CHANGES IN TRAIL USAGE AMONG CHILDREN AGED 2-12 YEARS OLD FOLLOWING A TRAIL ENHANCEMENT INTERVENTION ON A GREENWAY IN **RURAL SOUTH CAROLINA**

by

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Abstract

It is important for children to spend time outdoors because there are numerous physiological, cognitive, psychological, and social benefits to being outside. Unfortunately, there has been a significant decline in the amount of time that children spend engaged in outdoor play. Reasons for this decline include increased technology usage, changes within school systems, parental influences, environmental factors, and lack of understanding of the motivators that get kids outside. Several interventions have been implemented with the goal of increasing children's outdoor time, including interventions in outdoor recreation, local park-based efforts, and community based programming. The purpose of this study was to evaluate the effectiveness of a trail enhancement intervention to increase trail usage of children aged 2-12 years old on a greenway in rural South Carolina. While trail usage decreased overall from baseline to post-intervention, the number of children and the number of groups with at least one child increased, indicating that the trail enhancement may have increased trail usage among children.

Introduction

Spending time outdoors is very important for the growth and development of children and leads to improvements in emotional wellbeing as well as mental and physical health (Kemple et al., 2016). Unfortunately, the amount of time children spend engaging in outdoor physical activity has declined in recent years (Kemple et al., 2016). Research suggests that this decline is due to increased use of technology, schools removing or limiting recess, increased parent fears for their children's safety when engaging in unstructured outdoor play, and childcare centers not providing outdoor playtime (Clements, 2004; Kemple et al., 2016; Ming Wen et al., 2009). This decrease is also due to schools reducing time spent in physical education class to accommodate increases in time allocated to reading and math (Trost & van der Mars, 2010). Additionally, individual, parental, social, and home environments all play a role in children's time spent outdoors, as well as ecological factors such as length of seasons or degree of rurality of an area (Lee et al., 2021).

It is currently recommended that children of all ages spend at least 90 minutes outdoors per day (Gifford, 2021). Unfortunately, recent studies show that kids spend 7.65 hours a day using electronic media while only spending an average of 7 minutes a day engaging in unstructured outdoor play (Hofferth & Sandberg, 2001; Juster et al., 2004). The American Academy of Pediatrics (AAP) states that "children play harder outdoors, and so getting them outside can help with motor development and overall physical health" and that "spending time outdoors can help children lower their stress and increase their focus" (Sally Goza, AAP President, 2020). Founded in 2008, Kids in Parks encourages active engagement of families, increases trail usage, and raises awareness of recreational activities available in parks and the surrounding community (Kids in Parks, 2022). To accomplish their mission of engaging kids and families in outdoor recreation, Kids in Parks has implemented a network of TRACK Trails through partnerships with local, state and federal governments as well as other partners to provide family-friendly trails that include self-guided materials such as signs and brochures to make the outdoor experience more educational and enjoyable. Oftentimes, even though there are already many existing trails that are accessible to communities, families are still hesitant to utilize them because of perceived difficulty, potential danger, or they simply are not interested or excited by them (Kids in Parks). Other barriers to nature engagement are the degree of urbanization and the nature orientation of the child's family members (Soga et al., 2018). TRACK Trails is meant to solve these issues so more children and families spend time outdoors (Kids in Parks).

The purpose of this study is to investigate whether the implementation of a TRACK Trail on a rural greenway leads to increased usage among children and families. It is anticipated that more children and families with children will use the greenway trail after TRACK Trails implementation.

Literature Review

Health Benefits of Children Spending Time Outdoors

There is sufficient evidence to support that there are numerous benefits of spending time outdoors for children. In a recent review of existing literature on nature-based physical activity, it was found that for children and adolescents, the amount of green space in the neighborhood, as well as high-quality facilities, led to increased levels of outdoor physical activity (Christiana et al., 2021). The review also found that there were clear physiological, cognitive, psychological, social benefits linked to nature-based physical activity.

Physiological Benefits

The research surrounding physical activity and outdoor time suggest that spending time outdoors benefits the physical health of children (Christiana et al., 2021). The known health benefits of physical activity (PA) include "reduced risk of heart disease, stroke, hypertension, type II diabetes, certain types of cancer, and decreased symptoms of depression" (Piercy et al., 2018 as cited in Christiana et al., 2021). Also, nature and nature-based physical activity is associated with decreased heart rate, blood pressure, cholesterol, body mass index (BMI), and improved heart rate variability (Christiana et al., 2021).

