoor time per day?” The participants were then provided a space to answer in minutes.

A nature affinity scale was used to measure the participants’ attraction to nature. The participants were asked to evaluate the following statements located in Table 1. The

participants were asked to check one of the following: strongly disagree, disagree, neither disagree nor agree, agree, strongly agree for each statement.

Table 1: Affinity to Nature Scale

I enjoy being outdoors.
I like being in nature.
I want to spend time outdoors.
I am attracted to nature.
I feel free when I am outdoors.
I enjoy the freedom of being outside.
I feel safe in nature.
I am comfortable in the outdoors.
I feel part of the natural world.
I feel connected to the natural environment.

The next section of the survey assessed the participants' perceived and actual barriers to being physically active outside. The participants were asked to mark how likely they would be to say various statements regarding potential barriers keeping them from being physically active outdoors. These statements can be seen in Table 2.

Table 2: Potential Barriers to Outdoor Physical Activity

My days are so busy, I don't think I have time to be active outside.
None of my family does anything active outside, so I don't have the chance to be active outside.
None of my friends do anything active outside, so I don't have the chance to be active outside.
I don't have access to outdoor areas.
My usual social activities do not include being active outside.
I am not skilled in any outdoor physical activity.
Outdoor activities are too expensive.
Rainy weather keeps me from being physically active outside.
Cold weather keeps me from being physically active outside.

Participants were asked to respond to each statement by selecting whether it was very likely, somewhat likely, somewhat unlikely, or very unlikely. Participants were then asked to add additional barriers by the following: "If there are other barriers to outdoor physical activity that were not listed above, please provide those barriers in the space provided." A space was provided for a typed response.

A section was also included that examined access Maryville College students' participation and knowledge of outdoor physical activity programming options. The first question said, "Have you ever participated in a Mountain Challenge event like Camp 4 or an open trip? If yes, how many times?" A space was provided the answer yes or no to the first question. If yes, a space was made available to give a numerical value for their

attendance to Mountain Challenge events. The next question asked about how people found out about Mountain Challenge events. The question asked, “How do you get information about Mountain Challenge events?” The following options were provided for the participants to check which were applicable: “Flyers in dorms, flyers in classrooms, Mountain Challenge Instagram, Mountain Challenge Facebook page, Mountain Challenge website, Professors (schedules in syllabus, classroom announcements), Classmates/Roommates/Friends.” The next question asked, “Have you heard of Fit.Green.Happy?”. A box to check yes or no was available. If yes, the next question was “Where did you hear about it?” If no, the participants would advance to the next questions.

The last section was added to evaluate the experiences in nature after the age of 11. There were three questions used. The first one asked, “Activities in ‘wild nature’ are defined as activities such as hiking, walking or playing in the woods, or natural areas, camping, hunting or fishing. How often did you participate in wild-nature related activities after the age of 11?” There were three different answer choices to choose from to describe time spent in wild nature for each age range: never, sometimes, or always. If the participant answered sometimes or always, they were asked, “What types of activities did you do?” The last question was aimed at gathering who the participants spent the most time with engaging in time spent outside. It read, “After the age 11, with whom did you spend time outdoors with? Please select all that apply.” The options consisted of the following “Parent/guardian, Sibling, Friend, Classmates, and Other.” If “Other” was marked, a box for a written explanation popped up.

DATA ANALYSIS PLAN

Prior to data analysis, all data will be coded to a numerical format for use in the IBM SPSS Statistics 24 data analysis program. Aggregate data will be used in analysis and no individual data will be needed to answer the four research questions.

To answer question 1, Likert scale responses about barriers to outdoor physical activity will be coded on a five-point scale. Frequencies of each barrier reported will be calculated. Student t-tests will be used to examine barriers reported based on outdoor physical activity level, affinity to nature and time spent in nature as an adolescent.

To answer research question 2, frequencies for each of the awareness outcomes (questions 13-15) will be calculated. Frequencies of responses will also be calculated for the entire group and for select demographic subcategories.

To answer question 3, all relationships will be examined to make recommendations for next logical steps for promoting outdoor time on Maryville College's campus. These steps may include posters, flyers, social media messaging, first year studies presentations and others student education programming.

CHAPTER IV:

RESULTS

Table 3 shows the demographics of the students who participated in the online survey. Out of the 102 students who took the survey, most of the students were sophomores (39.6%) who were majors in the Division of Health Science and Outdoor Studies (56.0%). There were participants from six different academic divisions present in the study. Most of the students were residential students (73.3%). Although there were more non-athlete who took the survey (56.0%), there were also a lot of athletes who participated (44.0%). Most of the students had some type of job (51.5%), while most of them are part-time positions (43.6%).

