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The Role of Street Trees for Pedestrian Safety

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16. Abstract

This research report studies the link between street trees and the gap between pedestrians' perceptions of safety and their actual safety while walking along street corridors. Prior to this report, there was little research highlighting the relationship between street trees and pedestrian safety. The research team undertook two projects to understand the role of street trees and pedestrian safety: (1) An analysis of 181 pedestrian intercept surveys across streets with varying street tree cover; and (2) A GIS mapping analysis that measured urban design variables and street tree characteristics alongside recorded pedestrian-vehicle crashes. Overall, street trees did positively impact pedestrian safety, but the impact was small and further research is needed. These findings support the work of previous research and contain relevant information for street redesign standards and planning, especially Complete Streets guidance and technical assistance. Street trees can serve as an option for applying Complete Streets principles into smaller-scale projects to improve pedestrian mobility and community livability, especially in environmental justice areas. There may also be ways to leverage street tree advocacy and streetscape redevelopment projects through existing funding programs, and promote inter-agency collaboration and public-private partnerships.

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The Role of Street Trees for Pedestrian Safety

Final Report

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Disclaimer

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Executive Summary

This study of the Role of Street Trees for Pedestrian Safety was undertaken as part of the Massachusetts Department of Transportation (MassDOT) Research Program. This program is funded with Federal Highway Administration (FHWA) State Planning and Research (SPR) funds. Through this program, applied research is conducted on topics of importance to the Commonwealth of Massachusetts transportation agencies.

This study researched the link between street trees and pedestrians' perceptions of safety compared to their actual safety, while walking along urban street corridors. While there is a relatively limited body of scholarship on this topic, recent research has shown that trees planted within rights of way of urban streets can contribute to the walkability of communities by decreasing vehicle speeds and helping reduce pedestrian-vehicle crashes. Furthermore, variations in streetscape features and road traffic volumes along street corridors may impact pedestrians' feelings of safety and their use of built pedestrian infrastructure. Additional research and the synthesis of existing relevant case studies will assist with better understanding the connection between street trees and pedestrian safety and with further developing walkability and design interventions involving street trees.

The following objectives guided this study:

- Review relevant case studies and literature on streetscape projects that have improved pedestrian walkability with street trees or other design interventions.
- Determine if pedestrian perceptions of safety are influenced by the presence or absence of street trees and related streetscape design variables using a pedestrian survey.
- Assess the relationship between pedestrian-vehicle accident reports, and the presence of street trees, and tree characteristics - location, size, spacing, and species - using geographic information systems (GIS).

There currently exists little research on the relationship between street trees and pedestrian safety. Previous studies have shown that trees and other roadside vegetation can mitigate adverse environmental conditions on street corridors. Recent research has also found that trees planted within the rights-of-way of urban streets can positively contribute to perceptions of safety and walkability. Future investigation of these interactions is needed.

The current literature review also finds an increase in people walking for transportation, especially lower-income individuals, and projects larger numbers of older walkers in the future. Methods to improve pedestrian safety, including through streetscape interventions, are crucial. They are especially important for the most vulnerable groups of pedestrians who often lack walkable routes.

In this study, pedestrian surveys conducted in three Massachusetts cities—Chicopee, Holyoke, and Springfield—found that street trees did positively impact pedestrian safety, but the impact was small and further research is needed . In terms of feelings of safety, while the

study found no significant differences based on gender, there were differences based on income and age: Across all locations, participants with lower annual incomes (<$30,000), and ages between 18 and 34 years old, reported greater concerns for their personal safety. This suggests that socioeconomic status may have a more pervasive influence on perceived sense of security than other environmental or demographic variables.

Survey participants reported walking primarily for non-recreational purposes, such as commuting to work, going shopping, or doing other essential tasks. Only a limited percentage (44.8%) of study participant households own a car, compared to 87.8% of households statewide, and 91.3% of households nationwide. It therefore was not surprising that the study found participants spent a considerable length of time walking, an average of 34.5 minutes at the time they were surveyed. When assessing the potential vulnerability of the study areas and their populations, this observation is particularly important. It suggests that the creation of pedestrian-friendly street corridors and street tree-planting initiatives in low-income neighborhoods should continue to be a priority for state and municipal project development.

The GIS mapping results of the study showed that urban design features, including street tree characteristics, may help decrease pedestrian-vehicle crashes. It is valuable to consider that both urban design interventions and street trees can add to safe walking environments in combination with other environmental variables typical of mixed-use, urbanized settings. This is a pragmatic approach to take when considering the role of street trees in supporting pedestrian safety, since a tree's attributes (height, trunk size, canopy spread, etc.) will change over time as the tree grows.

The study's findings support the work of previous research and can be extended to street redesign standards, especially MassDOT's Complete Streets guidance and technical assistance. While it may not be economically or physically practical to retrofit every street in every city into an inclusive, traffic-calmed redesign project, street trees can serve as an option for incorporating Complete Streets principles into smaller-scale projects and budgets to improve pedestrian mobility and community livability.

In addition, there may be ways to leverage existing street tree advocacy and streetscape redevelopment projects involving state agencies and local municipalities in Massachusetts with programs such as Complete Streets, Safe Routes to School, and Greening the Gateway Cities. Such leveraging would encourage inter-agency and interdepartmental collaboration and public-private partnerships.

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1.0 Introduction

This study of the Role of Street Trees for Pedestrian Safety was undertaken as part of the Massachusetts Department of Transportation (MassDOT) Research Program. This program is funded with Federal Highway Administration (FHWA) State Planning and Research (SPR) funds. Through this program, applied research is conducted on topics of importance to the Commonwealth of Massachusetts transportation agencies.

The team sought to understand how street trees influence both pedestrians' perceptions of safety and actual safety, based on the recorded pedestrian-vehicle crashes on streets in three Massachusetts cities. Previous research examining how various roadside design features affect driver safety and behavior is fairly vigorous, and recent studies have shown that trees planted along streets can reduce vehicle-pedestrian crash severity. However, much of the previous research on walkability has focused on the built environment and land use characteristics without emphasizing pedestrians' interactions with the natural environment while walking. Researchers know little about the factors that influence pedestrian satisfaction, such as feelings of safety, security, convenience, comfort, and visual experience when walking. Empirical research on the impact of street trees is limited; studies with a narrowed focus on street trees and pedestrian safety are virtually nonexistent.

Inspired by the Massachusetts Pedestrian Plan and the Commonwealth's Complete Streets initiative, the research team sought to find out how pedestrian value the amount and type of street trees in promoting walkability in fairly dense, mixed-land use neighborhoods that would typically encourage and support active walking. The research team also explored sociodemographic variables (age, gender, race, income) that could potentially affect pedestrians' walking perceptions and experiences.

1.1 Problem Statement

This study researched the link between street trees and pedestrians' perceptions of safety, compared with actual safety, while walking along urban street corridors. Recent research has shown that trees planted within rights-of-way of urban streets contribute to the walkability of communities by decreasing vehicle speeds and helping to reduce pedestrian-vehicle crashes. Furthermore, variations in streetscape features and road traffic volumes along street corridors may impact pedestrians' feelings of safety and their use of built pedestrian infrastructure. Additional research and the synthesis of existing relevant case studies will assist with better understanding the connection between street trees and pedestrian safety and with further developing walkability and design interventions involving street trees.

A second goal was to understand how both pedestrians value the presence or absence of street trees as related to vehicular traffic speed. Existing research shows an increase in people walking for transportation, especially for low-income individuals, and projects larger numbers of older walkers in the future (*1, 2*). Another objective was to see if perceived

feelings of safety varied across demographic variables related to income and age. Furthermore, the study looked at how the point of origin of a pedestrian trip may impact the use of pedestrian networks. The researchers interviewed pedestrians walking along urban streets with human-centered design elements to understand how they felt about the physical conditions, including sidewalk utility.

A third goal was to spatially assess the relationship between pedestrian-vehicle accident reports with the presence of street trees. The researchers documented detailed characteristics of the trees to see if there was a correlation between crash sites and tree location and tree characteristics, such as the size, spacing, and species of trees.

1.2 Research Objectives

The following objectives guided this study:

- Review relevant case studies and literature on streetscape projects that have improved pedestrian walkability with street trees or other design interventions.
- Determine if pedestrian perceptions of safety are influenced by the presence or absence of street trees and related streetscape design variables using a pedestrian survey.
- Assess the relationship between pedestrian-vehicle accident reports, the presence and characteristics of street trees, and other streetscape elements using geographic information systems (GIS).

1.3 Report Outline and Action Steps

The research approach to this project was twofold: (1) To develop a written survey instrument for measuring pedestrian perceptions of safety, and then survey pedestrians on streets with varying degrees of street tree cover; and (2) To develop or refine an existing method of spatial analysis to explores the relationships among pedestrian-vehicle accident reports, street trees, and other important variables in streetscapes. To meet the research objectives, the study included the following tasks:

Conduct a literature review (Section 2.1). The literature review was the starting point for understanding past research on pedestrian safety, street design, and street trees, and limitations of that research. This effort also helped to list key variables that may influence pedestrian perceptions of safety; these were subsequently included in the final survey instrument.

Determine study areas (Section 2.2). Using information from the literature review, as well as other criteria important to the research team, the team selected three study areas within each of three Massachusetts cities. These communities were selected due to their population size, socioeconomic diversity participation in MassDOT's Complete Streets Funding

Program, and proactive urban forestry efforts. The study area streets were chosen for their varied street tree cover (high tree abundance, low tree abundance, and streets with new tree plantings), with other streetscape and neighborhood composition variables (such as sidewalk presence, road width, road volume, adjacent land use, and socioeconomic profiles) held constant. Planning personnel within the selected cities offered cooperation and insight before the team selected the final study areas, and the research team received their assistance in identifying appropriate locations based on the project's streetscape criteria.

Survey pedestrians of study areas. The research team developed and distributed a survey to gather information about pedestrian feelings of safety while walking along familiar street corridors, in order to understand how they feel about the street's physical condition and the utility of the sidewalk. (Section 2.3). For examining perceptions of safety, the team determined various aspects of walking — comfort, aesthetics, satisfaction, ease, frequency — and sociodemographic variables (age, gender, race, income) to measure. Similar studies and the research team's interests influenced the development this survey, as did feedback from the MassDOT Project Champion. The team distributed a pilot survey to ensure its readability prior to full implementation. The research team conducted the survey in the field at the selected site locations and surveyed 181 pedestrians in total. The researchers then analyzed the survey data (Section 3.1) using SPSS statistical software to assess the participants' perceptions of pedestrian safety, comfort, and satisfaction based on physical street characteristics, street tree density, and socioeconomic variables.

Compare reported pedestrian-vehicular crash locations, and the presence of street trees and other human-centered design features in the three study communities via spatial analysis (Section 2.4). To model the streetscape, the research team largely used publicly available spatial data, including building footprints, land-use metrics, and Level 3 Assessors' parcel data. Community contacts in the study areas directly provided some datasets (i.e., street tree inventories). The team collected accident reports from MassDOT in a format compatible with ArcGIS 10.5, the spatial analysis software. The team then tested the interaction of the above spatial measurements and relationships for statistical validity and modeled the interaction in three negative binomial regression models (Section 3.2).

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2.0 Research Methodology

2.1 Literature Review

2.1.1. Background

Risks to pedestrian safety often stem from other road users, including motorists. Pedestrians account for nearly one-quarter (22%) of the one million global road traffic deaths annually *(3)*. Many pedestrian fatalities and injuries are related to the built environment and elements of street corridors: traffic volumes, speed limits, land use patterns and road lighting *(4)*. Planners, engineers, and related transportation professionals can help mitigate these risk factors.

The Massachusetts Department of Transportation launched the Complete Streets funding program in 2016 to provide technical assistance and funding for Complete Street projects. The complete streets design framework incorporates human-centered street redesign and multimodal transportation options to promote safety and accessibility for people of all ages and abilities across all travel modes.

One complete street technique is to protect pedestrians from the roadway traffic with strategic buffers, such as bike lanes or street trees. Bike lanes are now used in many locations. Street trees so far have been given less attention. Street trees can be an important piece of the urban forest canopy by providing essential ecosystem functions such as shading buildings and outdoor public spaces, reducing wind and wintertime building heating energy use, and intercepting stormwater runoff, as well as offering psychosocial benefits for individuals through a sense of connection to nature. Street trees can also serve as important infrastructure during a pedestrian's walking experience. In the best cases, a dense tree canopy cover offsets sunlight penetration and provides a cooler sidewalk climate on warm days, and abundant tree plantings promote traffic-calming among motorists.

However, we know little about how street trees may contribute to pedestrian safety, as few studies exist on this topic. The implementation section of the drafted Massachusetts Pedestrian Plan contains a criterion selection process for prioritize projects *(5)*. However, researchers have given very little study to one important criterion: the impact of proposed landscape and roadside improvements on pedestrian safety. This literature review explores the current state of practice and research with regards to the perception of pedestrian safety on tree-lined versus non-tree-lined streets, as well as the impacts of roadside landscape improvements on traffic safety and pedestrian walkability, which is in line with the Safety Goal of the Massachusetts Pedestrian Plan. Supported by this literature review, detailed below, the study's research team hypothesizes that street trees can improve pedestrian safety and reduce pedestrian-vehicle crashes.

2.1.2. Major Themes

2.1.2.1. Pedestrian Safety and Satisfaction

In a review of recent literature related to pedestrian safety and the built environment, Stoker et al. (2015) present broad categories of pedestrian types and a general ranking of relative risk for injury and fatality for each. The synthesis found that young children have the highest relative pedestrian risk factors, followed by young adults, women and girls, the elderly, those with low socioeconomic status, and intoxicated pedestrians, distracted pedestrians, and those with disabilities (*4*). Pedestrians are particularly vulnerable roadway users who are exposed to many physical variables in their surrounding environment, including motorized traffic, non-motorized roadway users, other pedestrians, and inclement weather (*6*). The public health literature on risk exposure and injury prevention suggests that the most effective interventions for pedestrian safety involve systematic changes to the built environment (physical and policy enforcement). Other empirical research shows links between the built environment, including transit and geometric road design, and pedestrian-vehicle collisions (*7, 8*). This highlights the importance of interventions that reallocate road space to help improve transportation safety for non-motorists, especially pedestrians. Pollak et al. found that elements of the streetscape, including street trees, that offer the most promise in minimizing pedestrian injuries (*9*).

Considering the equity implications of walkability, many studies show income and racial disparities of safe, walkable street corridors; some researchers consider inaccessible walking environments an environmental justice issue (*10, 11, 12*). In Austin, Texas, Yu (2014) found that the levels of poverty, ethnicity, as well as sidewalk completeness and land-use mix were related both to the percentage of people who walked to work and to total pedestrian-vehicle crash rates. Studies have shown that people living in economically poor areas are more likely to walk or bike to work even though the built environment is less safe for them, while more affluent areas offer safer environments (*11, 13*).

The type of pedestrian continues to be an important theme when considering what characteristics lead pedestrians to perceive a street corridor as safe and walkable. In a study of walking habits of older adults in the Netherlands, Van Cauwenberg et al. found that access to public transit and stores; quality of walking facilities including sidewalks and crosswalks; traffic safety; crime safety; social contacts; and a sense of familiarity, aesthetics, and weather were the most important factors influencing the decision to walk (*14*). Sanders and Cooper found that pedestrians seek streetscape features, such as bike lanes and pedestrian crossings that create predictable behaviors for motorists and other non-pedestrians (*15*. Henderson et al. found that improved aesthetics, higher perceived safety, and greater social cohesion reduce perceived stress among low-income African-American women while walking in Greenville, North Carolina (*16*). When exploring the relationships among neighborhood characteristics, the authors found that gender did not appear to moderate perceived stress as they had expected, which contrasts with the findings of Stoker et al. who found that females had a higher risk factor (*4*).

A relationship among quality of travel and travel satisfaction and life satisfaction has emerged in the research. Ettema et al. found that vehicular traffic, short travel times, and easy access to bus stops had the greatest positive impact on participants' evaluations of their

own well-being (*17*). In another study examining travel satisfaction across modes, St-Louis et al. found that pedestrians, commuter train users, and cyclists expressed significantly higher mean satisfaction levels than drivers, subway users, and bus passengers (*18*). Participants who saw an inherent value in their commute (the ability to be productive on the train, for example), expressed higher commute satisfaction and life satisfaction levels. This study differentiates many types of public and active transportation, and examines the internal factors that facilitate decision-making processes, including preference and sociodemographic.

The literature on pedestrian satisfaction has tended to examine and define positive factors influencing the pedestrian experience and negative factors discouraging people from walking to a destination. Since people seek travel modes that they perceive to be safe from traffic collisions and secure from crime, the variable road traffic volume across street corridors and variations in streetscape features may impact pedestrian feelings of safety and use of the built pedestrian networks (*19*). During in-depth interviews in the San Francisco Bay area, Schneider found that some interviewees mentioned that roadways with high-speed, high-volume car traffic prevented them from walking to nearby destinations because they were concerned about safety (*19).* Lovasi et al. also found that neighborhoods with more aesthetic amenities (sidewalk cafés, street trees, and clean sidewalks) and fewer safety hazards (pedestrian-vehicle fatalities and homicides) were associated with higher pedestrian walkability (*20*). If pedestrians avoid walking because they deem a route to be unsafe, the attributes of the streetscape associated with that route and perception negatively contribute to their satisfaction with walking, possibly leading to the decision of choosing another travel mode. If there is no other option, having to walk may adversely affect their pedestrian experience and well-being.

2.1.2.2. Street Design

From the pedestrian's perspective, walkability is the most important element of the street corridor. Walkability is the "match" between a pedestrian's needs and their actual experience: the distance, length of time, and quality of their path to a destination. Neighborhoods and corridors that meet this match between built forms and pedestrians' needs will have more people walking in them *(13)*. To be walkable, streets should have sidewalks with, at least, minimal features that provide comfort, attractiveness, and safety for pedestrians *(10, 21, 22)*. The availability, quantity, and quality of sidewalks correlate with walking activity *(21, 23, 24)*. Moudon et al. found sidewalks to be strongly associated with leisure walking, but not with walking for transportation *(21)*. This may not be surprising, since the goal of transportation walking is to reach a destination; this can lead pedestrians to prioritize the shortest route over considerations of route quality *(10)*. Other factors affecting walkability include: sidewalk and street connectivity; attractive streetscapes, including the presence of trees and vegetation; transit access; proximity and distance to destination; neighborhood characteristics; street lighting; traffic volume; street length, perceptions of personal and traffic safety; and car ownership *(10, 22)*. Mjahed et al. found that increased walkability of the routes near an individual's home or work increased the habit of walking regardless of that individual's pre-held attitudes toward walking. They also found that a positive attitude toward walking may not necessarily be tied to the built environment.

