Greenville Hospital System
Swamp Rabbit Trail: Year 1 Findings

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Executive Summary

Overweight and obesity rates in the United States over the past decade continue to increase as the levels of physical activity among youth and adults have declined. The built environment is often considered a foundation for health and wellness affecting decisions related to many health outcomes including inactivity and obesity. Recreational trails have been identified from the Centers for Disease Control and Prevention and the Institute of Medicine as examples of built environmental supports associated with promoting regular physical activity. Community designs offering access to recreational facilities and open space, like trails, promote active living and contribute to local economies. Individuals residing in walkable communities are more active than those who do not live in walkable communities and are more likely to meet current activity recommendations.

The Greenville Hospital System Swamp Rabbit Trail (GHS SRT) is community infrastructure designed to promote active living and multi-modal transportation options. The findings from this report were collected on the GHS SRT segment from North Greenville Medical campus of the Greenville Hospital System in Travelers Rest to Linky Stone Park in Downtown Greenville. This trail provides Greenville County residents and tourists with an array of opportunities to actively commute to varying destinations, while promoting health and economic activity.

The development of the GHS SRT was a conscious strategy by Greenville County and City officials to intervene on risky behaviors linked to inactivity and obesity and offer additional transportation options, while promoting economic development and reduced emissions. To successfully measure the contextual elements impacting trail user patterns on the GHS SRT, five modes of evaluation were utilized: (1) systematic observation of 15,751 individuals using momentary time sampling techniques (e.g., direct observation) during 4 days each season for a total of 16 days in Year 1; (2) 1,161 intercept surveys on the GHS SRT; (3) 500 Random Digit Dial (RDD) surveys of Greenville County residents; (4) two focus groups; and (5) 9 interviews of businesses in close proximity to the trail.

The overall purpose of the evaluation is to (a) determine whether key target populations in Greenville, South Carolina are utilizing the GHS SRT to increase their physical activity levels or for active transportation; and (b) obtain data on which to base future community infrastructure investments on the GHS SRT to promote health, alternative transportation, and economic activity. The evaluation period for this report was from July 1st, 2010 to June 30th, 2011.

Summary of Direct Observation Findings

To date, 15,751 trail users were observed on the GHS SRT during 16 observation days. Adjusting for seasonality, approximately 359,314 users would be observed on the GHS SRT (based on daily observation estimates for Year 1). Sixty-two percent of GHS SRT users were male and 38% were female. The majority of GHS SRT users were adults. Few minorities were observed using the GHS SRT. Approximately 93% of trail users observed were white. Relatively few children and teens were observed using the GHS SRT - only 11% of **all** GHS SRT users were children and teens.

Figure 1: Percent of GHS SRT Users for Gender

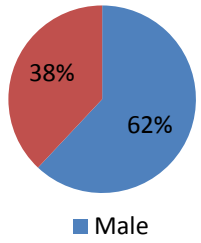


Figure 2: Percent of GHS SRT Users for Age

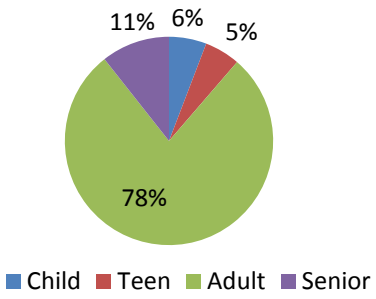
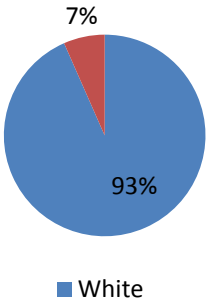


Figure 3: Percent of GHS SRT Users for Ethnicity



Other significant findings from Direct Observations follow:

- 83% of all males observed on the GHS SRT in Year 1 were bicyclists compared to 73% of all females.
- Nearly 15% of females were observed walking on the GHS SRT compared to 7.7% of males.
- A greater number of GHS SRT users were observed using the trail during the summer months.
- The greatest number of trail users was observed when the temperatures were between 61-70 degrees.
- GHS SRT users tended to use the trail more frequently in the early afternoon (i.e., between the hours 12-1:30pm).
- An overwhelmingly large number of GHS SRT users chose to visit the trail on weekends (primarily Saturdays).
- The most frequently used access point on the GHS SRT was Duncan Chapel Road on the campus of Furman University.
- Approximately 50% of adult male and female trail users were not wearing helmets when bicycling on the GHS SRT in Year 1.

Summary of Intercept and RDD Survey Findings

Intercept surveys were administered to 1,161 trail users. The key findings from these surveys are outlined below:

- Approximately 55% of female and 77% of male intercept survey respondents were bicycling when asked to complete the survey. This finding is consistent with the direct observation findings.
- The majority of female (59%) and male (57%) respondents resided less than 15 minutes from the trail.

- The majority of female (64%) and male (56%) respondents used a motorized vehicle to access the trail.
- GHS SRT users tended to spend between 1 and 2 hours on the trail per visit when using it for recreation.
- Approximately 71% of females and 68% of males reported the maintenance of the GHS SRT was 'excellent'.
- Approximately 6% of GHS SRT users reported using the trail for transportation purposes, which is considerably higher than the 2.7% of Greenville County residents who reported 'walking' or using 'other means' to commute to and from work in the 2009 American Community Survey.

In addition to intercept surveys, a Random Digit Dialing (RDD) survey was administered to 500 Greenville County residents to identify barriers and determinants linked to GHS SRT use. Non-users frequently cited lack of awareness of the GHS SRT and perceived inconvenience as the reasons they did not use the trail. Trail users, on average resided approximately two miles closer to the GHS SRT than non-users.

Summary of Focus Groups and Business Interviews

Nineteen adult GHS SRT users participated in two focus groups (13 males; 6 females). All participants were white and 79% held a college degree. The median household income of the participants was $80,000 or greater; and 78% of participants were married. Focus group participants reported the GHS SRT to be one of Greenville's primary assets that should be used for promoting health among youth and adults. Focus group participants suggested using the trail as a marketing tool to recruit new business and to showcase Greenville County. Participants cited its accessibility for recreation, transportation, and physical activity as its best feature.

Open spaces like the GHS SRT generate economic benefits to local governments, homeowners and businesses. Trail based tourism has been found to provide a variety of economic advantages to communities. A total of nine managers/owners of retail businesses directly abutting and/or within close proximity to the GHS SRT were interviewed. Most businesses reported increases in sales/revenue ranging from 30% to as high as 85%. Use of business parking by trail users that did not visit their business was the most frequently cited disadvantage of having a business abutting and/or near the GHS SRT.

1 Introduction

To date, there is a paucity of studies relating to how creation of trails impacts physical activity behavior, non-automobile travel, and economics. One frequently cited reason is that it is logistically challenging to construct a recreational trail for such a study because these projects are typically the responsibility of local governments and agencies. Recognizing this challenge, there has recently been a call for using natural or opportunistic experiments to gather information to determine the effects of interventions that modify the built environment on physical activity behaviors, non-automobile travel, and local economies as well as other important community indicators.

The development of the Greenville Hospital System Swamp Rabbit Trail (GHS SRT) is an excellent example of how creating a trail may modify physical activity, recreation and transportation behaviors while contributing to local economies. The GHS SRT, as defined for this report, links the North Greenville Medical campus of the Greenville Hospital System in Travelers Rest along the Reedy River to Linky Stone Park in Downtown Greenville, SC.

1.1 Active Transportation Using Trails

Minimal research is available that examines the impact of trail creation on active transportation (i.e., walking and bicycling for transportation purposes) and corresponding links to health outcomes. Active transportation continues to be understudied, but may reduce the incidence of obesity and cardiovascular disease risk factors, as well as contribute to overall physical activity levels[1-4].

Transportation and behavioral psychologists frequently use the Theory of Planned Behavior as a framework to examine and better understand the influences on travel behaviors[2]. Despite the well-documented health benefits of regular physical activity, only 6% of trips are completed by foot or bicycle and these trips have recently decreased[3]. Currently, national trends show that 31% of trips 1 mile or less are made by bicycling or walking and only 4% of all trips between 1 and 3 miles are done by walking or biking. According to the National Household Travel Survey, increasing the share of walking or biking trips between 1 and 3 miles from 4% to 10% would avoid 21 billion miles of driving per year[5].

Half of the trips in the US can be completed with a 20 minute bicycle ride according to Gotchi and Mills,[6] authors of *Active Transportation for America*. Obviously the availability of safe and convenient infrastructure to support active transport, such as bicycling, is integral to encouraging more active transportation. The Transportation Research Board/Institute of Medicine and the Task Force on Community Preventive Services concluded that there is substantial evidence supporting how trail creation can promote active transportation[6].

Greenville County's development of trails, such as the GHS SRT, can promote daily bouts of "life style" activity to meet current activity recommendations and can positively affect transportation trends in the communities where such trails are located. For approximately $50 million, the price of a single mile of four-lane urban highway, hundreds of miles of bicycle and pedestrian infrastructure can be built[6].

1.1.1 Safe Routes to School

The Safe Routes to School (SRTS) program is designed to encourage active and safe transportation for children to school. It was launched in 2005 by the Federal *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users.* Through this program, $612 million in federal transportation funds were made available from 2005 through 2009 to state, local, and regional agencies and to nonprofit organizations for programs that encourage primary and middle school students to walk or bike to school[7-9]. To qualify for the funds these programs must have used at least 70% but no more than 90% of the funds on infrastructure-related projects, which may include sidewalk improvements, traffic-calming measures, bicycle lanes, and bike racks[9]. Non-infrastructure related projects may include student and parent education, public awareness campaigns, and traffic enforcement[10].

According to Fiske[11], the SRTS program in Boulder, Colorado supports more than 75% of area children using active transportation to attend school. Active transportation to school provides an opportunity to promote regular activity while reducing the prevalence of childhood obesity among Greenville's youth. Approximately 43% of South Carolina middle school youth recently reported three or more hours of sedentary time per school day from television alone. Furthermore, twice as many African American middle school students (62.4%) reported three or more hours of sedentary time per school day from television alone as white middle school students (30.6%)[12]. The GHS SRT can provide opportunities for recreation and transportation activity to limit the negative consequences of daily sedentary behaviors exhibited by South Carolina youth.

In 1969 over 40% of youth walked to school compared to approximately 13% today[13]. Walking to school may only contribute to a portion of the recommended levels of daily physical activity needed for optimal health, but those children who walk participate in significantly more activity than those who do not[14]. According to some researchers this is enough activity to "fend" off excess weight gain[15]. With many youth in South Carolina sedentary throughout the day, the GHS SRT - and its close proximity to AJ Wittenberg Elementary School, Legacy Charter School, and Traveler's Rest High School for example - can provide opportunities for children and teenagers to actively travel to and from school to increase their levels of daily activity.

1.2 Economic Impact of Open Space and Recreational Trails

According to Active Living Research funded by the Robert Wood Johnson Foundation[16], recreation areas including open space and trails provide a host of economic benefits to residents, local governments and private developers. Trails and recreation areas have been found to increase residential property values and tax revenues[16]. The City of Boulder, Colorado for example purchased a greenbelt for approximately $1.5 million. The overall value of the Greenbelt was $5.4 million which contributed potentially $500,000 annually to overall property tax revenue for the neighborhood where the greenbelt was located, allowing a return on the investment for the project costs in three years[17].

Recent findings also document that consumers are willing to pay a premium to reside in walkable communities with open space[17]. A review of over 60 studies examining the impact open spaces have on residential property values found that most open spaces increase property values. The magnitude of the increased value depends on the size of the area, the proximity to residences, the type of open space, and the method of analysis[18].