Additionally, it has been shown that spending more time outdoors can help prevent obesity in children (Cleland et al., 2008). When examining children's time spent outdoors and objectively measured physical activity, weight, and body mass index (BMI) in a three-year cohort study, researchers found that encouraging 10–12-year-old children to spend more time outdoors may be an effective strategy for increasing physical activity and preventing increases in overweight and obesity (Cleland et al., 2008).

Cognitive Benefits

A significant number of anthropometric, biochemical, and neural outcomes have been used to assess the cognitive effects of spending time in nature on physiology and overall health (Christiana et al., 2021). For example, "biochemical responses [to nature and nature-based physical activity] include positive impacts on enzymes such as alpha-amylase which aids glucose absorption; hormones such as cortisol (linked with stress and metabolic regulation) and dehydroepiandrosterone sulfate (linked with sex drive, osteoporosis and dementia); the immune system (e.g., interleukin-6 (IL-6), natural killer cells); and neurotransmitters such as noradrenaline, which mobilizes the brain and body for action, and dopamine, which plays a role in the motivational element of reward-motivated behavior" (Christiana et al., 2021).

Psychological Benefits

Outdoor time is very beneficial to children's psychological health. The majority of studies conducted on children's outdoor time have reached the same conclusion – that children who spend more time outside are able to think more clearly, are more attentive, are in a better mood, and experience less anxiety compared to those who spend most of their time indoors. It is important for children to experience unstructured "free play," with "unstructured" meaning that "*they* decide what to do, and how to do it, and are playing simply for play's sake" (Cohen, 2021). Additionally, unstructured outdoor play has been found to build confidence and promote creativity because children have more of a choice in how they choose to interact with their surroundings (Cohen, 2021). One study examining whether being within close proximity to residential outdoor play spaces contributed to the mental and behavioral health of children found that residential play space proximity was associated with a lower prevalence of development of a psychological disorder (Pérez-del-Pulgar et al., 2021).

There have been numerous reviews of the literature and research behind the mental health benefits of spending time outdoors for children. In one review, 35 papers involving children ages 0-18 were reviewed that examined nature's effects on the mental health of children and teenagers and found that spending more time in nature led to positive mental health outcomes for this age group (Tillmann et al., 2018).

Social Benefits

Having social relationships is very important to a person's overall health. Existing crosssectional studies indicate that "spending time in nature fosters social capital and social support that a person receives from others" (Christiana et al., 2021). Exposure to nature also leads to increased social connection and cohesion, which is one of the key aspects of the Healthy People 2020 Social and Community context domain, which refers to the "strength of relationships and the sense of solidarity among community members" (US Department of Health and Human Services, 2010, as cited in Christiana et al., 2021). One goal of Healthy People 2030 is to increase social and community support. Because spending time outdoors supports the building of relationships and leads to increased social support, it will help to achieve this goal as well (US Department of Health and Human Services, 2020).

Trends in Children's Time Spent Outdoors

Within the past few decades, the amount of time that children spend engaged in outdoor play has declined significantly. Research suggests that children have shifted from spending time playing outside to playing indoors. There are several potential reasons for the decline in children's outdoor time, such as the increased use of technology, changes within school systems, strong parental influences, environmental factors, and the lack of understanding of what motivates children to spend time outdoors (Brussoni et al., 2020; Clements, 2004; Kemple et al., 2016; Kepper et al., 2020; Lee et al., 2021; McCarthy, 2020; Ming Wen et al., 2009; Oakley et al., 2021; Trost & van der Mars, 2010).

Increased Use of Technology Among Children

In a cross-sectional survey conducted in Sydney, Australia, researchers investigated the relationship between time spent outdoors and independent mobility in children aged 10-12 years (Ming Wen et al., 2009). During this study, children recorded how much time they were spending outdoors, watching television, or playing computer games after school using a five-day diary. Upon study completion, it was found that a significant proportion of children typically spend less than half an hour a day playing outdoors after school, and have excessive amounts of screen time (Ming Wen et al., 2009).