These walkability indicators characterize pedestrian routes and may influence how and when pedestrians chose a particular walking route. Walkability is especially important for the types

of pedestrians at greatest risk of injury: children and older adults. Survey results of an international sample proved the existence of a relationship between travel behavior during childhood and the determinants of walking behavior during adulthood. When studying parents' decisions in how their children get to school, Faulkner et al. found that micro level urban form features, including those influenced by the physical and social environment of a neighborhood, are important to the decisions of walkability, but time and convenience are the most influential factors *(26)*. In studies of older adults, the authors supported the concept that healthy aging is contingent on contextual interactions between the people and their environment, and that safe walking can be an important part of that process, though this may vary between suburban and urban neighborhoods *(27, 28)*.

While most studies on walkability take a pragmatic, design-oriented focus, much of the research so far has neglected to measure the objective and subjective qualities of the street environment and test for significant associations with walking behavior *(22)*. These factors — physical features, urban design qualities, and individuals' reactions — may influence the way an individual feels about an area's walkability. Studies by Stamps, and Stamps and Smith, provided more abstract and psychological dimensions of a pedestrian's experience *(29, 30)*. With a focus on prospect (area visibility), refuge (hidden spaces), and enclosure (permeable walls of a streetscape), their research supports the idea that geometries of the built environment have a significant impact on perceptions of safety and pedestrian experience. Similarly, Ewing et al. defined qualitative but quantifiable characteristics of the streetscape environment, including imageability, visual enclosure, human scale, transparency, and complexity *(22, 31)*. Ewing's studies have found that pedestrian perceptions of physical features contribute to overall walkability and walking behavior.

2.1.2.3. Street Trees

The use of street trees has been scrutinized by transportation engineers and others, with mixed findings. As Rosenblatt et al. stated, "Street trees are dangerous, difficult to install, and expensive to maintain, but there is not a transportation engineer who has not had to negotiate tree planting or tree preservation to reach project completion. Engineering design and transportation planning guidelines consider street trees as obstacles in the roadside environment" *(32)*. Much of the empirical research related to street trees and roadside vegetation, such as in Rosenblatt, has viewed the streetscape from the perspective of a motorist, not a pedestrian or other road corridor user. Despite the comments above, Rosenblatt et al. found some positive aspects of street trees for motorists. Rosenblatt et al. took a holistic approach and measured motorists' subjective experience with street trees *(32)*. Considering the work of Daniel Berlyne (focused on visual complexity and psychology) and Kevin Lynch (on legibility and urban design), Rosenblatt et al. supported that idea street trees provide a perceptual edge on the roadway, alongside other visual complexities (texture, color) that positively impact attention and alertness while driving. This edge separates the roadway from the adjacent environment, offering a visual buffer that additionally contributes to feelings of familiarity and comfort. Results from a simulated driving trial indicated that the street tree effect may provide positive safety benefits for drivers. Increases in driver perception of safety had a significant relationship with increases in driver perception of this spatial edge; the latter was significantly increased with the addition of curbside trees.

Others have also found that motorist safety benefits from street trees. Harvey and Aultman-

Hall found that enclosure due to tree canopy (or lack thereof) had the largest implications for crash severity *(33)*. Crashes on streetscapes fully covered by a tree canopy were 51% less likely to result in injury or death than those on streetscapes without trees. Crashes on more enclosed, human-scale streetscapes were less likely to be severe, while those on or at the intersection of arterial streets were more likely to be severe. By contrast a visual preference survey that studied roadway visibility for adults in a simulated streetscape in a controlled environment, found that increases in vehicle traffic, number of lanes, number of parking lots, or the tree density of the streetscape were less preferred by drivers *(34)*. Meanwhile, the presence of sidewalks, pedestrians, trees set back from the street, and traffic-calming measures created positive associations for respondents. These tree-related results could be related to perceived safety; for example, dense trees close to a street can limit visibility of along the street corridor.

From the perspective of the pedestrian, empirical research looking at streetscape attributes often draws attention to the non-safety impact of street trees. Kim et al. identified significant effects of both mesoscale (e.g., density of people walking, intersection density, hilliness, and the presence of bus stops), and microscale (e.g., sidewalk width, and the presence of bus dedicated lanes, crossings, lamps, and trees) variables on pedestrian satisfaction *(35)*. Jung et al. recently evaluated the impact of street improvements on pedestrian satisfaction and volume before and after the implementation of Design Street Project initiatives on streets Seoul, South Korea *(36)*. That study also highlighted the importance of street trees in pedestrian satisfaction levels, while noting that other microscale factors, including street furniture and sidewalk width, did not appear to affect pedestrian satisfaction significantly, a finding inconsistent with Kim et al. and other literature *(35)*.

Many studies do not explicitly mention street trees but allude to them as part of neighborhood aesthetics that either encourage or discourage walkability *(37)*. The inference is that pedestrian satisfaction will increase as a result of human-centered design elements such as street trees. A recent study by Choi et al. showed that planting strips were the most important factor for increasing pedestrian satisfaction and perceptions of safety *(38)*.

Other research has shown that street trees play an important role in pedestrians' awareness of their surroundings. Lin et al. used a photographic preference methodology to understand the awareness of street trees and the restoration of attention *(39)*. Two main findings emerged: first, streetscapes with trees improved the performance of participants on attentional tests, regardless of whether or not awareness of the trees themselves increased; and participants who had heightened awareness of street trees performed best on the attentional test and rated the streetscapes as being more restorative. In a study of older adults in the Netherlands, Van Cauwenberg et al. found that participants tended to feel positively about trees and other natural elements *(14)*.

Pedestrian satisfaction and the walkability of street corridors has been shown to improve with street trees. This topic deserves further study. Further, it is it is critical to evaluate street trees as part of street corridor infrastructure, not as obstacles to roadway engineering.

2.1.3. Literature Gap and Future Research

There are presently a number of research-related gaps in the literature and worthwhile areas to consider for future research.

(a) Research examining how various roadside design characteristics affect driver safety and behavior is fairly robust, but we know little about how roadside design may influence pedestrian, satisfaction, comfort, convenience, and visual experience *(15, 35)*. Empirical research focusing on the impact of street trees for walkers is especially limited. Much of the research validating walkability indices consider the microscale design elements of a streetscape that influence pedestrian perceptions and behavior. However, street trees are often lumped within categories such as "enjoyment" or "aesthetics." While street trees do serve those purposes, this categorical treatment minimizes street trees' potential role and value in improving pedestrian safety and perceptions of safety. There is a need to view street trees as a worthy form of urban infrastructure in their own right, deserving of the same attention as other facets of the built environment. Additional street tree and pedestrian research will help trees be adequately considered in street infrastructure policies and regulations.

(b) Walkability research focused solely on the built environment and land use characteristics and misses interactions between individuals and their neighborhoods, both as built and natural spaces *(13)*. The study by Henderson et al., although applicable primarily to Greenville, North Carolina because of its sampling methods, is significant for tying the literature on mental health and urban greening to include the relationship between neighborhood design elements and well-being *(18)*. This directly translates to pedestrian experiences, and the study sheds light on the continued need to conduct research from the angle of subjective perceptions of safety, building on a similar body of research in planning and design.

(c) Alongside the other benefits provided by street trees and the overlapping goals of this research, there is an opportunity to link pedestrian safety research in places where tree planting programs exist, especially if these are low-income areas where people depend on walkability for work and everyday life. For example, the Florida Department of Transportation has recognized measures of human safety as a way to encourage economic development, and the department updated its landscaping requirements to be more amenable to incorporating street trees, median tree setbacks, and other pro-vegetative landscaping *(40)*. Related initiatives along street corridors are also in effect across the Massachusetts. For example, the Massachusetts Department of Conservation and Recreation's Greening the Gateway Cities program intentionally coordinates with residential homeowners to plant shade tree species for home energy efficiency *(41)*.

(d) To date, most of the research examining the relationship of pedestrians to the built environment has taken purely quantitative or qualitative approaches. Much of the empirical work on environment and pedestrian injury has used GIS, simulated laboratory environments, and/ or statistical modeling *(33, 42, 43)*. Research to evaluate pedestrian satisfaction, walkability, and travel behavior has used intercept sampling for participant surveys, and qualitative approaches *(19, 26, 27, 38)*. Few studies have taken a mixed

methods approach *(35)*, even though such an approach could lead to more robust conclusions about the links between street trees and the pedestrian experience, including perceptions of safety and reported injuries. Methods combining the quantitative products of spatial analysis, tests of correlation and significance, and the qualitative results of interview and survey, could generate additional knowledge to help inform future street development and improvement projects. The United States is currently underrepresented in applying mixed-methods research in this area of study. Much of the highly textured research has been conducted in Seoul, South Korea, and consideration should be given to cultural and political factors when interpreting the results *(35, 36, 38)*. A few of the most relevant studies have focused on major cities in the United States, including New York, San Francisco, and Austin, Texas, and smaller cities like Greenville, North Carolina, and Spokane, Washington *(10, 11, 16, 18, 33)*.

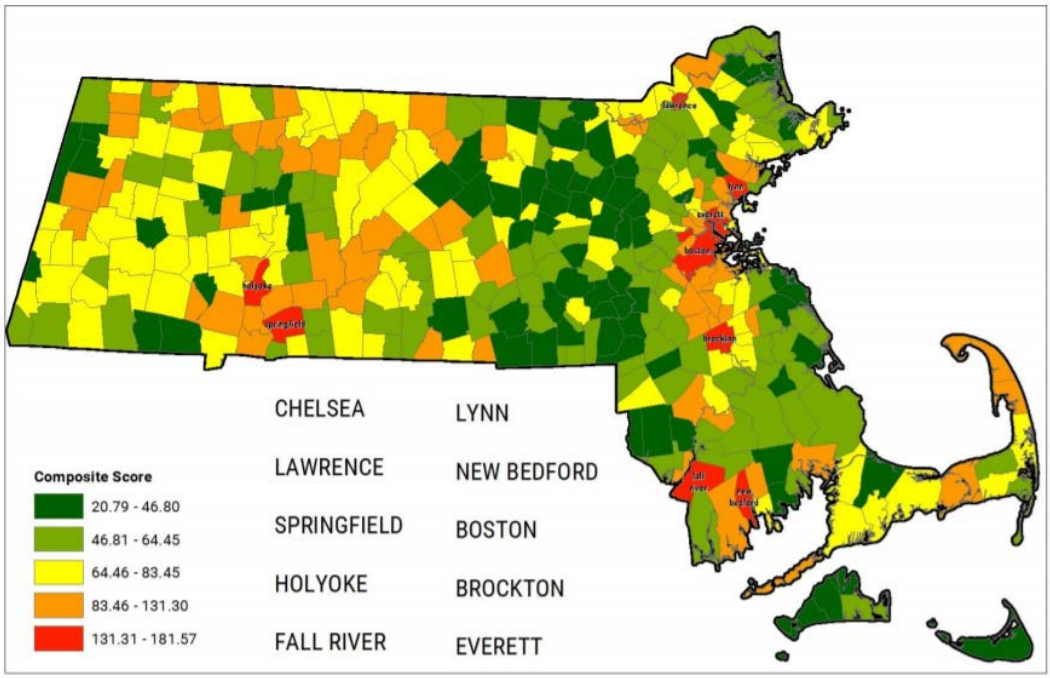
2.1.4. Relevant Policies, Plans, and Directives in the Commonwealth of Massachusetts

Support for pedestrian infrastructure, and related roadside vegetation has been increasing in Massachusetts in a number of ways. MassDOT's Healthy Transportation campaign promotes active travel, such as bicycling and walking, as both accessible and healthful. The Healthy Transportation Engineering Directive helps to promote consideration of healthy transportation modes as potential solutions during MassDOT project design and implementation. Projects involving a pedestrian facility or accommodation must be in accordance with Chapter 5 of the American Association of State Highway and Transportation Officials (AASHTO) Guide for the Planning, Design, and Operation of Pedestrian Facilities, which states:

- Wherever adjacent land uses include commercial or residential development greater than five units per acre, planners shall provide a sidewalk along the roadway adjacent to the use.
- For projects in urbanized areas on roadways where pedestrians are legally allowed, planners shall provide sidewalks on both sides of the roadway.
- The minimum sidewalk width below which a design exception is required is five feet, exclusive of curb.

MassDOT is currently updating the Massachusetts Pedestrian Transportation Plan to improve walkability in the Commonwealth. The Plan's guiding vision is as follows: "Massachusetts' integrated and multimodal transportation system will provide a safe and well-connected pedestrian network that will increase access for both transportation and recreational purposes." MassDOT published a "critical gap analysis" in January 2017 to identify (a) top priority areas for investment in walking, and (b) major barriers and improvements needed in the priority areas *(5)*. This analysis used data related to infrastructure (defined by places of utility, demand by users, sidewalk gaps, safety measures), equity (race, income, English language barriers, vehicle ownership), and physical disabilities. A preliminary composite map was created by assigning data-specific scores and aggregating the variables by city or town. The composite map of preliminary results is shown in Figure 2.1, which also lists highest priority communities for investments in walking infrastructure (*5)*.

Figure 2.1: Preliminary priority areas for walking investments



In addition, many of the regional planning agencies (RPAs) in Massachusetts have made progress toward improved pedestrian walkability within their regions and their served communities. A number of the RPAs have created pedestrian plans. The Central Massachusetts Regional Planning Commission (CMRPC) prepared the its Regional Bicycle and Pedestrian Plan (2011) with the intention of making it a "living" document that continues to develop and builds on statewide momentum to "improve visibility and inclusion of pedestrian and bicycle planning and infrastructure in transportation projects" *(44)*. The goals of the Regional Bicycle and Pedestrian Plan are to: (1) inventory existing facilities; (2) identify physical and other impediments to walking and bicycling in the region; and (3) develop strategies to increase the use of walking and bicycling modes as transportation options in the region. Highlighted throughout the plan is the use of pedestrian and bicycle infrastructure to establish healthy livable communities. This is emphasized in the expressed desire to align the plan with MassDOT's Green Policy Directive which promotes the reduction of greenhouse gas emissions and focuses on complete street infrastructure. The Regional Bicycle and Pedestrian Plan breaks down complete streets implementation in four sections: Pedestrian and Bicycle Accommodations; Online Plans; Pedestrian and Bicycle Safety Education; and Grantee Obligations. To date, the plan does not include information on roadside vegetation or street trees; however, based on growing awareness of this topic, the plan may include it in future updates.

The Montachusett Regional Planning Commission (MRPC) created its Regional Transportation Plan in 2016 *(45)*. The plan provides a comprehensive analysis of existing transportation elements and multimodal infrastructure, current and future needs, policy adjustments, and guidelines for local and state officials to decide how to spend federal and state transportation funds over the next 25 years. The plan was created in accordance with MRPC's vision of providing a "multimodal transportation system that is safe, secure,

efficient, and affordable to all individuals, while maintaining support and encouragement for economic development, growth, and revitalization and simultaneously promoting a sustainable, healthy, livable, and environmentally-sensitive region." Of particular relevance for multimodal transportation is Chapter 10, which focuses on bicycle and pedestrian infrastructure *(45)*. Included in this section is an analysis of complete streets, both existing projects and the need to encourage future initiatives within the region. This chapter represents the emphasis on inclusion, safety, and sustainability consistent throughout the entirety of the plan.

The Pioneer Valley Regional Bicycle and Pedestrian Transportation Plan (2000), from the Pioneer Valley Planning Commission (PVPC), is one of the oldest regional pedestrian plans in the Commonwealth. It provides an overview of ways the Pioneer Valley can establish itself as a safer and more accessible place for pedestrians and bicyclists *(46)*. Central to the plan is the argument for both government and citizen participation in encouraging public policy changes that make walking and bicycling a more attractive means of transportation. The plan outlines a series of goals, objectives, strategies, and actions for implementing pedestrian and bicycle infrastructure. This plan is unique in that it mentions Massachusetts policies, regulations, and practices that relate specifically to street trees and roadside environments (Massachusetts General Laws (MGL), Chapter 87, on shade trees; and MGL, Chapter 40, section 15C on scenic roads.).

The Metropolitan Area Planning Commission created the Boston Region's Pedestrian Transportation Plan (2010) to identify actions local governments, advocacy organizations, citizen groups, the private sector, and individuals should take to promote walking *(47)*. It describes current pedestrian infrastructure in the Boston region and suggests policies and programs to facilitate walking as a convenient, practical, and safe mode of transportation. The plan provides information pertinent to both regional and local walkability and discusses federal and community initiatives related to pedestrian infrastructure. Close attention is paid to complete streets, is defined as "roadways designed and operated to enable safe, attractive, and comfortable access and travel for all users." According to the plan, complete streets should create a sense of place and improve social interaction and can improve the value of adjacent properties. It is further explained that there is no single formula for a complete street, but rather there are many qualities that can be incorporated into a street corridor that would result in its being considered a complete street. Because the Boston region consists of both urban and suburban areas, this plan mentions strategies for both and the overlap between cities and towns.

2.1.5. Summary

Additional research is needed to further examine the relationship between street trees and pedestrian safety. While one can measure physical features of the built environment objectively and use them to evaluate that environment, perceptions of the physical features experienced can influence individual reactions to that setting. Previous studies have shown that trees and other roadway vegetation can mitigate adverse environmental conditions on street corridors, which can be especially important for the most vulnerable types of pedestrians who have limited access to walkable spaces. Recent research has also found that

trees planted within the right-of-ways of urban streets can positively contribute to perceptions of safety and walkability.

This literature review confirms the need for additional research between pedestrian safety, street trees, and psychological and microscale environmental factors of streetscapes. This will improve understanding of the various aspects of pedestrian satisfaction and the diverse motivations behind travel mode choice, as well as provide concrete recommendations for producing safer, more walkable, and more satisfactory pedestrian environments along street corridors.

An annotated bibliography can be found in Appendix A.

2.2 Study Areas

2.2.1. Rationale

Using information from the literature review and considering additional criteria, the research team aimed to select three study areas within each of three separate Massachusetts communities, yielding a total of nine study areas. The research team gave thoughtful consideration to the specific communities, as well as the street segments chosen as study sites, and selected communities based on their participation in Massachusetts' Complete Streets Program,, proactive forest management, socioeconomic diversity, and population size.

For the study, the team first queried communities by population size (2010 U.S. Census) and participation in the Massachusetts Complete Streets Program. In support of its Healthy Transportation Policy and following the state legislature's approval of the establishment of a Complete Streets program (MGL, Chapter 90I), MassDOT created a program to specifically encourage municipalities to include complete street design elements in locally-funded road projects *(48)*. MassDOT funds this program through an incentive-based approach, requiring communities to make certain commitments and take certain actions in order to become eligible for grant funding. The community level of commitment has three tiers, with each setting the framework for, and leading into, the next. Tier 1 includes staff training and Complete Street policy development and approval. Tier 2 involves the creation of a Complete Street Prioritization Plan that itemizes and details specific project objectives, and Tier 3 approves projects and funds construction. This street tree study aimed to work in communities that had reached at least Tier 1 status.

Considering the proposed sampling protocol and other land-use considerations important to this study, the research team also limited consideration to areas with a population size of 30,000 or higher. This size captures suburban areas with dense development, as well as urban centers. Using a system created by the Metropolitan Area Planning Council, the team gave top priority to communities classified as Regional Urban Centers, as they encompass both Major Regional Urban Centers (defined as large, high-density urban centers) and Sub-Regional Urban Centers (defined as smaller, mid-size urban areas with dense downtowns and

diverse neighborhoods) *(49)*. Communities within these classification types share important characteristics that influence their current use and projected development.

