

**Self-Reported Facilitators and Barriers to Trail Use Along an Urban
Community Trail**

**By
Jacob Taylor**

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Supervised by:
Scott McIntosh, PhD

Department of Public Health Sciences
School of Medicine and Dentistry
University of Rochester
Rochester, NY

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I. Abstract

Background: Physical inactivity and obesity continue to be among the biggest contributors to public health problems in the United States. National guidelines recommend the development of improved preventive and community opportunities for individuals to engage in physical activity. Environmentally available public spaces provide one such possibility for individuals to engage in more active lifestyles. In the local Rochester community, the Genesee Riverway Trail is an extensive environmental resource that is potentially being underutilized. This cross-sectional study will investigate possible facilitators and barriers to use of this Trail.

Objective: Assess the relative odds of self-reported infrequent trail use associated with perceived barriers and individual characteristics among a community sample of adults.

Methods: This study used both qualitative and quantitative analysis approaches and data from a trail survey conducted in the summer of 2012 by the Environmental Health Sciences Center. Trail use is the dependent outcome of interest and was dichotomized into frequent and infrequent users. Adjusted and unadjusted logistic regressions were performed for each factor (e.g. perceptions of access and crime) and Trail use. A qualitative thematic analysis of open-ended questions from a separate survey of community members at the public market was conducted to further explore the determinants of frequency of trail use.

Results: Roughly 42% (108/257) of the trail respondents reported using the trail between 0-5 times per month, while 60% of the market respondents reported using the trail never or less than 5 times per month. People who reported the trail was

poorly connected to other places were more likely to be infrequent trail users (OR=3.83, 95% CI 1.28-5.05). Living farther from the increased the likelihood of being an infrequent trail user, an effect that varied by individual level characteristic.

Conclusion: A better understanding of what perceptions individuals have surrounding trail use will allow more targeted interventions and improvements in the local environment to support more active lifestyles and greater levels of physical activity. The results from this study reveal target areas and sampling technique issues that should be considered in further research and improvement implementation projects.

II. Introduction

Project History

In January of 2012 the Community Outreach and Engagement Core (COEC) of the University of Rochester Environmental Health Sciences Center began a Health Impact Assessment of the potential health implications of Rochester's Local Waterfront Revitalization Program (LWRP). The LWRP is a state funded program to maintain and improve New York's waterways. In the summer of 2012 community, trail, and beach surveys were conducted to assess neighborhood well-being, how waterfront resources are currently used, how current use impacts health, and how those relationships might change based on LWRP recommendations.

Many insights were gained from the three surveys that influenced the development of this study. Community surveys in the southeast quadrant of Rochester were administered at community events and door to door. Among a range of indicators, data showed that 58% of African Americans meet the CDC recommendations for weekly physical activity compared to 71% of Whites. Additionally, less crime was also indicated as a change that would strongly benefit health.¹

The trail survey was adapted from three sources: the National Bicycle and Pedestrian Documentation Project², the Parks and Trails NY Trail User Survey³, and the Portland State University Trail Use Survey.⁴ Additional questions were added to assess the barriers to using the trail more (e.g. more time, better connectivity, proximity).¹

Durand Beach and Ontario Beach were also investigated as public resources given that they fall within the boundaries of the Local Waterfront Revitalization

Program. The beach survey was developed largely from the Eastern Lake Ontario Beach survey, which helped to identify use patterns. As with the trail survey, questions were added to assess factors that might facilitate or inhibit beach use (e.g. safety, maintenance, water quality). Among this particular sample, better water quality, maintenance, and facilities were found to be factors that potentially mediate beach use.

The previous surveys were conducted to assess neighborhood characteristics, current use of public environmental space (specifically regarding to Genesee River Trail and Beach Use), and perceptions of changes that might increase or limit use. The trail survey is available in Appendix A.

Survey Development

In the Fall of 2012, I conducted an additional survey at the Rochester Public Market. The goal was to obtain data from people who never or infrequently use publicly available spaces as active resources. These data were intended to compliment the data already gathered from the summer. This Market survey, available in Appendix B, was adapted from both the trail and the beach surveys, and included questions on use and a range of potential resource specific barriers. Part 1 of the market survey included questions about beach use and potential limiting factors.

Part 2 of the Market survey assessed waterfront trail use in a similar way to the Trail Survey. Questions on frequency, types of activity, and barriers to trail use questions were kept largely the same. 'Never' was substituted for 'It's my first time'

for the frequency question, and an additional “lack of knowledge barrier”¹ was added. Additionally, a question on perceived access to the trail and a question on willingness to use the trails were added with the rationale that some non-users might not think they can get to the trail or might simply have no desire to use them. Finally, questions were added to investigate perceptions of crime among those who use the trails or beaches infrequently. The two main questions added were: “In your opinion, the safety and security along this trail is: (Excellent, Good, Fair, Poor, Don’t know)”; “How often does crime prevent you from using the waterfront trails? (Often, Sometimes, Rarely, Never, Don’t know).”

Monroe County has some of the highest crime rates in the state. In 2010, Monroe County had an index crime rate of 3586.2 (vs. 2318.8 state rate), violent crime rate of 389.1 (vs. 391.2), and property crime rate of 3197.1 (vs. 1928.6), all per 100,000 people.⁵ Initial indications from the trail surveys revealed that safety may be a potential barrier to use, especially among women, so questions were added to more specifically address this concern.

The final part of the Market survey included the same demographic questions from the previous surveys of race, ethnicity, age, gender, income, and home address or cross street. From the literature it was also found that BMI, education, and time spent in the community were related to physical activity and trail use, so this information was also included.

Before data collection began the survey was pre-tested on 5 subjects to assess ease of administration and quality of responses. Slight modifications were

¹ Response added for the question: I would use the waterfront trails in the City of Rochester more often if...?

made to produce the final survey. During data collection it was observed that some of the spacing between questions was causing participants to miss or skip some questions, especially in the demographic section; so a new version with improved formatting was used about a third of the way through. Additionally, the original survey contained open-ended questions to elicit reasons for why individuals were not using the trails or beaches. However, about two-thirds through collection it was determined that useful responses were not being gained, so the open-ended questions regarding perceptions of access and trail use were removed from the survey. This was done with the intention of shortening the survey to allow the recruitment of more subjects. The University of Rochester Research Subjects Review Board approved each survey iteration.

Market Survey Administration Protocol-Data Collection

Surveying was conducted at the Rochester Public Market (RPM) on Saturday mornings between October 6th, 2012 and November 17th, 2012. The primary investigator and another Masters of Public Health Student conducted all the surveys. Before the first day of sampling, protocol and a standardized method for approaching and conducting the surveys were reviewed to assure maximum uniformity in collection.

Surveying was conducted at the Rochester Public Market because it was hypothesized that if those individuals had the ability to get to the market, in theory they could get to a trail or a beach too. Additionally, previous survey work at RPM conducted by the research team indicated strong socioeconomic diversity, which was an important consideration for this study. However, this design might have

systematically failed to capture the individuals that truly cannot access neighborhood resources, such as the Market and the trails or beaches. This was a major drawback of this sampling method because those individuals are the least likely to have social support and access to resources that can positively impact their health. However, given the scope of the Health Impact Assessment project the sampling frame was appropriate

After data collection, surveys were coded with an identification number and entered into a database. Double entry of the data was conducted to ensure agreement and reconcile entry errors. It should be noted that during data collection a few qualitative accounts (i.e. need for more police patrol on trails, criminals coming to the beaches) were volunteered by individuals. These were recorded separately.

This study analyzed the barriers to potential trail use among both frequent and infrequent users and will help inform future studies as well as the Health Impact Assessment that will make recommendations to the City of Rochester for the LWRP.