A recent study examining data from departments of transportation and public works departments from 11 cities in the United States entitled *Using Pedestrian and Bicycle Infrastructure: A National Study of Employment Impacts*[19] evaluated 58 separate projects. The report found that bicycling infrastructure (e.g., bicycle lanes) creates the most jobs for a given level of spending - for each $1 million spent, the bicycle projects create 11.4 jobs within the state where the project is located. Pedestrian-only projects (e.g., sidewalks) create an average of about 10 jobs per $1 million invested. Multi-use trails (e.g., greenways) create 9.6 jobs per $1 million invested. Infrastructure that combines road construction with pedestrian and bicycle facilities create fewer jobs than pedestrian and bicycle projects. Automobile-only road projects create the least number of jobs per $1 million spent - 7.8 jobs per $1 million[19].

A national survey of developers revealed consumer interest in higher density, mixed use, pedestrian-oriented alternatives to conventional, low-density, automobile-oriented suburban development[20]. This demand is expected to continue to rise as demographic changes and consumer preferences shift toward denser, more compact residential environments, according to the study[21]. Furthermore, additional factors support the market for walkable urban places, including: urban job growth, tight urban housing markets, preferences for urban amenities and support for public policies and investments that favor revitalization, alternative transportation modes, historic preservation and urban parks and open space[22].

Open spaces, like trails, can enhance the value of nearby developable lands to allow compact development to command a premium in the residential real estate market[23]. A survey of 2,000 homebuyers, conducted by the National Association of Homebuilders and National Association of Realtors, indicated that walking/jogging and bike trails rank "important to very important" behind highway access. Trails consistently rank in the top five important amenities in making real estate purchase decisions[24].

1.3 Trails and Health

Efforts to create trails that promote and encourage physical activity have been successful in various settings[25-27]. A greater emphasis on outdoor activity and the creation of trails and areas to support outdoor activity continues to emerge in the research linking physical activity and health. Understanding the influences that trails and recreation areas provide will assist researchers, practitioners and policy makers in efforts to better understand the impact that public policy, social systems, and infrastructure[28-32] have on physical activity adherence. Accessibility to no-cost facilities that support physical activity (like the GHS SRT) has been linked to physical activity participation[33-35].

The Centers for Disease Control and Prevention (CDC) Task Force on Community Preventive Services recommended that efforts aimed at promoting walking and bicycling should include access to trails to encourage physical activity[36], and identified trails as integral infrastructure for physical activity[37-43]. Community infrastructure is often considered a foundation for health and wellness and affects decisions related to health outcomes. Trails are examples of infrastructure associated with regular physical activity participation[37-44].

Reed and colleagues[44] examined the activity behaviors in 25 parks in Greenville County and found that trails were the most frequently used amenity. Sixty-percent of males and 81% of females observed in all 25 parks were on trails. The development of and increased access to trails, has been frequently advocated by researchers and policy makers alike to promote regular physical activity[37-42, 44-45]. Librett and colleagues[46] examined the physical activity levels among trail users in the United States and found that individuals who reported using trails at least once a week were twice as likely to meet physical activity recommendations as individuals who reported rarely or never using trails.

1.3.1 Sedentary Living: A National Problem

Participation in regular physical activity is a preventive behavior, reducing the risks of chronic disease (including diabetes) and increasing quality, and perhaps length of life[47]. The CDC estimates that 48.3 million Americans will have diabetes by the year 2050[48].

More than 66% of American adults are obese or overweight, according to the CDC's recent calculations[49-50]. Less than 50% of American adults meet current activity recommendations[50]. Therefore, it should not come as a surprise that so many children are overweight and inactive. Physical activity declines precipitously once children enter adolescence[51-52]. Females of all ages are less active than males of the same age. Adolescent girls are less likely to meet the 60-minute per day activity recommendation when compared to boys of the same age[49-50].

1.3.2 Recommendations for Physical Activity by Age Group

According to the *2008 Physical Activity Guidelines for Americans*[50], the following updated guidelines are recommended for youth, adults and seniors:

Recommended Guidelines for Youth, Adults and Seniors

Adults	• Should participate in at least 150 minutes (2 hours and 30 minutes) of moderate-intensity activity per week, or 75 minutes (1 hour and 15 minutes) of vigorous-intensity physical activity per week, or an equivalent combination of moderate- and vigorous- intensity activity. • Additional health benefits possible through greater amounts of physical activity (i.e., 300 minutes (5 hours) of moderate-intensity per week, or 150 minutes of vigorous-intensity aerobic physical activity per week, or an equivalent combination of moderate- and vigorous-intensity activity).	• Moderate intensity activities that raise the heart rate, including brisk walking (3-4 mph) gardening, climbing stairs, housework. • Should be performed in bouts of at least 10 minutes, and preferably, it should be spread throughout the week. • Can be accumulated from leisure, occupational, or transportation.
Older Adults	• Adult guidelines apply, unless health conditions prevent older adults from performing 150 minutes a week. • Should be as physically active as their abilities and health conditions allow.	
Children and Adolescents	• Should participate in 1 hour or more of at least moderate-intensity activity every day. • At least three times a week, some of these activities should be vigorous-intensity, and help to enhance and maintain muscular strength, flexibility, and bone health.	• Important to encourage physical activities that are age appropriate, enjoyable, and offer variety.

Meeting activity recommendations links physical activity to the strongest health benefits. Since the majority of the United States population is inactive and susceptible to greater health risks, the greatest potential for reducing the public's risk is by promoting those who are sedentary to become moderately active, rather than promoting more activity among those already active[51-52]. According to recent reports, increasing physical activity to recommended levels would prevent approximately 150,000 deaths from cardiovascular disease, over 20,000 deaths from cancer, and 20,000 deaths from diabetes each year[53]. Tobacco use, high blood pressure, being overweight, and obesity are the only risk factors causing more disease and ultimately more deaths than physical inactivity[54].

1.3.3 Health in South Carolina: Adults and Youth

Findings from the 2010 Behavioral Risk Factor Surveillance System (BRFSS) reveal approximately 76% of African American adults in South Carolina are overweight and/or obese compared to 64% of white adults[55]. In addition, approximately 49% of African American adults are insufficiently active and 24% report no physical activity participation[55].

Results from the 2009 Youth Risk Behavior Survey (YRBS) reveal that approximately 40% of South Carolina African American high school students are overweight or obese[55]; and nearly 48% of all African American rural children ages 10 – 17 years old are overweight or obese, compared to 23% of white rural children. Equally alarming, over 25% of low-income children ages 2 - 5 are overweight or obese in South Carolina[55-56, 58]. South Carolina is one of the nation's

leaders in the percentage of children (50%) who do not participate in afterschool team sports or lessons[57] and 83% of high school students did not attend daily physical education when in school. Furthermore, 65% of high school students did not attend physical education classes[59] in an average week. The CDC's State Indicator Report on Physical Activity for 2010[60] found that 27% of South Carolina adults do not participate in any leisure-time physical activity and only 20% of high school students are physically active.

According to a recent report 30% of South Carolina children between the ages of 2 and 5 years old were either overweight or obese. The percentage of overweight and obesity among Hispanic children between the ages of 2 and 5 was 37%. This percentage was the highest compared to African American children (27%) and White children (26%) of the same age group[60].

1.3.4 Health in Greenville: Adults and Youth

Approximately 48% of adults in Greenville County do not participate in moderate-intensity physical activity as defined by current activity guidelines[55]. Data collected by the Greenville County School District (with support from the Piedmont Healthcare Foundation in collaboration with Furman University and Activate Upstate) revealed that 36% of white youth, 44% of Hispanic youth, and 49% of African American youth are overweight and/or obese[61]. Additionally, the low-income obesity preschool rate for Greenville County is 13.7% compared to 11.4% for South Carolina. A lack of participation in regular physical activity among Greenville's youth has contributed to this epidemic.

2 Evaluation Methods for Active Transportation Usage, Economic Impacts, and Usage Characteristics of the GHS SRT

The GHS SRT evaluation process was designed to obtain objective quantifiable information about active transportation use, economic impact, and usage characteristics (including demographics and physical activity intensity levels) of trail users. Within this research field, examining the multitude of user behaviors continues to be difficult due to the lack of objective measures of activity intensity in specific ecological contexts. Therefore, to successfully measure the contextual elements impacting user patterns, objective methodologies in concert with survey methods were utilized.

This information was collected through five modes: (1) systematic observation using momentary time sampling techniques (e.g., direct observation 4 days each season for a total of 16 days in Year 1; (2) intercept surveys on the GHS SRT; (3) Random Digit Dial (RDD) survey methods of Greenville County residents; (4) focus groups; and (5) interviews of businesses in close proximity to the GHS SRT. The purpose of the overall evaluation was to (a) determine whether key target populations in Greenville are utilizing the GHS SRT to increase their physical activity levels and/or for transportation purposes; and (b) obtain data on which to base future infrastructure improvements on the GHS SRT.

3 GHS SRT Intercept Survey Results for Year 1

A brief (5 to 10 minutes) valid and reliable survey[62] comprised of 15-17 interviewer administered questions was used to assess users' perceptions of the GHS SRT. No identifiable information of the respondent was solicited and Internal Review Board procedures protecting human subject confidentiality were strictly followed. The survey was designed to provide practitioners, researchers, along with Greenville County and City officials, the ability to collect objective information on a variety of users. The survey included questions related to patterns of GHS SRT use (both recreation and transportation). Specific items concerning the length of time using the GHS SRT, time spent on the GHS SRT, origin (e.g., home or work) when accessing the GHS SRT, distance and time from home and work to the GHS SRT, mode of transportation to the GHS SRT and the usual reason for using the GHS SRT (e.g., recreational physical activity or transit) were included. Five separate questions were asked for recreational and transportation activity. Four additional questions focused on whether the respondent visited the GHS SRT alone or with someone else (e.g., friend, family and/or pet), perceptions of GHS SRT maintenance and safety, and perceived impacts of GHS SRT use on respondent physical activity. The survey also included demographic items such as: age, gender, ethnicity, and highest educational level attained.

One-thousand one hundred and sixty-one (1,161) respondents completed the survey in Year 1. All respondents were at least 18 years old. Approximately 55% of female (N=258) and 77% of male (N=523) survey respondents were bicycling when asked to complete the survey. This finding is consistent with the direct observation findings (see Section 4). The majority of female (59%) and male (57%) respondents resided less than 15 minutes from the trail. The majority of female (64%) and male (56%) respondents used a motorized vehicle to access the trail. GHS SRT users tend to spend between 1 and 2 hours on the trail per visit when using it for recreation. In addition, approximately 71% of females and 68% of males believed the maintenance of the GHS SRT was 'excellent'.

An overwhelming majority (95%) of respondents were white, also consistent with GHS SRT's direct observation findings. Approximately 93% GHS SRT female respondents used the trail primarily for exercise or recreation. Similarly, 90% of males reported using the trail for exercise and recreation. Approximately 6% of all GHS SRT users reported using the trail for transportation purposes, which is considerably higher than the 2.7% of Greenville County residents who reported 'walking' or using 'other means' to commute to and from work in the 2009 American Community Survey. Frequency and percent of most frequently cited intercept survey response(s) for Year 1 are listed in Table 1.