In a study examining the difference in levels of outdoor play among today's children compared to previous generations, it was found that children today engage in different activities than they used to, many of which involve technology of some form (Clements, 2004). Additionally, results showed that in general, children participate in more indoor activities today primarily because of television. This study also found that most of the mothers of the children studied understood the importance of outdoor play and the benefits it could provide to their children despite their children not participating in as much outdoor activity as they did as children (Clements, 2004).

Changes Within School Systems

Potential reasons for the decline in children's time spent outdoors are that schools have removed or limited recess, and childcare centers are not providing outdoor playtime (Kemple et al., 2016). Offering outdoor play to children in school settings is crucial because many children do not have a safe space available to play outside where they live (McCarthy, 2020).

The No Child Left Behind Act (NCLB), passed in 2002, has contributed to decreased outdoor time in schools. NCLB has created a stigma where classes such as physical education, music, and art are viewed as nonessential and secondary to the school's academic mission. According to a 2007 national study conducted by the Center on Education Policy, since the passing of NLCB, 62% of elementary schools and 20% of middle schools have allocated significantly more time to reading/language arts and math (Trost & van der Mars, 2010). To accommodate this increase, 44% of school districts reported cutting time in subject areas such as social studies, art, music, physical education, and recess. Schools reduced the allotted time for these subjects by an average of more than 30 minutes per day (Trost & van der Mars, 2010).

Parental Influences

Parents also play a significant role in childrens' outdoor time, because it is ultimately their decision to incorporate outside activities into their child's life. Parents have increased fears about their child's safety while playing outdoors (Kemple et al., 2016), which is part of the reason why the overall time spent outdoors has declined.

Examining home environments and parental relationships, one study was conducted where researchers were seeking to understand the relationship between women's parenting practices and their child's outdoor play and physical activity in diverse neighborhood environments. It was found that parents in highly disadvantaged neighborhoods and communities, specifically parents of female adolescents, imposed more restrictions on outdoor play compared to the majority of other parents. Interestingly, restrictive parenting practices were negatively associated with outdoor play, but not physical activity (Kepper et al., 2020). Therefore, it can be concluded that stricter parenting styles may be connected to decreasing outdoor time for children.

Environmental Factors

According to a systematic review of the correlates of outdoor play and time among children aged 10-12 years, certain environmental factors influence children's time spent outdoors (Lee et al., 2021). Ecological factors such the length and nature of the seasons or degree of rurality of the area were found to be related to children's outdoor play and time.

Oftentimes, one of the top priorities for parents searching for a home is the availability of a green yard that is large enough to accommodate their children, especially since having a yard is an environmental factor thought to encourage kids to get outside. One cross-sectional study conducted in Melbourne, Australia investigated the relationship between yard size and greenness and children's outdoor play and physical activity levels (Oakley et al., 2021). Researchers found that for young children residing in higher socio-economic areas of Melbourne, yard characteristics did not appear to have a major impact on children's physical activity. This is an interesting finding because "existing evidence has shown that greener, more natural environments facilitate more outdoor play in children since they provide more interesting play areas and promote enthusiastic, diverse and imaginative play" (Spurrier et al., 2008 & Christian et al., 2015 as cited in Oakley et al., 2021).

Motivators for Children to Spend Time Outdoors

Research examining factors that promote children spending more time outside is crucial to the understanding of what the motivators are for children, as well as what common barriers exist (Brussoni et al., 2020). Additionally, understanding the factors that influence children's time spent outside will help in developing more effective solutions in the future. During a qualitative investigation of factors that influence 10-13 year old children's unsupervised outdoor activities, two main themes emerged: "feeling safe" and "things to do" (Brussoni et al., 2020) "Feeling safe" related to aspects that contributed to children's sense of safety. "Things to do" related to whether children perceived there were outdoor options in the neighborhood that they could easily and safely access (Brussoni et al., 2020). This study reveals the factors considered

by children when deciding whether or not they wish to engage in outdoor activities. Acquiring knowledge of these deciding factors will help adults develop more appealing outdoor options for children, which will ultimately result in children spending more time outside.

Interventions to Promote Children's Time Spent Outdoors

There have been various interventions implemented in the past that have been geared towards getting more children to spend time outdoors. These interventions include outdoor recreation, local park-based efforts, and community-based programming.