Table 3: Demographics

Variable	Percent (%)
Year at MC	
Freshman	30.7
Sophomore	39.6
Junior	20.8
Senior	7.9
Transfer	1.0
Academic Division	
Health Science and Outdoor Studies	56
Natural Science	13
Social Science	8
Behavioral Science	12
Humanities	6
Education	4
Residential Status	
On-campus Resident	73.3
Commuter	26.7
Athlete Status	
MC Athlete	44.0
Non-Athlete	56.0
Job Status	
Has job	51.5
Does not have job	48.5
Job Type	
Part-time	43.6
Full-time	7.9
N/A	48.5

Table 4 consists of the outdoor time and PA behaviors of the 101 students who participated in the survey. The mean volume of outdoor time was 440.2 ± 479.3 minutes per week, indicating that students are spending approximately 7 hours of time outdoors each week. In regard to PA performed outside, students report spending 356.4 ± 435.0 minutes per week being active outside. This means that students are spending an average of 6 hours being physical active outside every week. The large standard deviations should be taken into consideration for these values. Furthermore, most of the students (48.0%) reported sometimes spending time in wild nature after the age of eleven. Thirty-seven percent of students reported always spending time in wild nature after the age of eleven.

Table 4: Outdoor Time and Physical Activity Behaviors

Variable	Percent (%) or Mean \pm SD
Outdoor Time (day/wk)	5.1 ± 1.9
Outdoor Time (min/day)	79.7 ± 82.0
Outdoor Time Volume (min/wk)	440.2 ± 479.3
PA Outdoor Time (day/wk)	4.3 ± 2.1
PA Outdoor Time (min/day)	71.1 ± 69.0
PA Outdoor Time Volume (min/wk)	356.4 ± 435.0
Time Spent in Wild Nature (%)	
Never	15
Sometimes	48
Always	37

Table 5 shows the results for the participant's affinity to nature. The results showed that the majority (89.1%) of the participants reported that they enjoy being outdoors. Also, the majority (84.1%) of students reported that they like being in nature. Only 56.5% of participants reported that they feel safe in the outdoors. However, 76.2% of people reported that they feel comfortable in the outdoors. A little over half (60.0%) of participants reported that they feel connected to nature.

Table 5: Affinity to Nature

	Mean Response ± SD	Strongly Disagree/Disagree (%)	Neutral (%)	Strongly Agree/Agree (%)
I enjoy being outdoors.	4.3 ± 0.87	5.0	5.9	89.1
I like being in nature.	4.2 ± 0.95	7.0	8.9	84.1
I want to spend time outdoors.	4.22 ± 0.96	6.0	12.9	81.2
I am attracted to nature.	4.00 ± 1.1	9.0	22.0	69.0
I feel free when I am outdoors.	4.12 ± 0.96	4.0	22.8	73.3
I enjoy the freedom of being outside.	4.3 ± 0.87	3.0	12.0	85.0
I feel safe in nature.	3.7 ± 0.99	8.9	34.7	56.5
I am comfortable in the outdoors.	4.0 ± 1.0	8.0	15.8	76.2
I feel part of the natural world.	3.7 ± 1.1	11.0	34.0	55.0
I feel connected to the natural environment.	3.8 ± 1.1	13.0	27.0	60.0

Table 6 shows the potential barriers to outdoor PA in college students. Regarding busyness as a barrier, the participants were split almost half and half. About 42.6% of students reported that being too busy keeps them from the outdoors whereas 44.5% of participants said that this is not a barrier. Also, 39.0% of students reported that cold weather is a barrier from being physically active outside.

Table 6: Barriers to Outdoor PA

	Mean Response \pm SD	Strongly Disagree/Disagree (%)	Neutral (%)	Strongly Agree/Agree (%)
My days are so busy, I don't think I have time to be active outside.	3.0 \pm 1.2	44.5	12.9	42.6
None of my family does anything active outside, so I don't have the chance to be active outside.	2.2 \pm 1.0	69.4	15.8	14.9
None of my friends do anything active outside, so I don't have the chance to be active outside.	2.14 \pm 1.0	69.7	19.2	11.1
I don't have access to outdoor areas.	1.5 \pm 0.7	92.1	5.9	2.0
My usual social activities do not include being active outside.	2.5 \pm 1.1	56.4	5.9	22.8
I am not skilled in any outdoor physical activity.	2.1 \pm 1.0	72.0	17.0	11.0
Outdoor activities are too expensive	1.8 \pm 0.9	79.0	18.0	3.0
Rainy weather keeps me from being physically active outside.	2.7 \pm 1.2	44.5	23.8	31.7
Cold weather keeps me from being physically active outside.	2.9 \pm 1.2	38.0	23.0	39.0

The participants' active outdoor time varied dependent on their enjoyment of nature. The participants who reported having a low affinity to nature reported spending 156.6 ± 219.2 minutes per week of total outdoor time. The participants who reported a high affinity to nature reported spending 455.3 ± 490.9 minutes per week of total outdoor time. Also, 54.5% of participants who conveyed not enjoying nature also reported that they never engaged in wild nature activities after the age of eleven. However, for the participants who reported a high affinity to nature, only 10.1% of students reported never engaging in wild nature activities after the age of eleven.