Table 1: Frequency and Percent of Most Frequently Cited INTERCEPT Survey Response(s) for Year 1

Number	Survey Question	Gender	Most Frequently Cited Response(s)	Frequency (%)[#]
1	Identify the physical activity respondent is doing.	Female Male	Bicycling* Bicycling*	258(54.5%) 523(76.2%)
1a	Identify who the person is on the trail with.	Female Male	With others With others	308(64.8%) 344(50%)
2	Identify gender	Female Male	NA NA	475(41%) 686(59%)
3	When was the first time you used this trail?	Female Male	12 to 16 months ago 12 to 16 months ago	245(51.6%) 376(54.8%)
4	Where are you usually coming from when you use this trail?	Female Male	Home Home	400(84.2%) 579(84.4%)
4a	How much time does it usually take to get to this trail from your home?	Female Male	Less than 15 minutes Less than 15 minutes	281(59.2%) 390(56.9%)
4b	How much time does it usually take to get to this trail from your work?	Female Male	Less than 15 minutes Less than 15 minutes	21(70.0%) 59(70.2%)
5	How do you usually get to this trail?	Female Male	Car or other vehicle Car or other vehicle	305(64.2%) 381(55.5%)
6	What is your usual reason for using this trail?	Female Male	Exercise or do recreational physical activity Exercise or do recreational physical activity	440(92.6%) 615(89.7%)
6a	During the past 7 days (including today), how many days have you used this trail for exercise or recreational purposes?	Female Male	One day One day	225(47.4%) 267(38.9%)
6b	What exactly do you usually do when you are on this trail for exercise or recreational purposes?	Female Male	Bicycle* Bicycle*	226(47.6%) 470(68.5%)
6c	How much time do you usually spend on the trail per visit when you use it for exercise or recreational purposes?	Female Male	Between 1-2 hours Between 1-2 hours	236(49.7%) 353(51.5%)
6d	During the past 7 days (including today), how many days have you used this trail for transportation purposes (to get somewhere)?	Female Male	See Table 2	See Table 2
6e	What activity do you usually do when you are on this trail for transportation purposes?	Female Male	See Table 2	See Table 2

6f	How much time do you usually spend on the trail per visit when you use it for transportation purposes?	Female Male	See Table 2	See Table 2
7	Who are you usually with when you use this trail?	Female Male	Family Nobody/by myself	161(33.9%) 261(38.1%)
8	In your opinion, the maintenance of the trail is EXCELLENT, GOOD, FAIR or POOR?	Female Male	EXCELLENT EXCELLENT	334(70.5%) 463(67.6%)
9	In your opinion, the safety and security along the trail is EXCELLENT, GOOD, FAIR or POOR?	Female Male	EXCELLENT EXCELLENT	179(37.8%) 278(40.6%)
10	How did you find out about this trail?	Female Male	Word of mouth Word of mouth	230(48.4%) 291(42.5%)
11	What do you like most about this trail?	Female Male	Free place to exercise Free place to exercise	96(20.3%) 149(21.8%)
12	What is your age?	Female Male	Average Average	33 years old 36 years old
13	Are you Hispanic or Latino?	Female Male	No No	461(98.1%) 658(97.2%)
14	What is your race?	Female Male	White* White*	446(94.7%) 645(95.0%)
15	What is the highest grade in school you have completed?	Female Male	College graduate College graduate	166(34.9%) 249(36.3%)
16	Where did you access the trail today?	Female Male	Linky Stone Park Linky Stone Park	134(28.2%) 270(39.4%)

* Denotes consistency with direct observation findings, where applicable (see section 4).
# The percentage listed for frequency refers to the percentage of respondents of a specific gender that provided the corresponding answer. For example, 54.5% of all females observed on the trail (question 1) were bicycling, while 76.2% of all males were observed bicycling.

3.1 GHS SRT Active Transportation Findings

According to the findings shown below, approximately 6% (or 72 respondents) of all users surveyed (1,161) reported using the GHS SRT at least 1 day during the past 7 days for transportation purposes. The vast majority of trail users on the GHS SRT for transportation prefer bicycle transportation, consistent with the direct observation findings for Year 1. Approximately 31% of respondents using the trail for transportation spent between 1 to 2 hours on the GHS SRT. The frequency and percent of GHS SRT Transportation Users are listed below.

Table 2: Frequency and Percent of GHS SRT Transportation Users (includes all respondents that indicated they use the trail for some type of transportation).

Question Number	Survey Question	Survey Response	Freq. (%)[#]
6	What is your usual reason for using this trail?	To travel somewhere (e.g., to store, commute to work or school)	17 (1.5%)
		Both for recreation and transportation purposes	85 (7.3%)
6d	During the past 7 days (including today), how many days have you used this trail for transportation purposes (to get somewhere)?	0	17 (16.7)
		1 Day	35 (34.3%)
		2 Days	11 (10.8%)
		3 Days	11 (10.8%)
		4 Days	4 (3.9%)
		5 Days	6 (5.9%)
		6 Days	2 (2.0%
		7 Days	3 (2.9%)
		No response	13 (12.7%)
6e	What activity do you usually do when you are on this trail for transportation purposes?	Walk	7 (6.9%)
		Jog or Run	0 (0.0%)
		Bicycle	74 (72.5%)
		In-Line Skate, roller skate or skate board	0 (0%)
		Other	1 (1.0%)
		NA	2 (2.0%)
		No response	18 (17.6%)
6f	How much time do you usually spend on the trail per visit when you use it for transportation purposes?	Less than 15 minutes	10 (9.8%)
		Between 15 to 29 minutes	7 (6.9%)
		Between 30 to 44 minutes	23 (22.5%)
		Between 45 to 59 minutes	10 (9.8%)
		Between 1 to 2 hours	26 (25.5%)
		Between 2+ and 3 hours	7 (6.9%)
		Between 3+ and 5 hours	2 (2.0%)
		More than 5 hours	0 (0.0%)
		No response	17 (16.7%)

The percentage listed for frequency in question 6 refers to the percentage of all respondents to this question (that is, of all respondents to the survey, 7.3% use the trail for both recreation and transportation). For questions 6d-6f, the percentage represents the percentage of the 102 individuals that indicated they use the trail for some sort of transportation purpose.

According to the 2009 American Community Survey[63], 94% of Greenville County residents reported using a vehicle to commute to work and 3.6% reported working at home. Thus,

approximately 2.7% of Greenville County residents reported 'walking' or using 'other means' to commute to and from work. The active transportation findings document that a significantly greater percentage of individuals are using the GHS SRT for transportation than estimates for the entire County[63].

Minnesota found in 2006 that 28% of trips in Minneapolis were performed by active transportation[6]. Similar findings were observed in Portland, Oregon when bicycling was encouraged. Portland's program found that the number of bicyclists increased fivefold over 15 years[6]. Cleveland, Ohio is currently developing an active transport system to ensure all residents are within a 10-minute bike ride of a trail connecting major employment and activity centers[6]. Bicycling has the greatest potential to assist all Americans in meeting the current physical activity guidelines, since travel by bicycle is faster than walking[6] and active transport takes less time with similar health benefits to walking.

3.2 Proximity to Residence and GHS SRT

Proximity to exercise facilities is an environmental characteristic identified as a possible determinant and barrier for physical activity[25-27]. Sallis and colleagues[64] reported that an environment abundant with exercise facilities could encourage physical activity in at least two ways. First, exercise facilities initially encourage physical activity by serving as visual stimuli cueing exercise behavior. Facilities close to an individual's residence will be seen often and will bring exercise to one's attention. Second, individuals in and around the facility who appear to be exercisers will strengthen the impact of the stimulus by making exercise appear to be a social norm, thus allowing proximity of facilities to provide role models for exercise. In addition, an environment abundant with exercise facilities can encourage physical activity by having facilities close to one's home. In previous studies, perceived inconvenience and travel problems have been reported as reasons for ceasing activity programs[64]. Troped and colleagues[1] examined factors impacting trail use and determined that travel distance to access the trail plays a significant role and should be considered when building a trail.

To better understand the relationship between proximity from the GHS SRT to place of residence, GHS SRT users were asked to indicate the proximity of their residence to the GHS SRT. Members of the research team identified themselves to each potential respondent and discussed the purpose of the research and how the data would be used. Respondents were asked their age, to ensure all respondents were 18 years or older. Respondents were also asked to identify their gender and ethnicity. Each respondent was asked for the nearest two cross-streets of their primary residence. GPS coordinates pertaining to the residence of each respondent were registered to a common datum, converted into a spatial map, and imported into ArcView GIS to be used as a base for examining proximal relationships and determining a mileage distance from place of residence to their preferred GHS SRT access point (See Figure 4). Females resided closer to their preferred GHS SRT access point than males. The average distance from place of residence and preferred access point on the GHS SRT is listed in Table 3.

Table 3: Average Distance from Place of Residence and Preferred GHS SRT Access Point

Question	Gender	Distance (Miles)
What are nearest two cross streets to your residence, city and zip code?	Female (N=343) Male (N=461)	8.48 10.04

Figure 4: GHS SRT Access Points and Trail User Residences

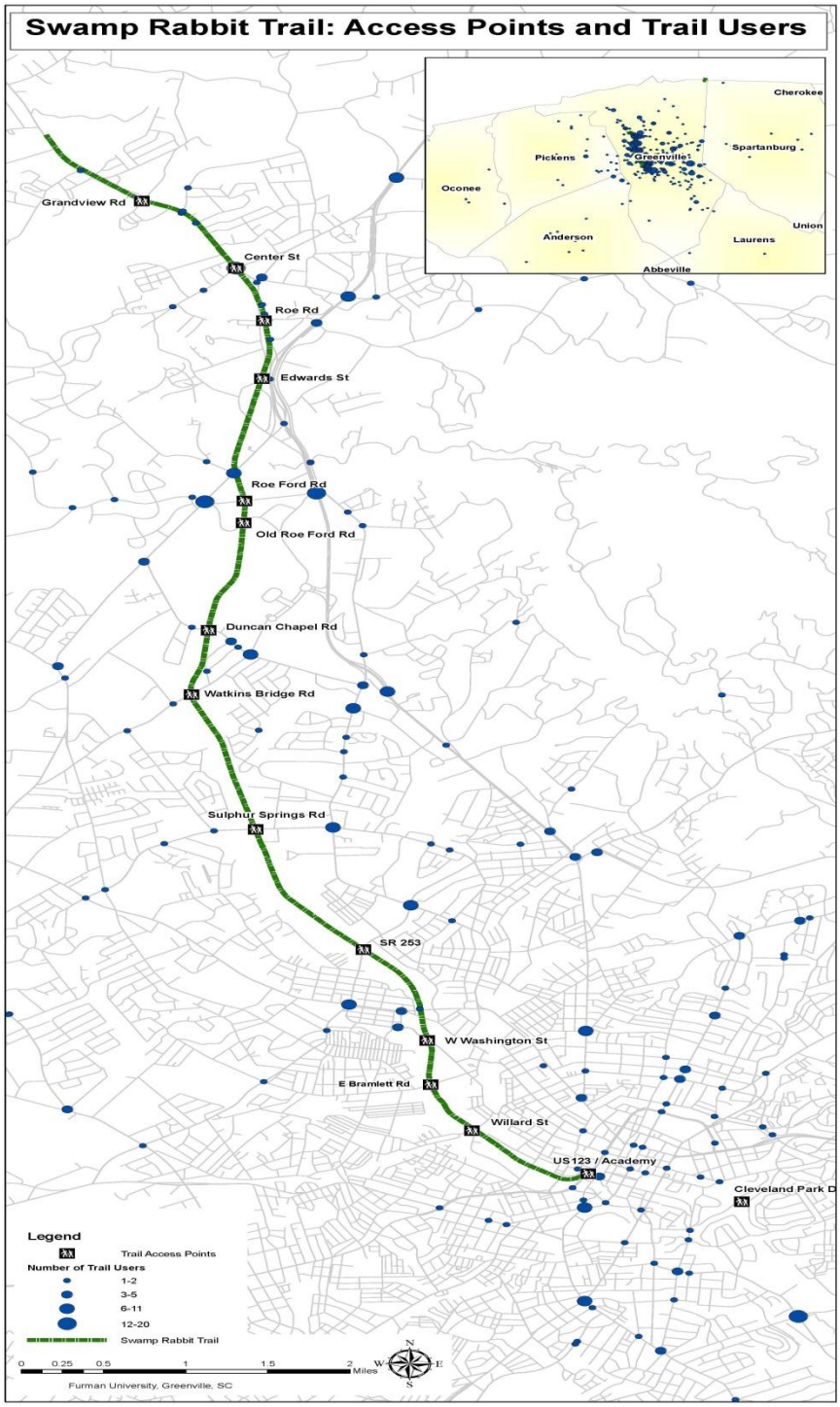


Figure 4 above illustrates where GHS SRT users reside in proximity to the trail. The larger the size of blue circles reflects a great number of trail users residing in that area. The intercept survey found that a greater number of GHS SRT users reside in downtown Greenville in comparison to other geographical areas along the trail.