The research team agreed that it would be best to study communities in the same MassDOT Highway Division district. These districts regulate onsite engineering performance, implement maintenance programs, generate proposals for maintenance and construction work, and provide engineering support to municipalities, and oversee road and bridge construction within their jurisdiction. Choosing communities in the same district would allow for more rigorous direct comparisons of roadways that are within the same operational framework.

The research team also made a concerted effort to select communities within the same Regional Planning Commission service area since pedestrian planning is often conducted at the regional level, as documented earlier. Finally, the team sought to include communities that participate in urban greening initiatives. One such initiative is the Greening the Gateway Cities program, a tree planting campaign led by the Commonwealth's Executive Office of Energy and Environmental Affairs, Department of Conservation Recreation, Department of Energy Resources, and Department of Housing and Community Development. The program actively engages homeowners in designated environmental justice areas and other locations with low tree canopy to care for funded street tree plantings. The program, in effect for several years, has been expanding and added new gateway cities to the program as recently as 2017. The research team decided to only consider communities with completed tree planting projects. Based on all of the above criteria, the team developed a preliminary map to highlight potential study areas (Figure 2.2). Using the outlined criteria, the cities of Chicopee, Holyoke, and Springfield stood out as promising communities for this research. The research team then engaged in preliminary conversations with local officials in those communities to gain their cooperation and interest in this research project. These conversations also led to a list of example study areas in each community that fit the criteria for the project (discussed in Section 2.2.3) *(50)*.

Figure 2.2: Potential communities of interest for study

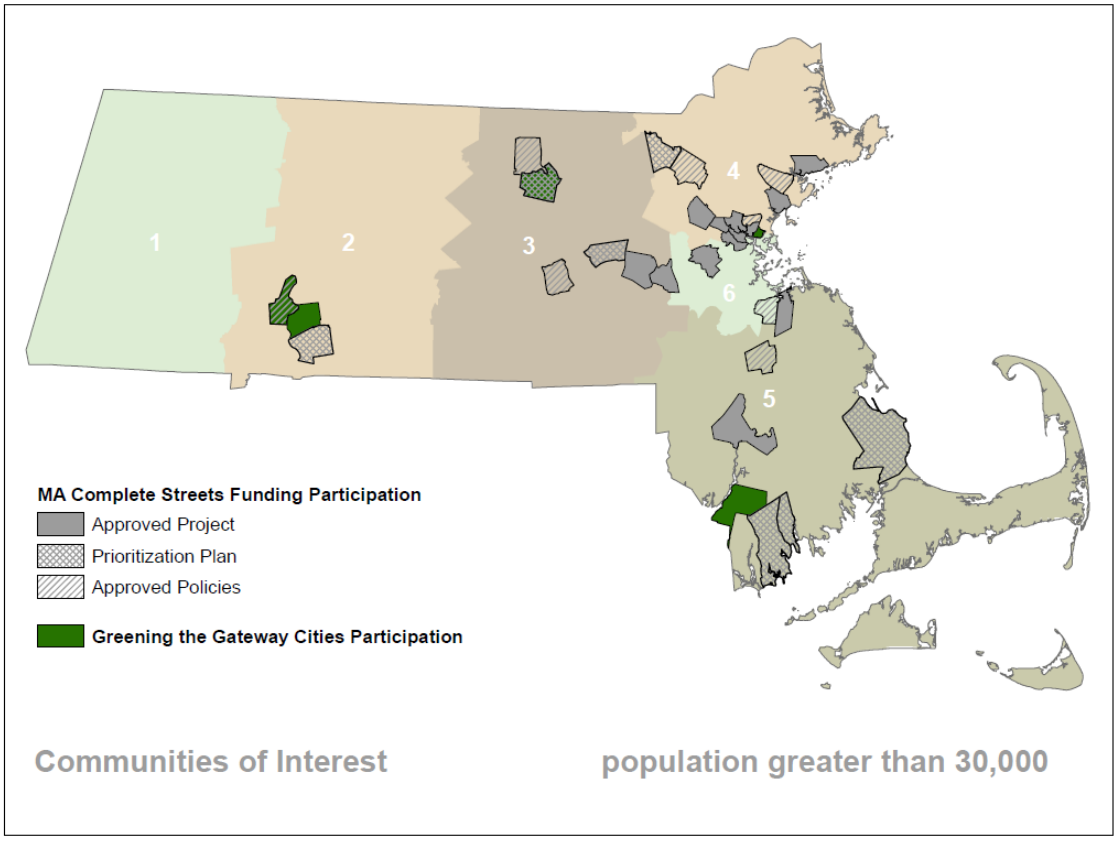


Table 2.1: Select attributes of potential communities for study

	Registered with MassDOT Complete Streets Program	Approved Complete Streets policies	Approved Complete Streets Prioritization Plan	Greening the Gateway Cities community	Commitment to urban forestry
City of Chicopee	X	-	-	X	X
City of Holyoke	X	X	-	X	X
City of Springfield	X	X	X	-	X

2.2.2. Overview of Selected Communities

The following sections describes each of the selected communities in terms of their participation in MassDOT's Complete Streets Funding Program, and their urban forestry planning and initiatives, including for street trees (broad highlights can be seen in Table 2.1 above). In addition, the neighborhoods where the study areas are located are described in terms of their existing conditions and envisioned planning efforts (demographic profiles of each neighborhood and accompanying street tree inventories can be found in Appendix B).

The study communities are described in Table 2.2, which outlines select demographic profiles of each community (April 1, 2010 estimate base unless otherwise noted). Note that, according to this U.S. Census collection, Hispanics may be of any race, and may also be included in applicable race categories *(51)*.

Table 2.2: State and community profiles

		Commonwealth of Massachusetts	City of Chicopee	City of Holyoke	City of Springfield
	Total Population	6,547,629	55,298	39,880	153,060
Age, Sex & Health	Persons under 18 years	21.7%	20.7%	26.4%	27%
	Persons 65 years and over	13.8%	16%	14.2%	10.9%
	Female persons	51.6%	52.2%	53.1%	52.2%
	With a disability, under age 65 (2011–2015)	7.9%	11.1%	15.2%	15.9%
Race & Hispanic Origin	White alone , not Hispanic or Latino	76.1%	79.5%	46.8%	36.7%
	Black or African American alone	6.6%	3.7%	4.7%	22.3%
	Other (Asian, American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, or Two or More Races)	8.3%	4.1%	5.9%	7.8%
	Hispanic or Latino	9.6%	14.8%	48.4%	38.8%
Income & Poverty	Median household income (2011–2015)	$68,563	$47,684	$36,608	$34,728
	Percent of population in poverty	11.5%	13.3%	28.8%	30%
Transportation	Mean travel time to work (minutes), workers age 16+ (2011–2015)	28.7	20.1	20.1	21.1

2.2.2.1. City of Chicopee

Complete Streets Participation. The City of Chicopee is a Tier 1 community in the MassDOT Complete Streets Program. Under this qualification, the city has sent a municipal employee to attend a Complete Streets training and has submitted notice that it intends to submit a Complete Streets policy. To date, the city has not passed a Complete Streets ordinance that would provide eligibility for state-sponsored Complete Street roadway improvement projects. The city commissioned a recent study by a regional planning graduate class at the University of Massachusetts Amherst that prioritized bicycle and pedestrian networks in the city. A noteworthy recommendation of this study was that the city use the plan to identify priority areas and policy goals for complete street improvements.

Urban Forestry Planning and Initiatives. According to the city's Planning Department webpage, "The City of Chicopee is dedicated to the vitality of its Urban Forest through proactive management of both public and private trees within municipal bounds. Targeted efforts to promote trees within the urban landscape bring holistic results; when properly maintained, trees provide numerous environmental, economic, and social benefits far in excess of the time and resources invested in their planting, pruning, protection, and removal."

In 2013, the U.S. Forest Service, through its Urban and Community Forestry Grant Program, awarded Chicopee grant money to begin a comprehensive Street Tree Inventory and develop a Tree Management Plan. The inventory recorded a total of 15,043 sites consisting of trees, stumps, and plantings. The following is a summary of the inventory as found in Chicopee's Open Space Plan (2013):

- "Fair" rating for the inventoried tree population;
- Maintenance needs of the inventory included new plantings (59%), pruning (36%), and tree/stump removal (5%);
- Maple composed 41% of the right-of-way street trees, which the inventory cited as a threat to local biodiversity; and
- The overall age of the inventory was mature, with much fewer young, established, or maturing trees.

The City of Chicopee has regularly participated in initiatives to preserve, protect, and increase the planting of public trees. In fact, Chicopee annually receives the Tree City USA designation from the National Arbor Day Foundation. The city successfully competed for a state Heritage Tree grant in 1999 to preserve two sycamores in Chicopee Center estimated to have been standing since the 1840s. In 2015, Chicopee received a $20,000 award from the TD Green Streets Program administered by TD Bank and the Arbor Day Foundation. The grant supported the planting of approximately 160 trees throughout the neighborhoods of Chicopee Center, Chicopee Falls, and Willimansett. The money will also support the establishment of the city's Urban Forestry Commission, which will create educational programs on the importance of urban forestry. Finally, Chicopee allocated funds to complete the 2013 inventory. In 2016, the Greening the Gateway City program focused tree planting efforts in the Willimansett neighborhood with the goal of achieving a 10% increase in urban tree canopy cover *(52)*.

Neighborhood of Interest: Chicopee Center. Chicopee Center is one of seven original villages that were consolidated in the city in the 19th century. As an older neighborhood, Chicopee Center has higher rates of development and population density compared to newer neighborhoods. In addition to its base zoning, Chicopee Center is also part of the Smart Growth Overlay zoning district, which encourages dense residential and mixed-use development near transportation centers in existing areas of concentrated development. According to Chicopee's most recent Open Space and Recreation Plan (updated in 2015) public survey, the people of Chicopee would like to see Chicopee Center revitalized into a vibrant mixed-use neighborhood, mimicking the aesthetics and convenience of Northampton, Massachusetts. With this in mind, the city has great interest in making Chicopee Center more walkable and conducive to pedestrian activity.

2.2.2.2. City of Holyoke

Complete Streets Participation. The City of Holyoke is a Tier 2 community under the MassDOT Complete Streets Program. In 2014, Holyoke became the first community in western Massachusetts and the second community in the Commonwealth to adopt a Complete Streets ordinance. Members of the Holyoke Bicycle/Pedestrian Committee prepared this policy.

The city has not publicly published a citywide pedestrian plan; however, other proactive efforts indicate municipal effort for improved pedestrian safety. Through a study funded by the Conway School of Design (2014), "Green Streets Guidebook for the City of Holyoke, Massachusetts," the city assessed local roadways for Green Street interventions, which include Complete Street principles *(53).*

Urban Forestry Planning and Initiatives. In 2013, Holyoke announced that it was "serious about making urban street trees and public shade trees a component of its ongoing redevelopment efforts *(54).*" The mayor promised to commission an Urban Forestry Plan as part of implementing its Urban Renewal Plan (2013) Open Space and Recreation Plan (2012), using a grant from the Department of Conservation and Recreation's Urban and Community Forestry program.

In 2014, the city commissioned a Community-Based Assessment of Urban Forestry Conditions to evaluate the conditions of the city's urban tree cover and prioritize new plantings, especially in Environmental Justice areas. This study provided five socioeconomic and demographic categories that the authors considered important to study against tree cover: population density, median household income, ethnicity, education, and age. The city also continues to be an active recipient of the Greening the Gateway Cities planting program in select neighborhoods.

A 2017 study by the Conway School of Design, "Greening the Paper City," built upon its 2014 study. The new study detailed the environmental, economic, and social benefits of green infrastructure *(55).* The study was created for the Pioneer Valley Planning Commission (PVPC) and the City of Holyoke. In the study's report, PVPC's Chief Planner Chris Curtis, described the relationship between green infrastructure and cities clear in a statement, "Street trees planted in urban areas offer a low-cost way to address stormwater runoff into the Connecticut River, while at the same time providing more attractive neighborhood environments for walking and biking, and thus reducing car use and improving property values" *(55).* The study also noted the role of tree plantings in relation to environmental justice, to "help address the disproportionate share of environmental burdens experienced by lower-income people and communities of color who, at the same time, often lack environmental assets in their neighborhoods."

Holyoke's Open Space Plan and Recreation Plan (2013) is consistent with the previously mentioned planning documents in that it refers to trees as a means to mitigating pollutants, increasing street shade, beautifying the city, and addressing environmental justice concerns. It also notes that, although Holyoke does not currently have an accurate count of public street trees, in 2012 the city submitted an Urban Forestry Environmental Justice Challenge Grant that aimed to produce a 30-year strategic vision for the city's street trees and public shade

trees. The City of Holyoke's Conservation Commission and Parks Department are in the process of updating the city's Open Space and Recreation Plan. Due to the presence of environmental justice concerns throughout the city's green street planning documents, it is anticipated that the updated plan, will encourage the strategic placement of new trees in neighborhoods as a form of equity.

Neighborhood of Interest: Downtown. Holyoke is a traditional New England mill town which has started experiencing a revitalization in recent years. Most of downtown Holyoke's recent development and growth has been in the form of infill and redevelopment, as undeveloped space is scarce. The success of infill development has been aided by the Downtown Residential Zone (DR), which provides flexible dimensional regulations that ensure new structures are consistent with the existing built environment. Redeveloping the downtown has long stood as a priority for Holyoke's planning efforts. Part of the vision is to improve the downtown environment for pedestrians and other non-motorists with improved amenities.

2.2.2.3. City of Springfield

Complete Streets Participation. The City of Springfield is a Tier 3 community in MassDOT's Complete Streets Program, having both a Complete Streets ordinance, passed by the City Council in 2016, and a Complete Streets Prioritization Plan approved by MassDOT in 2017. Historically, the city has undertaken numerous pedestrian infrastructure projects, especially in the downtown. From 2012 to 2014, the city collaborated with the PVPC and other partners to facilitate a Complete Streets Implementation Plan, with funding from the Centers for Disease Control and Prevention (CDC).The Plan's complete street construction priorities for five, ten, fifteen, and twenty years out, and can be viewed via a public interactive map maintained by the PVPC (link at resilientspringfield.org/complete-streets/).

Urban Forestry Planning and Initiatives. The Forestry Division of the City Parks and Recreation Department manages urban forestry in Springfield. The city takes pride in having established its Forestry Division over a century ago, helping to "maintain and beautify the landscape of this great city same as we did back in 1898." The topic of street trees is a motif throughout development plans for the city. The city master plan specifically notes the importance of creating safer, more pleasant neighborhoods, streetscapes, and public spaces by increasing the number of tree plantings and maintenance of existing trees.

The Conway School of Design developed a Green Streets plan for the City of Springfield, called "Greening the X: A Vision for Green Streets in "Greening the X: A Vision for Green Streets in Springfield, MA" (2016). The "X" refers to a historic, busy intersection of Sumner Avenue, Belmont Avenue, and Dickinson Street in Springfield. The plan examined the need to increase green infrastructure for the X intersection *(56)*.

"Greening the X" was attentive to the benefits of the urban tree canopy and impact of root systems for healthy ecology and watershed management, and recommended a tree cover of at least 45% for Springfield to keep the ecology of local streams and rivers intact." However, not all of Springfield has achieved this benchmark for canopy cover "Greening the X" made several suggestions for how to utilize street trees as central components to green infrastructure development, including in tree box filters or tree trenches into existing

sidewalk networks to allow for more efficient water drainage, an increase in shade and clean air, and improved aesthetics. Further, the focus of the "Greening the X" study suggests that the city would install such tree infrastructure initially within the neighborhoods surrounding the X intersection.

To inform new street tree plantings within the city, the "Greening the X" project included a citywide tree inventory with funds from MassDOT. The inventory recorded tree location, height, canopy size, tree size, and maturity.

Neighborhoods of Interest: South End/Forest Park. South End is a small connecting neighborhood between Springfield's central business district and the Forest Park neighborhood. Forest Park is the second largest of the city's neighborhoods, containing several commercial nodes concentrated near major streets and medium- to high-density residential clusters. The neighborhood is also home to the city's largest contiguous piece of open space and the neighborhood's namesake, Forest Park. The "X" intersection is a major transportation corridor, connecting the South End to Forest Park and other secondary arteries in the southern part of the city. The Pioneer Valley Planning Commission recorded the "X" intersection as the highest crash intersection in the Pioneer Valley region (Hampshire and Hampden Counties) for the 2011-2013 period. *(57).*

2.2.3. Study Area Locations

One goal of this research was to study both sites with young trees as well as streets containing high and low street-tree canopies. The project team consulted with municipal staff, and from these conversations, decided to define "Complete Streets" as streets that had received new tree plantings and were also slated for roadway improvement projects and redevelopment to encourage walkability. In addition, the research team sought to keep all three of the selected study areas within a community, in the same neighborhood, to better account for the survey participants' walking destination.

In determining the study areas in each community, the project team kept the street geometry as constant as possible. The team matched study areas as closely as possible for: annual average daily traffic (ADT), a proxy for volume; speed limit; sidewalk width; shoulder width; and intersection with residential areas (per the 2005 land-use GIS shapefile) and environmental justice areas (which captures lower income and racial diversity). Much of this data was available in MassDOT's road inventory GIS layer from 2014. A more recent version of this dataset is available, from 2017. However, the most recently available accident reports for the selected communities (from the MassDOT Crash Portal) was from 2014, so the 2014 GIS data was used for consistency.

The research team manually evaluated street tree canopy cover and abundance on a street-by-street basis using Google Street View and spatial tree inventory data the team received from communities where available. Street-level images (from Google Street View) for the final selected study area streets are shown in Figure 2.3, and details for the locations appear in Tables 2.3, 2.4, and 2.5.