Table 7 organizes barriers to outdoor PA by the participants' affinity to nature. The majority of participants (76.1%) who reported they enjoy nature disagreed that having friends who are not active outside was not a prevalent barrier in keeping them from outdoor PA. Furthermore, access to the outdoors was not a highly reported barrier for participants who enjoy nature (96.7%), however, it was a more common barrier for participants who do not enjoy nature (54.5%). Regarding skill level, 78.7% of students who enjoy nature disagreed or strongly disagreed that lack of skill is not a barrier to outdoor PA. Nonetheless, only 18.2% of participants who do not enjoy nature reported that lack of skill is not a barrier to outdoor PA.

Table 7: Barriers by Enjoyment

	Strongly Disagree/Disagree (%)		Neutral (%)		Strongly Agree/Agree (%)	
	Enjoy	Not Enjoy	Enjoy	Not Enjoy	Enjoy	Not Enjoy
My days are so busy, I don't think I have time to be active outside.	46.7	27.3	11.1	27.3	42.2	45.5
None of my family does anything active outside, so I don't have the chance to be active outside.	75.6	18.2	11.1	54.5	13.3	27.3
None of my friends do anything active outside, so I don't have the chance to be active outside.	76.1	18.2	14.8	54.5	9.1	9.1
I don't have access to outdoor areas.	96.7	54.5	3.3	27.3	0.0	18.2
My usual social activities do not include being active outside.	61.1	18.2	18.9	36.4	20.0	45.5
I am not skilled in any outdoor physical activity.	78.7	18.2	13.5	45.5	7.8	36.4
Outdoor activities are too expensive	83.1	45.5	13.5	54.5	3.3	0.0
Rainy weather keeps me from being physically active outside.	45.6	36.4	24.4	18.2	30.0	45.5
Cold weather keeps me from being physically active outside.	38.9	30.0	23.3	20.0	37.8	50.0

Furthermore, the results showed that 56% of Maryville College students found out about Mountain Challenge programming through flyers located in the dorms, classrooms, or placed around campus. The second largest way (53%) of increasing awareness for Mountain Challenge events was through professors (schedules in syllabus and classroom announcements). Results also showed that 37% of students found out about Mountain Challenge programming through a Mountain Challenge social media platform (website, Facebook, or Instagram).

The majority (97%) of participants reported that they were familiar with Fit.Green.Happy.TM and related hearing about it in various ways. The majority of students (38%) reported learning about Fit.Green.Happy.TM from professors or in a classroom environment on campus. The second largest avenue for learning about Fit.Green.Happy.TM was freshman orientation (20%) and the third being Mountain Challenge staff or Mountain Challenge programming (13%).

According to the survey results, 60% of students reported having engaged in some type of Mountain Challenge event. This includes Camp 4 or open trips with Mountain Challenge. These students reported engaging in events anywhere from one time to 115 times. The specific events the students engaged in were not identified. However, 40% of students reported that they have never engaged in a Mountain Challenge event (except for orientation which is required for all freshmen and transfers). Of the people who have not engaged in a Mountain Challenge event, 80.0% of them reported that they enjoy the outdoors.

CHAPTER V:

DISCUSSION

The participants of this survey reported spending time outside an average of five days per week. Overall, the average time spent outside by students was approximately seven hours each week. This time spent outside may have included things like walking to class, eating lunch outside, studying outside, hammocking, etc. This time did not specifically represent time being physically active outside. The students spent less time being physically active outside each week. The participants reported engaging in outdoor PA approximately four days each week for over an hour a day. This may have included engaging in athletic team practice outside (i.e. football, cross country, or soccer), doing a Mountain Challenge or Camp 4 event, or independently engaging in some kind of outdoor activity.

The majority of students reported sometimes spending time in wild nature after the age of eleven. Activities in “wild nature” are defined as activities such as hiking, walking in the woods, walking in natural areas, camping, hunting or fishing. The majority of participants had been exposed to some type of wild nature activity after the age of eleven which may contribute to their level of knowledge and comfort with the outdoors. Common activities that students doing outdoors included hiking, running, camping,

swimming, playing in the woods, climbing, biking, and rafting. Around fifteen students reported never engaging in wild nature activities. These students may be more apprehensive about outdoor engagement due to their lack of experience being outside. This lack of experience may have contributed to fear of the outdoors or other potential barriers. For the campus as a whole, there are probably numerous students who have never been exposed to wild nature activities before their time in college. Therefore, giving students like this the opportunity to experience green exercise on a level they are comfortable with is vital.