4 Direct Observation of the GHS SRT

The System for Observing Play and Recreation in Communities (SOPARC)[45] was the instrument used to objectively assess GHS SRT user demographics and physical activity behaviors. Several studies have used SOPARC in the United States[31, 37, 41] to measure physical activity in open environments such as trails. Validity of SOPARC physical activity codes has been established through heart rate monitoring. Provided measures of persistent behaviors (i.e., physical activity) are taken at frequent intervals, momentary time sampling (i.e., specific time episodes throughout the day - e.g., 7:30am, 12:00pm, 3:30pm, 5:00pm) techniques have been shown to be valid and reliable[45]. SOPARC was selected to measure trails because: 1) it is a valid and reliable tool[45,] ; and 2) it will assist in obtaining useful information on GHS SRT users.

Open spaces have been identified in the literature as important to promoting participation in regular physical activity[65-70]. Documenting the varying types of physical activity in open spaces, like the GHS SRT, and preference of differing demographics provides invaluable information to establish priorities for infrastructure[31, 45].

4.1 Observer Preparations for Direct Observation on the GHS SRT

Prior to beginning the direct observation evaluations, undergraduate college students were trained as GHS SRT observers. The GHS SRT observers prepared materials that included: synchronized wristwatch, counter, clipboard, sufficient SOPARC recording forms, and pencils. The observers arrived at the GHS SRT site at least 10 minutes prior to the official start of data collection. They reviewed the sequence for observing all trail access areas, which are places where individuals could enter and exit the GHS SRT.

4.2 Direct Observation Procedures for the GHS SRT

Inter-rater reliability of all trained trail observers was assessed prior to participating in the present evaluation of the GHS SRT. Each observer was assessed using 30 pictures of diverse individuals performing a variety of physical activities. Each observer identified the gender, age, and race/ethnicity of the individual, plus the physical activity behavior and intensity. Observers were required to have an inter-rater reliability score of 90% or greater before field observations began.

Visual scans were made at each target area. During each scan, the physical level of each user was coded as Sedentary (i.e., lying down, sitting, or standing), Walking, Running, Rollerblading or Bicycling. Scans were made for gender, perceived age, and ethnicity groupings. Simultaneous entries were made for time of day and temperature. Quarterly (i.e., seasonal) observations of trail users were made 4x/day (7:30am, 12:00pm, 3:30pm, 5:00pm) for 4 days (Tuesday, Thursday, Saturday and Sunday) beginning in the summer of 2010. Summary frequency counts described the number of participants by gender, activity mode and level, estimated age and ethnicity groupings.

4.3 Direct Observation Results for the GHS SRT

4.3.1 Overview of Demographic Trail Findings

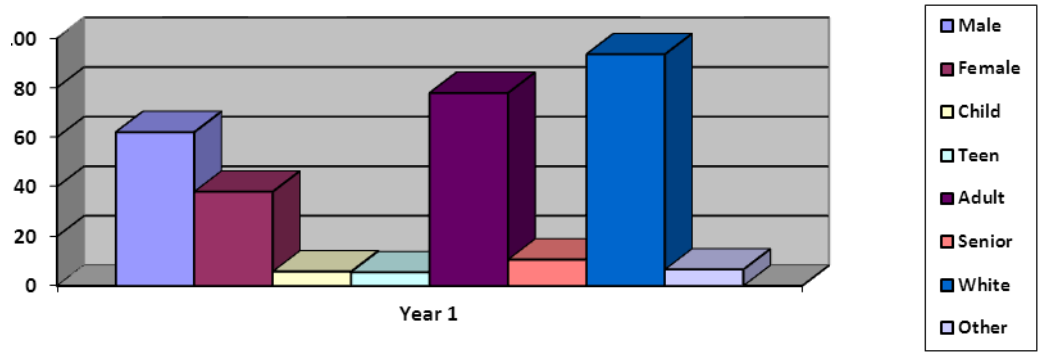
During the study period, 15,751 trail users were observed on the GHS SRT during the 16 observation days. Adjusting for seasonality, approximately 359,314 users would have used the GHS SRT during the first year of study. Sixty-two percent of users were male and 38% were female. The majority of GHS SRT users were adults. Few minorities (7%) were observed using

the GHS SRT. Approximately 93% of trail users observed were white. However, current census data estimates that 25% of Greenville residents are minorities. Demographics of GHS SRT users for gender, age and ethnicity are listed in Table 4 and Figure 5.

Table 4: Demographics of GHS SRT Users for Gender, Age and Ethnicity

		Year 1	
		Frequency	*Percent*
Gender	Male	9,722	62.0%
	Female	6,029	38.0%
Age	Child	925	5.8%
	Teen	879	5.5%
	Adult	12,267	77.8%
	Senior	1,680	10.6%
Ethnicity	White	14,709	93.4%
	Other	1,042	6.6%

Figure 5: Demographics of GHS SRT Users



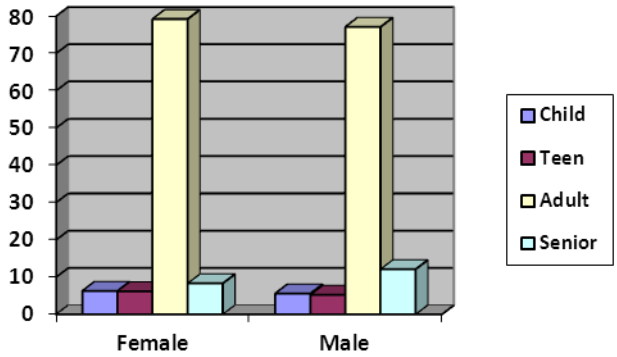
4.3.2 GHS SRT Use for Age by Gender

Identifying the physical activity patterns (e.g., walking, running, bicycling) in open environments, such as the GHS SRT, provides specific objective data to develop user profiles that can lead to creation of effective physical activity infrastructure. Seventy-seven percent of males (7,494 individuals) observed on the GHS SRT were adults. A similar percentage of females observed on the GHS SRT were adults in Year 1. Frequency and percent of GHS SRT users for age by gender are listed in Table 5 and Figure 6.

Table 5: Frequency and Percent of GHS SRT Users for Age by Gender

	Frequency (%)	*Frequency (%)*
Age	*Female*	*Male*
Child	380(6.3%)	545(5.6%)
Teen	375(6.2%)	504(5.2%)
Adult	4,773(79.2%)	7,494(77.1%)
Senior	501 (8.3%)	1,179(12.1%)

Figure 6: Percent of GHS SRT Users by Age and Gender



The majority of GHS SRT trail users observed in Year 1 were adults, which is consistent with previous trail findings[28-32]. Relatively few children and teens were observed using the GHS SRT. Only 11% of **all** GHS SRT trail users were children and teens.

It is well documented that a significant percentage of American youth do not participate in enough physical activity to receive health benefits contributing to an unprecedented epidemic of childhood obesity that is currently plaguing the United States[71-72]. Of children age five to ten who are overweight, 61% have one or more cardiovascular disease risk factors, and 27% have two or more[72-74]. The percentage of young people six to 19 years old who are overweight or obese has more than doubled in past 20 years[74]. Data suggest that more than 33% of adolescents, equating to about 25 million youth, are overweight or obese[74].

Having accessible, convenient and environmentally stimulating places to participate in physical activity and other recreational activities such as trails can impact youth physical activity patterns and perhaps reverse current obesity trends[75]. Examples include improving access to facilities through collaboration with local health, recreation and park departments, along with the development of infrastructure to promote regular activity[75, 77]. Identifying the varying places youth choose to engage in physical activity is necessary to better understand factors impacting their decisions to use a particular facility[75-82].

Few seniors (60 years and older) were observed on the GHS SRT in Year 1. Approximately 11% of all GHS SRT users were seniors. Participation in regular physical activity can prevent and reduce health risks linked to aging[83]. Continued efforts to promote trail use amid seniors are important for all future GHS SRT funded projects. Gallagher and colleagues[81] recently examined neighborhood factors related to walking in older African American adults and found that the most "salient" factors identified to impact walking were: the presence of other people, neighborhood surroundings, safety from crime, sidewalk and traffic conditions along with walking trails and weather.

4.3.3 GHS SRT Use by Activity Intensity

Activity intensity has been linked to a variety of health outcomes with more intense activities providing greater health benefits. Eighty-three percent of all males (8,056 individuals) observed on the GHS SRT in Year 1 were bicycling compared to 73% of all females (4,390 individuals) observed. Approximately 15% of females were walking on the GHS SRT compared to only 7.7%

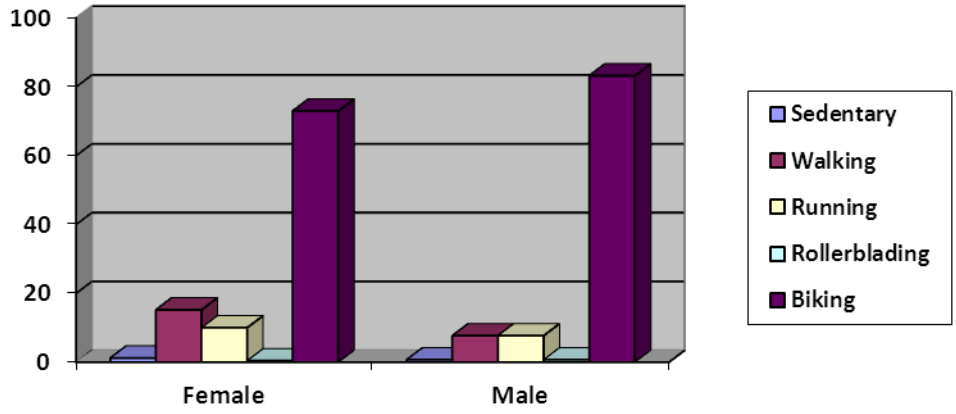
of males. Although most Americans are not regularly active, walking is the most common form of activity[84]. Eyler and colleagues[84] examined the epidemiology of walking in the United States using the United States Physical Activity Study and found that approximately 34% of the American population reports that they are regular walkers and 46% are occasional walkers.

Bicycling is the second most popular activity in the United States. This finding supports the large numbers of bicyclists observed on the GHS SRT. Frequency and percent of GHS SRT users for activity intensity by gender are listed in Table 6 and Figure 7.

Table 6: Frequency and Percent of GHS SRT Users for Activity Intensity by Gender

Gender	*Activity Intensity*	*Frequency (%)*
Female	Sedentary	75(1.2%)
	Walking	916(15.2%)
	Running	604(10.0%)
	Rollerblading	26(0.4%)
	Bicycling	4,390(73.0%)
Male	Sedentary	65(0.7%)
	Walking	744(7.7%)
	Running	744(7.7%)
	Rollerblading	71(0.7%)
	Bicycling	8,056(83.2%)

Figure 7: Percent of GHS SRT Users for Activity Intensity by Gender



4.3.4 GHS SRT Use by Ethnicity and the Role of Awareness & Accessibility

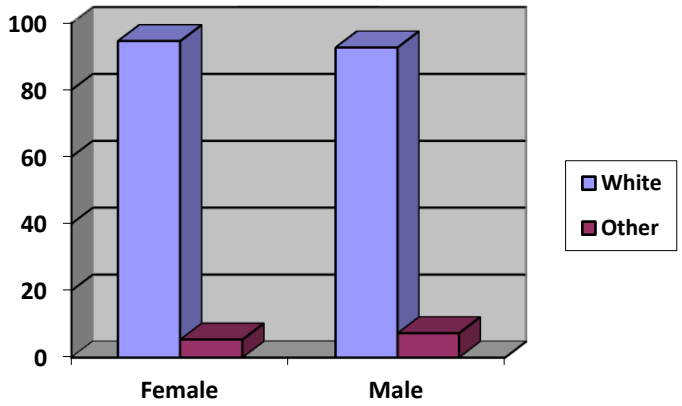
Approximately 7% of all GHS SRT users observed in Year 1 were minorities; however approximately 28% of the population residing in census tracts abutting the GHS SRT from Travelers Rest to downtown Greenville are minorities. Based on findings from previous research, the relative prevalence of walking on trails is higher among African Americans and other ethnic groups when compared to regular and occasional white walkers[84]. This was not consistent with the direct observation GHS SRT findings for Year 1, suggesting that barriers exist to minority usage of the GHS SRT.