III. Background

Health Status in the U.S./Rochester and Correlates with Physical Activity

In the U.S., the current combined overweight and obesity prevalence is 68.0% (95% CI, 66.3%-69.8%)⁶, a burden that many link to the lack of physical activity in our population.^{7,8} In 2010, the Centers for Disease Control and Prevention found that 25.4% of people nationally reported no leisure-time activity⁸ with more than 50% overall not receiving adequate amounts of exercise.⁹ These numbers persist

despite accepted knowledge that regular physical activity can reduce the risk of various cancers, cardiovascular events, and stroke.⁹ It was estimated that physical activity along with poor diet accounted for 14% and 16.6% of the total causes of death in 1990 and 2000, respectively.¹⁰ These striking numbers continue to demand national guidelines to reduce physical inactivity and the subsequent contribution to disease. As a result, reducing physical inactivity has become the primary objective for the physical activity related goals for Healthy People 2020.¹¹

Similar rates of physical inactivity and the subsequent overweight and obesity burden are also reflected locally in Rochester, New York. In 2006, 61% of adults in Monroe county were overweight or obese, 3% higher than the state average.¹² Although overall physical inactivity rates in Rochester decreased by 12% from 2000 to 2006, this was a disproportionate decline as all subgroups improved except African Americans and Latinos.¹² African Americans and Latinos reported no improvement or a slight decrease in activity (34% and 36%) for the two groups respectively, while the overall rate of physical inactivity decreased from 27% to 15% for the county in the six year period.¹² This disparate improvement in physical activity could be one indication for why obesity rates increased at significantly higher rates from 2000 to 2006 among African American and Latino populations. In 2006, 39% of African Americans and 37% of Latinos were obese, 7% and 20% increases from 2000.¹² This is contrasted with only 4% and 5% increases in obesity among whites and non-Latino's respectively during the same time period.¹² These numbers point to disparities in physical activity levels and corresponding burdens of obesity within the community. Physical inactivity and related obesity is also felt

economically, costing the United States \$117 billion in 2010, further straining an already resource-deprived health care system.⁹ Thus, there is an urgent need to develop sustainable, cost-effective strategies for increasing physical activity and improving overall health.

Relationship with the Built Environment

A growing body of literature shows that factors in the built environment can both facilitate and restrict physical activity. One guiding framework suggests that the built environment can broadly include four main groups: functionality, safety, aesthetics, and destinations.¹³ Functionality characteristics include walking surfaces, street width, traffic, and permeability; safety attributes include both personal and traffic safety; aesthetic factors include streetscape and views; and destination factors include the existence of facilities.¹³ These groupings include a wide range of factors in the physical environment that can facilitate or limit the likelihood an individual might engage in physical activity within a given community. For instance, a well maintained walking path might be a functional predictor of physical activity in a certain community, while lack of lighting might be a safety barrier. Some positive associations between physical activity and built environment characteristics such as convenience and accessibility to trails, connectivity of trails, and safety and security within ones neighborhood have been observed.^{14,15} In one population-based analysis from the Nevada Behavioral Risk Factor Surveillance System, Yang et al. found that commute time, violence, population density, and urbanization were all significantly associated with an individual's likelihood of engaging in physical activity.¹⁶ Other studies have found no associations between

neighborhood crime, accessibility, and aesthetic factors with physical activity.^{15,17}

Associations within each domains have been thoroughly investigated, often providing inconclusive results.

Many built environment characteristics can be objectively measured to assess how various factors might predict rates of physical activity within a population. In some ways objectively measuring both the quantity of and the distance to trails, parks, and other recreational resources is beneficial to substantiating claims that people may be physically active or not because of mere accessibility to spaces to do so. Likewise, the density of a population and the degree of urbanization might shed light on how factors in the environment that might deter people from being physical activity.

Although many studies on the built environment have assessed structural and objective measures that to varying degrees influence physical activity, individual and personal level characteristics, as well as personal perceptions of the built environment also heavily predict the degree to which someone is physically active. The same study by Yang et al. also found that age, education, income, BMI, and life satisfaction were significantly associated with the odds of engaging in leisure time physical activity.¹⁶ In addition to socio-economic status factors, perceived characteristics within the environment and local neighborhood often influences the likelihood someone will be physically active. In one study by Roman and Chalfin, perceived fear of walking due to crime in the neighborhood remained significant even after objective measures of gang and violent crime numbers were added to the model,¹⁴ suggesting that perceptions within the built environment

have some influence on individual behavior. If individuals perceive that they won't be safe in recreational spaces or if they believe that getting to such a place is too far away, then it is likely that they will not engage in physical activity in the outdoor environment.

Impacts of Trails on Physical Activity

The development and existence of a trails within communities has been one aspect of the built environment that has received increased attention in the literature as permanent fixtures that have the potential to provide opportunities for physical activity at potentially low costs.¹⁸ Individuals can use trails for transportation, recreation, walking, cycling, and running among other activities that allow opportunities for physical activity.

However, in 2011 the first ever review of the effects of trails on physical activity found mixed effects, calling for further research to evaluate the potential positive effects of trail use.¹⁹ Some studies observed no increases in physical activity, while others have found that perceptions of living close to a trail were associated with an increased odds of being active.^{20, 21}

Within the literature, a social-ecological approach is often used to describe different associations with trail use and physical activity.¹⁹ Individual characteristics such as age, race, education, income, and gender have all produced varying correlations with trail use. For instance in one study, intensity of trail use increased with age,²² while in another study for every 10-year increase in age, respondents were 33% likely to be users of a community trail.²³ Similar mixed findings were found with race and frequency of trail use.^{21, 24} The majority of studies found

positive associations between education and trail use.^{23,25,26} Income and gender also saw mixed results. For example, one study revealed that those with income of \$35,000 or more were 70% more likely to use a walking trail in a rural community,²⁶ whereas another study produced null associations between income level and frequency of walking.²⁵ In most of the studies examined males were generally more likely to use trails and public space for physical activity.

This study specifically analyzed the different facilitators and barriers to trail use. The most frequent correlation to trail use is access, or distance to a particular trail. For instance, trail use differed with greater perceived distance to the trail, a difference that was supported by objective measures.²⁷ Other aspects of a trail such as condition and maintenance of the trail have been found to be a facilitator or barrier to use depending on the state of the factor. One study found that subjects were 32% and 73% more likely to use a trail in excellent condition when compared to a trail in fair or poor condition, respectively.²⁸ Other factors such as trail facilities, safety, services, and trail design have produced mixed results as either facilitators or barriers to trail use.¹⁹ These factors were reviewed in this study as they relate to perceptions of individuals in the Rochester area who might utilize the local Genesee Valley Trail System.

This type of research has the potential to achieve the Healthy People 2020 objective of developing policies on the environment and trail systems to help promote greater levels of physical activity in the community.¹¹ Increasing research in this area has shown that the creation of environmental opportunities for physical activity, such as trails, increases overall level of physical activity in the community.

In one study evaluating the effect of two new trails in West Virginia, 52% of regular exercisers (≥ 3 times per week) and 98% of new exercisers (< 3 times per week) reported increases in physical activity since using the trails, with statistically greater increases in physical activity among new exercisers than regular exercisers.²⁹ This suggests that developing environmental opportunities for physical activity is especially important for less active individuals. This is support by other data that shows that trail users are more frequently active than non-trail users.³⁰ Investigating how individuals exercise in the local Rochester community and what perceptions are held about the local Genesee Trail System will provide useful information for targeting interventions to help increase physical activity for the least active individuals, as well as the larger community.

IV. Specific Aims

Primary Aim: Assess the relative odds of infrequent trail versus frequent trail use with individual characteristics (e.g. Race, Income, Gender) and perceived barriers (e.g. perceived lack of access or time) among a sample of trail users.

Secondary Aim: Qualitatively describe the characteristics of infrequent or never users among a sample of trail users and non-users.

V. Methods and Data Analysis

This study combined quantitative and qualitative approaches to analyze the factors that predict trail use. The primary analysis used data collected on the Genesee Riverway Trail by the Healthy Waterways project in June and July of 2012. A second, qualitative and thematic analysis of the qualitative open-ended responses

from the market survey was used to triangulate the data and helps interpret the main findings. This second data set was collected from the Rochester Public Market in October and November of 2012.

Quantitative Analysis of Trail Data

The primary analysis of the trail data examined the odds of infrequent trail use associated with different individual characteristics (e.g. Race, Age, Income) and perceived barriers (e.g. perceptions of a lack of access or time) to trail use.

Two questions from the survey were used to assess the potential barriers. The first question asked about perceived safety and security on a Likert scale. The responses were dichotomized into Excellent and Good vs. Fair and Poor to produce the first safety concern barrier. The second question from the survey that was used is "I would use the trail more often if..." Dichotomous responses were attained and represent the following barriers: Lack of time, having to travel with small children, poor major street connections, Far distance to places, poor connections to other places, lack of safety/security, having to carry things, poor trail condition, use of another trail, or lack of desire to use the trail more.