Interventions in Outdoor Recreation

Some interventions meant to increase children's outdoor time are focused on outdoor recreation. One evidence-based outdoor recreation intervention called "Finding Your Voice," or FYV, is a weekend residential camp program based in Clemson, South Carolina focused on introducing adolescent girls between the ages of nine and thirteen to outdoor recreation to increase their sense of self-efficacy and self-empowerment (Evans et al., 2020). FYV was "intentionally crafted to encourage participants to enhance their self-efficacy. Self-efficacy, or one's belief in their competency at a task, is grounded in the expectations one has for how well they will perform that task" (Evans et al., 2020). FYV based their camp on the self-efficacy theory defined by Albert Bandura of Stanford University. According to Bandura's work, the self-efficacy theory details that "an individual's efficacy expectations are a 'major determinant' of how much effort they are willing to put into the task, and how well they will persevere in that task" (Bandura, 1994, as cited in Evans et al., 2020). This theory also describes four main sources through which individuals improve their efficacy expectations: performance accomplishments (successful experiences), vicarious experience (observing the success of others

who are similar to you), verbal persuasion (being told you can succeed), and emotional/physiological arousal (emotional/physiological responses in a given situation that provide either positive or negative feedback to an individual) (Bandura, 1994, as cited in Evans et al., 2020). Several steps have been taken to ensure the FYV camp provides these four sources for efficacy expectation improvement. First, all of the counselors, the majority of the instructors, and all campers are females of similar age for their respective groups. This provides models for participants to observe who are interacting in the camp environment positively, therefore allowing them to see others, similar to themselves, succeeding (Evans et al., 2020). The activities are also focused on basic, entry-level skills to increase the opportunity for participant success when first trying an activity. Before each camp, counselors are also trained on the basic principles of the self-efficacy theory to "ensure they understand the importance of encouraging participants to view the success of others, of providing realistic positive verbal feedback, of working with each participant to help them succeed in each activity (e.g., providing positive reinforcement and helpful instructions during the activity), and to properly handle discussions around the anxiety, stress, or fear campers might feel prior to or during activities" (Evans et al., 2020). There have been a wide variety of changes made to the FYV program due to new research, theory, and the consistent goal of keeping the camp focused on outdoor adventure recreation. For example, more emphasis was placed on inserting the camp into the natural environment because of growing research evidence that developing a connection with the outdoors is important in overcoming constraints over time in outdoor recreation (Evans et al., 2020). This included the transition of all activities to an outdoor facility, an adjustment to the schedule to ensure that all campers would participate in activities central to the recreation focus

of the camp, such as backpacking, rock climbing, and kayaking, and would prepare and eat at least one meal outdoors (Evans et al., 2020).

Data from the FYV camp was collected for eight, nonconsecutive years (once in 2006 and then from 2013-2019). The original camp in 2006 was run as a pilot camp and started again in 2013 due to increased personnel and funding support. A survey based on a task-specific self-efficacy measurement was given to participants twice, once in 2006 and once in 2013. Questions included were related to parental/adult support, barriers to participation (e.g. how likely participants felt they would be able to overcome constraints to participate in physical activity), and positive alternatives (e.g. how likely participants felt they were to choose physical activity over non-physically active activities). Adolescent girls who participated in FYV (N=75) on these two instances completed a pre- and post-test survey on the first and last day of camp. In addition to the survey, each year, on the last day of camp. Paired sample t-tests were conducted to evaluate changes in self-efficacy with a p-value of <0.05 indicating significance (Evans et al., 2020).

It was found that there were clear positive benefits related to participation in the intervention (Evans et al., 2020). Results of the quantitative evaluation indicated a statistically significant increase in the participants' physical activity self-efficacy from pre- to post-program. Qualitative findings uncovered themes related to the camp's design, including confidence-building, an appreciation of the camp environment and all-female experience, and improvements in resiliency and self-empowerment. These findings are encouraging and support the importance of offering outdoor interventions to adolescent girls to increase their exposure to nature and to remind them that outdoor spaces are meant for everyone (Evans et al., 2020).