Frequency and percent of GHS SRT users for gender by ethnicity are listed in Table 7 and Figure 8.

Table 7: Frequency and Percent of GHS SRT Users for Gender by Ethnicity

Gender	*Ethnicity*	*Frequency (%)*
Female	White	5,701(94.6%)
	Other	328(5.4%)
Male	White	9,008(92.7%)
	Other	714(7.3%)

Figure 8: Percent of GHS SRT Users for Gender and Ethnicity



4.3.5 GHS SRT Use by Socio Economic Status

Socioeconomic status (SES) is a composite measure of an individual's resources and prestige within a community[85]. Resources include both material goods (e.g., owning a home) and assets (e.g., savings), whereas prestige refers to an individual's status within a social hierarchy and is typically determined by the classification of education and profession according to the esteem placed on each by society. In nearly every disease category, adults of lower SES experience higher rates of morbidity and mortality than adults of higher SES[86-88]. Similar findings have been documented in samples of children and adolescents when relations between family SES and health are examined. In addition, there is often a correlation between low SES and minority communities.

Wilson and colleagues[89] examined environmental variables (i.e., perceptions of access for physical activity) impacting the physical activity patterns of individuals residing in low and high socio-economic status (SES) areas and found that the low (vs. high) SES group reported lower perceptions of access to public recreation facilities like trails. Leslie and colleagues[90] examined the perceived neighborhood environment and park use as mediators of SES and walking behaviors, and found residents of high SES areas often live in environments that promote recreation, positively contributing to weekly and overall levels of walking. Thus, the individuals

residing in low SES areas near the GHS SRT may perceive a lack of access and/or found it to be more difficult to access the trail and therefore used the GHS SRT less than individuals residing in or near higher SES areas along the trail. Assuming that conclusions from prior studies hold true on the GHS SRT, a perception of a lack of access among minorities in low SES communities may be a barrier contributing to decreased usage by minorities on the GHS SRT.

4.3.6 GHS SRT Use by Time of Day

Four time periods were examined: Morning (7:30 -9am), Noon (12-1:30pm), Afternoon (3:00-4:30pm) and Evening (5:00-6:30pm). The Evening observation (5pm-6:30pm) time period had less traffic than the other three observation time periods, for females and males alike. Results from the CDC's Neighborhood Safety and Prevalence of physical activity report[91] found that 12,750 males and females over the age of 18 showed that perceptions of unsafe neighborhoods were associated with the inactivity patterns of respondents. Similarly, Broomhall[92] concluded from a literature review that numerous observable factors, like perceived safety could influence use of open space as well. Previous studies therefore suggest that perceptions of safety during evening hours may have influenced one's decision to use the GHS SRT. However, it should be noted, GHS SRT intercept survey respondents reported that the safety and security along the trail to be 'excellent'. The frequency and percent of GHS SRT users for time period by gender are listed in Table 8 and Figure 9.

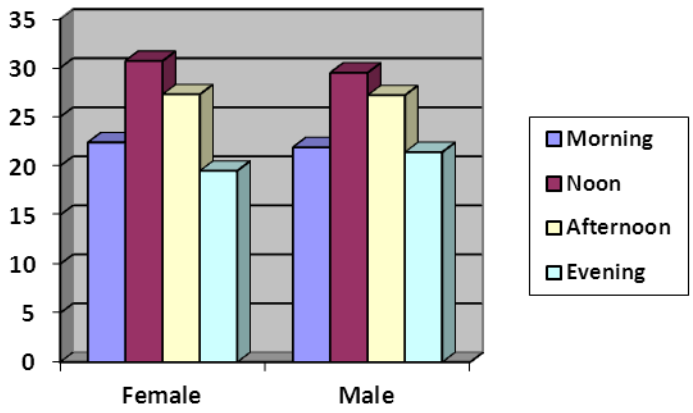
Table 8: Frequency and Percent of GHS SRT Users For Time Period by Gender

Gender	*Time Period*	*Frequency (%)*
Female	Morning	1353(22.4%)
	Noon	1852(30.7%)
	Afternoon	1646(27.3%)
	Evening	1178(19.5%)
Male	Morning	2129(21.9%)
	Noon	2870(29.5%)
	Afternoon	2643(27.2%)
	Evening	2080(21.4%)

Morning = 7:30am-9am; Noon = 12pm-1:30pm; Afternoon = 3:00pm-4:30pm; Evening = 5:00pm-6:30pm

.

Figure 9: Percent of GHS SRT Users for Time Period by Gender



4.3.7 GHS SRT Use by Seasonality

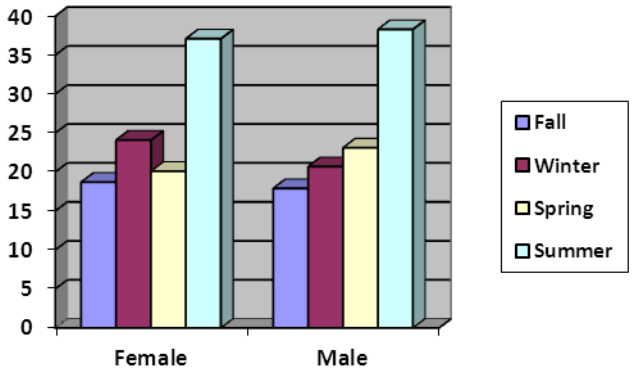
Researchers have called for additional studies examining associations between physical activity behavior and natural elements, such as seasonality[93-97]. Despite easy access provided by greenways like the GHS SRT for outdoor physical activity, individuals have a variety of potential barriers to being physically active in the outdoor environment. One of the barriers to overcome is weather, including both hot and cold temperature extremes, precipitation, wind, and humidity. Researchers recently found that inclement weather is associated with lower rates of physical activity.

A study by Lindsey and colleagues[42] investigated weather and time-related variables to determine their correlation to neighborhood trail use. Results from their analysis indicate that temperature and precipitation impact neighborhood trail use. Specifically, Lindsey et al.[42] found that trail traffic increased 3.2% for every one degree Fahrenheit increase in temperature above the annual average and decreased by 40% for every inch of rain above the annual average. Similarly, GHS SRT users preferred to use the trail during the warmer and dryer summer months in comparison to the fall, winter and spring. The frequency and percent of GHS users by seasonality are listed in Table 9 and Figure 10.

Table 9: Frequency and Percent of GHS SRT Users for Seasonality by Gender

Gender	*Season (Months)*	*Frequency (%)*
Female	Fall (Sep-Nov)	1,130(18.7%)
	Winter (Dec-Feb)	1,450(24.1%)
	Spring (Mar-May)	1,211(20.1%)
	Summer (June-Aug)	2,238(37.1%)
Male	Fall (Sep-Nov)	1,737(17.9%)
	Winter (Dec-Feb)	2016(20.7%)
	Spring (Mar-May)	2,241(23.1%)
	Summer (June-Aug)	3,728(38.3%)

Figure 10: Percent of GHS SRT Users for Seasonality by Gender



4.3.8 GHS SRT Use by Temperature

Contextual elements, such as ambient temperature, impact physical activity[98]. The limited studies available suggest physical activity levels do vary with seasonality and the impact of poor and extreme weather has been identified as a barrier to activity among various populations[99-100]. Studies that attempt to identify usage barriers for trails and/or physical activity should, therefore, recognize and account for these contextual variables to better gage usage[99]. GHS SRT users clearly prefer to use the trail between 61 – 70 degrees Fahrenheit. Frequency and percent of GHS SRT users for changes in temperature by gender are listed in Table 10.

Table 10: Frequency and Percent of GHS SRT Users for Changes in Temperature by Gender

		Temperature in Degrees Fahrenheit						
		<40°	*40-50°*	*51-60°*	*61-70°*	*71-80°*	*81-90°*	*91-100°*
Gender	Female	36	106	675	1,959	959	1,509	785
		.6%	1.8%	11.2%	32.5%	15.9%	25.0%	13.0%
	Male	73	147	1,063	2,808	1,493	2,557	1,581
		.8%	1.5%	10.9%	28.9%	15.4%	26.7%	16.2%

Matthews and colleagues[101] found that 6% of the variance in physical activity levels over 12 months was explained by temperature effects. Older adults' physical activity behavior may be especially influenced by temperature because of reductions in thermal tolerance with age, which may be largely due to chronic diseases and a sedentary lifestyle rather than age itself[101]. In addition, older adults have specifically reported extreme temperatures as barriers to engaging in regular physical activity[101].

Few seniors were observed on the GHS SRT. Furthermore, as temperatures increased above 80 degrees Fahrenheit, a 50% decrease in seniors using the trail was observed. Thus, the literature and findings from our observations, suggest that temperature and weather may have an effect on older adult activity patterns.

4.3.9 GHS SRT Use and Day of Week

The vast majority of GHS SRT use was on the weekends. Recent reports have found that day of the week, in addition to weather and temperature has also been related to trail use. Weekend trail use has been identified to be significantly higher than weekday use[97]. The frequency and percent of GHS SRT users for day of the week by gender are listed in Table 11.

Table 11: Frequency and Percent of GHS SRT Users for Day of the Week by Gender		
Gender	*Day of the Week*	*Frequency (%)*
Female	Tuesday	879(14.6%)
	Thursday	660(10.9%)
	Saturday	2,983(49.5%)
	Sunday	1,507(25.0%)
Male	Tuesday	1,732(17.8%)
	Thursday	1,265(13.0%)
	Saturday	4,259(43.8%)
	Sunday	2,466(25.4%)

4.3.10 Helmet Use and Cycling Injuries

The use of bicycle helmets is effective in preventing head injury[102-104]. Community programs to increase bicycle helmet use can reduce the incidence of head injury among bicycle riders, thereby reducing the number of riders who are killed or disabled. Increasingly, state and local laws are being developed that will make mandatory the use of bicycle helmets. South Carolina does not currently require use of bicycle helmets.

Approximately 54% of adult female and 49% of adult male GHS SRT users were not wearing helmets when bicycling. More than 75% of teen females and males did not wear a helmet either. Bicycling is the second most popular outdoor activity in the United States[104-105]. Americans from six and older participated in 2.54 billion bicycling outings, averaging 59 outings per bicyclist[105] in 2010. With this many individuals, proper bicycling helmet use is needed to prevent severe head injuries. The frequency and percent of GHS SRT users by helmet use for gender are listed in Table 12.

Table 12: Frequency and Percent of GHS SRT Users by Helmet Use for Gender			
Gender		*Yes(%)*	*No(%)*
Female	Child	225(60.0%)	152(40%)
	Teen	89(23.7%)	286(76.3%)
	Adult	2,176(45.6%)	2,597(54.4%)
	Senior	225(44.9)	276(55.1%)
Male	Child	332(60.9%)	213(39.1%)
	Teen	119(23.6%)	385(76.4%)
	Adult	3,861(51.5%)	3,632(48.5%)
	Senior	625(53.0%)	554(47.0%)

Greater than 40% of all deaths from bicycle-related head injury were among persons less than 15 years of age[106]. This finding is a concern since three-fourths of male and female teens observed on the GHS SRT were not wearing a helmet. However, 60% of all male and female children were wearing helmets, indicating that helmet education may need to target teens or parents of

teenagers. According to experts a properly fitted bicycle helmet reduces the risk of head injury by as much as 85% and the risk of brain injury by as much as 88%[107].