The dependent variable was "trail use." Options for trail use in the past month included: first time, 0-5 times, 6-10, 11-20, 21-29, daily, and don't know. Trail use was dichotomized into Frequent (> 5 times in the past month) vs. Infrequent Users (\leq 5 times in the past month). A total of 265 trail surveys were collected. Individuals were excluded if the outcome variable was missing or "don't know," or if respondents were first time users with a home address outside of Monroe County and the surrounding area. This was done to exclude individuals who were just

visiting and using the trails only once. Analyses were run on the final sample of 257 individuals.

We estimated the relative odds of “infrequent trail use” associated with perceived barriers using logistic regression. We regressed “infrequent trail use” (≤ 5 times in the past month vs. >5 times in the past month) against each self reported barrier (Not enough time to use the trails, perceiving the trail poorly connected to other places, feeling unsafe and insecure, no desire to use the trail more, and Likert feelings of safety and security along the trail) and subject characteristics (Gender, Age [18-29, 30-45, 46-55, ≤ 45 vs. >45], Race [White, Non-White], Ethnicity [Non-Hispanic, Hispanic], Income [\$10,000-\$39,000, \$40,000-\$74,999, $>75,000$], and Access [Within 0.5 miles from trail, Between 0.5 and 1.5 miles, Greater than 1.5 miles], separately. Each subject’s home address was geocoded by Healthy Waterways project staff to produce an “access” variable, which we categorized into distances from the trail of 0.5 miles, 0.5-1.5 miles, and greater than 1.5 miles from the trail.

Next, a multivariable model was constructed, including all the perceived barriers and individual level factors identified above in the univariate analyses, to determine if they were all independent predictors of infrequent trail use. Only subjects with complete data for all of the variables were included in the analyses (N=234).

Finally, we evaluated if our results were sensitive to how we defined “infrequent trail use.” First, we dichotomized trail use into less than or equal to 10 times per month vs. between 11 times and daily use per month. We then re-ran the

models described above and compared effect estimates for each perceived barrier and individual level characteristic from both sets of models. All analyses were performed using ArcGIS10 and SAS Version 9.2 (SAS Institute, Cary, NC).

Analysis of Market Data

Analysis of the market data was conducted in two ways. First, descriptive statistics from the market survey was compared to the trail survey and qualitatively described for differences. The additional factors from the market survey on perceptions of crime along the trail, education level, BMI, smoking status, and years living in Monroe County provided further insight into the barriers to trail use.

The second part of the Market data analysis qualitatively analyzed a series of open-ended responses that were reported on the market survey. Open-ended questions were intended to prompt users who never used the trail to describe why they had never used it. The primary investigator and a Healthy Waterways researcher independently organized the responses into 4 domains, after which the themes and categorization techniques were compared and reconciled. This thematic analysis served to triangulate the previous quantitative approaches and improve the reliability of the findings.

VI. Results*Quantitative Analysis***Table 1. Trail Use Among Trail Respondents. (Trail Survey; N=258, 2 Missing)**

Trail Use	Frequency	%
First Time Users	36	14
0-5 times per month	72	28
6-10	43	17
11-20	38	15
21-29	18	7
Daily	50	19
Don't Know	1	1

Table 1 shows the frequency of trail use in the past month as reported from the trail survey. Fourteen percent (36/258) of respondents reported first time use of the Genesee Trails, while 28% (72/258) reported using the trails 5 times or less in the past month. Daily users of the trail comprised 19% (50/258) of the sample. Frequency of trail use was dichotomized into infrequent (≤ 5 times per month) vs. frequent (> 5 times per month), resulting in 108 infrequent trail users and 149 frequent trail users. The respondent who was unsure of their trail use was excluded from the main analysis.

Table 2. Distribution of Perceived Barriers of Survey Respondents by Infrequent or Frequent Trail Use. (Trail Survey; N=257)

	Infrequent Trail Users (≤ 5 Times a Month) N=108		Frequent Trail Users (> 5 Times a Month) N=149	
	N	%	N	%
Perceived Barriers				
Not enough time to use trails	46	43	46	31
Having to travel with children	1	1	1	1
Difficult to cross major streets	5	5	5	3
Places too far away to use trail	5	5	3	2
Trail poorly connected to other places	13	12	8	5
Feeling unsafe and insecure	4	4	15	10
Having to carry things	1	1	3	2
Poor trail condition	2	2	7	5
Use another trail	7	6	0	0
Lack of desire to use trail more	27	25	72	48
Missing	4	4	5	3
Safety and Security Along Trail				
Rated as Excellent/Good	80	74	115	77
Rated as Fair/Poor	17	16	30	21
Don't know	10	9	3	2
Missing	1	1	1	1

Table 2 shows the distribution of perceived barriers broken down by frequency of trail use. Forty-three percent of infrequent trails users thought the most important barrier to trail use was not having enough time compared to 31% of infrequent users. Twenty-five percent of infrequent users reported a lack of desire to use the trail more, whereas 28% of frequent trail users viewed this as the most important reason preventing increased trail use. Twelve percent of infrequent users and 5% of frequent users reported a perception that the trail is poorly connected to other places. Not feeling safe and secure was reported by only 4% of infrequent users, but 10% of frequent users. This difference was not reflected when asked to

rate safety and security along the trail on a Likert scale. The mean safety and security rating among the respondents was 1.97, corresponding to “good” safety and security along the trail. This was not different by frequency of use.

Table 3. Individual Characteristics of Trail Survey by Frequency of Use. (Trail Survey; N=257)

	Infrequent Trail Users (≤5 times per month) N=108		Frequent Trail Users (>5 times per month) N=149	
	N	%*	N	%*
Gender				
Female	32	30	39	26
Male	67	62	90	60
Missing	9	8	20	13
Age				
18-29	23	21	33	22
30-45	27	25	28	19
46-55	18	17	32	21
>56	25	23	26	17
Missing	15	14	30	20
Race				
White	88	81	110	74
Black	9	8	21	14
Asian	4	4	1	1
Other	1	1	7	5
Missing	6	6	10	7
Ethnicity				
Non-Hispanic	58	54	67	45
Hispanic	5	5	13	9
Missing	45	42	69	46
Income				
<\$10,000	9	8	17	11
\$10,000-\$14,999	1	1	3	2
\$15,000-\$19,999	3	3	4	3
\$20,000-\$24,999	2	2	5	3
\$25,000-\$29,999	3	3	5	3
\$30,000-\$34,999	5	5	6	4
\$35,000-\$39,999	7	6	3	2
\$40,000-\$74,999	23	21	24	16
>\$75,000	35	32	47	32
Missing	20	19	35	23
Access				
Within 0.5 miles of trail	21	19	73	49
Between 0.5-1.5 miles of trail	35	32	49	33
Greater than 1.5 miles from trail	52	48	27	18
Missing	-		-	

*Due to rounding, percentages may not add to exactly 100%.

A little less than two-thirds of the sample was male, while one-third was female. This distribution was not different between infrequent and frequent users.

Of the respondents who provided information on race and ethnicity, the majority was white (82%) and non-Hispanic (87%). In general the sample reported incomes of greater than \$40,000. Infrequent users were more likely to live greater than 1.5 miles from the Genesee Riverway Trail (48% vs. 18%), whereas frequent users were more likely to live within 0.5 miles of the trail (49% vs. 19%).

Table 4. Unadjusted Logistic Regressions of Infrequent Trail Use Associated with Perceived Barriers and Individual Characteristics. (Trail Survey; N=257)

	N*	Unadjusted	
		OR	95% CI
Perceived Barriers			
Not enough time to use trails [‡]	248	1.63	0.96-2.74
Trail poorly connected to other places [‡]		2.43	0.97-6.09
Feeling unsafe and insecure [‡]		0.34	0.11-1.07
Lack of desire to use trail more [‡]		0.33	0.19-0.58
Safety and Security Along Trail			
Rated as Fair/Poor vs. Excellent/Good	244	0.81	0.42-1.57
Individual Characteristics			
Gender			
Male	228	1	-
Female		1.10	0.63-1.94
Age			
18-29	212	1	-
30-45		1.38	0.65-2.93
46-55		0.81	0.37-1.77
>55		1.38	0.64-2.96
>45 vs. <45		0.91	0.53-1.56
Race[‡]			
White	241	1	-
Non-White		0.74	0.49-1.14
Ethnicity			
Non-Hispanic	143	1	-
Hispanic		0.44	0.15-1.32
Income			
\$10,000-\$39,999	202	0.94	0.49-1.78
\$40,000-\$74,999		1.29	0.63-2.64
>\$75,000		1	-
Access[‡]			
Within 0.5 mile of trail	257	1	-
Between 0.5-1.5 miles of trail		2.48	1.30-4.76
Greater than 1.5 miles from trail		6.70	3.42-13.11

* Effective Sample Size; Missing variables excluded from analysis

[‡] Variables to be used in the Full Logistic Model

From Table 2 the perceived barriers that had a sample size adequate for regression analyses (n=248) were “not having enough time,” “the trail being poorly connected to other places,” “feeling unsafe and insecure,” “a lack of desire to use the

trail more,” and the Likert safety and security responses (poor to excellent) (n=242). Those who reported a time barrier were 1.63 times as likely to be an infrequent trail user as those who did not report a time barrier (Table 4). A perception that the trail was poorly connected to other places resulted in a 143% greater relative odds of being an infrequent trail user. Perceiving the trail to be unsafe or lacking a desire to use the trail was associated with a roughly 75% decreased relative odds of being a trail user.