Different people have different affinities to nature. This means that people may respond differently to natural environments on an emotional and mental level. Some students may feel happy, connected, and at peace in a natural, green environment. However, some students may feel nervous, fearful, and anxious in outdoor spaces. The majority of participants reported that they enjoy spending time outside and that they like being in nature. There was a small portion of students who reported that they do not like being outdoors. The barriers for outdoor PA were different for these participants who reported a low affinity to nature. For example, these participants stated that their usual social activities do not involve going outside, that lack of access to outdoor space is a barrier, as well as not being skilled in any type of outdoor PA. The participants with a low affinity to nature also reported time and weather as the largest barriers to outdoor PA. Interestingly, participants who stated they have a high affinity to nature reported that lacking outdoor social activities, skills, and access to the outdoors were not barriers to outdoor PA. This shows that whether or not an individual inherently enjoys nature greatly affects their perception of barriers to the outdoors.

The majority of participants reported feeling attracted to nature and feeling free when in the outdoors. This positive relationship seems to coincide with the amount of time participants choose to spend outside on a weekly basis. Only about half of students feel safe in nature. However, the majority of students reported that they feel comfortable in the outdoors. Perhaps natural environments pose some threat to students, however, that does not seem to affect the majority of students. About half of the participants reported that they feel like they are part of the natural world. Although the majority of students do not feel like they are part of the natural world, a little more than half the participants reported feeling connected to the natural environment.

The results of this study in particular showed that the largest barriers to outdoor PA in college students at Maryville College were related to time and weather. Students reported that because their days are already so busy, they do not have time to be active outside. The majority of participants measured having a high affinity to nature. However, due to the high demands of their lives, they cannot engage in the desired amount of outdoor time each week. This could be due to various reasons including full-time academic schedules, social clubs, poor time management, etc. Also, many of the participants reported being student athletes as well as working full or part-time jobs. Because of the lack of time, perhaps students should consider ways to be active outdoors in a way that better fits into their schedule.

Weather was the second largest barrier in keeping participants from engaging in outdoor PA. Specifically, cold weather was reported as a barrier to keeping college students from engaging in outdoor PA. Rainy weather was also a highly reported barrier following after cold weather. Cold and rainy weather might make the outdoors less

enjoyable because people are less comfortable and they require more gear to combat the weather (i.e. winter gear, raincoats, etc.). This gear is often expensive and not affordable for most college students. This weather barrier may have something to do with cultural norms. When it rains, most people like to stay inside because it is more comfortable than being outside in the adverse conditions. Rainy days are often associated with indoor sedentary activities like watching movies and playing games. This coincides with a study done on the effects of weather on outdoor trail usage (Wolff & Fitzhugh, 2011). This study found that trail usage decreased when there was rain, cold weather, or even weather that was consider to be too hot (Wolff & Fitzhugh, 2011). There is an optimum temperature and type of weather where people like to engage in PA outdoors (Wolff & Fitzhugh, 2011). This optimum weather condition includes temperature in the low 70s, low wind, and low humidity (Wolff & Fitzhugh, 2011). With changing seasons and ranging temperatures, there are numerous days that do not fall into the optimum weather conditions. Therefore, understanding how to combat this barrier is vital to promoting outdoor PA in people of all ages.

Moreover, the majority of participants in this study reported spending numerous days per week outside being physically active. However, the outdoor PA habits of Maryville College students seems to be outside of the norm. The 2018 Outdoor Participation Report stated that 21% of participants were extremely active, enjoying outdoor activities at least twice per week (Outdoor Industry Association). According to the results of this survey, the majority of Maryville College students reported spending more time outside than the national average spends outside on a weekly basis. However, this only accounts for a small portion of Maryville College campus since the study only

consisted of 102 participants. Therefore, it is likely that the rest of the campus does engage in the same amount of outdoor PA each week.

Surprisingly, there are a lot of Maryville College students that have never taken part in a Mountain Challenge event like Camp 4 or open trips. A little under half of the participants who took the survey said that they have never taken part in a Mountain Challenge event. A little over half of the students reported that they have taken part in at least one Mountain Challenge event during their time as a student. The lack of participation from some Maryville College students could be due to a variety of reasons or barriers. The 2018 Outdoor Participation Report stated that the greatest barriers keeping people ages 18-24 from engaging in outdoor activities were not having anyone to participate with, the high expensive of outdoor recreation equipment, and the lack of time (Outdoor Industry Association). The results of this study on Maryville College did not report barriers pertaining to not having anyone to participate with or the expense of the equipment. This is likely due to the high rate of outdoor group fitness opportunities offered. Also, equipment such as climbing harnesses, climbing shoes, kayaks, paddle board, and much more is provided for the students. This keeps the students from being forced to opt out of activities for financial reasons. However, similar to the Outdoor Participation Report, time is a barrier to Maryville College students.