Bicyclist deaths represented 2% of all traffic related fatalities in the United States in 2009. And 51,000 bicyclists were injured in traffic in 2009, which is up sharply from 43,000 in the US in 2007. Approximately 12% of bicyclists killed in traffic crashes in the United States in 2008 were between 5 to 15 years old[106-107]. According to the National Highway Traffic Safety Administration, injuries and deaths related to bicyclists affect children and young people more frequently. Therefore, Greenville County and City officials should consider the implementation of effective bicycle helmet programs to reduce injuries and their associated costs. The healthcare costs and savings are significant. For example, total annual cost of traffic related bicyclist death and injury among children 14 and younger is more than $2.2 billion in the United States[106-107]; and every dollar spent on a bike helmet saves approximately $30 in indirect medical costs.

4.4 Demographics and Use at Selected Access Points

Observers were strategically placed at three access points along the GHS SRT: near Roe Road, Duncan Chapel, and E. Bramlett. Using SOPARC, each observer recorded gender, age, ethnicity and activity intensity per user.

4.4.1 Gender

The most GHS SRT users overall (both male and female) were observed near Duncan Chapel Road. Following Duncan Chapel, there were more male users at E. Bramlett Road and more female users at Roe Road. Visibility of GHS SRT users at Roe Road in Travelers Rest and Duncan Chapel Road on the campus of Furman University is significantly better than at E. Bramlett. Furthermore, the access points at Roe and Duncan roads support vehicular parking, are well marked, and users can be seen by oncoming vehicular traffic in comparison to E. Bramlett. Finally, GHS SRT use was discouraged by the Greenville County Recreation District along the trail crossing on East Bramlett for part of 2010. This suggests that the data collected at E. Bramlett are likely conservative values of the total usage that can be expected at this location over the long-term.

Table 13: Frequency and Percent of GHS SRT Users at Access Points by Gender

Gender	*Roe Road*	*Duncan Chapel*	*E. Bramlett*
Female	1,938(42%)	2,333(38%)	1,754(35%)
Male	2,686(58%)	3,798(62%)	3,234(65%)
Total Users per Access Point	4,624	6,131	4,988

4.4.2 Age

Relatively few children and teens were observed using the GHS SRT. Having accessible, convenient and environmentally stimulating places to participate in physical activity like the GHS SRT can impact youth physical activity patterns and perhaps reverse current obesity trends. Improving access to facilities like the GHS SRT along with the development of interventions to promote regular activity among youth is essential. Of the children that were observed, they were nearly always accompanied by an adult. Similarly, few seniors were observed on the GHS SRT. Participation in regular physical activity can prevent and reduce risks linked to aging.

It is of interest to note that the observed teenage users were most likely to be engaged in vigorous intensity activity. Thus, the GHS SRT could provide a viable option for teens to achieve recommended amounts of activity for health and fitness benefits if use by this age group could be enhanced. The frequency and percent of GHS SRT users at access points by age are listed in Table 14.

Table 14: Frequency and Percent of GHS SRT Users at Access Points by Age

Age	*Roe Road*	*Duncan Chapel*	*E. Bramlett*
Child	322(7.0%)	313(5.1%)	290(5.5%)
Teen	285(6.2%)	303(4.9%)	291(7.2%)
Adult	3,412(73.8%)	4,861(79.3%)	3,986(79.3%)
Senior	605(13.1%)	654(10.7%)	421(8.4%)
Total Users per Access Point	4,264	6,131	4,988

4.4.3 Ethnicity

Perception of being vulnerable to crime is a frequently cited barrier to trail use[108-112] among minority communities. Current research examining ethnicity and physical activity in urban Missouri revealed that African Americans perceived their neighborhoods as less safe and less pleasing for physical activity in comparison to whites, regardless of neighborhood racial composition[113]. Of whites surveyed on the GHS SRT, 40% perceived the safety and security of the trail to be 'excellent'; compared to only 30% of minority respondents. Furthermore few minorities were observed using the trail compared to whites. It is therefore possible that perception of safety on the trail may have been a barrier to use among minorities, as suggested by conclusions of previous studies and the differing perceptions of safety between white and minority users.

Lack of awareness of recreational facilities is also frequently cited barrier to participating in physical activity among minorities and these facilities are often less prevalent in low SES areas[114-116]. Although the GHS SRT bisects many low SES census tracts, these individuals may not be aware of the trail.

A recent study examining the geographic and social distribution of physical activity facilities revealed that lower SES and high minority block groups of adolescents had reduced access to facilities and were associated with a decrease in physical activity and increased numbers of overweight individuals[109]. It has been observed in focus group studies and in quantitative studies[100-102] that fear of crime and fear for one's personal safety among minority groups are barriers to walking and being physically active in neighborhood settings[99-102].

The small percentage of minority trail users observed and surveyed on the GHS SRT warrants future investigation of the racial disparity of users identified. These direct observation findings do not align with the current demography for Greenville, South Carolina residents based on current census data estimates[63] of census tracts abutting the GHS SRT. As mentioned previously 28% of residents residing in the census tracts abutting the GHS SRT are minorities, yet minorities only comprised 7% of all users observed on GHS SRT in Year 1. Awareness and accessibility among residents living near trails in Greenville, especially for minorities and low SES residents, should be explored to determine if countermeasures should be implemented to

increase use of trails by these groups. The frequency and percent of GHS SRT users at access points by ethnicity are listed in Table 15.

Table 15: Frequency and Percent of GHS SRT Users at Access Points by Ethnicity

Ethnicity	*Roe Road*	*Duncan Chapel*	*E. Bramlett*
White	4,358(94.2%)	5,760(93.9%)	4,585(91.9%)
Black	150(3.2%)	162(2.6%)	197(3.9%)
Other	116(2.5%)	209(3.4%)	206(4.1%)
Total Users per Access Point	4,624	6,131	4,988

4.4.4 Activity Type

Numerous studies had identified bicycling as the second most popular activity in the United States after walking[106-107, 117-118]. However, ease of access to trails can affect the use of trails. The varying activities observed on the trail could be related to the type of infrastructure surrounding the trail serving to limit and/or promote safe and accessible access. Therefore, it is reasonable that more bicycles were observed on the GHS SRT because users perceived that the evaluated access points provide better access for bicycles rather than walking. In a recent study examining trail user patterns among users of paved vs. natural surface trails, paved trails were found to be more accessible, had greater use, and were perceived to be safer and more secure compared to natural surface trails[37]. The frequency and percent of GHS SRT users for each access area by activity intensity are listed in Table 16.

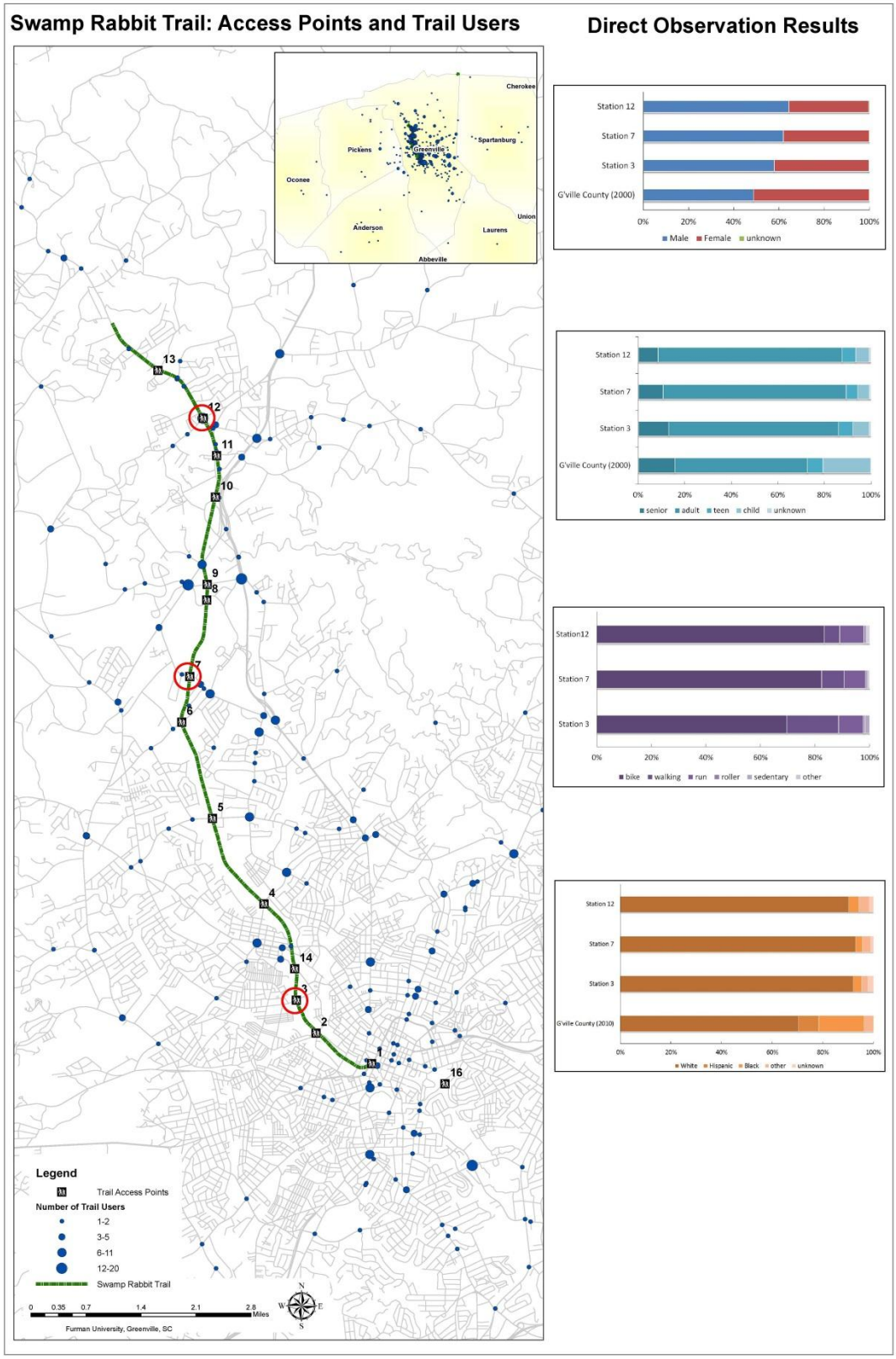
Table 16: Frequency and Percent of GHS SRT Users at Access Points by Activity Intensity

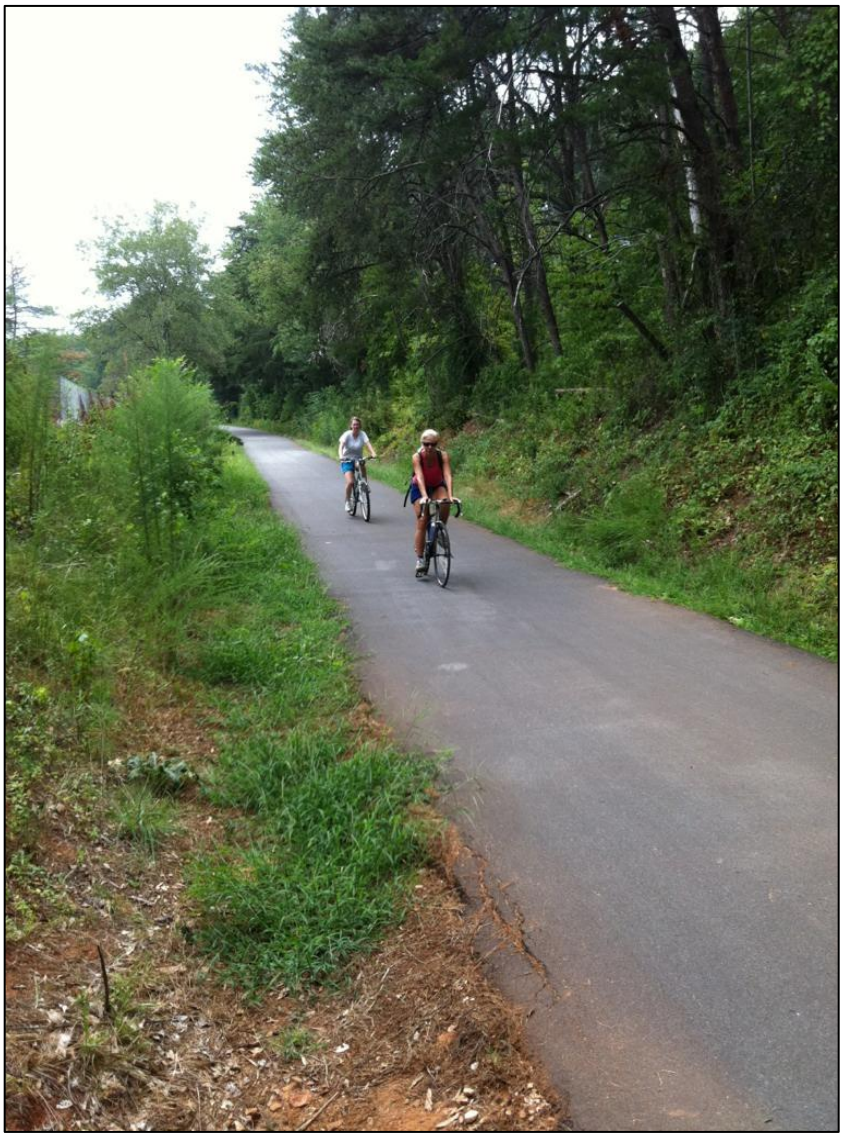
Activity Intensity	*Roe Road*	*Duncan Chapel*	*E. Bramlett*
Sedentary	70(1.5%)	38(0.6%)	32(0.6%)
Walking	876(19.9%)	499(8.1%)	285(5.7%)
Running	419(9.1%)	483(7.9%)	446(8.9%)
Roller Blading	28(0.6%)	33(0.5%)	36(0.7%)
Bicycling	3,224(69.7%)	5,057(82.7%)	4,157(84.0%)
Total Users per Access Point	4,617	6,110	4,956