In the unadjusted analyses, there was little increased relative odds of being an infrequent trail user associated with being male versus female. Age categorized ordinally showed mixed associations with the odds of being an infrequent user, while dichotomizing age (>45 vs. \leq 45) was associated with a small decreased in relative odds of being an infrequent trail user. Non-whites had a 26% decreased odds of being an infrequent trail user compared to whites. Income when categorized into three groups also showed mixed associations, with a slight decrease (6%) in odds of being an infrequent trail user for those with incomes between \$10,000 and \$39,999, and a slight increase in odds for those with incomes between \$40,000 and \$75,000 (29%). In regards to accessing the trail, as distance from the trail increases the relative odds of being an infrequent trail use also increases.

Table 5. Adjusted Logistic Regressions Modeling Infrequent Trail Use with the Variables Identified in Table 4. (Trail Survey; N=232)

Variables in the Model	Unadjusted		Adjusted [¥]	
	OR	95% CI	OR	95% CI
Not enough time to use trails	1.60	0.93-2.74	1.35	0.75-2.45
Trail poorly connected to other places	2.98	1.08-8.23	3.83	1.28-2.45
Feeling unsafe and insecure	0.32	0.09-1.17	0.47	0.11-1.93
Non-White	0.58	0.28-1.19	0.58	0.26-1.28
Between 0.5-1.5 miles of trail	2.42	1.22-4.77	2.24	1.10-4.54
Greater than 1.5 miles from trail	6.56	3.26-13.22	6.36	3.06-13.19

¥: Adjusted for the other variables in the model

Table 5 shows the regressions from the multivariable model that was constructed to examine if all the factors identified as significant predictors of infrequent trail use in the unadjusted analyses were all independent predictors when including them all in the same model. Unadjusted and adjusted analyses were run on the same sample of respondents (n=234). After deleting the observations with missing data, the perceived barriers (time, safety) changed very little from the crude regressions (Table 4). However, the relative odds of being an infrequent trail user associated with perceiving the trail as poorly connected to other places increased from OR=2.43 (95% CI= 0.97, 6.09) to OR=2.98 (95% CI= 1.08, 8.23). The relative odds for Non-Whites decreased from OR=0.74 (95% CI= 0.49, 1.14) to OR=0.58 (95% CI=0.28, 1.19) in the unadjusted multivariable model.

Adjusted regressions were then run on each of the variables adjusting for each of the other variables that appeared to have substantial effect on trail use. After adjustment, the only major difference in the odds estimates was for the perception that the trail is poorly connected to other places, which increased from OR=2.98 (95% CI= 1.08, 8.23) to OR=3.83 (95% CI= 1.28, 2.25). The associations for both perceived lack of time and safety and security on the trail moved toward the null.

The associations between the distance variables and frequency of trail use decreased slightly (~3-8%).

Table 6. Relative Odds of Infrequent Trail Use Associated with Perceiving the Trail as Poorly Connected to Other Places by Individual Characteristics. (Trail Survey; N=257)

Perceived Barriers	N	OR	95% CI
<u>Trail Poorly Connected to Other Places</u>			
Female	67	1.17	0.16-8.85
Male	153	5.15	1.36-19.56
Age <45	108	3.09	0.89-10.76
Age >45*	93	-	-
White	191	4.58	1.22-17.21
Non-White	41	1.52	0.22-10.38
Hispanic	18	8.00	0.53-120.64
Non-Hispanic	124	3.12	0.58-16.75
\$10,000-\$39,999	126	1.43	0.45-4.54
\$40,000-\$74,999*	45	-	-
>\$75,000*	78	-	-
Within 0.5 mile of trail	92	5.23	1.26-21.73
Between 0.5-1.5 miles of trail	80	1.91	0.40-9.12
Greater than 1.5 miles from trail	76	2.31	0.25-21.79

* Contains zero cells

Stratification reveals that the relative odds of being an infrequent trail user associated with perceiving the trail as poorly connected to other places varies by individual characteristics. Males had almost five times the odds of being an infrequent user as females if that perception is held. Similarly, White respondents had 300% greater relative odds than Non-Whites of infrequent trail use associated with a belief that the Trail is poorly connected to other places. This may indicate that certain conditions of the trail are larger barriers to use for some groups more than others. Stratifying also shows that all 17 respondents who perceived the trail

as poorly connected to other places are under the age of 45 and have incomes between \$10,000 and \$39,999.

Table 7. Relative Odds of Infrequent Trail Use Associated with Increased Distance from the Trail Stratified by Individual Characteristics. (Trail Survey; N=257)

Distance	N	Less than 0.5 miles from Trail		Between 0.5-1.5 from Trail[¥]		Greater than 1.5 miles from Trail[¥]	
		OR	95% CI	OR	95% CI	OR	95% CI
Female	71	1.00	---	4.17	1.15-15.04	14.17	3.72-53.95
Male	157	1.00	---	2.32	1.03-5.21	6.10	2.52-14.78
Age ≤45	111	1.00	---	1.42	0.58-3.45	16.33	4.22-63.16
Age >45	101	1.00	---	4.67	1.44-15.07	10.73	3.30-34.92
White	198	1.00	---	2.25	1.07-4.74	6.68	3.15-14.18
Non-White	43	1.00	---	3.20	0.65-15.78	8.89	1.34-58.79
Hispanic	18	1.00	---	1.20	0.12-11.87	1.5	0.08-26.86
Non-Hispanic	125	1.00	---	2.45	0.97-6.24	7.49	2.81-19.96
\$10,000-\$39,999	65	1.00	---	5.41	1.42-20.60	4.20	0.91-19.439
\$40,000-\$74,999	20	1.00	---	6.50	1.26-33.58	5.11	1.18-22.16
>\$75,000	82	1.00	---	1.87	0.44-7.93	12.83	2.90-56.74

¥: Home Address within 0.5 miles from trail used as Reference.

Those respondents living between 0.5 and 1.5 miles of the trail and those living >1.5 miles from the Trail, the odds of being an infrequent user was substantially greater compared to respondents living <0.5 miles from the Trail. Within all strata there was a trend of increasing relative odds of infrequent trail use as distance from the trails increased.

Table 8. Trail Use Among Market Respondents (Market Survey; N=123, 4 Missing)

Trail Use	N	%
Never	18	15
1-5 times per month	54	45
6-10	21	17
11-20	13	10
21-29	12	10
Daily	0	0
Don't Know	1	0

Table 8 shows the distribution of trail use in a typical warm weather month as reported from the Market survey. Fifteen percent (18/119) of respondents reported that they had never used the trail, while 45% (54/119) of subjects reported using the trail 1-5 times in a typical warm month. Ten percent of the sample used the trail 21-29 times per month, while no one reported using the trails daily. Frequency of trail use was dichotomized in the same way as the trail user survey (≤ 5 vs. > 5 times per month), resulting in 61% (72/118) infrequent users and 39% (46/118) frequent users.