Outdoor adventure interventions are a type of outdoor recreation intervention with the goal of creating positive change in participants and improving their overall health and wellbeing. Outdoor adventure interventions are "outdoor adventure programs that combine small groups, contact with nature, participation in adventure activities, and therapeutic processes to create opportunities for change in participants and to support an individual (or family group) to move toward greater health and well-being" (Gass et al., 2012 & Pryor, 2009 as cited in Bowen et al., 2016). One national online survey completed by 98 program leaders and 24 program managers in Australia sought to find out specifically what the characteristics of outdoor adventure interventions made a valuable contribution to the personal and social development of young people in general. The primary findings of this study, as perceived by program staff, were that OAIs effectively address the behavior problems of young people and potentially support the prevention and treatment of mental health issues commonly experienced by young people (Bowen et al., 2016).

Interventions as Local Park-Based Efforts

There is also extensive evidence that outdoor programming benefits disabled youth, and that utilizing the natural environment has an effect on emotional behavior, social relationships, and the state of mind of children living with learning disabilities (Floresca, 2020). The Nature Walk Program was an intervention tool designed to allow participants with learning disabilities, specifically with cases of mild autism and Down's Syndrome, to experience nature activities. It was found that there were positive behavioral changes in children with learning disabilities who underwent the Nature Walk Program. There was an increased desire to participate in succeeding intervention sessions, improvement in memory function, improved awareness, and improved sensitivity to their natural surroundings (Floresca, 2020).

Interventions as Community-Based Programming

One intervention with the goal of increasing the number of people, specifically children, spending time outdoors, is a program called Kids in Parks, which offers a network of family-friendly trails called TRACK Trails (Kids in Parks, 2022). Each TRACK Trail features self-guided brochures and trailhead signs that are designed to create a fun, educational, and interactive experience for children.

Materials and Methods

Study Location

This study was conducted at the Lindsay Pettus Greenway, a greenway trail in Lancaster, South Carolina. The greenway is a point-to-point 2.2 mile trail consisting of a combination of boardwalks and paved walkways. Lancaster is a rural town with 8,460 people and a median household income of \$29,615. Of these people, 75.1% are white, 21.4% are Black or African American, 5.9% are Hispanic or Latino, 1.6% are Asian, and 0.3% are American Indian and Alaska Native (US Census Bureau, 2020).

The main recreational activity for children in this community is sports, so the greenway presents a different type of location for activity from what was available previously. The paved trail expands who can use it and how it can be used. From a health equity perspective, the greenway is in a federal opportunity zone, as the trail runs through two census tracts where the majority of households are low-income. Created by Congress in the Tax Cuts and Jobs Act of 2017, opportunity zones are a federal program meant to encourage economic development and job creation in low-income urban and rural communities (SC Opportunity Zones). Community leaders planned and developed the route of this greenway intentionally in a place that was in need. Leaders also felt that this greenway would improve the community renewal aspect, which will encourage people to stay within the rural community instead of moving to urban areas. Lastly, leaders wanted to connect the schools in the area.

Intervention

TRACK Trails are family-friendly outdoor adventures offered by Kids in Parks, whose mission is to "engage kids and families in outdoor recreation to foster lifelong wellness and meaningful connections to public lands" (Kids in Parks, 2022). TRACK Trails are not built as new trails; rather, they are implemented at existing trails to add an interactive and educational element. Kids in Parks was founded in 2008 as an initiative of the Blue Ridge Parkway Foundation. The program partners with national parks, state parks, city/county parks, and other public land management agencies throughout the country, and receives funding from healthcare organizations such as Blue Cross and Blue Shield of North Carolina Foundation and BlueCross BlueShield of South Carolina Foundation to install its network of trails. Today, there are over 190 TRACK Trails in 12 states, Washington DC, and the Eastern Band of the Cherokee Nation. TRACK Trails is now a national network of trails with self-guided adventures that encourage kids and families to spend more time outdoors (Kids in Parks, 2022).

One primary characteristic of TRACK Trails is that they promote engagement with the natural environment. One way this is accomplished is through the utilization of interactive brochures available at trailhead signs designed to excite and educate children. All of the

brochures can also be found online. Every TRACK Trail has self-guided brochures and signs to turn any visit into a more fun and exciting outdoor experience. The TRACK Trails program also consists of an online component where children can register online to track their outdoor adventures, which are not limited to just the TRACK Trail adventures. By registering their adventures online, children have the opportunity to win prizes.