4.4.5 Comparison to Census Data

The findings shown in Figure 11 illustrate use at three access points on the GHS SRT (Roe Road, Duncan Chapel Road and East Bramlett Road) and how the demography of GHS SRT users compares to Greenville County Census data. Significantly more males were observed at all three access points in comparison to females. However, the County as a whole consists of 51% males and 49% females, a demographic that is not consistent with our findings of users on the trail. Findings also did not agree with County statistics for age and ethnicity on the GHS SRT as discussed previously.

Figure 11: GHS SRT Direct Observation Results





5 Random Digit Dial Results for Year 1

5.1 Participants

A sample of 500 Greenville County residents that was contacted using Random Digit Dialing (RDD) agreed to participate in this study. A marketing company was hired to derive a representative sample of the population from a database of all residential telephone numbers and various geographic service parameters such as primary zip codes in Greenville County. In addition, the database provided working bank information at the two-digit level - each of the 100 banks (i.e., first two digits of the four-digit suffix) in each exchange was defined as "working" if it contained one or more listed telephone households. On a national basis, this definition covers an estimated 96.4% of all residential telephone numbers and 99.96% of listed residential numbers. This database is updated on a quarterly basis. Following specification of the geographic area, the system selected all exchanges and associated working banks that meet those criteria.

5.2 Purpose of RDD

The primary purpose of the RDD survey was to identify barriers and determinants related to GHS SRT use and non-use. Direct observation analysis, intercept surveys and focus groups focused on GHS SRT users. The RDD survey was able to identify perceptions of non GHS SRT users as well as examining a variety of geographic information system data (i.e., proximity to trail from residence) perhaps affecting use.

Table 17: RDD Survey Questions & Responses for GHS SRT Non-Users

Num.	Survey Question	Gender	Responses	Freq. (%)[#]
1	In the last 6 months, did you visit the GHS SRT?	Female	No	241(76%)
		Male	No	130(71%)
2	Why did you NOT visit the GHS SRT?	Female	a. Too far away/inconveniently located	29(9.1%)
			b. Not open at convenient times	8(2.5%)
			c. Does not have features/equipment/programs I desire	25(7.9%)
			d. Inadequately maintained	1(0.3%)
			e. Too crowded	0(0.0%)
			f. Located in unsafe area	3(0.9%)
			g. Not aware of the trail	53(16.7%)
			h. No particular reason	98(30.9%)
			i. Other	24(7.6%)
		Male	a. Too far away/inconveniently located	20(10.9%)
			b. Not open at convenient times	4(2.2%)
			c. Does not have features/equipment/programs I desire	10(5.5%)
			d. Inadequately maintained	0(0.0%)
			e. Too crowded	0(0.0%)
			f. Located in unsafe area	0(0.0%)
			g. Not aware of the trail	24(13.1%)
			h. No particular reason	60(32.8%)
			i. Other	12(6.6%)

The percentage listed for frequency refers to the percentage of respondents of a specific gender that provided the corresponding answer. For example, 76% of all females that responded to the RDD survey have not visited the trail in the last 6 months (question 1).

5.3 Awareness of Trails and Promoting Trail Use

As mentioned earlier, lack of awareness is a frequently cited barrier for not using a trail[38-39, 119-120] and is one of the most common reasons given in the RDD study. A recent study promoting and developing a trail network across suburban, rural and urban communities by Schasberger and colleagues[121] increased awareness for the trail network; and found messaging promoting social and entertainment benefits of participating in physical activity on a trail most effective.

Brownson and colleagues[119] examined trail use in 12 rural counties in Missouri and discovered that of the individuals who had access to walking trails, close to 40% reported having used the trails to engage in activity. In another program that focused on reducing obesity through trail development, the Missouri Department of Health was interested in examining if individuals were participating in more physical activity following an awareness campaign in a community with a one-year-old trail[122]. The Department found significant increases in trail use following the promotional campaign when compared to a community that did not participate in the campaign[122].

Similar to Missouri's public health campaign, Greenville's GHS SRT was developed to facilitate multi-modal transportation and to promote public health recommendations for participating in regular activity. The data from this assessment suggest that Greenville must continue to publicize the trail and its positive impacts on transportation and physical activity, especially in light of the fact that approximately 17% of females and 13% of males reported not being aware of the GHS SRT.

5.4 Evaluation of Proximity

Each of the 500 RDD respondents, similar to intercept survey respondents, were asked for the nearest two cross-streets of their primary residence. No identifiable information of the respondent was solicited and the IRB procedures protecting human subject confidentiality were strictly followed. GPS coordinates pertaining to the residence of each respondent were registered to a common datum, converted into a spatial map, and imported into ArcView GIS to be used as a base for examining proximal relationships and determining a mileage distance from place of residence to the GHS SRT. The average distance from place of residence for GHS SRT users and non-users is listed in Table 18.

Table 18: Average Distance to GHS SRT from Residence for Users and Non-Users from the RDD

Question	User Status	Distance (Miles)
What are nearest two cross streets to your residence, city and zip code?	Non-User (N=359) User (N=45)	10.20 8.71

NOTE that because of the small number of respondents that answered "user" of the trail, statistical analysis did not yield a valid result for significance between the two distances.

RDD findings reveal that non-users on average live farther away from the GHS SRT when compared to users. Research clearly documents that if individuals reside in an area that has access to a trail and are aware of its existence, they will be more likely to engage in trail use in comparison to those individuals who are unaware of the trail. These previous findings, therefore suggest that non-users may not have been aware (see Figure 12) of the GHS SRT.

Figure 12: Users and Non-Users of GHS SRT and Place of Residence

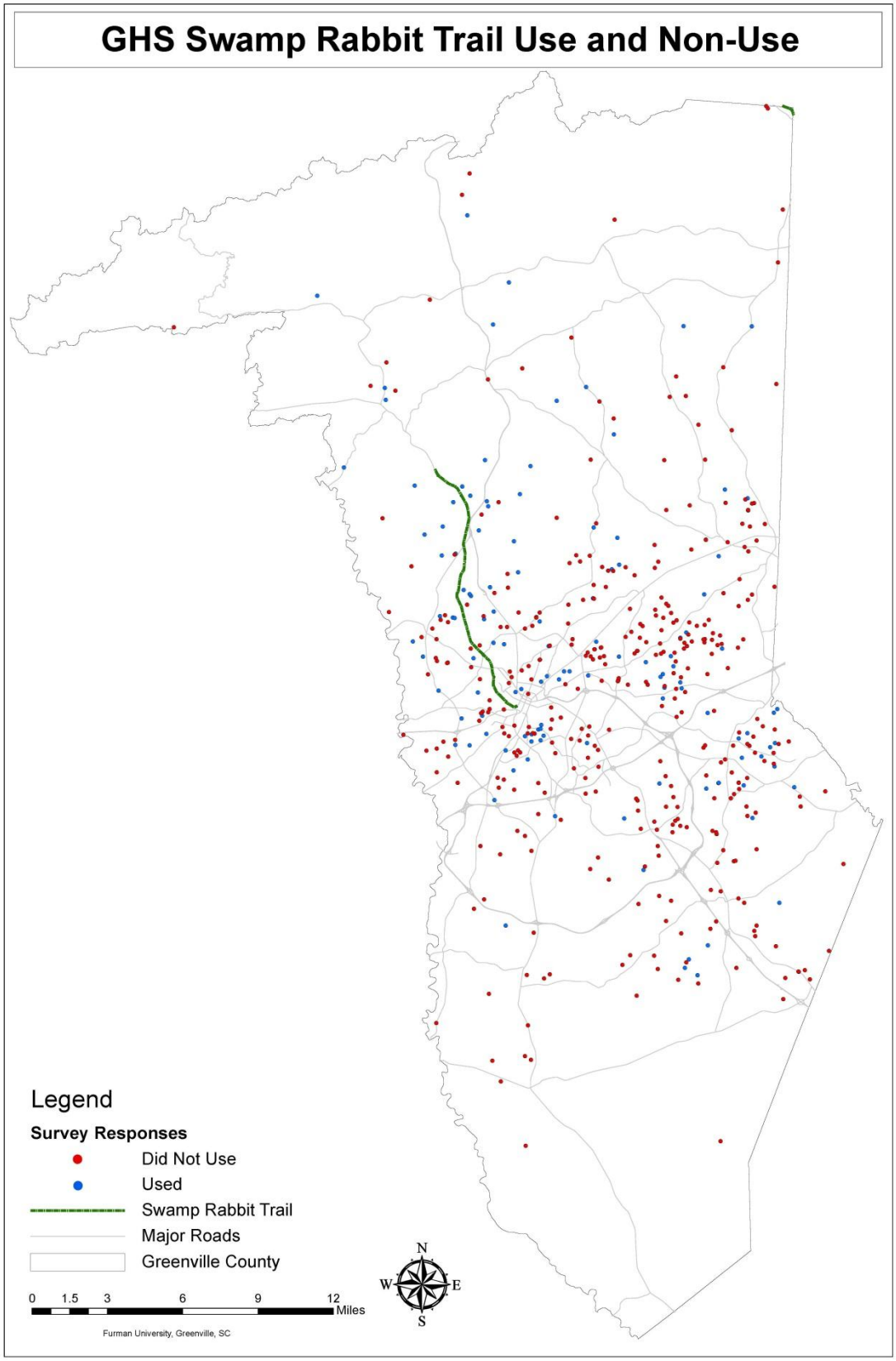
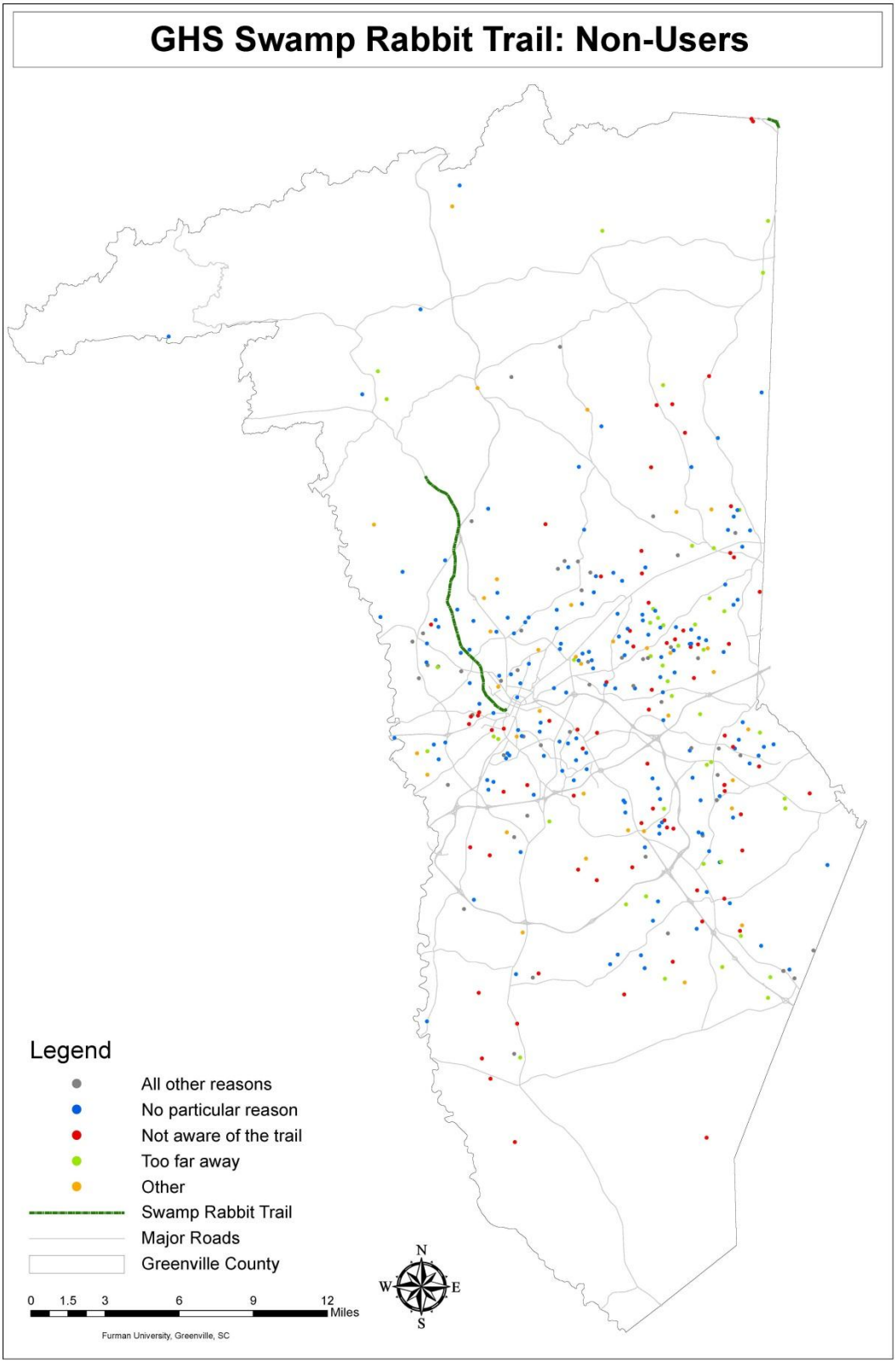