Table 9. Distribution of Perceived Barriers of Market Respondents by Infrequent or Frequent Trail Use. (Market Survey; N=118)

	Infrequent Trail Users (≤5 Times a Month) N=72		Frequent Trail Users (>5 Times a Month) N=46	
	N	%	N	%
<u>Perceived Barriers</u>				
Not enough time to use trails	48	67	24	52
Having to travel with children	3	4	1	2
Difficult to cross major streets	15	21	9	20
Places too far away to use trail	18	25	9	20
Trail poorly connected to other places	26	36	20	43
Feeling unsafe and insecure	34	47	8	17
Having to carry things	3	4	3	7
Poor trail condition	12	17	7	15
Use another trail	5	7	4	9
Lack of Knowledge about Trail	30	42	10	22
Safety and Security Along Trail				
Rated as Excellent/Good	23	32	32	70
Rated as Fair/Poor	34	47	13	28
Don't know	15	21	1	2
Crime Prevent Trail Use				
Rated as Often/Sometimes	27	38	9	20
Rated as Rarely/Never	34	47	36	78
Don't know	10	14	1	2
Missing	1	1	-	-
Crime Prevent Walking in Neighborhood				
Rated as Often/Sometimes	14	19	5	11
Rated as Rarely/Never	56	78	41	89
Don't Know	2	3	-	-

Both infrequent and frequent users reported “not enough time” as the most common barrier to trail use, 67% and 52% respectively. Infrequent trail users also commonly reported the trail being poorly connected to other places (36%), feeling

unsafe and insecure (47%), and a lack of knowledge about the trail (42%) as being significant barriers to increased use. Forty-three percent of frequent users also reported the trail being poorly connected to other places as a significant barrier.

Frequent users rated the safety and security along the trail substantially better than infrequent users (70% vs. 32%). In addition, 47% of infrequent users perceived the trail as fair or poor compared to only 28% of frequent users who viewed the safety of the trail as such. Similarly, 38% of infrequent users reported crime prevented trail use often or sometimes compared to only 20% of frequent users.

Table 13. Sensitivity Analyses of Trail Data. (Trail Survey; N=257)

	N*	Unadjusted	
		OR	95% CI
Perceived Barriers			
Feeling unsafe and insecure	248	0.96	0.37-2.47
Safety and Security Along Trail			
Fair/Poor vs. Excellent/Good			
Individual Characteristics			
Gender	228	1	-
Male			
Female		1.59	0.89-2.87
Age	212	1	-
18-29			
30-45		1.21	0.57-2.59
46-55		1.33	0.61-2.92
>55		1.07	0.50-2.31
>45 vs. <45		0.92	0.53-1.60
Income	202	1.06	0.56-2.01
\$10,000-\$39,999			
\$40,000-\$74,999		2.05	0.94-4.44
>\$75,000		1	-

Sensitivity Analyses were run to see if dichotomizing trail use differently caused any other variables to produce associations with frequency of trail use. In these analyses infrequent trail use was defined as ≤ 10 times per month and frequent trail use was defined as > 10 times to daily usage. This breakdown was chosen to result in large enough groups to maintain reasonable power, as well as reflect users that may be gaining closer to their recommended levels of physical activity⁴³ on the trail (3-7 times a week). The results from these analyses, shown below in Table 13, did not substantially differ from the main analyses. However, it is worth noting that the effect associated with the perception of feeling unsafe and insecure moved toward the null, the effect for gender increased, and all of the ordinal age and income effects increased over 1.0.

Table 10. Individual Characteristics of Market Respondents by Frequency of Use. (Market Survey; N=118)

Individual Characteristics	Infrequent Trail Users (≤5 Times a Month) N=72		Frequent Trail Users (>5 Times a Month) N=46	
	N	%	N	%
Gender				
Female	35	49	23	50
Male	29	40	19	41
Missing	8	11	4	9
Age				
18-29	10	14	15	33
30-45	14	19	9	20
46-55	26	36	11	24
>55	18	25	9	20
Missing	4	6	2	4
Race				
White	51	71	35	76
Black	12	17	4	9
Asian	2	3	2	4
Other	5	7	2	4
Missing	2	3	3	7
Ethnicity				
Non-Hispanic	52	72	34	74
Hispanic	1	1	4	9
Missing	19	26	8	17
Income				
<\$10,000-\$39,999	21	29	12	26
\$35,000-\$74,999	25	35	15	33
>\$75,000	22	31	17	37
Missing	4	32	2	4
Education				
Some or No High School	0	0	0	0
High School Graduate	2	3	0	0
Vocational/Technical	2	3	1	2
Some College	17	24	5	11
College Graduate or higher	47	65	38	83
Missing	4	6	2	4
BMI				
<25	21	29	18	39
25-30	20	28	13	28
>30	18	25	8	17
Missing	13	18	7	15
Smoking				
Never Smoked	47	65	30	42
Currently Smoke	4	6	5	11

Former Smoker	17	24	9	20
Missing	4	6	2	4

The Market sample had similar distributions of genders and race/ethnicity, for frequent and infrequent users. Whites and Non-Hispanics made up 71% and 72% of the infrequent users, with a similar distribution for frequent users. About a third of both infrequent and frequent users reported incomes in each of the three categories. The majority of respondents were college graduates or higher for both infrequent (65%) and frequent users (83%). More infrequent users (24%) reported some college education compared to frequent users (11%). Thirty-nine percent of frequent users had a Body-Mass-Index below 25 compared to 29% of infrequent users, while 45% of frequent users were overweight or obese compared to 53% of infrequent users. Sixty-five percent of infrequent users and 42% of frequent users reported never smoking.

Qualitative Analysis of Market Data

Domains

The domains chosen for evaluation were crime and safety, and access and distance. For the domain crime and safety, the themes that emerged were site-specific concerns, conditional concerns, general concerns, and no safety concerns. For the domain access and distance, the themes that emerged were trail connectivity, trail signage, distance from trail, and a need for more trails. Additional domains such as poor water quality, knowledge about the trails, and personal reasons also emerged, but with far lower frequency.

There were a total of 32 open-ended responses that related to crime and safety. Thirteen of these comments related to site-specific safety concerns, or perceptions that an area was particularly unsafe. Ten comments related to general safety concerns. These comments related to generally perceiving the trail or people on the trail as unsafe, rather than a particular condition of trail use that might concern them. Conditional concerns, as defined as responses relating to a particular state of using the trail such as night rather than a specific spot, made up five of the 32 comments and often related to fear of using the trail at night or alone as a single woman. Five out of the 32 responses related to positive perceptions of safety and comments of no safety issues on the trails. Examples of the responses are in Table 11 below.

Nineteen of the open-ended responses related to issues of access and distance from the Genesee Trail System. The responses overwhelming related to the theme of distance from the trail as a barrier to increased use. Five of the 19 responses related to the need for more trails in the area, particularly more biking trails. Trail connectivity and signage issues comprised the remaining responses. Examples of the themes and the responses are shown below in Table 12.

Table 11. Open-Ended Crime and Safety Response Examples. (Market Survey; N=32)

<u>Crime and Safety</u>	Quotations
Site-Specific Concerns	<p>“Haven’t tried Genesee River Trail between downtown and Zoo. I perceive it as unsafe.”</p> <p>“Areas have had many crimes- Genesee Valley, Maplewood.”</p> <p>(In response to if there is a particular concerning area of trail) “Trail parallel to St. Paul is not safe.”</p>
Conditional Concerns	<p>(In response to perception of safety and security on trail) “Go during the day.”</p> <p>“If I’m alone I likely would not be on the trails.”</p> <p>“Single women can just be snatched out, it’s scary.”</p>
General Concerns	<p>“I’ve never worried while on the trail, but I do think about safety on the trails.”</p> <p>“Trails need more monitoring by police or security guards...Safety is a big deterrent. I was scared and anxious.”</p> <p>“Sometimes sporadic crime is a concern.”</p>
No Safety Concerns	<p>“Very little crime along the trail.”</p> <p>“No safety or security incidents.”</p> <p>“Never had a problem.”</p>

Table 12. Open-Ended Access and Distance Response Examples. (Market Survey; N=19)

<u>Access and Distance</u>	Quotations
Distance from Trail	<p>(In response to why they never use the trail) “Don’t live close by.”</p> <p>“Not close enough.” (When asked if they would consider using trails more) “Would use trail more, proximity to home.”</p>
Need for More Trails	<p>“I’d love to see more trails for biking.”</p> <p>“Need more ‘marked’ running or hiking trails in Monroe county.”</p> <p>“Get from Pitts to the lake all by trail.”</p>
Signage	<p>“Better signage.”</p> <p>“Get lost too many signs.”</p> <p>“Need more ‘marked’ running or hiking trails.”</p>
Trail Connectivity	<p>“Trail Systems too far, not linked.”</p> <p>“More complete trails and complete system.”</p>

VII. Discussion

In this study perceived barriers and individual characteristics were evaluated as important predictors of infrequent trail use using both quantitative and qualitative approaches to analyze two different community samples. From the trail sample collected in the summer of 2012, the leading predictor of infrequent trail use was a perception that the trail was poorly connected to other places (OR=3.83). This finding is also supported from the percentage of market respondents with this perception and the themes from the open-ended responses from the market sample. Qualitative responses from the market data indicated individuals would use the trail more if it were a more complete linked system. As expected, the trail data showed that individuals were more likely to be infrequent users as the distance from their home increased. There was a 124% to 536% greater odds of infrequent trail use among those living more than 0.5 miles from the trail. This raises the question of whether the primary barrier to frequent trail use is a perception that the trail is poorly connected and accessible from other places with few access points, or it is the distance of getting to the trail that prevents use. It is likely a combination of the accessibility of the trail system, including it's linkages to other parts of the neighborhood and community such as the workplace or grocery store, and better signage and connectivity, in addition to the distance the trail may be from an individual's home for more leisurely usage.