Other studies suggest that lack of time is a barrier to outdoor physical activity. This study in particular evaluated the perceived barriers to outdoor PA in a group of high school aged girls (Sackett, Newhart, Jenkins, & Cory, 2018). The participants reported wanting to engage in more outdoor activities, however their busy schedules did not allow for it (Sackett, Newhart, Jenkins, & Cory, 2018). The participants mentioned that people

seem to already be too busy as it is, so adding more to their schedules would seem unbearable (Sackett, Newhart, Jenkins, & Cory, 2018). The participants in this study were a younger population group than Maryville College students, however these results are similar. Perhaps being a full-time student along with being an athlete, and/or working a job does not allow for extra time to be physically active outside. However, even short bursts of time spent outside being active has been proven to be physically and mentally beneficial (Sackett, Newhart, Jenkins, & Cory, 2018). Other common barriers in this study include people choosing indoor activities over outdoor options, cultural influencing kids away from the outdoors, and the distraction of electronic devices and social media (Sackett, Newhart, Jenkins, & Cory, 2018).

Furthermore, having access to areas for outdoor PA may be a reason Maryville College students are able to engage in so much outdoor PA. The campus has Mountain Challenge, an outdoor program that provides students with open trips each week as well as Camp 4. The offered trips include outings like hiking, rock climbing, kayaking, Alpine tower climbs, yoga sessions, and freshwater snorkeling trips. These trips are led by student workers on campus. These trips are cost efficient and gear is provided for students. Camp 4 is a weekly 3-hour outdoor workout session on campus which is free to students and faculty of Maryville College. Camp 4 is also open to the community to encourage outdoor PA on a greater level. Workouts available include climbing the Alpine tower, engaging in an outdoor yoga class, bouldering in the climbing cave, or taking a full-body workout class with a fitness instructor. These events are easily accessible to students because they are affordable and located on campus. Similarly, the University of Oregon built an outdoor fitness center and noticed an increase in participation because it

was so easy to access for students on campus (Cameron, 2018). This area consisted of 6,000 square feet of open outdoor space including both asphalt and natural turf (Cameron, 2018). The fitness center included functional fitness equipment as well as the option to engage in a group fitness class outdoor (Cameron, 2018). Students at the University of Oregon engaged in a high record of outdoor PA since they were provided with an easily accessible outdoor fitness area (Cameron, 2018). Having an easily accessible outdoor fitness area on campus with various engagement options is a beneficial way to increase outdoor PA time among college students.

The majority of students reported hearing about outdoor programming options on campus through flyers, professors, and social media platforms. The highest reported successful avenue for advertisement was flyers posted in dorms, in classrooms, and around campus. Also, the majority of students reported learning about Fit.Green.Happy™ from professors in their classroom environments. This specific classes were not recorded. Perhaps making sure that all the professors on campus are aware of Mountain Challenge programming and Fit.Green.Happy™ as well as making sure flyers are spread throughout classrooms all over campus would promote awareness about outdoor programming even further.

There are some limitations to the current study. For example, the survey was a way to easily collect data, but it is possible that participants over-estimated their outdoor time or time being physically active. Also, this study did not evaluate gender and its effect on affinity to nature or potential barriers to outdoor engagement. Also, the results of this study only reflect a small portion of the campus—many of which are majors in a field that get more exposed to physical activity and the outdoors. Because of this, there is

a limitation in understanding the physical activity habits of other students around campus who are in majors not exposed to physical activity or outdoor environments as often.

Strengths of this study include the survey questions and the number of participants. The survey asked about days and time of being PA outside which was used to calculate volume. This is beneficial in understanding specific outdoor behaviors about college students. Furthermore, the survey evaluated the participants' affinity to nature which was compared to their reported barriers of outdoor PA. This was advantageous in understanding how to navigate future outdoor programming to optimize participation from students. The large population size of students from various academic divisions across campus gave a more realistic view of outdoor participation on campus.

Since there is a large number of students that have not engaged in outdoor programming on campus due to specific barriers, programming should be established to help diminish these barriers. Offering short sessions of outdoor fitness activities throughout the week may allow people with limited time to still engage in outdoor physical activities. Offering short sessions of outdoor yoga, a group run, forest bathing, or other outdoor activity options throughout the week may allow students who are too busy for a multi-hour trip to engage in outdoor PA. Also, programming could be offered for students who have never engaged in wild-nature activities. Since there was a group of participants who reported never having engaged in wild-nature activities, there could be easier and less intense outdoor programming options for them to try. Also, since so many adults are not active enough (CDC, 2008), creating program options for people who are very uncomfortable with their current fitness levels may allow more people to engage in green exercise.