Figure 2.3: Study area locations

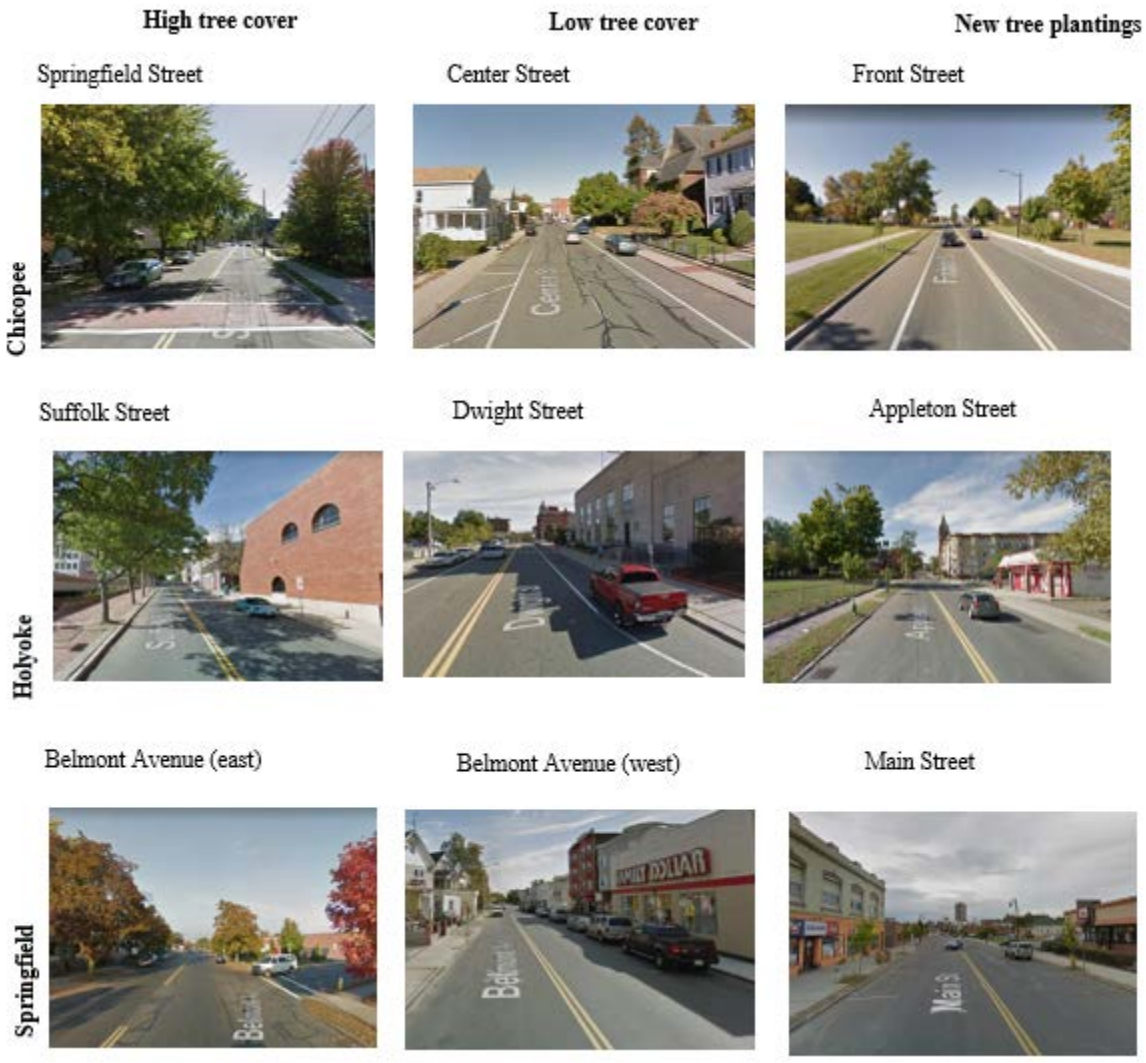


Table 2.3: High street tree cover locations

	Road Segment	Average Daily Traffic (ADT)	Speed Limit (mph)	Sidewalk width (Left/Right) – (feet)	Shoulder width (L/R) (feet)	Land use / Environmental Justice (EJ)	Street Trees	Other
Chicopee	Springfield Street (Grape Street to Pearl Street)	12,900	30 (est)	5/5	0/0	Mixed use toward Chicopee center, largely residential; EJ areas containing income isolation.	Plantings heavier in some areas more than others. Sporadic new plantings.	Part of City Tree Planting Initiative (2017). Painted crosswalks at intersections. No shoulder, no parking on street. Planting strips between sidewalk and roadway.
Holyoke	Suffolk Street (Maple Street to Heritage Street)	6,000 (est)	25 (est)	5/7	0/0	Mixed use along intersections, primarily residential; EJ areas containing race, income, and language isolation.	Mature, deciduous street trees fairly consistently planted along roadway.	Complete Street – Green Street design proposal (Conway School of Design). Faded crosswalks at intersections. Planting strip between sidewalk and road. No shoulder; parking permitted along roadway.
Springfield	Belmont Avenue – east (Walden Street to Sumner Avenue)	11,069	35	6/6	0/0	Mixed use along intersections, primarily residential; EJ areas containing race, income, and language isolation.	Mature, deciduous street trees fairly consistently planted along roadway.	Part of city's Complete Street Prioritization list to install crosswalk warning strips.

Table 2.4: Low street tree cover locations

	Road segment	Average Daily Traffic (ADT)	Speed Limit (mph)	Sidewalk width (Left/Right) (feet)	Shoulder width (L/R) (feet)	Land use / Environmental Justice	Street Trees	Other
Chicopee	Center Street (Cabot Street to Exchange Street)	5,164	20	5/5	unknown	Primarily residential, minor commercial, and institutions; EJ areas containing race, income, and language isolation.	Minimal	Green and complete street renovations proposed in Conway School documents, but not carried out yet.
Holyoke	Dwight Street (Chestnut Street to High Street)	6,318	30 (est)	10/10	0/0	Mixed use; EJ areas containing race, income, and language isolation.	Sporadic mature trees	Parking permitted along roadway. Faded crosswalks at intersections.
Springfield	Belmont Ave - West (Hall Street to Oakland Street)	9,843	30	6/6	0/0	Mixed use; EJ areas containing race and income isolation.	Some mature trees set back from road	Near the "X," top crash site intersection slated for road redesigns.

Table 2.5: New street tree planting location

	Road Segment	Average Daily Traffic (ADT)	Speed Limit (mph)	Sidewalk width (Left/Right) (feet)	Shoulder width (L/R) (feet)	Land use / Environmental Justice	Street Trees	Other
Chicopee	Front Street (Academy Street to Cyman Drive)	7,000	30	6/6	0/3	Mixed use; EJ areas containing race and income isolation	Very few trees planted in the right-of-way, recent new plantings. Residential trees planted in private yards, minimal plantings along road.	Target location for future Complete Street interventions. Quite a few bus stops, and street lights. Parking permitted along undesignated shoulder. Crosswalks at intersections.
Holyoke	Appleton Street (Walnut Street to Chestnut Street)	6,318	25	6/6	0/0	Mixed use; EJ areas containing race, income, and language isolation	Very few trees planted in the right-of-way, recent new plantings.	Parking permitted along roadway. Faded crosswalks at intersections.
Springfield	Main Street (Central Street to Winthrop Street)	13,695	25	9/9	0/0	Mixed use; EJ areas containing race income, and language isolation	Some maturing, but still young, street trees at end of road. This section contains recent new plantings.	Target of future Complete Street interventions. Sidewalk, road, and traffic volumes slightly higher than others (due to a connecting artery from between the Commercial District and the “X” node of Forest Park).

2.3 Survey Instrument

2.3.1. Design

The research team worked closely with the Project Champion to design the pedestrian survey in tandem with the literature review. The Project Champion was particularly interested in capturing the effects of pedestrian satisfaction and comfort on perceived feelings of safety, much of which is synthesized in the walkability and livable streets literature. Walkability studies tend to be divided by scale (macro/neighborhood vs. micro/streetscape), method (pedestrian interception, walking interviews, statistical modeling), and interest in sociodemographic data. Satisfaction studies typically examine and define positive factors influencing pedestrian satisfaction and negative factors discouraging people from choosing to walk.

To create questions related to perceived safety, the research team believed it necessary to parse the multiple dimensions of personal safety while walking, including fear of crime, traffic safety, and other personal characteristics that contribute to feelings of safety. Separate survey questions served to capture these themes. Additionally, since the goal of this research is to understand the impact of street trees play beyond aesthetics and ecological health, the research team crafted questions regarding street tree placement and other streetscape features.

The survey instrument originally included 5-point Likert scales, space for short open-ended responses, a photo preference section, and sociodemographic questions. The Likert scales questions had participants choose pre-coded responses indicating how much they agree or disagree with particular statements, with the neutral point being neither agree nor disagree *(58)*. Short, open-ended questions were used to ask participants about street trees and additional improvements the participants would like to see on the streets of interest. The photo preference questions gave participants a series of images for compare and score based on pre-coded responses *(59)*. The research team created the sociodemographic section largely from previous survey instruments used by the project Principal Investigator, with categories known to fit within U.S. Census data classes for subsequent neighborhood-level comparisons *(60)*.

During the survey design period, the research team and Project Champion considered options for distributing the survey. Some studies utilize a door-to-door approach or request mail-in responses; however, the research team hesitated to adopt such techniques due to a predefined target sample size and response rate per study area. A mail-in survey would also prohibit the team from engaging with the participants and asking clarifying questions. Many studies related to walkability have showed success with intercept surveying in urban areas (Jung et al. *(36);* Choi et al. *(38)*). The team decided this would be the most effective survey method for this study, considering the desire to efficiently meet a survey quota and include questions regarding reasons for walking, trip starting points, and destinations.

Two versions of the survey were initially developed for each study area: a long-version survey and a short-version survey. The long version of the survey included sections on the participant's utility of the street and important factors for walkability; feelings of safety

related to traffic, crime, street trees, and other streetscape features; a photo preference and safety section; and sociodemographic questions. The short version of the survey asked asking about feelings of safety on the street, interest in more street trees, the photo preferences, and sociodemographic characteristics. The team intended to use this short version if prospective participants were willing to commit a few minutes to the survey but were unable to spend the time needed to complete the longer version.

2.3.2. Pilot Testing

The survey was pre-tested prior to implementation. The goals of the pilot testing were to help make the survey clearer and more concise, estimate the time commitment for both the short- and long-survey versions, and see if the survey was more effective administered in oral or self-written form.

Undergraduate research assistants conducted the first round of pilot testing with familiar participants such as roommates, parents, and friends. This testing raised several key issues, including survey length and confusing syntax in the Likert scale questions. After revisions, a second round of pilot testing was conducted in the field. Main Street in Easthampton, Massachusetts was selected as the pilot location due to its population characteristics, street tree density, proximity to UMass-Amherst, and the school's cordial relationship with the city's planning department. For this round of pilot testing, the undergraduate research assistants again administered both the long and short versions of the survey. The Easthampton pilot tests revealed that the survey needed further simplification and that self-written administration was more efficient than oral administration. Additionally, although the pilot participants were appreciative of a choice of surveys, the research team decided to only offer one simplified version of the survey to make it easiest to capture all pertinent data.

2.3.3. Final Survey Instruments

The final survey instruments primarily used 5-point Likert scales and open-ended responses; they contained five parts:

- Part 1 contained questions related to pedestrian satisfaction and walkability. *(16, 29, 30, 35, 38, 61).*
- Part 2 asked about participants' perceptions of safety while walking in the study area, due to streetscape elements, traffic, and crime *(4, 14, 17, 22, 29, 30, 35, 37, 38, 61, 63-66).*
- Part 3 questions examined the relationship between street trees and participants' feelings of personal safety *(32)*
- Part 4 contained photos of the study street corridors and asked participants how often they walked along each street, how much they liked each street, and how safe they felt on each street. (Photo preference surveys are used widely in other types of planning studies *(67, 68)*, but are not commonly found in pedestrian safety studies.)
- Part 5 asked for sociodemographic background information.

The study included slightly different surveys, including with different Part 4 photos, for Chicopee, Holyoke, and Springfield. The final survey instruments for each community are provided in Appendix D.

2.3.4. Institutional Review Board Compliance

The Pedestrian Survey was reviewed and approved by the University of Massachusetts Amherst Institutional Review Board (IRB) panel. In accordance with the federal policy on protecting the rights and welfare of human subjects (Title 45, Part 46), the IRB is a mandated committee that reviews all UMass Amherst research involving human subjects. As part of IRB compliance, the research team's personnel each completed CITI (Collaborative Institutional Training Initiative) training in Human Subjects Research. The research team also submitted a full research protocol (Protocol ID 2017-4052) to the UMass Amherst IRB for review and approval. The research protocol was approved on July 25, 2017 (Appendix C contains the IRB approval letter).

When the survey was administered, the survey instrument was accompanied by the following: (1) an IRB-approved consent form explaining the participant's role and protections in the survey, (2) a research information sheet explaining the research goals and purpose of the study, and (3) a contact information sheet providing the e-mail addresses and phone numbers for the study's Principal Investigator, Robert Ryan, the city planner for the community where participant is doing the survey, and the UMass Transportation Center, in case the participant had any questions or concerns after doing the survey. The consent form and research information sheet are included in Appendix D.

2.3.5. Survey Implementation

The research team distributed the survey across all nine study areas from August 2017 through October 2017 (copies of each survey are available in Appendix D). In response to the demographics of the nine study areas and their respective neighborhoods, the pedestrian surveys were translated into Spanish using the University of Massachusetts Translation Services after IRB approval and the hiring of a Spanish-speaking research assistant in September 2017.

The onsite display and location of the survey station in each community was imperative to successful data collection. The pilot testing revealed that prospective participants would be more inclined to stop if the research assistants did not appear to be solicitors with clipboards, if the participants had a chair to sit down, and if the assistants provided snacks. During each survey session, the research assistants picked a station space that was representative of the intended tree cover within the bounds of the two-block street area of interest. The survey station included a folding table, four chairs, English and Spanish versions of the survey, and informational material. The station was always positioned on the sidewalk, with room for other pedestrians to easily navigate around the table.

The Project's research assistants were to follow IRB guidelines on informed consent and to answer any questions the participants may have about the survey questions or about the study. The assistants were also trained to be sensitive to and orally administer the survey for any participants unable to read the written materials. The research assistants always worked in pairs at the survey stations. They adhered to a rigorous surveying schedule (Table 2.6). The surveying began in the Chicopee in August 2017, and then shifted to Holyoke and

Springfield. With a goal of 20 completed surveys per study area, the team finished the surveys the first week of October 2017.

Table 2.6: Survey schedule and completed surveys

	August 2017		September 2017		October 2017		
	Sessions	**Completed surveys**	**Sessions**	**Completed Surveys**	**Sessions**	**Completed Surveys**	**Total completed surveys**
Chicopee	10	30	7	21	3	8	59
Holyoke	6	43	4	12	1	5	60
Springfield	8	41	1	21	-	-	62
Total	24	114	12	54	4	13	181

2.4 Mapping Pedestrian Safety and Street Trees

2.4.1. Background

This section of the study reviewed pedestrian-environment spatial relationships, including the physical features of the streetscape, including street trees, and recorded pedestrian-vehicular crash data. These spatial relationships can provide important indicators of how pedestrian infrastructure and amenities translate into pedestrian safety, as measured by vehicle-pedestrian crashes.

This study's primary interest is the impact of street trees on the pedestrian perception of safety. However, in order to isolate the impacts of a specific streetscape feature (street trees), the analysis first needed to assess the compounding impacts of land uses and streetscape features more generally. Previous research has used land use and roadway data as indicators of the built environment that could perpetuate pedestrian-vehicle crashes. Other studies have separately evaluated aspects of urban form (street design, development patterns) that can help create safer walking environments *(69, 70)*.

Public health and transportation planning literature measures the built environment through "D" variables, which includes themes of density, diversity, design, demographics, and destination accessibility *(71, 72)*. Over 200 studies have measured or operationalized the built environment through one or more D variables, and a large portion attempt to discern the pedestrian walking realm from the roadway driving environment by focusing on pedestrian mode choice or walking frequency *(73)*. The distinction between D variables in the driver and pedestrian environments is complicated to define and measure for the specific larger variables that create each space (street network vs. sidewalk connectivity, street width vs. building setback, etc.). The subtler D features of the street environment relate to a microscale environment, the level at which pedestrians primarily form their experience *(35, 73)*. Classic urban design literature frequently cites these experiential qualities of the street environment and consider them important and desirable for active street life *(74-77)*. As discussed in the Literature Review (Section 2.1), street trees and vegetation car facilitate walkability and safe driving behavior. However, when coupled with inopportune driving conditions even a highly

populated pedestrian environment created by ideal urban design features can pose a risk of frequent and severe pedestrian-vehicular accidents.

Past research has struggled to account for pedestrian risk exposure when identifying the effects of built environmental design on walking safety *(33)*. Some studies have provided indirect or proxy measures of exposure within macro-scale areal units (Census Tracts or Transportation Analysis Zones), creating results that are inadequate for location-based inferences or solutions *(7, 78)*. Other studies only acknowledged fluctuating environmental qualities (weather, light, surface conditions) or personal sociodemographic attributes that contribute to pedestrian risk, not permanent pieces of the built and natural environment *(79)*.

A handful of studies did attempt to control for the qualitative measures of land use and the built environment by measuring urban design qualities that directly impact walkability (e.g., sidewalk width, landscape furniture) and, by extension, pedestrian safety *(31,79, 80)*. Not only do these methods directly capture the physical surroundings of a streetscape that contribute to safe walking environments, they have the potential to offer insight into the factors of a specific location that may be facilitating or disserving pedestrian safety.

Some studies have acknowledged the role of street trees as a quantifiable part of the pedestrian environment, especially as a human-scale component that contributes to a sense of enclosure *(33, 65)*. However, other studies have simplified the three-dimensional urban environment too much by only concentrating on large and broad-scale features, such as building height, space between buildings, and population density. While the highly textured data collected from qualitative assessments is attractive for purposes of empirical research (such as the style of buildings, attributes of pedestrian amenities, types of vegetation, etc.), at the scale of the streetscape, data collection can be costly in terms of time and training. An approach using GIS as a tool that automates direct measurements offers greater data collection efficiency and measurement consistency than manual auditing methods.

The first study to develop measurement protocols for urban design qualities engaged an expert panel of urban designers, planners, landscape architects, and social ecologists to define perceptual qualities of urban scenes that explain and predict levels of pedestrian activity in urban settings *(31, 80)*. The number of trees per scene was originally included as an urban design quality that may increase pedestrian activity, but its insignificance in the final model forced its removal. Researchers later validated the metrics developed as part of these studies for New York City, where the dependent variable was the number of pedestrians along a “block face,” or a small, walkable segment of street in which pedestrians have a clear sightline along their travel trip *(81)*. This study consolidated a list of environmental features into five urban design metrics (image ability, enclosure, human scale, transparency, and complexity); as a group, these features create high-quality pedestrian environments and encourage walking. These metrics do not directly track street trees and many other aspects of urban vegetation, but the authors continue to allude to their importance in creating human-scale walkable environments. While the empirical quantification of walkability made this an important study, the context in which the research team derived these metrics is not generalizable to variable walking conditions that exist in medium-sized cities, which may lack continuous sidewalks and vibrant adjacent

land uses that characterize New York City. Additionally, the data collection relied upon expert panels; thus, the study's process was time-consuming and not easily replicable. Subsequent research has been conducted that has refined the original methodology of Ewing and Handy by employing the use of GIS software as a measurement tool for field observations and to test the model's metrics in the medium-sized city of Salt Lake City, Utah *(22, 73, 82)*. The use of GIS software as a measurement tool enabled researchers to automate the process of measuring urban design qualities and create a model that is salient for smaller urban environments, such as the study area communities in the current research project.