If individuals live farther from the trail it is logical that they would use the trail less often compared to those who live in close proximity to the trail. However, it is also likely that the farther individuals live from a trail, or the more they perceive

the trail is poorly connected to other places, the less frequently they will use the trail or perceive that they have enough time to even get to the trail. This is supported by the fact that 72% of trail respondents reported they walked or biked to get to the trail, and 26% reported they drove to the trail. Only 2% (5/265) of the survey participants reported they took a bus to the trail. Thus, it is more likely that an individual will use the trail infrequently if they live farther away, do not have access to a car, and do not enjoy biking. This suggests the need to either create greater access points to the trail or build more connections into local neighborhoods to allow more individuals to access the trail system. Doing so could potentially decrease the time burden individuals perceive in getting to the trail and increase overall physical activity.

Additional secondary analyses revealed that 83% of Non-Whites living within 0.5 miles from the trail and 74% of Non-Whites with incomes between \$10,000-\$39,999 were frequent users, compared to 75% of Whites living within 0.5 miles from the trail and 55% of Whites with low incomes. This suggests that lower income minorities, sub-populations more likely to live in the City of Rochester and disproportionately have poorer health, may be more likely to be frequent trail users, especially if they live close to the trail. Additionally, 67% of Non-Whites surveyed preferred to run or walk on the trail, compared to 42% of Whites. Thus, for Non-Whites who more prefer to walk or run on the trail improving the accessibility of the trail could lead to higher levels of use. Future work should incorporate more in-depth qualitative techniques and more precise quantitative measures of perceptions to further determine how to improve the accessibility of the trail, especially for city

residents who may be more inclined to use the trail due to the shorter distance from their homes. Figuring out the specific breakdown of physical inactivity for various high-risk populations and their associated perceptions around the trail is important for developing targeted interventions to help promote greater levels of physical activity not only for the larger community, but specifically for those high-risk groups who need specific attention to change behavior and improve health. This is especially important given City residents and African Americans have 8% and 23% higher rates of physical inactivity than suburban residents and Whites, respectively.¹² These higher risk groups also consistently report worse overall health with significantly higher rates of obesity and disease.¹² This awareness of tailoring relevant environmental interventions to high risk groups has been emphasized for rural communities elsewhere in the literature,³¹ but should also be underscored in urban policy and planning.

Individuals who perceived not having enough time to use the trails had 1.35 times the relative odds of being an infrequent trail user as those who did not report that perception. This finding is supported by the market data in which 67% and 52% of infrequent and frequent users reported lack of time as a significant barrier to increased use.

These results are in agreement with previous studies that found individuals were 35% less likely to be trail users for every 0.25 mile increase distance from a community trail.²³ Other studies using both objective and subjective measures have supported this negative relationship between home distance and trail use.^{21, 27, 32} This finding is also in agreement with the qualitative responses from the market

sample in which 11 out of the 19 responses suggested limited use due to distance from the trail.

Many have found that physical activity increases with improved neighborhood connectivity and walkable access to various destinations.^{33, 34} Some evidence also suggests that interventions to increase the connectivity and walkability of neighborhoods leads to increased total physical activity.³⁵ Thus, increasing the total connectivity of the trail system in Rochester might lead to increased physical activity, especially for certain groups.

Stratifying by distance also revealed that infrequent trail use varies by individual characteristics as distance increases. Females were substantially more likely than males to be infrequent trail users as home distance from the trail increased. Although the sample was evenly split between walkers/runners (48.64%) and bikers (49.81%), males were 2.22 times (95% CI 1.25-3.96) as likely as females to be bikers, preferences sometimes cited in the literature.³⁶ This preference for biking might allow males from farther distances to more easily use the trails and could explain why females are more likely than males to be infrequent trail users as distance increases.

Additionally, those over the age of 45 were about 5 and 10 times more likely to be infrequent users if they lived between 0.5-1.5 miles from the trail and farther than 1.5 miles respectively, compared to those living within 0.5 miles from the trail. This distinction is an important difference from the crude regressions, which found older age to be slightly protective for infrequent trail use. Stratifying reveals that the association between infrequent trail use and age is effect modified by distance from

the trail increasing the odds of infrequent trail use as distance increases. This is further evidence for the need for more trails integrated in local neighborhoods, as it may be more difficult for older individuals to walk farther distances to access the trails.

In addition to the convenience and availability of trails, crime and safety has been another factor hypothesized in previous literature as a significant deterrent to engaging in physical activity within the built environment.^{14,37} This study produced largely inconclusive results in evaluating perceptions of crime and safety in regards to trail use. The unadjusted regression for the association between perceiving the trail as unsafe or insecure and infrequent trail use showed a protective effect. In other words, those who believe the trail is safe and secure have roughly a 70% decreased chance of being a frequent trail use. This effect remained after adjustment in the full model (OR=0.47; 95% CI 0.11-1.93). Similarly, those who viewed safety and security along the trail as either fair/poor had a 20% decreased odds of being an infrequent trail user compared to those who viewed safety and security along the trail as excellent/good. However, there may be a few explanations for this. First, the sample size is extremely small; only 19 respondents from the full sample reported a perception of feeling unsafe and insecure on the trail. Secondly, it is possible that infrequent users are not aware of issues of safety and crime purely due to the fact that they are inexperienced with conditions along the trail system. This is a plausible explanation given 42% of the trail respondents were either first time users or reported using the trail between 0 and 5 times in the preceding month. Lastly, if it is presumed that frequent trail users have more experience with safety and crime

issues, it is possible that they have developed safe strategies of dealing with such concerns, but would still be more likely to report those concerns given their experience and awareness. However, the results show no difference in average ratings of safety and crime between the infrequent ($\mu=1.99$) and frequent users ($\mu=1.95$), responding to a “Good” perception of Safety. From the trail survey, crime and safety not only does not appear to be a barrier, but also could potentially be a facilitator for some experienced users.

However, there may be some underlying factors that explain this lack of a finding for safety and security concerns. When the survey locations were grouped into South (Genesee Valley Park West and East, Erie-Lackawanna Railroad Bridge, and Ford St. Bridge), Central (South Ave., Cataract St., and Scrantom St.), and North (Maplewood, Zoo Rd., Turning Point Park, Lake Ontario Parkway at River St., and Lakeside at Durand Park), we see that user frequency is skewed towards the South Region. Forty-seven percent respondents in the South region reported frequent use, compared to only roughly 26% in both the Central and North regions of the trail. When overlaying this with individuals who perceive conditions on the trail as Excellent or Good we see a similar distribution in these regions, with 45% reporting Excellent or Good safety and security conditions in the South, compared to only 28% and 27% in the Central and North, respectively. Qualitative reports, as well as other crime data has supported these perceptions of more dangerous conditions along those regions of the trail. These safety issues may completely deter some people from using the trail and should be investigated in the future using both quantitative and qualitative methods. Policy makers should also specifically focus on these areas

of the trail, in the aforementioned areas of accessibility and safety, where there are denser low-income and minority populations suffering from poorer health and who may have the most opportunity to increase their physical activity.