Since weather was a highly reported barrier, specific programming can be advertised to teach people how to not let the weather stop them from having a great time outside. This could include gear talks on appropriate outfitting for cold or rainy weather, partnering with local outdoor gear outfitters to offer student discounts on gear, or even creating events specifically around cold weather. For example, advertising a winter hike in the Smoky Mountains and offering hot chocolate may entice students to engage more when the weather is not ideal. Offering rain gear or ways to stay warm and dry in the rain can help promote PA outside when rain is an issue. There are numerous walking paths in the woods and on campus Maryville College Campus as well as around Maryville City. Encouraging students to utilize these walking paths will help students achieve more time outside being physical active. There are numerous coffee shops, dining options, and entertainment options within walking distance to the college. Increasing awareness of these opportunities may help students to utilize this.

The implications of this study consist of people having a high affinity to nature, however, there are still some barriers keeping people from the outdoors. These barriers consist of lack of time as well as cold, rainy weather. Furthermore, it is apparent from this study that although participants reported a high affinity to nature, there is still a large amount of the sample size that have never taken part in an outdoor programming option like Mountain Challenge. This is important because there is more potential to increase outdoor PA in students who already like the outdoors. With the right type of advertisement and programming options offered, outdoor PA participation can be increased by targeting the students who report high affinities to nature.

Future studies should evaluate the specific outdoor behaviors of student athletes who play a sport outside. Evaluating whether student athletes are choosing to spend extra time outside being active or if they are just required to spend time outside for a practice or a game would give a more specific view of outdoor PA barriers in college students. Further studies can be used to evaluate whether or not inadequate fitness levels are a barrier to outdoor PA. If someone perceives that they are not fit, they may not be comfortable in participating in a solo or group green exercise endeavors. Future studies can also be used to determine if there is an effect of screen time on the decline in outdoor PA in various ages. This would be beneficial in helping to diminish barriers to outdoor PA amongst other age groups besides college students.

Campus programming can market specific events to students who like the outdoors but have not engaged in the campus programming options. Perhaps offering new program options such various types of workouts or shorter sessions at various times of the day/week would attract more students. Also, focusing on expanding the campus-wide knowledge of outdoor programming options is likely to increase awareness and participation in outdoor PA events.

Overall, there are numerous benefits to green exercise that prove people of all ages should engage in outdoor PA. Knowing the barriers that keep people from enjoying the benefits of green exercise allows for opportunity to overcome those barriers. There can always be improvements to make everyone feel more comfortable and passionate about engaging in green exercise.

APPENDIX A

IRB Approval



Maryville College Institutional Review Board
OHRP IRB#: IRB00007383
FWA Assurance #: FWA00015150

Principal Researcher: Caitlin Blair
Faculty Supervisor: Jennifer Oody
Division: Education
Title: Assistant Professor
Protocol# 220419.01
Approval Status: Approved

April 23, 2019

Dear Caitlin,

The Maryville College Institutional Review Board (IRB) has carefully considered your amended proposal referenced above. The proposed procedures afford reasonable protection to the human participants involved and therefore you are granted approval for the study.

Your approval is effective April 23, 2019 and will expire one year from this date. Thereafter, continued approval is contingent upon submission of a progress report that must be reviewed and approved prior to the expiration date. Approval is contingent upon your agreement to obtain informed consent from your participants, to abide by the protocol summarized in the approved IRB application, and to keep appropriate records concerning your participants.

You are required to submit to the Maryville College IRB for review any changes in procedures involving human participants prior to the implementation of such changes.

If you have any questions concerning this approval or regulations governing human participant activities, please contact Dr. Ryan Mickey, Chair of the Maryville College IRB, by e-mail at IRBReview@maryvillecollege.edu.

Sincerely,

Nathan Duncan

Institutional Review Board

APPENDIX B

Informed Consent Form

Maryville College Division of Education

A Study of the Barriers to Outdoor Physical Activity in Maryville College Students

Human Participant Online Informed Consent Form

You are being invited to take part in a research project conducted by Ms. Caitlin Blair as part of her Senior Thesis for the Division of Education. Before you decide to participate in this study, you should read this form and ask questions about anything you do not understand by contacting the primary investigators via email or phone. Your participation in this study is completely voluntary and you may discontinue at any time without penalty.

Approximately 100 Maryville College students will be recruited to participate in this study. After you have given consent to participate, you will be asked a variety of questions. This study will examine the barriers to outdoor physical activity and awareness of opportunities on the Maryville College campus. The survey can be taken on a computer, cell phone or with a tablet. The duration of survey will not exceed 10 minutes.

There are no direct benefits to you from participating in this study. However, your participation will be valuable to the researchers, as it will contribute a better

understanding of the barriers that Maryville College students encounter related to outdoor time, which will help to further develop programs which promote outdoor time in students. There are no costs of participation. There are no alternate procedures that would be advantageous to the participant. All data will be kept on a password protected computer in Dr. Oody's office (faculty supervisor).