With the goals of this research in mind, the research team developed a GIS-based methodology to understand how perceived urban design qualities and certain street tree characteristics may explain vehicular-pedestrian crash counts. The team generated its approach to analysis with precedent studies from the Literature Review. First, the research team used a hot spot analysis to determine where the greatest concentration of pedestrian-vehicular crashes occurred in each study area between 2013 and 2017. Following the precedent studies for the desired analysis, the team was able to make more inferences when looking at more sample sites per city (New York, Salt Lake City) *(73,82)*.

To make robust inferences about the spatial role of street trees and pedestrian safety, the research team needed: a spatial model whose dependent variable was free of spatial dependency, extracted measurements whose attributes were constructed under similar operational conditions and management regimes, and sufficient sample sites for a regression analysis (which is typically greater than 20). They conducted a hot spot analysis in each of the three study communities. Each hot spot analysis was then evaluated to determine a single study area in the City of Springfield to extract a greater sample pool for further analysis. The research team used the most recent study by Ameli et al. *(73)* as a template to aggregate the urban design quality measurements for segments of streets ("block faces") in the study area. Examples of each urban design quality are shown in Chapter 3, Section 3.2.

Finally, the research team constructed three negative binomial regression models to determine the explanatory power of: (1) control variables that influence pedestrian-vehicular crashes; (2) control variables and urban design characteristics that influence pedestrian-vehicular crashes; and (3) control variables and street tree characteristics that influence pedestrian-vehicular crashes. The research team controlled for confounding variables that influence the walkability of a street within broad categories of land use (residential and commercial), street geometry (presence of sidewalk, building footprint and height, roadway intersections) and other streetscape features (street trees, outdoor dining, bus stops). Here, the D variables of density, diversity, destination accessibility, distance to travel, and demographics were control variables. Measuring these features independently was fairly straightforward. While there was some overlap when collectively controlling for the variables (e.g., streetscape "entropy" and accessibility both measure land uses that facilitate walking), the literature largely agrees in these dimensions of the built environment and the metrics used by the research team to operationalize walkability *(73)*.

2.4.2. Data Measure Descriptions and Sources

The details of variable measures, definitions, data types, and data sources used in the UMass Amherst team's spatial analysis can be found in Appendix #. Further descriptions of the characteristics and qualities evaluated (listed in the first column in the table) are provided in Section 2.4.2.1 (dependent variables) and Section 2.4.2.2 (independent variables) It should be noted, that due to limited availability of certain data, the UMass researchers excluded some urban design quality variables verified in the original studies from their analysis. These variables included: number of buildings with non-rectangular shapes, proportion of historic building frontage, proportion of sky visible straight ahead, proportion of sky visible looking across the street, number of planters, number of pieces of street furniture, and number of building colors, and number of public art pieces.

2.4.2.1. Dependent Measures

The only dependent variable the research team used in its analysis was the count of reported pedestrian-vehicle crashes in the cities of Chicopee, Holyoke, and Springfield during the 2013-2017 period. The team chose this range of years because the new street tree plantings in the study areas in all three communities were planted in 2013, and the research team wanted to eliminate the possibility of false inferences related to crash locations where trees had not yet been planted. The team used MassDOT Crash Portal online database to download the crash reports for the study communities. This data is equipped with X/Y spatial coordinates indicating the location of a crash (as recorded on the crash report) and is readily compatible with GIS software. The team discovered that the Crash Portal only offered crash reports from 2014, so they contacted the Department of Registry and Motor Vehicles (RMV) for a broader sample. The RMV provided crash location data for all requested years. The team received datasets representing all reported vehicular-related crashes, including vehicle-vehicle, vehicle-pedestrian, vehicle-bicyclist, and vehicle-tree, which contained no personal identifiers of any persons involved in those crashes. The team extracted pedestrian-related accident reports from the full dataset manually using database queries. Although they would not use them in subsequent analysis, the research team then coded the pedestrian crashes to see if they fell within the study area street segments. For the hot spot analysis, the research team removed pedestrian crashes from interstate highways (I-90, I-91, I-291, and I-391).

2.4.2.2. Independent Measures

2.4.2.2.1. Urban Design Qualities

Following the protocol created by Ewing et al. (and validated and defined by Purciel et al. and Ameli et al.), the research team quantified the urban design qualities according to the listed definitions and data features shown *(31, 73, 82)*. As noted in the original studies, the researchers replicated some features across multiple urban design qualities. The team aggregated each measurement at the level of a "block face" for a two- to three-block length of street; as determined by the precedent studies.

If the accuracy of the data was questionable, researchers verified the place and feature with Google Street View and aerial imagery.

The researchers had an opportunity to add additional features related to street tree characteristics to the urban design qualities, especially the Enclosure and Human Scale

factors. However, they refrained from doing so in their analysis because, as explained in the next section, they combined and weighted these features by metrics derived from the original studies, and they took due care to avoid the introduction of potential bias into the results.

As defined by Ameli et al., the urban design qualities are described below. The independent variables used to evaluate each quality were listed and summarized earlier in Table 2.7 *(73)*.

- **Imageability**. The quality of a place that makes it distinct, recognizable, and memorable. High imageability includes physical elements arranged to capture attention, evoke feelings, and create a lasting impression.

- **Enclosure**. The degree to which the streetscape and public space is visually defined by buildings, walls, trees, and other vertical elements. These spaces are where the vertical height is proportionally related to the width of the space between structures, creating a room-like quality.

- **Human scale.** Physical elements that match the size and proportion of people through their size, texture, and other design characteristics, especially as evident at a walking speed. Typically, building details, pavement texture, street trees, and street furniture all contribute to human scale.

- **Transparency.** The degree to which pedestrians can see and perceive what lies beyond the edge of a street, especially human activity. Physical elements that influence transparency include walls, windows, doors, fences, landscaping, and space between buildings.

- **Complexity.** The variety and visual richness of a place based on its physical environment, specifically the number and types of buildings, architectural ornamentation, landscape elements, street furniture, signage, and human activity.

2.4.2.2.2. "D" Control Variables

Characterizations of "D" variables directly mimicked the procedure set by the precedent studies (noted in *73)*. The research team created quarter-mile buffers around each block face, which also included the block faces themselves. The team measured Density as building footprint floor area ratios and population density, and Diversity as a land use "entropy". The team defined Design as a measure of the street intersections and length of the block face segment. The "Walk Score" measured destination accessibility. The team used the index as derived by Walk Score, Inc., which scored locations between 0 and100 based on their amenity value and proximity up to 1.5 miles from a destination; the index categorizes Distances over 1.5 miles as inaccessible for pedestrians. The team defined Distance to Transit as the shortest distance to the closest bus stop, and Demographics as the average household size derived from the most recent (2010) U.S. Census data. The "D" variables are described further in Table 2.7.

2.4.2.2.3. Street Tree Inventory

The City of Springfield's Office of Planning and Economic Development provided the research team with a detailed street tree inventory. The Cities of Chicopee and Holyoke did not have a dataset of this caliber easily accessible, thus we were unable to do this part of the analysis for those cities. The Springfield dataset included the spatial location of each tree, diameter at breast height (DBH), measured as 4.5 feet off the ground, a dendrometric measure of the tree trunk, and tree species. Since the dataset did not include many of the characteristics of a tree that contribute to the experience of a streetscape (particularly canopy spread and height), the team used allometric equations from the U.S. Forest Service for those metrics *(83)*. The database housing the equations included all but one species of tree (Amelanchier spp.) in the study area; details from additional sources allowed researchers to approximate attributes for this type of tree *(84, 85)*. Additionally, researchers measured the abundance of trees along the block face segments as the ratio of trees per 12 linear feet (mimicking the sight line metric) and counted the species diversity of each segment.

2.4.3. Methodology

The research team used ESRI's popular GIS software, ArcGIS 10.5, to perform the hot spot analysis and data measurement extraction, and IBM's SPSS statistical software package to create the negative binomial regression models.

Before processing the dependent variable, the team needed to test the gathered data for spatial autocorrelation. As a property of geographic features, spatial dependency states that nearby features are more similar than far features, and based on proximal location, these features appear correlated. This poses an issue for subsequent statistical analysis because it violates the assumption that each feature observation is independent of its neighbor or others in the dataset. Spatial autocorrelation (through a Global Moran's I statistic) evaluates the spatial relationship between a feature's location and its value to determine if the feature's pattern across space is clustered (not random), dispersed, or random (*86)*. ArcGIS 10.5 (*86*) defines the Moran's I as:

$$II = \frac{nn \sum_{i=1}^{n} \sum_{nnjj=1} ww_{ii,jj} zz_{ii} zz_{jj}}{\overline{SS_0} \sum_{ii=1}^{nn} zz_{ii2}}$$

where z_i is the deviation of an attribute for feature i from its mean $(x_i - \bar{X})$, $w_{i,j}$ is the spatial weight between feature i and j, n is the total number of features, and S_0 is the aggregate of the spatial weights:

$$SS_0 = \sum_{ii=1}^{nn} \sum_{jj=1}^{nn} ww_{ii,jj}$$

The Global Moran's I is an inferential statistic and works with the assumption (null hypothesis) that the attributes and processes creating the pattern of the feature being analyzed

are due to random chance. When the returning p-value is statistically significant, we can reject the assumption that the feature's pattern is not random. The Global Moran's I summary of pedestrian crashes in each study area community is displayed in Table 2.7.

Table 2.7: Global Moran's I summary

	Moran's Index	z-score	p-value
Chicopee	0.014282	4.336362 *	0.000014 *
Holyoke	0.011512	2.907722 *	0.003641 *
Springfield	0.013355	5.328974 *	0.000000 *
*= significance at the 95% confidence interval (p<.05)			

Since both the z-score and the p-value in all study area communities are separately statistically significant, we can reject the null hypothesis that the distribution of high or low values in the dataset are more spatially clustered than we would expect if the conditions were random (*86*). Thus, we can use this dataset without further adjustment.

2.4.3.1. Hot Spot Analysis

The research team used ArcGIS's Hot Spot Analysis tool to identify statistically significant clusters of events across spatial areas, generating clusters of both high values (hot spots) and low values (cold spots). The analysis generates a Getis-Ord Gi* local statistic, which is based on the proximity and value of input features.

ArcGIS 10.5 (*87*) defines the Getis-Ord local statistic as:

$$GG_{ii*} = \frac{\sum_{jj=1}^{nn} ww_{ii,jj}\, xx_{jj} - XXX \sum_{jj=1}^{nn} ww_{ii,jj}}{SS \sqrt{\frac{nn \sum_{jj=1}^{nn} ww_{ii2,jj} - \left(\sum_{jj=1}^{nn} ww_{ii,jj}\right)^2}{nn-1}}}$$

where x_j is the attribute value for feature j, $w_{i,j}$ is the spatial weight between feature i and j, n the total number of features, and:

$$XX = \frac{\sum_{jj=1}^{nn} xx_{jj}}{nn}$$

$$SS = \sum_{jj=1} xx_{2jj} - \frac{XX^{2}}{nn}$$

For this analysis, the input data was the incident occurrence of vehicle-pedestrian crashes. Since the GIS software does not naturally recognize artificial boundaries that hold real-world regulatory significance (e.g., town boundary lines), the researchers isolated pedestrian crash records for each study area community and analyzed them separately. This helped to isolate the data points within the same roadway management and regulatory jurisdictions.

The Getis-Ord Gi* is a z-score with similar interpretations as a p-value. A larger z-score (following a normal distribution for statistical significance, greater than or equal to +/- 1.96) indicates more intense clustering of high values (hot spots), while lower z-scores indicate a more intense clustering of low values (cold spots) (*87*). Conforming with standard research practice, the research team only reported as hot or cold spots records that achieved statistical significance at or above the 95% confidence interval.

2.4.3.1. Measurement Extraction

Following the data retrieval and the data definitions outlined by the Purciel et al. and Ameli et al. precedent studies, the research team quantified each D variable and urban design quality feature by block face and/or buffer area in ArcMap 10.5 *(73, 82).* The D variables were handled in raw form. The urban design quality features were inserted into equations. The equations were weighted by coefficients developed by the precedent studies, and then aggregated with their partnered features to create the design quality metric. For example, the team calculated the quality of Transparency by adding the proportion of windows multiplied by its coefficient, plus the proportion of active land uses multiplied by its coefficient, plus the proportion of street wall multiplied by its coefficient. Table 2.8 lists the coefficients and pvalues for the urban design features evaluated. *(81).*

Table 2.8: Summary of urban design coefficients

Urban design quality	Physical feature	Coefficient	p-value
Imageability	Number of courtyards, plazas, and parks	0.414	<0.001
	Number of major visible landscape features	0.722	0.049
	Number of buildings with identifiers	0.11	0.083
	Presence of outdoor dining	0.644	<0.001
	Number of people	0.0239	<0.001
	Noise level estimate	-0.183	0.045
Enclosure	Number of long sight lines visible in three directions	-0.308	0.035
	Proportion of street segment with street wall	0.716	0.001
Human scale	Number of long sight lines visible in three directions	-0.744	<0.001
	Proportion of street segment with windows	1.099	<0.001
	Average height of building weighted by building frontage	-0.00304	0.033
Transparency	Proportion of street segment with windows	1.219	0.002
	Proportion of street segment with street wall	0.666	0.011
	Proportion of street segment with active uses	0.533	0.004
Complexity	Number of buildings	0.051	0.008
	Presence of outdoor dining	0.367	0.045
	Number of people	0.0268	<0.001

The research team also manipulated the street tree dataset with the specific equations and coefficients identified for each variable (crown spread, height) and for each species as noted in the Urban Tree Database and its supporting documentation (McPherson et al. *(83)*). For example, they used the DBH of a particular silver maple (Acer saccharinum) (x=84.78 cm) to calculate the spread of the tree's canopy. The calculation used a cubic equation (a+(b * x) +(c *x^2) +(d * x^3), where the coefficients (a-d) create 0.73372 + (0.3504*84.78) + (-0.00296*84.78^2) + (0.00001*84.78^3)) and estimated the canopy spread at 15.25 m (50 feet).

2.4.4. Pedestrian Crash Models

Two types of regression models following the Poisson distribution—Poisson regression and negative binomial regression—are generally most appropriate when the dependent variable is a count. The Poisson distribution assumes non-negative integers with many low values (few pedestrian crashes) and fewer large values (many pedestrian crashes). The pedestrian crash dataset fits this case. Poisson regression is best when the mean and the variance of the dependent variable are equal, while the negative binomial model is best when the variance is greater than the mean. The pedestrian accident dataset has me=15.69 and var=2074.62, so a negative binomial model is the most appropriate here.

Three separate models of pedestrian crashes were estimated. Model 1 comprised the six "D" variables (Density, Diversity, Design, Destination Accessibility, Distance to transit, and Demographics) without the operationalized urban design qualities. Model 2 added the five urban design qualities (imageability, enclosure, human scale, transparency, and complexity)

to the D variables. Model 3 added the street tree characteristics to the D variables. The final results of the regression analysis are shown in Section 3.2 (Mapping Results).

3.0 Results

3.1 Survey Results

3.1.1. Background

This section outlines the results of the pedestrian surveys. The researchers analyzed the survey responses using IBM SPSS statistical software. The research team handled most of the survey responses in raw form, with the exception of those with small sample sizes; those they aggregated into similar categories. The open-ended survey questions generated qualitative data that the team coded based on emergent themes. The most significant results are reported here in Section 3.1. Unreported tables can be found in Appendix E.

Overall, researchers administered surveys in Chicopee, Holyoke, and Springfield, and a total of 181 surveys were completed. Participant languages spoken led 10.5% (n=19) of the surveys to be completed in Spanish.

Over half of the participants (55%) reported use the study area streets every day, a theme that is consistent across cities and tree cover type; only three participants reported “almost never” using the study area streets. The average walking time for those surveyed was 34.5 minutes, with participants in Holyoke walking the longest, 53.7 minutes. Most participants named an exact street or local landmark they were walking from, and few reported walking from home (n=28), shopping (n=11), or work (n=10). In Chicopee and Holyoke, participants primarily used the study area streets for exercise, while participants in Springfield shopped on those block (Table 3.1).

Table 3.1: Primary reason for walking in the study areas

	Total		**n**	**Chicopee**		**n**
1	Going Home	32.6%	59	For Exercise	20.3%	12
2	Going Shopping	32%	58	For Leisure	18.6%	11
3	For Exercise	31.5%	57	Going to Work	18.6%	11
4	Going to Work	27.6%	50	Going Home	15.3%	9
5	For Leisure	26%	47	Going Shopping	13.6%	8

	Holyoke		**n**	**Springfield**		**n**
1	For Exercise	40%	24	Going Shopping	50%	31
2	Going to Work	36.7%	22	Going Home	46.8%	29
3	Going Home	35%	21	For Leisure	33.9%	21
4	Going Shopping	31.7%	19	For Exercise	33.9%	21
5	Going to Bus Stop	28.3%	17	Going to Bus Stop	30.6%	19

3.1.2. Sociodemographic Information

Figure 3.1 shows the distribution of participants by age. The largest participant group by age (41% of all participants) were 35-54 year olds, followed by participants age 55 and over (30%), and those 18 to 34 (23%). Chicopee had a higher percentage of participants 55 and over (41%) than the other two cities. The highest level of education achieved for 42% of participants was a high school diploma or less, a pattern similar across the three cities.

Just less than half (46%) of all participants identified as White, while a third identified as being of Hispanic, Latino or Spanish; fewer participants identified as Black (10%) or Other (11%) (Figure 3.2). The racial composition of the samples in Chicopee and Springfield was predominantly White, followed by Hispanic, Latino, or Spanish origin; this was the reverse in Holyoke (Figure 3.2).