The Blue Ridge Parkway Foundation received funding from the Blue Cross and Blue Shield of South Carolina Foundation to identify communities where they could place TRACK Trails. The Lancaster County Parks and Recreation Director reached out and suggested the county as a site, and it was chosen. The trailhead of the Lindsay Pettus Greenway TRACK Trail connects two nearby schools in the area. The sign located at the trailhead features interactive brochures for children to follow along with. Because of the placement of the brochures at the trailhead sign, parents and children can retrieve their desired brochures at the beginning of their visit to allow for full engagement with what the TRACK Trail has to offer. These brochures were chosen by a volunteer committee of environmental educators in the community, based on what natural resources would be accessible to trail users while visiting the greenway. Activities included in the brochures are Natures Hide & Seek, Rivers through the Ages, Pond Life, and Animal Athletes. These activities are referred to as adventures. The Natures Hide & Seek brochure (Figure 1) is designed to help children identify certain things in nature that are often overlooked, and is designed so children will find something new every time they walk the trail. The Rivers through the Ages brochure (Figure 2) educates children on the stages of river maturation and helps them identify whether a river they are observing is young, mature, or elder. The Pond Life brochure (Figure 3) teaches kids what organisms live in a pond and how to identify where each one fits into the ecosystem. This is achieved by having kids be on the

lookout for 12 plants, animals, and insects commonly found at the pond, and explaining how each organism uses the pond to survive. Also, kids are taught the difference between producer and consumer organisms. Lastly, the Animal Athletes brochure (Figure 4) contains an adventure that encourages children to imitate the exercises of the animals they are observing. Contained in the brochure are eight different animal exercises that kids can try while exploring the trail, such as hummingbird hand-swings or frog hops.

Figure 5 depicts the trailhead sign with the available brochures. Figure 6 shows the surrounding area around the TRACK Trail sign. It should be noted that after completion of this study, a few more attractions were added to the site of the trailhead sign as shown in Figure 6. One attraction is a mini library/book swap station. The other attraction is a dog sculpture designed and painted by a Lancaster artist with the Paws on Parade outreach project, which places sculptures in outdoor locations where many would not normally encounter art in their daily lives (Paws on Parade).

Data Collection

This study was determined to be exempt from Institutional Review Board oversight by the Appalachian State University IRB. Four passive-infrared cameras (PICs) were used to record 30-second videos of trail users each time motion was detected. The PICs were installed and activated 24 hours a day for one week during early December 2020 (December 2nd, 2020 -December 8th, 2020) prior to the TRACK Trail sign installation. After the TRACK Trail sign was installed, PICs were placed in the same locations and activated for another full week during mid-January 2021 (January 12, 2021 - January 20, 2021). A total of four Moultrie M-8000i trail cameras were placed along 1.8 miles of greenway. Volunteers were trained and were responsible for replacing memory cards and batteries daily in the PICs. One PIC was placed at the 0.1 mile marker, another at the 0.8 mile marker, another at the 1.3 mile marker, and another at the 1.8 mile marker. The 0.1 mile marker is where the TRACK Trail brochure kiosk is located.

The average temperature in Lancaster at baseline was 43.65 degrees, while the average temperature post intervention was 41.88 degrees. There was a little over an inch (1.02 inches) of rain at baseline and no precipitation post-intervention (according to Weather Underground).

Data Coding

A total of twelve undergraduate and graduate students were trained to systematically observe and code the video data using a Qualtrics online survey and data collection form. Training consisted of going over the video coding protocol and practicing with training videos to ensure inter-coder reliability.

Variables Coded

Number of People in Group

The number of people in each group was recorded.

Age Range

The age range of each group member was recorded in years, with age categories of 0-2, 2-5, 5-12, 13-18, 18-30, 30-64, and 65+. For this study, the age categories of 2-5 and 5-12 were

combined to form a variable for children 2-12 years old and the age categories of 18-30, 30-64, and 65+ were combined to form a variable for adults aged 18 and older.

Sex

The sex of each group member was recorded as either male, female, or unclear (this option was chosen when sex was too difficult to identify from the video footage).