Moreover, the results from the market survey indicate that for some, crime and safety is still a significant perception that limits frequent trail use. Forty-seven percent of infrequent users from the market sample reported perceiving the trail as unsafe and insecure, compared to only 17% of frequent users. Similarly, frequent trail users consistently rated safety on the trail better than infrequent users when asked to assess on a Likert scale. Seventy percent of frequent users viewed safety and security along the trail as excellent/good compared to only 32% of infrequent users; whereas 47% of infrequent users viewed safety and security as fair/poor compared to only 28% of frequent users. These results contrast with the trail data. Similar low percentages in the two groups reported crime prevented walking in their neighborhood, a finding that differs from early research³⁸ and is more in agreement with recent studies.³⁹ These safety perceptions might be a better representation of what specifically limits users less familiar with the trail system as 60% of the market sample reported being a never user or an infrequent user (≤ 5 times a month).

None of the individual characteristics in the main trail analyses, apart from home distance, produced any conclusive associations with frequency of trail use. Females were found to be 10% more likely to be infrequent users, a finding similar to a study by Troped al. that found males 90% more likely to be trail users than females.²³ However, Brownson et al. found females were more likely to use walking

trails than males in a rural setting.²⁶ Although some studies have found increased age decreases the likelihood of individual trail use,²³ others have found mixed results for predicting frequency of trail use among different age categories,^{24, 25} as found in this study. It is possible that younger and older age groups (18-29 and >55) have characteristics, such as more perceived time, that could result in increased trail use, whereas middle-aged people may be less likely to use the trails for the same or different characteristics. These considerations and possible expectations should be specifically examined in future studies to determine activity patterns and associated perceptions corresponding with specific age groups. Non-Whites in this study were roughly 40% less likely to be infrequent trail users compared to Whites, a result consistent with other studies.^{25, 40} However, in this study Non-Whites compared to Whites were more likely to use the trail infrequently as distance from the trail increased. This may suggest that the integration of trails within certain neighborhoods may be more important than others, an interesting indication observed by Lindsey et al. that found increased trail traffic in neighborhoods with a greater proportion of minority residents relative to whites.⁴⁰ Associations with income produced mixed effects, similar to what has been found previously in the literature.^{25, 26} Given the higher density of minority and low-income populations in the city, increased access may be most important at closer distances to the trail, but less important for individuals farther from the trail who are more likely to be White, wealthy, and have access to transportation.

VIII. Limitations

This study has several limitations that should be considered when interpreting our results. First, the trail survey had only 257 participants, which is substantially lower than other interceptor-based surveys with over 400 individuals,^{24, 29} and telephone and population based samples with 1269 and 3717 subjects, respectively.^{26, 25} The smaller sample size likely reduced the precision of the estimates, reflected in the reasonably wide 95% confidence intervals, making it difficult to make firm conclusions. The data also suggest that this interceptor method of trail sampling might not be the best method for collecting data on perceptions of the trail, as the degree to which survey participants responded to the question assessing perceived barriers was very low. Ninety-three percent (238/257) of the trail participants reported two perceived barriers or less (of 11 possible barriers), whereas 58% (68/118) of the market participants responded to two perceived barriers or less (of 11 possible barriers). Meanwhile 42% (50/118) of the market participants reported between three and seven perceived barriers. The low responses for perceived barriers from the trail sample not only did not allow for regressions to be run due to insufficient sample size, but this sampling error likely led to underestimated risks for each perceived barrier that was calculated. Although it is possible that the lower response rate for perceived barriers from the trail survey is due to there just being fewer barriers for trail users, it is more plausible that trail users were likely in a rush to get back to their activity and less likely to contemplate each barrier. This explanation is reasonable given 55% of the trail sample reported using the trail for exercise or recreation at the time

they completed the survey. Given the higher percentage of responses to perceived barriers from the market sample, further studies should consider survey settings that allow individuals the time to complete the survey.

Additionally, the perceptions and results from this study cannot be generalized to the entire Rochester population who do not use the trail or public market. The trail data are 61% male, 77% white, and only 17% with income below \$25,000. The percentage of males in Monroe County and Rochester is around 48%, while Whites make up 76% of the county population but only 44% of the city population.⁴¹ Given that the Genesee Riverway Trail runs directly through the city, the perceptions from this study might not be accurate representations of other Rochester populations given the minimal minority representation. The same could be said for income as both Monroe County and the City of Rochester have higher percentages of individuals with incomes below \$25,000, at 24% and 42%, respectively.⁴¹ The demographic differences in the trail sample, especially from the City of Rochester demographics, likely produced different associations from the true source population through which the Genesee Trail runs. Future trail research should focus on city respondent perceptions as improvements to the built environment might have the biggest impacts on those groups in Rochester that exhibit the highest rates of physical inactivity and disease.¹²

Another limitation of this study is that trail use is only being analyzed as it specifically relates to the Genesee River Canal System, because this is the area that falls within the Local Waterfront Revitalization Program for the City of Rochester. Seven infrequent trail users indicated that they use a different trail, whereas none of

the frequent users reported this option. This could have led to differential outcome misclassification, which could have produced an overestimate of the true risk of infrequent trail use, as some users might infrequently use the Genesee River Trail but engage in other physical activity at other locations. However, the number is relatively small so the effect is likely to be small.

The large amount of incomplete surveys could have also reduced the statistical power of the effect estimates. Between 8% and 46% of respondents for a given individual characteristic had missing information. However, the missing responses were relatively the same within each variable in relation to frequent or infrequent trail use.

Finally, given that this study is a cross-sectional exploratory design, temporality cannot be assured. However, a recent review of the built environment by Wendel-Vos et al. found no difference in findings between longitudinal and cross-sectional designs among the 47 studies analyzed.¹⁵ Therefore, the results from this study might be valid reflections of what might have been found from a prospective study.

IX. Conclusion

To our knowledge, this is the first cross-sectional study of community trail use to incorporate both quantitative and qualitative approaches from two different study samples within the community. This study design also allowed deeper insight into the perceptions of barriers to frequent trail use, as well as revealed sampling technique issues that should be considered in future studies. The results from this

study suggest that the convenience one feels around the availability and the time commitment to use trails are important factors that influence trail use. Increasing individuals' perceptions of available time cannot be changed by policy, but one solution is to create more integrated neighborhoods that have more trails connected to more places within the neighborhood. Having more information about the availability of the trails, coupled with increased access points has been cited in the literature as one effective strategy to getting people more physically active.⁴² This has promise for the local Rochester community as 42% of infrequent users from the Market sample reported that they would use the trail more if they had more knowledge about it. The associations between crime and safety should be investigated further given the mixed results from this study and others in the literature.

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Appendix A: User Trail Survey

Location: _____ Date: _____ Time: _____
Survey conducted by: _____ Weather: _____ SURVEY ID # _____

We are interested in learning about how you use Rochester's waterfront trails. In this survey, "the trail" refers to any location along the Genesee Riverway Trail within the City of Rochester. For questions relating to trail condition and improvements, please refer to the area you are in now and how you are using the trail today.

1. **Today I am:** Walking/Running Biking Other (please specify): _____
2. **What best describes the purpose of this trip** (*check all that apply*)?
 Exercise Work commute School
 Recreation Shopping/doing errands Personal (medical, visiting friends, etc.)
3. **If you were not using the trail for this trip, how would you be traveling?**
 Car Carpool Transit (Bus) I would not make this trip Don't Know
4. **In the past month, about how often have you used this trail** (*check only one*)?
 It's my first time ever on this trail 0 – 5 times 6 – 10 times 11 – 20 times 21 – 29 times Daily Don't Know
5. **Please check the seasons in which you use this trail:**
 All year Summer Fall Winter Spring Don't Know
6. **How did you get to this trail today** (*check all that apply*)?
 Drove Walked Biked Took the bus Other: _____
7. **How far did you travel to get to this trail today?** _____ miles
8. **Home address** (*NOTE: If you prefer not to give your address, please give an address near your house*):
Number: _____ **Street:** _____ **City/State:** _____ **Zip:** _____
9. **How long will you be [walking/biking/other]** (*same activity as now*) **on this trip?**
_____ minutes
10. **How far will your trip on the trail be today** (*just the part of your trip that is actually on this trail*)?
 < ¼ mile ¼ mile to ½ mile ½ mile to 1 mile 1 mile to 2 miles
 2 miles to 5 miles >5 miles Don't Know
11. **Will any part of this trip be taken on public transit (such as the bus)?** Yes No
 Don't Know
12. **Why are you using this trail instead of [walking/biking/other]** (*same activity as now*) **somewhere else** (*check all that apply*)?
 Accessible/no stairs Scenic qualities It is less crowded here

- Personal safety (direct, close)
- Wider lanes/path (friends, media, etc)
- Connection to transit (bus)
- Level/flat
- Bike lanes
- No cars
- Convenient route
- Heard about it (from friends, media, etc)
- Other: _____

13. What would you like to see improved along this trail (check all that apply)?

- Wider path
- More shade trees
- Better maintenance
- Plowing in winter
- Better surface
- Benches
- Signs
- Nothing
- Better street crossings
- Access to shops, etc.
- Better lighting
- Other: _____

14. In your opinion, the safety and security along this trail is:

- Excellent
- Good
- Fair
- Poor
- Don't Know

15. I would use the trail more often if (check all that apply):

- I had more time
- It was easier to cross major streets
- It was better connected to other places
- I didn't have things to carry
- I normally take a different trail
- I already use the trail as often as I want (I would not use it more often)
- I did not have to travel with small children
- Places weren't too far away
- I felt safer/more secure
- The trail was in better condition
- Other: _____

16. FOR BIKERS ONLY: Are you wearing a helmet today? YES NO

IF "YES": Why are you wearing a helmet today (check all that apply)?