Figure 3.1: Age of study sample

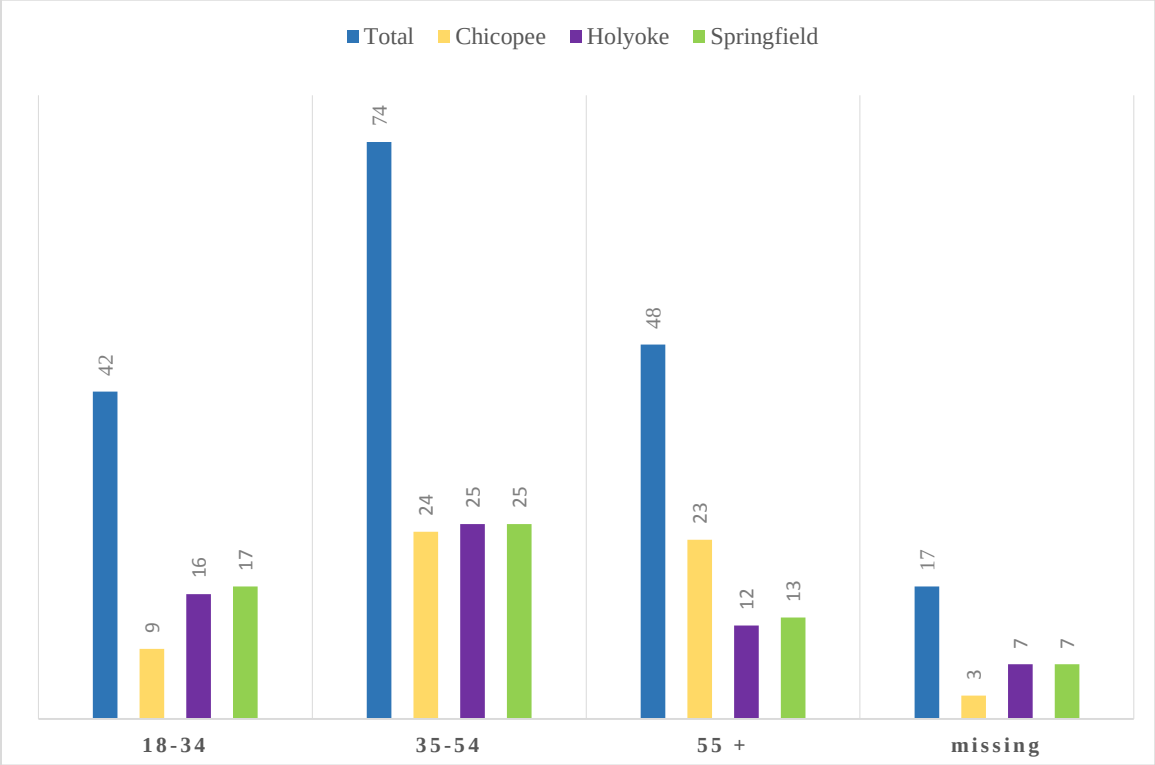
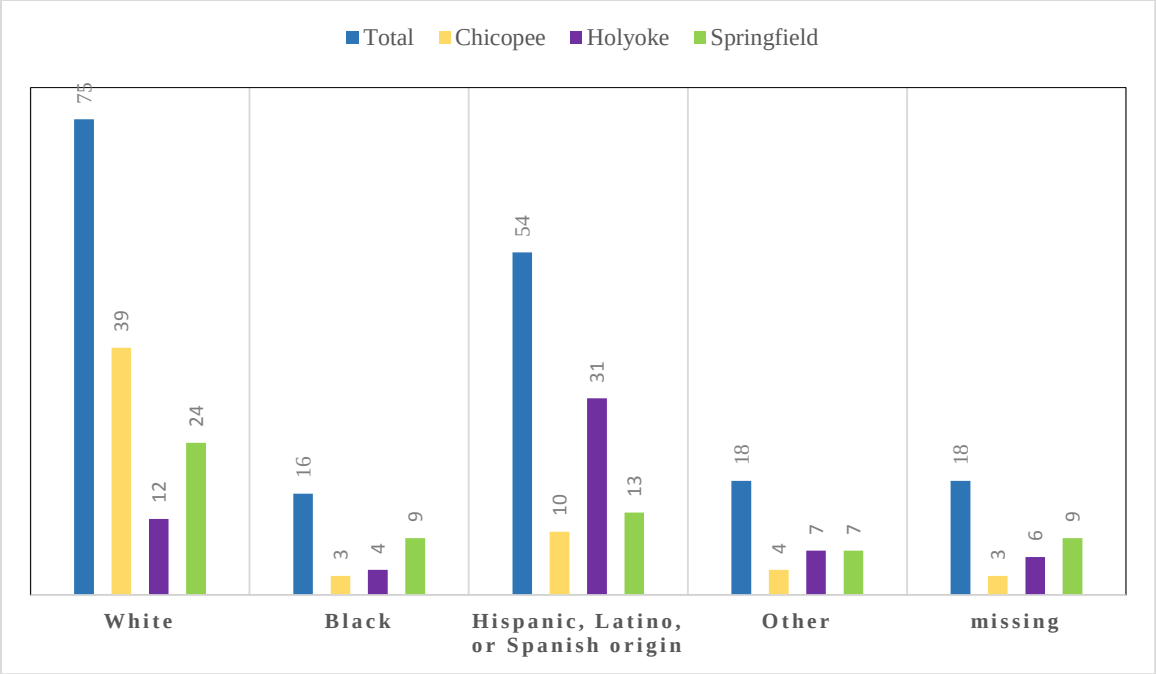


Figure 3.2: Race/ethnicity of study sample



Tables 3.2, 3.3, and 3.4 summarize pedestrian survey participation by gender, race, and income. Participants' gender was generally evenly split across the sample, and across cities.

Across the sample, 60% of participants had an annual household income of less than $35,000 per year (Figure 3.3). The sample most prominently includes women from lower-income (< $35,000 per year) households (25% of participants), and people of Hispanic, Latino, and Spanish origin from lower-income households (20.4% of participants).

Table 3.2: Gender and household income of study sample

	< $35,000	> $35,000
Male	28 (15.5%)	26 (14.3%)
Female	45 (24.9%)	26 (14.3%)
Identified as Male & Female		1 (0.5%)

percent of total in parentheses (%); missing data: n=55 (30%)

Table 3.3: Gender and race of study sample

	Black or African American	Hispanic, Latino, or Spanish Origin	White	Other
Male	6 (0.3%)	20 (11%)	29 (16%)	7 (0.3%)
Female	9 (0.5%)	21 (11.6%)	38 (20.9%)	8 (0.4%)
Male & Female			1 (0.5%)	

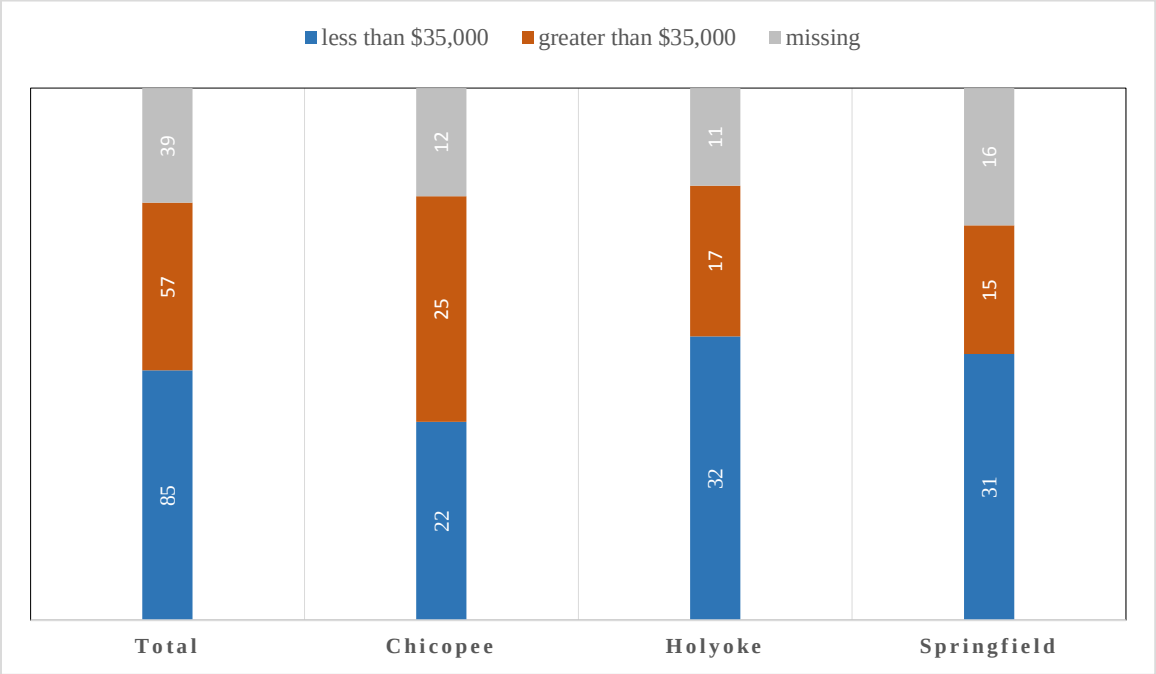
percent of total in parentheses (%); missing data: n=43 (23.8%)

Table 3.4: Household income and race of study sample

	Black or African American	Hispanic, Latino, or Spanish Origin	White	Other
< $35,000	7 (0.3%)	37 (20.4%)	34 (18.8%)	7 (0.3%)
> $35,000	7 (0.3%)	7 (0.3%)	36 (19.8%)	7 (0.3%)

percent of total in parentheses (%); missing data: n=39/ (21.5%)

Figure 3.3: Income of study sample



The average household size was approximately 3 people, many without children in the house (n=79). Two-thirds of all survey participants lived in the neighborhood where the survey took place; 33% had lived there for 1–5 years, while 19% had lived there for more than 20 years. The sample had more home renters (n=100) than homeowners (n=42), a trend consistent across cities and street tree cover type. Seventeen participants reported that they did not pay for housing. As shown by the counts, not all participants completed that question in the survey.

Car ownership across the study sample was 50%, and 35.8% and 55.8% in Holyoke and Springfield, respectively; 75.4% of Chicopee participants owned a car (Figure 3.4). This was a low household car-ownership rate compared to the national estimate of 91%, reported by the most recent National Household Travel Survey (NHTS), and the Massachusetts estimate of 87.8%, according to the most recent statewide travel survey funded by MassDOT (*88, 89*).

3.1.3 Important Features for Walking Route Choice

Survey participants were asked about what street features matter most to them when deciding what route to take as a pedestrian. Overall, those surveyed ranked “safe crossings, crosswalks, and traffic lights” as the most important feature (Table 3.5).

The researchers used one-way analysis of the variance (ANOVA) tests to see if there was a statistically significant difference between the features participants ranked as important in choosing a walking route and the city in which the survey took place, as well as participant gender, income, race, and age.

Sidewalk maintenance and repair was the second most important feature overall, followed by perceived aesthetics (e.g., the street is a pleasant place to walk). This held true in Springfield and Holyoke, but in Chicopee, sidewalk maintenance and repair was ranked as the most important feature. Shade from trees had the second-highest ranking in Holyoke.

The ANOVA test revealed that there was a statistically significant difference by community in how participants responded to Question 5 (places to sit/rest) and Question 6 (tree canopy shade). To evaluate where responses differed, Tukey post hoc tests showed that participants considered a place to sit/rest more important in Holyoke than Chicopee, and participants considered tree canopy shade more important in Holyoke than in the other two cities. Participants in Holyoke who do not own cars ranked tree canopy shade and places to sit/ rest to be more important than did car owners.

Table 3.5: Importance of different street features for walking trip route selection

(Ratings of 1 to 5, with 1 = "Not at all" important and 5 = "A great deal" important)

	Total			Chicopee			Holyoke			Springfield		
	mean	sd	n	Mean	sd	n	mean	sd	n	mean	sd	n
Safe crossings, crosswalks, and traffic lights	4.13	1.25	149	3.90	1.47	30	4.27	0.98	59	4.12	1.35	60
Sidewalk maintenance and repair	4.04	1.26	153	3.97	1.38	31	4.15	1.19	60	3.97	1.27	62
Tree canopy shade	3.64	1.27	151	3.14	1.13	29	4.07	1.07	60	3.45	1.40	62
Sidewalk width	3.52	1.41	145	3.34	1.40	29	3.63	1.41	57	3.49	1.43	59
Places to sit/rest (benches)	3.39	1.47	151	2.81	1.38	31	3.84	1.31	58	3.26	1.54	62

There were no statistically significant differences by income or gender. By age, however, participants age 55 and over, ranked sidewalk maintenance and repair and safe crossings as more important than younger adults (age 18–34) did. By race, having safe crossings, crosswalks, and traffic lights was found to be significantly more important to White participants than to Hispanic participants; this shows to be true across cities.

3.1.4. Feelings of Safety

3.1.4.1. Results by City

Participants across the study areas felt moderately safe when walking on the study area streets (Table 3.6). They felt they were able to cross the street safely most of the time. Participants in Chicopee were less concerned about crime or illicit activities than those in

Holyoke or Springfield; this difference was statistically significant at the 95% confidence interval.

Participants across the study areas reported that they could usually see clearly across the study area streets and were generally unconcerned that an attacker could hide in a concealed place. Participants rarely found the study area streets to be too crowded with other pedestrians or bike riders. Across cities, participants thought traffic moved at a relatively slow speed; this may have contributed to their overall moderate feelings of safety on study area streets.

Table 3.6: Perceptions of pedestrian safety

(1= "Not at all" and 5 = "Very well")

	Total			**Chicopee**			**Holyoke**			**Springfield**		
	mean	sd	n	Mean	sd	n	mean	sd	n	mean	sd	n
I feel safe when walking here.	3.72	1.24	177	3.88	1.18	59	3.83	1.22	59	3.44	1.29	59
I can safely cross the street.	3.50	1.27	169	3.63	1.28	57	3.64	1.27	56	3.21	1.25	56
There are enough crosswalks.	3.29	1.37	171	3.41	1.36	58	3.46	1.40	56	3.00	1.32	57
I am concerned about crime or illicit activities.	3.27	1.42	169	2.96[a*]	1.37	55	3.58[a]*	1.33	55	3.25[ab]*	1.49	59
I am concerned about my safety as a pedestrian.	3.20	1.45	171	2.84	1.51	58	3.42	1.44	55	3.34	1.35	58
I can see clearly at all times.	3.48	1.26	165	3.56	1.24	55	3.54	1.27	54	3.36	1.29	56
I am concerned that someone could hide where I can't see.	2.69	1.40	170	2.19	1.19	57	2.98	1.42	56	2.91	1.46	57

	Total			Chicopee			Holyoke			Springfield		
	mean	sd	n	Mean	sd	n	mean	sd	n	mean	sd	n
Sidewalks are too crowded with people.	2.20	1.33	172	1.53	0.95	57	2.68	1.35	57	2.38	1.37	58
Bike riders often disrupt me when I walk on the sidewalks.	2.39	1.43	171	1.68	0.96	56	2.75	1.43	56	2.71	1.57	59
The traffic moves at a safe speed.	3.13	1.34	174	3.12	1.23	58	3.54	1.18	57	2.75	1.48	59
Trees on this street block my vision.	2.06	1.25	162	1.80	1.10	55	2.09	1.25	55	2.31	1.37	52
Trees on this street make me comfortable as a pedestrian.	3.47	1.33	174	3.46	1.32	57	3.72	1.33	57	3.23	1.31	60
Parked cars buffer me from traffic.	2.83	1.33	168	2.65	1.47	55	3.07	1.22	56	2.77	1.28	57
I like having trees between me and the traffic.	3.19	1.45	167	3.20	1.32	54	3.33	1.47	57	3.04	1.56	56
There is enough street lighting at night.	3.27	1.29	157	3.63	1.17	51	3.47	1.17	53	2.72	1.35	53

a, ab denotes a statistically significant mean difference at the .05 level*

3.1.4.2. Results by Street Tree Cover

The existence of street tree cover marginally contributed to feelings of pedestrian safety (Table 3.7). On the question of whether "Trees on this street make me feel comfortable as a pedestrian," the mean score was 3.46 on a 1 to 5 scale. Participants rated all street cover types moderately in terms of feeling safe while walking.

Street tree cover did not appear to be related to participants' ability to cross the street or their

visibility across study area streets. There was a difference in how participants reported concern for places where assailants can hide; the statistical differences appear to be between high tree canopy and low tree canopy as well as low tree canopy and new tree plantings, with new tree canopy ranking slightly higher. Participants on streets with higher tree cover did report less satisfaction with lighting at night, while participants on streets with low tree cover and new street tree plantings saw this as less of a concern.

Participants on low tree cover streets and streets with new tree plantings also felt more as though there were too many other pedestrians or bike riders crowding the sidewalk than did participants on streets with high tree cover; this difference was statistically significant.

Table 3.7: Perception of pedestrian safety provided by tree cover

(1= "Not at all" and 5 = "Very well")

	Trees–high level of canopy			Trees–low level of canopy			Trees–new street tree plantings		
	mean	sd	n	Mean	sd	n	mean	sd	n
I feel safe when walking here.	3.79	1.07	58	3.63	1.27	59	3.73	1.36	60
I can safely cross the street.	3.46	1.24	57	3.36	1.27	58	3.69	1.32	54
There are enough crosswalks.	3.32	1.33	57	3.12	1.38	57	3.44	1.41	57
I am concerned about crime or illicit activities.	3.30[b*]	1.35	57	3.45[a*]	1.35	56	3.05 [ab*]	1.54	56
I am concerned about my safety as a pedestrian.	3.00	1.41	57	3.42	1.37	55	3.19	1.54	59
I can see clearly at all times.	3.56	1.12	57	3.45	1.21	55	3.43	1.46	53
I am concerned that someone could hide where I can't see.	2.84[c*]	1.44	58	2.47[cd*]	1.25	55	2.75[d*]	1.49	57
Sidewalks are too crowded with people.	1.91[eg*]	1.09	57	2.17[gl*]	1.40	58	2.51[eg*]	1.42	57
Bike riders often disrupt me when I walk on the sidewalks.	1.84[hij*]	0.94	57	2.57[hi*]	1.56	56	2.74[hj*]	1.55	58
The traffic moves at a safe speed.	2.84[k*]	1.28	58	3.10[l*]	1.33	58	3.45[kl*]	1.35	58
Trees on this street block my vision.	2.02	1.20	53	1.87	1.13	54	2.29	1.38	55
Trees on this street make me comfortable as a pedestrian.	3.48	1.20	58	3.36	1.33	56	3.55	1.46	60
Parked cars buffer me from traffic.	2.78	1.21	55	2.80	1.34	56	2.91	1.44	57
I like having trees between me and the traffic.	2.98	1.45	56	3.17	1.42	52	3.41	1.48	59
There is enough street lighting at night.	2.89[mo*]	1.24	47	3.20[no*]	1.25	55	3.65[mo*]	1.28	55

a-o denote a statistically significant mean difference at the .05 level*

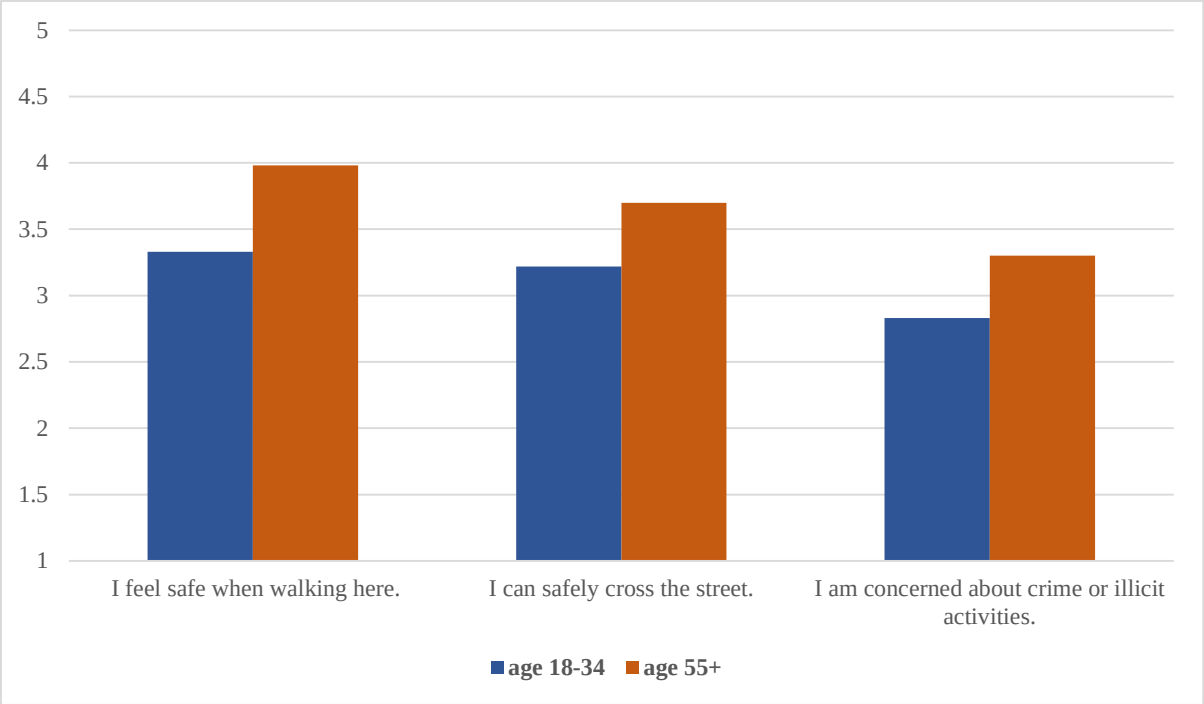
3.1.4.3 Perception of Pedestrian Safety by Age, Gender, Income, and Race

When considering sociodemographic factors, there were some statistically significant differences across groups, but the mean differences and scores were rated rather mid to low on the scale. For factors with only two categories (gender and income), the research team used independent sample t-tests to statistically compare population means. Overall, older adults (age 55 & over) felt safer walking on the study area streets than did younger adults (age 18–34) (Figure 3.4). On streets with low tree cover, the younger adults felt less safe than both middle-aged (age 35-54) and older adults; however, there were no statistically significant differences in responses on high tree cover streets or streets with new tree plantings. Younger adults felt less confident that they could cross the street safely than did older adults. Younger adults were also more concerned about crime and illicit activities. These results did not vary by tree cover.