Figure 13: Non-GHS SRT User Reasons and Place of Residence



6 GHS SRT Focus Group Findings

Focus group participants were recruited by media advertising (i.e., Go Magazine) and email recruitment from the Greenville County Recreation District. Requirements for participation were that the individual must be aware of the trail and must have used the trail in the past six months. Participants chose to attend one of two focus groups held in the Lay Physical Activity Center on the campus of Furman University in the spring of 2011. Participants were informed that refreshments would be provided and they would receive $20 incentive upon completion of the focus group. Each focus group was approximately 60 minutes in duration.

The focus groups were audio-taped and participant responses were manually recorded by two individuals. Once typed, the incomplete or illegible notes were corrected. The handwritten notes were reviewed by each question, and a coding theme was created for each question within the study guide. The notes were then coded with other codes added if needed. The moderator coded the final notes and wrote the summary of findings. Richard Kruger's Analyzing and Recording Focus Group Results[123] was used to develop the themes from the coded notes and findings.

6.1 Participant Description

Prior to beginning the focus group, each participant completed a brief survey. Nineteen adults participated in the two focus groups (13 males; 6 females). All participants were white and 15 participants (79%) held a college degree. The remaining 4 focus group participants (21%) attended college for at least 1 year. The median household income of the participants was $80,000 or more and 78% of respondents were married.

The GHS SRT was defined for both focus groups as the segment between the City of Travelers Rest and East Bramlett Road.

6.2 Focus Group Questions and Selected Responses

1. *If someone asked you to describe the GHS SRT, what would you say?*
   - Multi-use trail, one of Greenville's top five assets
   - Great marketing tool for Greenville
   - Great for fitness for all levels and abilities
   - Excellent for the economy
   - Promotes use from people who do not look like exercisers
   - Beautiful place to walk and ride your bike

2. *What are some reasons why you use the trail?*
   - Fitness and recreation
   - Transportation
   - Mostly commute using the trail
   - Healthy living
   - Get the family moving
   - Great way to get downtown from home

3. *What are the current deficiencies of the trail? What trail improvements would you recommend?*

- Bicyclists go way too fast
- Not enough signage
- Too busy
- Intersections are really dangerous
- Don't like the rails in the intersections
- Need trail signs for etiquette

4. *How does the GHS SRT impact the Greenville Community?*
   - A true community asset
   - Should be used for recruiting
   - Business benefits
   - Very social trail
   - People are extremely friendly
   - Great incentive to get people outdoors

5. *Based on observation and survey data during the past year, the vast majority of users are white, adult bicyclists. How would suggest promoting the trail among youth, seniors and minorities?*
   - More community outreach and promotion
   - Use the schools and promote the access points for the trail
   - Some perceive it to be unsafe
   - No bathroom facilities
   - No connections from many neighborhoods to the trail

6. *How can "active transport" be promoted on the GHS SRT?*
   - Promote use of the Greenlink, bikes are welcome on bus
   - More parking at access points
   - Need connections to trail, few bike lanes in county to connect to trail
   - No infrastructure around to support getting to trail
   - Need more bike racks
   - Need maps and kiosks to show where you are

7. *Do you think the trail has had an impact on businesses adjacent to the trail? Have you used, purchased, frequented any business near the trail when on the trail? Are you more likely to frequent a business that provides services (i.e., food, drink) for trail users?*
   - Definitely helped business in Travelers Rest
   - Assume bike sales are up
   - Leopard Forest, Williams Hardware and Sunrift have benefited
   - Property values should increase
   - Plan trips to Travelers Rest to get coffee and eat
   - Encouraged to frequent stores in Travelers Rest
   - More business will 'pop up' on the trail


Hot on the trail for some
Ice Cream?
Trailside Creamery
A soft serve Ice Cream Shop
NOW OPEN!

7 Interviews of Business Owners/Managers on GHS SRT

A total of nine managers/owners of retail businesses directly abutting and/or within close proximity to the GHS SRT were interviewed in Year 1. Selection criterion for the business interviews were as follows:

- Retail business (i.e., food/entertainment; clothing/equipment; services).
- Must directly abut GHS SRT or be located within 250 yards of a GHS SRT access point. The trail segment for the business interviews was from Travelers Rest to Linky Stone Park in downtown Greenville.

Questions for the business interviews were taken from Stewart and Barr[124] examining promotion methods used by hospitality-related firms in close proximity to rail/trails. The business interviews were designed to determine:

A. If businesses located near the GHS SRT access points have observed any change in business after the trail was built?
B. If employees of businesses located near the GHS SRT segment are utilizing it?

7.1 Questions on Any Impact on Business:

1. *Has the formation of the GHS SRT had any impact on your business? In what ways? How much?*
   - Most businesses reported increases in sales/revenue ranging from 30% to as high as 85%, however one business did not believe trail has affected business.
   - One business decided to open as a result of the trail being built.
   - One business reported changing location because they desired to be closer to the trail and observed a 30% increase in sales.

2. *Can you estimate the percentage of customers that come from the GHS SRT and the annual revenue generated from this group?*
   - One business over the past two years reported a 20% increase in revenue related to trail use.
   - One business reported that 75% of Saturday business is related to trail use and 40% of business during the week is related to trail use.
   - One business reports that an average customer purchase is approximately $15 dollars.

3. *Can you comment on any advantages or disadvantages associated with having your business located close to the GHS SRT?*
   a. Advantages? The advantages according to most of the businesses are more recognizable branding; another business reported that business has more than doubled since the trail opened. An additional advantage is easy advertising according to multiple businesses and new people visiting their respective establishments because of the location on the trail.
   b. Disadvantages? The vast majority of businesses reported parking to be the biggest disadvantage. Parking spots designated specifically for their businesses are frequently used by non-business visitors of the trail, negatively impacting business. Also, some of the businesses noted that providing the trail users access to restrooms has led to increases in utility bills.

4. *Have you attempted to specifically market your business to trail users in any way?*
    - Providing bike racks was frequently among business owners plan to market to trail users.
    - Advertising in the Greenville Journal was also reported to be used to market to trail users.
    - One already established business reported modifying their building infrastructure to provide access to trail users.
    - One business reported modifying the outside of their business to increase aesthetic appeal.

7.2 Questions Regarding Employee Utilization of Trail:

1. *Do you use the GHS SRT? For what purposes? When? How often? How long?*
    - Most business owners/managers interviewed reported using the trail frequently averaging 3 times per week for approximately 45 minutes per bout. Trail use among owners/managers was for recreation and transportation purposes.

2. *Do you think the trail has had an impact on your employees? Are they utilizing the trail? When? How often? How long? For what reasons are they using the trail? (e.g., leisure or commuting?)*
    - Most business owners/managers reported employees using the trail for recreation and transportation. Many employees according to the owners/managers use the trail get to work daily.

8 Conclusions and Implications for the GHS SRT (Year 1)

The GHS SRT was used primarily by white, adult bicyclists. Few children, teens, seniors and minorities were observed on the GHS SRT. Considering that lack of awareness among non-users was cited as a barrier to trail use, future GHS SRT funded projects should continue to encourage specific programs that include trail awareness and promotion. Awareness and promotion efforts elsewhere have demonstrated their effectiveness in numerous national and international greenway trail projects.

Based on the data collected, the following summary statements are appropriate for the GHS SRT:

- Transportation activity on the GHS SRT was greater than Greenville County census estimates for multimodal transit users.
- Focus group participants reported the GHS SRT to be one of Greenville's primary assets that should be used for promoting health among youth and adults.
- Most businesses reported increases in sales/revenue ranging from 30% to as high as 85%.
- More males used the GHS SRT.
- Adults were the primary users of the GHS SRT.
- The vast majority of GHS SRT users were white.
- Few children, teens and seniors used the GHS SRT.
- Bicycling was the most common behavior observed for males and females on the GHS SRT.
- More females were observed walking than males.
- The GHS SRT was used by educated adults, primarily for recreation.
- The GHS SRT was perceived to be well maintained and safe, however a greater percentage of white respondents believed the safety and security of the trail to be excellent as compared to minority respondents.

Greater efforts to promote trail use among underserved populations such as minorities should be considered. This is an extremely important element, since the majority of trail users observed and surveyed were white. Unfortunately, a significant disparity exists between white and minority populations in regards to education and chronic disease in the United States. Less educated minority adults exhibit more chronic disease risk factors linked to sedentary living than white educated adults. If advocates for the GHS SRT continue to observe low use of the trail by minorities, increased efforts to increase awareness and accessibility among those residents living near trails should be explored in order to determine if countermeasures should be implemented to increase use of trails by these groups. These individuals may benefit from efforts to focus future funding on connecting neighborhoods and communities of varying demography in order to promote more frequent trail use.

Finally, further efforts to promote trails for transportation activity should be developed. Although the trail had a larger percentage than Greenville County overall using non-motorized transportation, based on survey findings, the majority of trail users still used the trails for exercise and recreation.

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