- To protect myself in case of a crash
- It's the law
- To set a good example for children
- Other: _____

IF "NO": Why are you not wearing a helmet today (check all that apply)?

- I don't own one
- I have one but it doesn't fit
- It's too hot to wear one
- I don't like what it does to my hair
- Helmets don't protect you
- I have one but I forgot to wear it
- They're too expensive
- I don't like how it looks
- I don't need it right now (short trip)
- Other: _____

17. Do you or your family regularly fish in waters around Rochester? YES NO

- YES
- NO
- IF YES, do you ever fish in the Genesee River above (south of) Lower Falls? YES NO

Does your family regularly eat fish caught around Rochester? YES NO

- YES
- NO
- IF YES, about how often did you eat locally caught fish during the last fishing season?
_____ meals per month

ABOUT YOU:

- Race:** White Black Asian Other: _____
- Ethnicity:** Non-Hispanic Hispanic or Latino
- Age:** _____
- Gender:** _____

How many people currently live in your household? _____ adults _____ children (under

18. What is your approximate household income?

- | | | |
|--|--|--|
| <input type="checkbox"/> 1 Less than \$10,000 | <input type="checkbox"/> 2 \$20,000 - \$24,999 | <input type="checkbox"/> 3 \$35,000 - \$39,999 |
| <input type="checkbox"/> 4 \$10,000 - \$14,999 | <input type="checkbox"/> 5 \$25,000 - \$29,999 | <input type="checkbox"/> 6 \$40,000 - \$74,999 |
| <input type="checkbox"/> 7 \$15,000 - \$19,999 | <input type="checkbox"/> 8 \$30,000 - \$34,999 | <input type="checkbox"/> 9 \$75,000 or more |

Do you have any additional comments?

THANK YOU FOR YOUR TIME!

Appendix B: Non-User Public Market Survey

Location: _____ Date: _____ Time: _____
 Survey conducted by: _____ Weather: _____ SURVEY ID # _____

We are interested in how people use Rochester’s waterfront for recreation and physical activity. You must be over 18, have lived in Monroe County or the surrounding region for at least the past year, and must not have taken this survey before to participate. You may skip any questions you wish.

1. How often did you visit Durand Beach this year?

- 1 Never 2 1 – 4 times 3 5 – 10 times 4 11 – 20 times 5 21 or more times

If never, why not? _____ **(SKIP TO #3)**

2. What activities did you engage in at Durand Beach? (check all that apply)?

- 1 Swimming 2 Picnicking 3 Walking 4 Sunbathing 5 Playing sports 6 Other: _____

3. How often did you visit Ontario Beach this year?

- 1 Never 2 1 – 4 times 3 5 – 10 times 4 11 – 20 times 5 21 or more times

If never, why not? _____ **(SKIP TO #5)**

4. What activities did you engage in at Ontario Beach? (check all that apply)?

- 1 Swimming 2 Picnicking 3 Walking 4 Sunbathing 5 Playing sports 6 Other: _____

5. Would you ever consider using the beach(es) in Rochester more often?

- 1 Yes 2 No

6. Use the following scale to rate your answers to the following statements:

1= Strongly Disagree (SD) 2 = Disagree (D) 3= Neutral (N) 4 = Agree (A) 5 = Strongly Agree (SA)

I would visit the beach(es) MORE if ...	SD	D	N	A	SA
... it were better-maintained	1	2	3	4	5
... it were safer (less crime)	1	2	3	4	5
... it were open (lifeguarded) more often/longer hours	1	2	3	4	5
...it had better facilities (bathrooms/changing area)	1	2	3	4	5
...it had better water quality	1	2	3	4	5
...there were more shops/restaurants/vendors nearby	1	2	3	4	5
...there were a spray park or swimming pool	1	2	3	4	5
...there were better bus service	1	2	3	4	5
...I lived closer to it	1	2	3	4	5

...I knew more about it 1 2 3 4 5
 Other: _____ 1 2 3 4 5

7. Following are some examples of how pollution affects our local waterways. In the past year, have you been personally affected by:

Impact	Yes	no	maybe	don't know/ no answer
Beach closings				
Odor near waterways				
Too much algae in water				
Getting sick after swimming in Lake Ontario				

NOTE: In this survey, "waterfront trails" refers to trails along the Erie Canal and Genesee River (see map).

8. In a typical warm weather month, about how often do you use waterfront trails in Rochester (check only one)?

1 Never 2 1 – 5 times 3 6 – 10 times 4 11 – 20 times 5 21 – 29 times
 6 Daily 7 Don't Know

9. What best describes your trail use (check all that apply)?

1 Exercise 2 Work commute 3 School commute
 4 Recreation 5 Shopping/doing errands 6 Personal (medical, visiting friends, etc.)

10. In your opinion, can you get to the trail system easily? 1 Yes 2 No

11. Would you ever consider using the waterfront trails in the City of Rochester more often?

1 Yes 2 No

12. I would use the waterfront trails in the City of Rochester more often if (check all that apply):

1 I had more time 2 I did not have to travel with small children
 3 It was easier to cross major streets 4 Places weren't too far away
 5 It was better connected to other places 6 I felt safer/more secure
 7 I didn't have things to carry 8 The trail was in better condition
 9 I normally take a different trail 10 I knew more about them
 11 Other: _____

13. In your opinion, the safety and security along this trail is:

1 Excellent 2 Good 3 Fair 4 Poor 5 Don't Know

14. How often does crime prevent you from using the waterfront trails?

1 Often 2 Sometimes 3 Rarely 4 Never 5 Don't Know

Is there a particular area of concern to you? _____

15. How often does crime prevent you from walking in your neighborhood?

1 Often 2 Sometimes 3 Rarely 4 Never 5 Don't Know

16. How many times in the past week were you physically active (walking, biking, swimming, etc.)? _____ times

How many of these times were outdoors? _____ times

When you were physically active, for how many minutes or hours did you usually keep at it? _____ minutes

17. Do you or your family regularly eat fish caught in Lake Ontario or connected waters?

YES NO

If YES, about how often do you eat locally caught fish? _____ meals per month

18. ABOUT YOU:

Address or intersection near your house

Street: _____ Number or cross street: _____

City: _____ Zip: _____

Race (check only one): White Black Asian Other: _____

Ethnicity (check only one): Non-Hispanic Hispanic or Latino

Gender (check only one): Male Female

ABOUT YOU (Continued from previous page):

Age: _____ Height: _____ Weight: _____

Which of the following is your highest level of education (completed)?

Some or no high school High school graduate or GED Vocational/technical school Some college College graduate or higher

How many years have you lived in Monroe County or the surrounding region? _____ years

How many people currently live in your household? _____ adults _____ children (under 18)

Smoking History (Check only one): Never Smoked Currently Smoke Formerly Smoked

What is your approximate household income?

Less than \$10,000 \$20,000 - \$24,999 \$35,000 - \$39,999
 \$10,000 - \$14,999 \$25,000 - \$29,999 \$40,000 - \$74,999
 \$15,000 - \$19,999 \$30,000 - \$34,999 \$75,000 or more

Do you have any additional

comments? _____

THANK YOU FOR YOUR TIME