There were almost no statistically significant differences in responses by to almost all of the questions related to safety, with one exception. Men reported less concern with sidewalk crowding and bike riders on the sidewalk than did women; this did not differ across tree cover type.

Figure 3.4: Feeling safe, significant differences: Age

(1= “Not at all” and 5 = “Very well”)

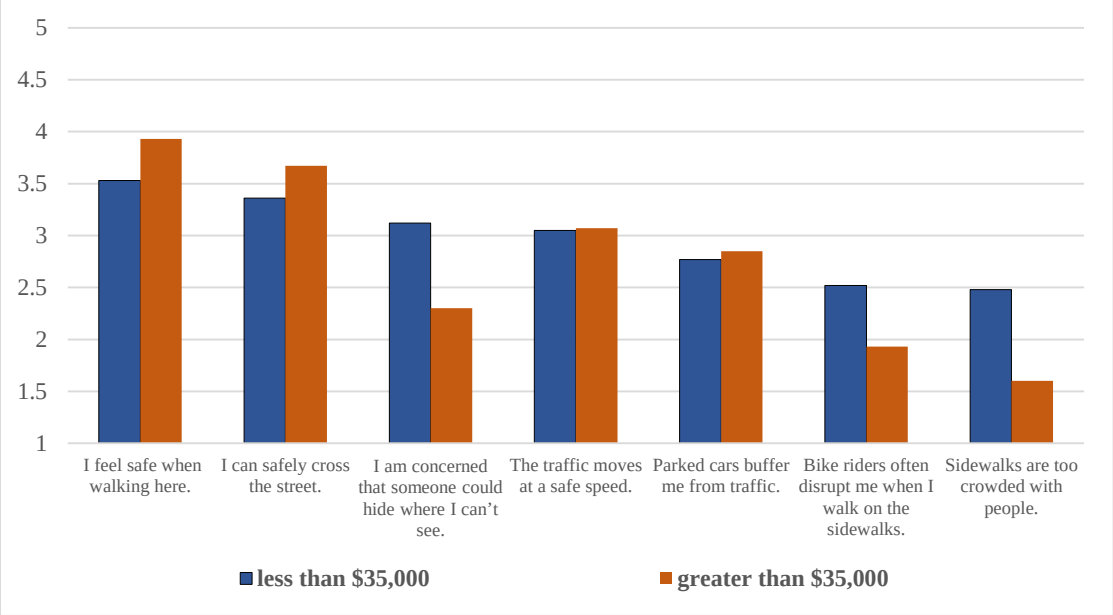


Survey results indicated statistically significant differences in the role of income on feelings of safety (Figure 3.5). Participants with higher annual household incomes (>$35,000) felt safer when walking on the study area streets than those with lower household income (<$35,000); this was especially true on streets with high tree cover. On streets with low tree cover, participants with lower incomes also reported greater fears of crossing the street, places where assailants could hide, traffic speeds. These differences only emerged when

income was considered. Those with lower incomes also felt slightly more than those with higher incomes that bike riders were an issue on the sidewalk and that sidewalks were too crowded with people on streets with new tree plantings.

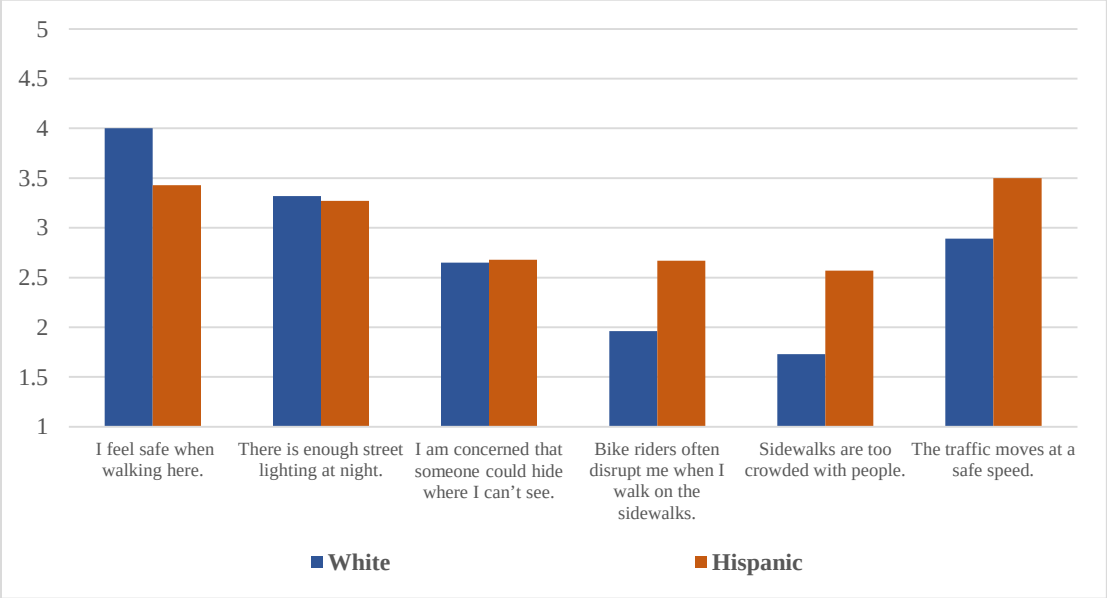
Figure 3.5: Feeling safe, significant differences: Income

(Ratings of 1 to 5 in terms of participants agreeing with statement, with 1 = "Not at all" and 5 = "Very well")



In terms of results by race and tree cover, Hispanic participants felt less safe than White participants did when walking on the study area streets, except on streets with high tree cover (Figure 3.6). White participants felt that there was sufficient street lighting at night more than did participants of other races. White participants also felt that there were more pedestrians and bike riders crowding the sidewalks than did Hispanic participants, especially on streets with new tree plantings. It is likely that only two racial groups presented differences because of the larger number of participants identifying as White or Hispanic.

Figure 3.6: Feeling safe, significant differences: Race/ethnicity



The "Hispanic" category includes people of Hispanic, Latino, or Spanish origin.

3.1.5. Preference for Additional Tree Plantings

Participants appear to be moderately interested about wanting additional tree plantings in the study area streets, with responses remaining fairly consistent across cities and tree cover type (Table 3.8). ANOVA tests did not find statistically significant differences in the responses across these groups.

Table 3.8: Preference for additional tree plantings

(Ratings of 1 to 5 showing how much participants would like to see new trees on the study area street, with 1 = "Not at all" and 5 = "A great deal")

	Total			Chicopee			Holyoke			Springfield		
	mean	sd	N	mean	sd	n	mean	sd	N	mean	sd	n
Large shade trees (40'–100' tall)	3.23	1.40	168	3.19	1.31	52	3.28	1.49	57	3.20	1.40	59
Mid-size ornamental trees (20'–50' tall)	3.35	1.26	161	3.32	1.20	50	3.25	1.33	56	3.49	1.25	55
A mix of trees	3.45	1.32	164	3.51	1.20	53	3.31	1.35	55	3.52	1.40	56

	Trees—high canopy			Trees—low canopy			Trees—new plantings		
	mean	sd	N	mean	sd	n	mean	sd	n
Large shade trees (40'–100' tall)	2.98	1.46	56	3.18	1.45	55	3.51	1.24	57
Mid-size ornamental trees (20'–50' tall)	3.27	1.28	55	3.20	1.33	51	3.58	1.15	55
A mix of trees	3.32	1.31	56	3.52	1.35	52	3.50	1.31	56

Socioeconomic factors could be an important consideration for community acceptance of new tree planting initiatives. Participants with higher income generally wanted more mid-size trees planted on streets with new tree plantings than did those with lower annual income. White participants more than Black participants wanted to see a mix of trees planted on streets with new tree plantings. On streets with low tree cover, men wanted to see more large shade trees planted than women; on streets with new tree plantings, women wanted fewer large and mid-size trees planted. These results may allude to the different perceptions of risk and safety between the genders.

About half of the participants (n=99) elaborated on the reasoning for their opinions. Some (n=32) enjoyed the "natural," "nice" appearance that the presence of trees offered to a streetscape, and some immigrant participants found the greenery comforting, as it reminded them of home. Many offered highly emotional responses in support of trees, claiming, "[it is] depressing without [them],"and "[I] love trees." The second most popular reason for support on behalf of trees was the shade, especially during warmer summer months. Other participants (n=19) acknowledged the environmental benefits trees offered, many citing air quality as the most important regulating ecosystem service provided by street trees. Others (n=19) did not expand on the reasons why they wanted more trees; they thought trees were good "just because." A few participants (n=8) drew connections between street trees and pedestrian/traffic safety, with comments like, "Bigger trees [create fewer] obstacles for cars… safer for pedestrians to hide behind in case a car [is] out of control," or more simply,

"canopy/speed control." A small number of participants in each city (n=5) wanted to see more trees planted in their neighborhood and city. A slightly larger number of participants (n=10) claimed that there were enough trees planted, citing their reason as a matter of personal preference and past action taken by the city.

3.1.6. Future Improvements

Of the responses to the survey's open-ended question pertaining to future improvements (n=82), participants overwhelmingly stated that they would like their city to improve traffic calming features and pedestrian safety amenities (n=36). Improvements participants desired included more crosswalks, improved visibility, speedometer signage, stop signs, traffic lights, reduced snow piles, and auditory signs for the blind. Others wanted to see a greater police presence in their neighborhood or other amenities that improve personal safety (n=15). Respondents noted examples that included call boxes, cameras, lighting, and visible police officers. On Belmont Avenue (east) in Springfield, one participant explained, "[There is] gun fire [during] daytime... too dangerous…feel very unsafe." Another participant on Belmont Avenue (east) strongly claimed, "Clean up the streets— [this is] more about safety [and] crime."

Some participants offered pedestrian-related maintenance and stewardship recommendations (n=8). From their view, more trash cans, cleaner sidewalks, tidier private properties, and replacing dead trees would help improve the aesthetics of the walkways. Additionally, quite a few participants (n=11) wanted to see sidewalks and roadway repairs happen more frequently (n=11). Others wanted their cities to enforce crosswalk laws and traffic speeding (n=5), as well as improvements for commercial and community amenities in their neighborhood (n=7).

3.1.7. Photo Preference

Figure 3.7 displays the photographs presented in each survey instrument, with total preference and safety ratings for each site as witnessed by standing on the study area street. Participants were asked "How much do you like each of these streets" and "How safe do you feel walking along these sections of street?" and gave their reply on a 1 to 5 scale, with 1 being "Not at all" and 5 being "A great deal."

Figure 3.7: Photographs presented in survey instruments

3.1.7.1. Results by City

As shown in Figure 3.8, overall, Dwight Street in Holyoke (mean rating (m) = 4.03, standard dev (sd) = 0.84) was participants' most liked street of the study area sites, while Main Street in Springfield was the least preferred street (m = 2.85, sd=1.33). Participants felt Front Street in Chicopee was the safest (m = 4.18, sd = 0.87), and Belmont Avenue (east) was the least safe (m = 3.04, sd = 0.94).

In Chicopee, participants both preferred and felt safest on Front Street; they liked Center Street the least but gave it a higher safety ranking than Springfield Street. The most preferred street in Holyoke among survey participants was Dwight Street, while Suffolk Street was least-liked). However, participants in Holyoke felt the safest on Suffolk Street and the least safe on Appleton Street.

The study area streets in Springfield had the overall lowest ratings both preference and safety. Participants liked Belmont Avenue (east) the most but felt safer on Belmont Avenue (west).

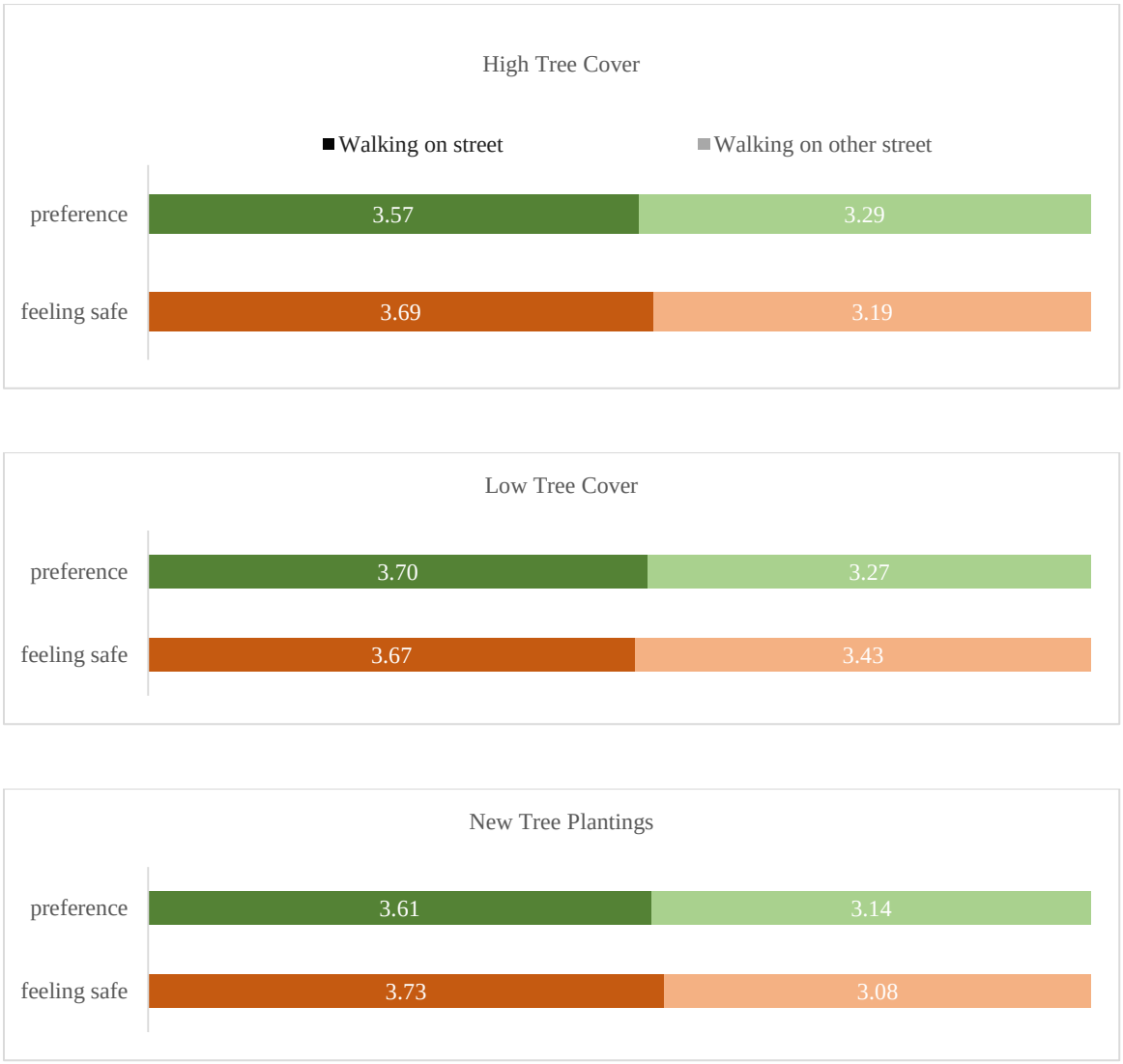
Without further investigation, it is unclear if site-specific land use or preconceived assumptions of each site contributed to these rankings in any way. For example, it was surprising to see Dwight Street (Holyoke) ranked so favorably, considering the reported crime in that area, but the utility of those blocks (with shops, a post office, a park) may have led to a higher score. Also, during site visits, the research assistants noticed that both Belmont Avenue (west) in Springfield and Appleton Street in Holyoke had higher traffic speed and participant remarks about crime and illicit activity; it was surprising that participants reported mid-level rankings here.

To see if statistically significant different responses emerged across cities, the research team used an ANOVA test to compare responses between street types. Across all three cities, participants did not report statistically significant different preferences or feelings of safety on any street type within the city, and preference and frequency of use did not significantly vary across these streets. The team conducted a separate ANOVA test to compare the street the participant was standing on to the other two types of streets imaged in the survey. In both Holyoke and Springfield, preference, feeling safe, and frequency of use did not vary across groups. In Chicopee, participants felt safer when viewing the Front Street (new tree plantings) image while standing on Center Street (low tree cover) than on Front Street; this result was statistically significant.

3.1.7.2. Results by Street Tree Cover

Figure 3.8 displays the total mean scores for each street tree cover type. Overall, the presence of trees had a marginal impact on participants' ranking of each study area site. Again, the most liked street was Dwight Street in Holyoke, a low tree cover street. Only in Chicopee (Center Street) was a low tree cover street the least preferred in a city. However, participants perceived Front Street in Chicopee, a street with new tree plantings, to be the safest; the same held true on Appleton Street in Holyoke. Streets with high tree cover (Springfield Street, Chicopee, and Belmont Avenue (east), Springfield) had some of the lowest feelings of safety within cities, and only in Springfield represented the most liked street (Belmont Avenue (east).