Race and Ethnicity

The race and ethnicity of each group member was recorded with categories of white, Black, Asian, Hispanic/Latinx, Other, and Unclear (this option was chosen when race and/or ethnicity was too difficult to identify from the video footage).

Interaction with TRACK Trail Signs and Brochures

To obtain more information on TRACK Trail interaction, specifically with the trailhead sign and brochures, interactions were coded including whether any person in the group stopped and looked at the sign, stopped and looked at the brochures, talked to another person while at the sign, took a brochure from the sign, took at least one brochure with them on the trail, and took a picture of/at the sign.

Data Analysis

Before beginning data analysis, the duplicate groups were removed from the dataset using Excel. There were 100 duplicate groups removed at baseline and 102 duplicate groups removed post-intervention. After removing duplicate groups, the frequencies and percentages of trail users, number of children aged 2-12 years, groups of trail users, and groups with at least one child at both baseline and post-intervention were calculated. The differences between frequencies at baseline and post-intervention were examined by calculating a simple test of significance that has been shown to be reliable when comparing two numbers (Pocock, 2006).

Results

Table 1 shows the demographic characteristics of trail users. Most trail users were adults over 18 years of age at baseline and post-intervention (80% and 78.77%, respectively) and white (82.25% and 67.32%, respectively). There were slightly more male trail users at baseline and post-intervention (47.19% and 44.69%, respectively). The race/ethnicity breakdown was similar to the makeup of Lancaster as a whole. The demographic characteristics of trail users are fairly consistent with the total population data, with white being the highest percentage and Black and Hispanic/Latino being second and third most frequent.

Table 2 shows the number of trail users and groups of trail users. The total number of trail users at baseline was 445, while post-intervention was 358, which is about a 19.6% decrease. Despite this decrease, the total number of children aged 2-12 years increased from 44 at baseline to 51 at post-intervention (about a 15.9% increase) which is an increase from 9.9% of the total number of trail users to 14.2% at post-intervention. The number of groups of trail users declined from 225 at baseline to 191 post-intervention, a 15% decrease. However, the number of groups with at least one child aged 2-12 years increased from 22 at baseline to 28 post-intervention, a 27% increase.

Table 3 shows the frequencies of groups that interacted with the trailhead sign and brochures. Out of the 191 groups of trail users at post-intervention, 42 (21.99%) interacted with

the sign in some manner and out of the 28 groups with at least one child 16 (57.14%) stopped and looked at the sign.

	Baseline $(n = 445)$		Post (n = 358)	
	n	%	n	%
Age range				
0-2 years old	6	1.35	8	2.23
2-12 years old	44	9.89	51	14.25
13-18 years old	38	8.54	18	5.03
Adults <18 years old	356	80.00	282	78.77
Sex				
Male	210	47.19	160	44.69
Female	194	43.60	155	43.30
Unclear	41	9.21	43	12.01
Race/Ethnicity				
White	366	82.25	241	67.32
Black	42	9.44	30	8.38
Hispanic/Latinx	5	1.12	15	4.19
Asian	0	0	1	0.28
Other	0	0	0	0
Unclear	30	6.74	68	18.99

 Table 1. Demographic Characteristics of Trail Users

	Baseline		Pc		
	n	%	n	%	Ζ
Trail Users	445		358		-3.07*
Groups	225		191		-1.67
Children (2- 12yrs)	44	9.89%	51	14.25%	0.72
Groups with at least one Child	22	9.78%	28	14.66%	0.85
* <i>p</i> < .001	•				

 Table 2. Number of Trail Users and Groups of Trail Users

	Number of Groups	Percent*	Number of Groups with at least One Child	Percent**	
Stopped and looked at the sign	42	21.99%	16	57.14%	
Stopped and looked at the brochures	10	5.23%	6	21.43%	
Talked to another person while at the sign	13	6.81%	6	21.43%	
Took a brochure from the sign	12	6.28%	7	25.00%	
Took at least one brochure on the trail	4	2.09%	4	14.29%	
Took picture of/at the sign	1	0.52%	1	3.57%	
* Total number of groups of trail users post intervention was 101					