For questions about the research, contact the principal investigator:

Primary Investigator: Caitlin Blair (Faculty Supervisor, Jennifer Flynn Oody, PhD.)

Division of Education, Maryville College

502 E. Lamar Alexander Pkwy.

Maryville, TN 37804

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phone: 865-981-8016

You have rights as a research volunteer. **Taking part in this study is completely voluntary. If you do not take part, you will receive no penalty. You may stop participating at any time without penalty.** If you have questions about your rights as a research volunteer that I have not addressed, you may write the Chair of the Maryville College IRB:

Institutional Review Board

Maryville College

502 E. Lamar Alexander Pkwy.

Maryville, TN 37804

Irb.review@maryvillecollege.edu

I have read and understood the information above. I consent to take part in this study.

The researchers have answered my questions to my satisfaction. I understand a copy of this form is available upon request.

Informed Consent to Participate.

1. Do you agree to participate in this survey?
 - a. Yes, I agree to participate in this survey
 - b. No, I do not agree to participate in this survey.

APPENDIX C

Online Survey Items

1. What is your current height? *(enter height in feet and inches)*
2. What is your current weight? *(enter weight in pounds)*
3. Year at MC? *(select freshman, sophomore, junior, senior, transfer)*
4. What is your major (or intended major) at Maryville College? *(select from list of majors)*
5. Do you commute or live on campus? *(select commute or on campus)*
6. Do you currently have a job? *(select yes/no)*
 - a. If yes, is it full time or part time? *(select full/part time)*
7. Are you a MC Athlete? *(select yes/no)*
8. Outdoor time is defined as purposeful time spent outdoors for either physical activities or sedentary behaviors. On average, how many days per week do you spend engaging in outdoor time, either physical (ex. running, walking) or sedentary (ex. studying, hammock)? *(select number 1-7)*
 - a. *If 1-7, On average, how many minutes do you engage in purposeful outdoor time per day? (enter minutes)*
 - b. If 0, go to next question.
9. On average, how many days per week do you spend engaging in physically active outdoor time (ex. running, walking)? *(select number 1-7)*
 - a. *If 1-7, On average, how many minutes do you engage in physically active outdoor time per day? (enter minutes)*
 - b. If 0, go to next question.

10. Activities in “wild nature” are defined as activities such as hiking, walking or playing in the woods, or natural areas, camping, hunting or fishing. How often did you participate in wild-nature related activities after the age of 11? [*select never, sometimes, always*]

- a. If “sometimes” or “always”, what types of activities did you do?
- b. If “never”, skip to question 11

11. Choose how much you agree or disagree with each of the following statements:

[*check one: strongly disagree, disagree, neither disagree nor agree, agree, strongly agree*]

1. I enjoy being outdoors
2. I like being in nature
3. I want to spend time outdoors
4. I am attracted to nature
5. I feel free when I am outdoors
6. I enjoy the freedom of being outside
7. I feel safe in nature
8. I am comfortable in the outdoors
9. I feel part of the natural world
10. I feel connected to the natural environment

12. Choose how likely you are to say the following: [*check one: strongly disagree, disagree, neither disagree nor agree, agree, strongly agree*]

- a. My days are so busy, I don’t think I have time to be active outside

- b. None of my family does anything active outside, so I don't have the chance to be active outside
- c. None of my friends do anything active outside, so I don't have the chance to be active outside
- d. I don't have access to outdoor areas
- e. My usual social activities do not include being active outside
- f. I am not skilled in any outdoor physical activity
- g. Outdoor activities are too expensive
- h. Rainy weather keeps me from being physically active outside
- i. Cold weather keeps me from being physically active outside

13. If there are other barriers to outdoor physical activity that were not listed above, please provide those barriers in the space provided.

14. Have you ever participated in a Mountain Challenge event like Camp 4 or an open trip?

- a. If yes, how many times?

15. How do you get information about Mountain Challenge events? *[check all that apply]*

- a. Flyers in dorms
- b. Flyers in classrooms
- c. Mountain Challenge Instagram
- d. Mountain Challenge Facebook page
- e. Mountain Challenge website
- f. Professors (schedules in syllabus, classroom announcements)
- g. Classmates/Roommates/Friends

16. Have you heard of “Fit.Green.Happy”?

a. If yes, where did you hear about it? [*Short answer*]

b. If no, end survey.

APPENDIX D

Recruiting Materials for Participants

Dear Student,

Please consider participating in this survey for an exercise science senior thesis. This study will examine the barriers to outdoor physical activity in college students. The survey will take no longer than 10 minutes. Your participation is voluntary and anonymous.

Please use this link to access the survey

[insert survey]

Thank you for your help!

Caitlin Blair

Senior, Exercise Science

WORKS CITED

- Andre, E. K., Williams, N., Schwartz, F., & Bullard, C. (2017). Benefits of campus outdoor recreation programs: A review of the literature. *Journal of Outdoor Recreation, Education, and Leadership, 1*(9), 15-25.
- Bang, K. S., Lee, I., Kim, S., Lim, C. S., Joh, H. K., Park, B. J. (2017). The effects of a campus Forest-Walking program on undergraduate and graduate students' physical and psychological health. *International Journal of Environmental Research and Public Health, 14*(7), 1-13.
- Cameron, C. (2018, August). Not your mother's tire swing: Bringing fitness programming to the great outdoors. *Athletic Business*. Retrieved from <http://athleticbusiness.com>
- Centers for Disease Control and Prevention [CDC]. (2018). *FastStats: Physical activity or exercise*. Retrieved from <https://www.cdc.gov/nchs/fastats/exercise.htm>
- Centers for Disease Control and Prevention [CDC]. (2008). *Physical activity guidelines for Americans*. Retrieved from https://www.cdc.gov/cancer/dcpc/prevention/policies_practices/physical_activity_guidelines.htm

Drăgoi, C. C. (2014). Study regarding the influence of hiking on certain health markers in middle school students. *Sp Soc Int J Ph Ed Sp*, (14), 3–7.

U.S. Department of Health and Human Services [HHS]. (2017). *Physical Activity Facts & Statistics*. Retrieved April 8, 2019, from <https://www.hhs.gov/fitness/resource-center/facts-and-statistics/index.html>

Hug, S., Hansmann, R., Krütli, P., & Seeland, K. (2008). Restorative effects of physical activity in forests and indoor setting. *International Journal of Fitness*, 4(2), 25-38.

National Institute of Mental Health [NIH]. (2015). *Any Mental Illness (AMI) Among Adults*. Retrieved from <http://www.nimh.nih.gov/health/statistics/prevalence/any-mental-illness-ami-among-adults.shtml>

National Recreation and Park Association [NRPA]. (2017). Children in nature: Improving health by reconnecting youth with the outdoors. Retrieved from <https://www.nrpa.org/uploadedFiles/nrpa.org/Advocacy/Children-in-Nature.pdf>

Office of Disease Prevention and Health Promotion [ODPHP]. (2017). Healthy people 2020: Physical Activity. Retrieved April 15, 2019, from <https://www.healthypeople.gov/2020/data-search/Search-the-Data#objid=5052>;

Outdoor Industry Association (2018, July 17). 2018 Outdoor Participation Report. Retrieved February 7, 2019, from <https://outdoorindustry.org/resource/2018-outdoor-participation-report/>

Owen N., Healy, G.N, Howard, B., Dunstan, D.W. (2012). Too much sitting: Health risks of sedentary behavior and opportunities for change. *President's Council on Fitness, Sports & Nutrition, 13*(3), 1-12.

Pretty, J. (2004). How nature contributes to mental and physical health. *Spirituality and Health International, 5*(2), 68-78.

Pretty, J., Peacock, J., Sellens, M., & Griffin, M. (2005). The mental and physical health outcomes of green exercise. *International Journal of Environmental Health Research, 5*(15), 319-337.

Sackett, C. R., Newhart, S., Jenkins, A. M., & Cory, L. (2018). Girls' Perspectives of Barriers to Outdoor Physical Activity Through Photovoice: A Call for Counselor Advocacy. *Journal of Creativity in Mental Health, 13*(1), 2–18.
<https://doi.org/10.1080/15401383.2017.1343166>

Selhub, Eva, Logan, A. (2012). Chapter 5: Green Exercise Is Like Exercise Squared. In *Your brain on nature: The science of nature's influence on your health, happiness, and vitality*, (105-126). New York City, NY: HarperCollins Publishers.

Stephens B.R., Granados K., Zderic T.W., Hamilton M.T., Braun B. (2011). Effects of 1 day of inactivity on insulin action in healthy men and women: Interaction with energy intake. *Metabolism, 60*(7), 941–949.

The Nature of Americans (2018). Adults spend little time outside weekly. Retrieved from <https://natureofamericans.org/findings/viz/adults-spend-little-time-outside-weekly>

The Nature of Americans (2018). Outdoors is unsafe is a likely barrier for younger adults.

Retrieved from <https://natureofamericans.org/findings/viz/outdoors-unsafe-likely-barrier-younger-adults>

Wolff, D., & Fitzhugh, E. C. (2011). The Relationships between Weather-Related Factors and Daily Outdoor Physical Activity Counts on an Urban Greenway, 579–589.

<https://doi.org/10.3390/ijerph8020579>

Zschucke, E., Gaudlitz, K., & Ströhle, A. (2013). Exercise and physical activity in mental disorders: Clinical and experimental evidence. *Journal of Preventive Medicine and Public Health*, 46(1), 12–21.