Table 3. Frequency of Trailhead Sign Behaviors of Groups of Trail Users

Total number of groups of trail users post-intervention was 191

** Total number of groups of trail users with at least one child post-intervention was 28

Discussion

The results of this study indicate that the number of children aged 2-12 years old and the number of groups with at least one child increased after the TRACK Trail intervention implementation, however this increase was not statistically significant. Even though there was not a statistically significant difference found, the percent of trail users that were children

increased from baseline to post-intervention (9.89% to 14.25%), which indicates that the TRACK Trail intervention may have resulted in more children being outside. The percent increase in the number of groups with children also indicates that not only were more children using the trail, but more children and their families were using the trail. Overall, the number of trail users and groups of trail users decreased from baseline to post-intervention. There are several possible explanations for this. The Lindsay Pettus Greenway opened on November 20, 2020 and data was collected at baseline from December 2, 2020 through December 8, 2020 while the post-TRACK Trail data was collected from January 12, 2021 through January 20, 2021. With the greenway being a new greenway, it is possible that community enthusiasm for its opening caused an influx of trail users in the very beginning, especially since the "teaser" video before the grand opening had a sizable number of views on YouTube and has garnered over 1,790 views total. It was right after the grand opening when the pre-TRACK trail videos were recorded. This excitement about a new resource opening in a community has been shown in previous research.. For example, when the Brooklyn Bridge Park project was completed, there was a shared sense of pride, accomplishment, and satisfaction, and a significant turnout at the park's phased openings (Webster & Shirley, 2016). This collective excitement also occurred during the groundbreaking of the Lindsay Pettus Greenway in April of 2019, where over 180 people were in attendance. Secondly, while there was only a slight decrease in daily temperatures from baseline to post-intervention, the temperatures overall were cold. It is possible that more groups would have been recorded if this study had been conducted during the warmer months. A third potential explanation for the decrease in trail usage is that the time period when postintervention data was collected was right after the holiday season ended while the baseline data

collection was during the holiday season which may be filled with excitement and increased willingness to leave the home.

About 22% of the groups of trail users interacted with the sign in some way. Out of the groups with at least one child, over half (almost 60%) of those groups interacted with the sign. This may indicate that the sign is more appealing to children and families, which is expected due to the target audience of TRACK Trails.

These findings could potentially assist other rural community leaders in making datainformed decisions in placing TRACK Trails or a nature brochure kiosk in their local parks as a strategy to enhance their programming efforts and increase visitor usage.

Limitations

There are several limitations to this study that need to be addressed. Due to the nature of this study, there is a possibility that several groups were recorded more than once and therefore recorded as two or more separate groups. Duplicate groups that were observed in consecutive videos were taken out of the dataset prior to analysis. However, there could have been duplicate groups that were not removed if groups passed by the camera location at different points in time. In addition, because the videos were 30 seconds long, it is possible that not all interactions with the trailhead sign and the brochures were recorded due to the duplicate groups in consecutive videos that were taken out prior to analysis.

This study reports data from only one camera location, the TRACK Trail trailhead camera. There were a total of four camera locations along the greenway. Due to the various access points along the greenway trail, it is likely that the other three cameras recorded trail users that were not recorded by the TRACK Trail trailhead camera. Specifically, this camera location

at the entrance of the TRACK Trail trailhead may not have gathered all of the visitors who entered from the Clinton neighborhood trailhead location. Also, the trail access at Almetta Street is less than 0.2 miles from this camera location, and may be where many local residents access the trail.

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Figure 1. Natures Hide & Seek brochure



Figure 2. Rivers through the Ages brochure



Figure 3. Pond Life brochure



Figure 4. Animal Athletes brochure



Listen for the "gunk" sound of the green frog by the pond next to the visitor center. Green frogs make a tasty snack for predators such as snakes and herons. To escape quickly, frogs use their strong back legs to hop away.



4. Heron Stance

You can often see a great blue heron standing along the edge of the New River with one leg drawn up to rest and conserve heat. The heron's long toes allow it to balance on one leg for hours at a time.



6. Grasshopper Long Jump You may glimpse some Carolina grasshoppers as you walk the trail through the meadow. Grasshoppers can jump 20 times the length of their own body. If you could do that, you would be able to jump almost 100 feet!



Figure 5. TRACK Trail Trailhead Sign with Brochures

Figure 6. TRACK Trail Trailhead Sign and Surrounding Area