Figure 3.8: Average photo survey responses
(1 = “Not at all” and 5 = “Very well”)



To see if statistically significant different responses emerged across streets with varying street tree cover, the research team used a paired samples t-test to compare population means of “preference” (“How much do you like each of these streets?”) and “feelings of safety” (“How safe do you feel walking along these sections of street?”). Subsequent tests also considered “frequency” (“How often do you walk along each of these streets?”). When considering each type of street the participant was standing on (high tree cover, low tree cover, or streets with new tree plantings), there was a statistically significant difference and fairly strong correlation between responses of preference and feelings of safety, whereby participants claimed to feel safer on each type of street more than they liked them (Table 3.9). Time spent on the street was not a factor in the different responses of preference and safety (see Section 7.6.8.4 in Appendix E).

Table 3.9: Photo preference group differences

	How did participants rank preference & safety on that street?	
Walking on streets with:	p-value	R^2
High tree cover	0.010	0.349
Low tree cover	< 0.001	0.560
New tree plantings	0.008	0.397

The research team used a paired samples t-test to find if participants responded differently to the other photos in their survey (each representing the different street tree cover type in their city). The results are shown in Table 3.10.

Table 3.10: Changes across tree cover

		preference		safety			preference		safety	
Walking on streets with:	How did participants rank streets with:	p-value	R^2	p-value	R^2		p-value	R^2	p-value	R^2
High tree cover	Low tree cover	0.412	-0.115	0.902	0.017	New tree plantings	0.001	0.450	0.000	0.620
Low tree cover	High tree cover	0.234	-0.170	0.665	-0.067	New tree plantings	0.247	0.016	0.473	0.111
New tree plantings	Low tree cover	0.094	0.230	0.004	0.433	High tree cover	0.015	0.332	0.000	0.631

Participants walking on high tree cover streets both preferred and felt safer on those streets than on streets with new tree plantings. The mean difference between tree cover groups was nominal. Across streets with high tree cover and low tree cover, frequent use of the streets likely did not contribute to these results. A statistically significant difference emerged on streets with new tree plantings; those standing on streets with new tree plantings both preferred and felt safer on streets with high tree cover.

3.1.8. Summary of Survey Results

The research team found the following points to be the most important survey results related to the role of street trees in pedestrian perceptions of safety:

1. There was a small but noticeable difference in pedestrian perceptions of safety across streets with high tree cover, low tree cover, and new tree plantings.

2. Participants walking on streets with new tree plantings both preferred and felt safer on streets with high tree cover.

3. Socioeconomic status and individual characteristics may have a more pervasive influence on perceived sense of security than environmental variables such as street trees.

4. Feelings of safety were low across all study sites and all cities, possibly suggesting that feelings of insecurity in outdoor plances are becoming more common.

A detailed account of the highlights is listed below:

1. From the surveys, the research team expected streets with high tree canopy cover to correlate with higher safety-related outcomes, especially in regard to vehicular traffic-related questions. Although statistically significant differences between high and low canopy cover streets emerged, the mean differences between street types were fairly modest. However, certain responses alluded to a positive relationship between street trees and safety. Even though participants felt moderately safe across each street tree cover type (overall: m=3.72, sd= 1.24), participants still felt that trees also contributed to their comfort while walking, with the highest rank on streets with new tree plantings (m=3.55, sd=1.46) and the lowest rank on streets with low tree cover (m=3.36, sd= 1.33). This could reveal that the absence of trees decreases feelings of safety, even if only by a small amount. Trees did not appear to have an impact on pedestrian vision or sightlines, whereas before the survey, it was hypothesized that streets with more mature trees could pose a lateral visual obstruction, or streets with newly planted trees could block sight lines until they reached a certain maturity and height. Participants also reported traffic speed to be of less concern on streets with high tree cover, suggesting that trees may moderate perceived safety from vehicular traffic. Considering most participants ranked safe crosswalks as one of the most important features of their walking routes, this finding suggests that other factors of the streetscape, like traffic speed or crosswalk infrastructure, may influence feelings of safety more than trees. Although not a significant difference, participants on streets with new tree plantings felt somewhat safer regarding fear of criminal intent than on either of the other street types. Participants who responded to the open-ended question about additional tree plantings only vaguely referenced a connection between trees and safety, possibly indicating that pedestrians look to other pieces of built infrastructure to determine if a walking environment is safe or not.

   The team anticipated that the survey participants would report more dramatic differences between streets with high tree cover and streets with low tree cover, but this did not prove to be the case. One notable related data point surfaced: participants preferred to have trees, rather than parked cars, buffer them from traffic on low tree cover streets. This may indicate that the presence of trees can improve feelings of a safer walking environment.

   Trees appeared to influence other factors related to personal safety, such as sidewalk crowding. Both pedestrian and bike-rider crowding on the sidewalks was rated higher on streets with low tree cover and new tree plantings. This may reveal that the mature trees act as a buffer or edge between the roadway traffic, instead of creating a crowded pedestrian walking space.

   Participants on streets with higher tree cover also reported less satisfaction with lighting at night than on either of the other street types. This could infer that a greater

tree cover blocks artificial lighting. Participants on streets with new tree plantings ranked this as less of an issue than those on streets with low tree cover.

2. The research team anticipated that the presence of either mature street trees or new street tree plantings would be the most preferred street type and to contribute to greater feelings of safety within the photo preference section. The most common response—participants walking on streets with new tree plantings both preferred and felt safer on streets with high tree cover—suggests a compelling rationale for not only planting new street trees but investing in their stewardship and survival. In accordance with theories related to "cues to care" and "broken windows," pedestrians may enjoy the aesthetic amenities and managed appearance provided by young trees and will subsequently feel safer on these streets as the trees mature.

   The fact that the highest preference and feelings of safety varied across street tree cover type and city may suggest that participants considered other attributes of the streetscape—including land use and utility—when evaluating the photos. This report explored many of these themes in discussing the survey results. It was surprising that participants rated a rather dull image (Dwight Street, Holyoke) as the most "liked," since there were minimal "green" or other aesthetically interesting elements to the image. The angles from which the photographer captured the images shown in the survey might have influenced some reported results, as the view from some photos were filled with more "green space" than others. While the team could have improved photograph framing, many differences related to land use and the individual streetscapes were unavoidable in a field experiment. Alternatively, vegetation may not have been an important causal indicator of how this study sample chose their walking routes, especially considering the utility of the study area sites and participants' inferred necessity of walking as a mode of transportation.

3. Considering the exposure to risk of different types of pedestrian walking experiences, the team expected to find significant differences between gender, age, and factors related to poverty (race, income, educational attainment). The team was surprised to find that on streets with low tree cover, younger adults (age 18-34) felt less safe than both middle-aged (age 35-54) and older adults (55 & over). It could be possible that younger adults in these neighborhoods have had a greater exposure to crime and violence, while adults in residence for longer periods of time may have adapted or become desensitized to exogenous threats. It is also notable that differences between men and women did not emerge, especially across street tree cover types, since past research has shown that women typically feel less safe as pedestrians than men.

   Participants with lower annual income reported greater fear of personal safety from traffic and other streetscape elements. This may reveal that socioeconomic status has a more pervasive influence on perceived sense of security than environmental variables. If walking is a primary mode of transportation for participants without a car, it is not surprising that they may feel less safe than those who typically drive. The results that considered race may have been biased toward White and Hispanic participants, since these groups had the largest sample sizes.

4. In spite of the statistical inferences and differences across study area sites, the rankings related to safety were not very high; group means did not reach scores between 4 and 5 on any question related to safety. Most standard deviations fluctuated at least one point, indicating a wide range among responses. Since more than half of the participants used these sites every day and lived in the neighborhoods of interest, we expected greater feelings of safety to translate to the survey results from the participants' sense of comfort and familiarity to these places. The results may reflect a pervasive theme in contemporary culture, where broader unease in the public realm does not permit feelings of calm in one's own neighborhood.

3.2 Mapping Pedestrian Safety and Street Tree Results

3.2.1. Background

The purpose of this mapping was to compare existing pedestrian-vehicular crash locations with the presence of street trees and other human-centered design features. For the pedestrian survey, researchers had chosen the study area streets based on the level of street tree cover, not the number of pedestrian-vehicular accidents. To make robust inferences about the spatial role of street trees and pedestrian safety, the research team needed a spatial model whose dependent variable was free of spatial dependency, extracted measurements whose attributes were constructed under similar operational conditions and management regimes, and sufficient sample sizes (typically greater than 20) for a regression analysis. These requirements permitted the research team to expand the geographic scope beyond the original study area streets to neighborhoods. Table 3.11 summarizes the pedestrian-vehicle crashes within the original study area street segments and study area communities.

Table 3.11: Study area crash reports: 2013–2017

		Total Reported Vehicle Crashes	Total Pedestrian Injuries		
			Fatal	Non-Fatal	Total
Chicopee		7,683	2	96	98
	Center Street	17	0	0	0
	Springfield Street	13	0	0	0
	Front Street	6	0	0	0
Holyoke		8,345	2	106	108
	Dwight Street	25	0	1	1
	Suffolk Street	29	0	2	2
	Appleton Street	17	0	0	0
Springfield		20,744	16	479	495
	Belmont Avenue (west)	51	0	9	9
	Belmont Avenue (east)	52	0	1	1
	Main Street	32	0	1	1

3.2.2. Hot Spot Analysis

The team used a hot spot analysis to identify statistically significant (at the 95% confidence interval) clusters with many pedestrian-vehicle crashes (hot spots) and few pedestrian-vehicle crashes (cold spots) across the study area communities. Figure 3.9 shows the results of this hot spot analysis.

Notably, this analysis found that Chicopee did not have any cold spot clusters and only a relatively small hot spot cluster (Figure 3.10). This is not surprising, given the relatively less frequent pedestrian-vehicle crashes in Chicopee. The one hot spot was concentrated around multifamily apartment complexes on Walnut Street and Broadway, as well as near the public services on Church Street and Grove Street (e.g. police station, fire station, district court offices). The amount of residential development to the east and destination-based amenities in the area of the hot spot, including public services, small shops, banks, bus stops, and post office, could lead to higher pedestrian volume and risk of pedestrian-vehicular collisions.

In Holyoke, almost the entirety of the downtown was found to be a hot spot for pedestrian-vehicle crashes, with a few small cold spots in the residential areas of the city and on the outskirts of the city's commercial districts (Figure 3.11). Downtown contains many features suggesting it is very walkable: an ample sidewalk network connecting retail and residential areas, single-direction traffic flows, and frequent streetlights and visible crosswalks. Coupled with multifamily residential housing above storefronts, there are predictable reasons for higher pedestrian volumes. The Highlands neighborhood of the cold spot is less developed, surrounded by forest, single-family homes, and less concentrated commercial activity. These amenities make driving a more appealing mode of transportation, with roads that likely have fewer walking pedestrians.

Given Springfield's greater population and greatest number of recorded pedestrian-vehicle crashes, it was not surprising to find a patchwork of hot and cold spots throughout the city (Figure 3.12). The Forest Park and South End neighborhoods (location of the original study area streets) are the most visibly gradient: two major hot spots abutting one another, channeling south from the Metro Center commercial district, followed by an abrupt gap of insignificant crash clusters, then a cold spot of few crashes in the East Forest Park neighborhood. As in Holyoke, the areas of hot spots were largely mixed use, with adequate destinations to encourage walking. The East Forest Park cold spot has fewer commercial services and more sprawled single-family homes. Of all hot spots in this region, the Springfield neighborhoods surface as the most intriguing for further analysis.

Figure 3.9: Hot spot analysis results for pedestrian-vehicle crashes

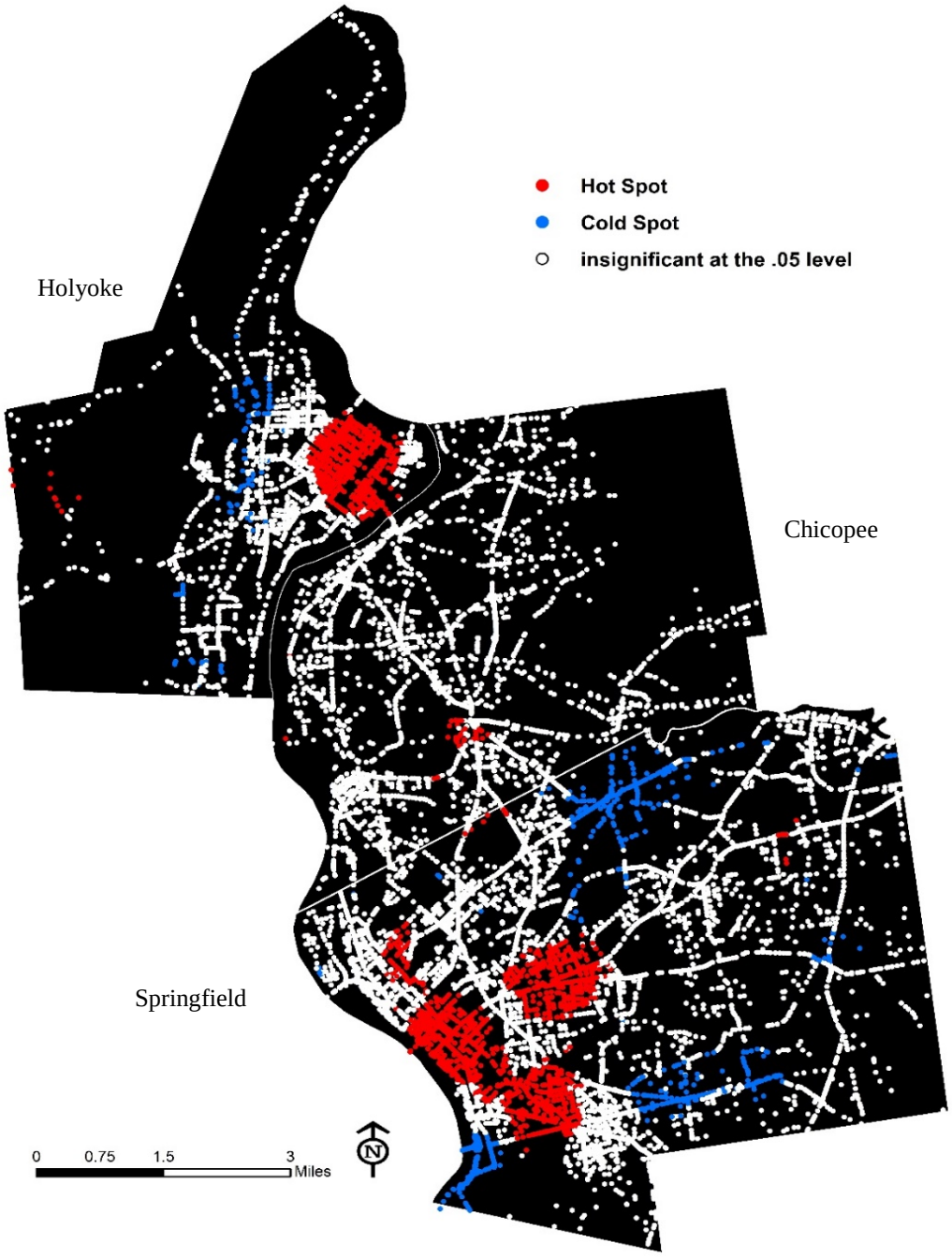


Figure 3.10: Hot spot analysis results, Chicopee

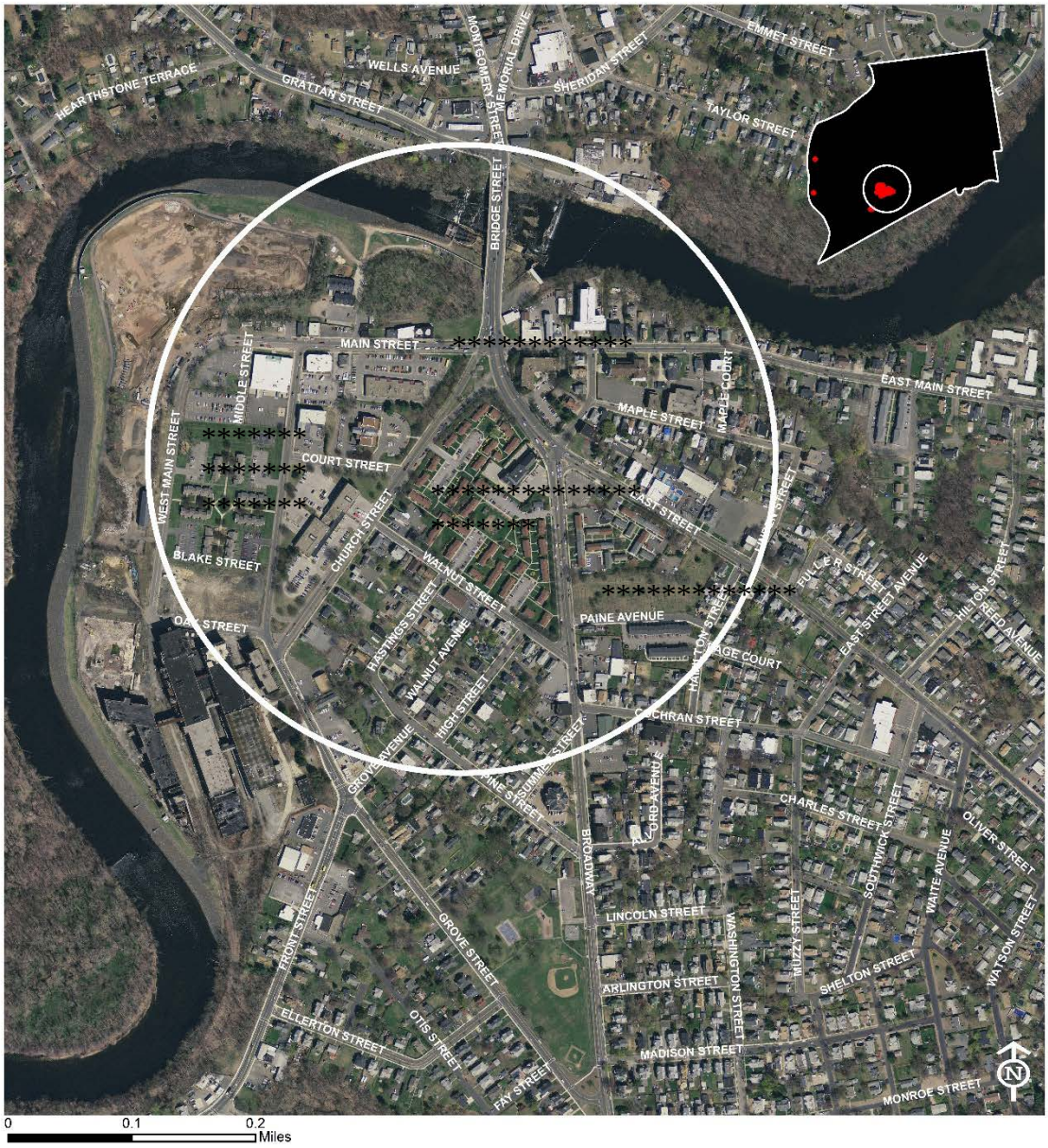


Figure 3.11: Hot spot analysis results, Holyoke

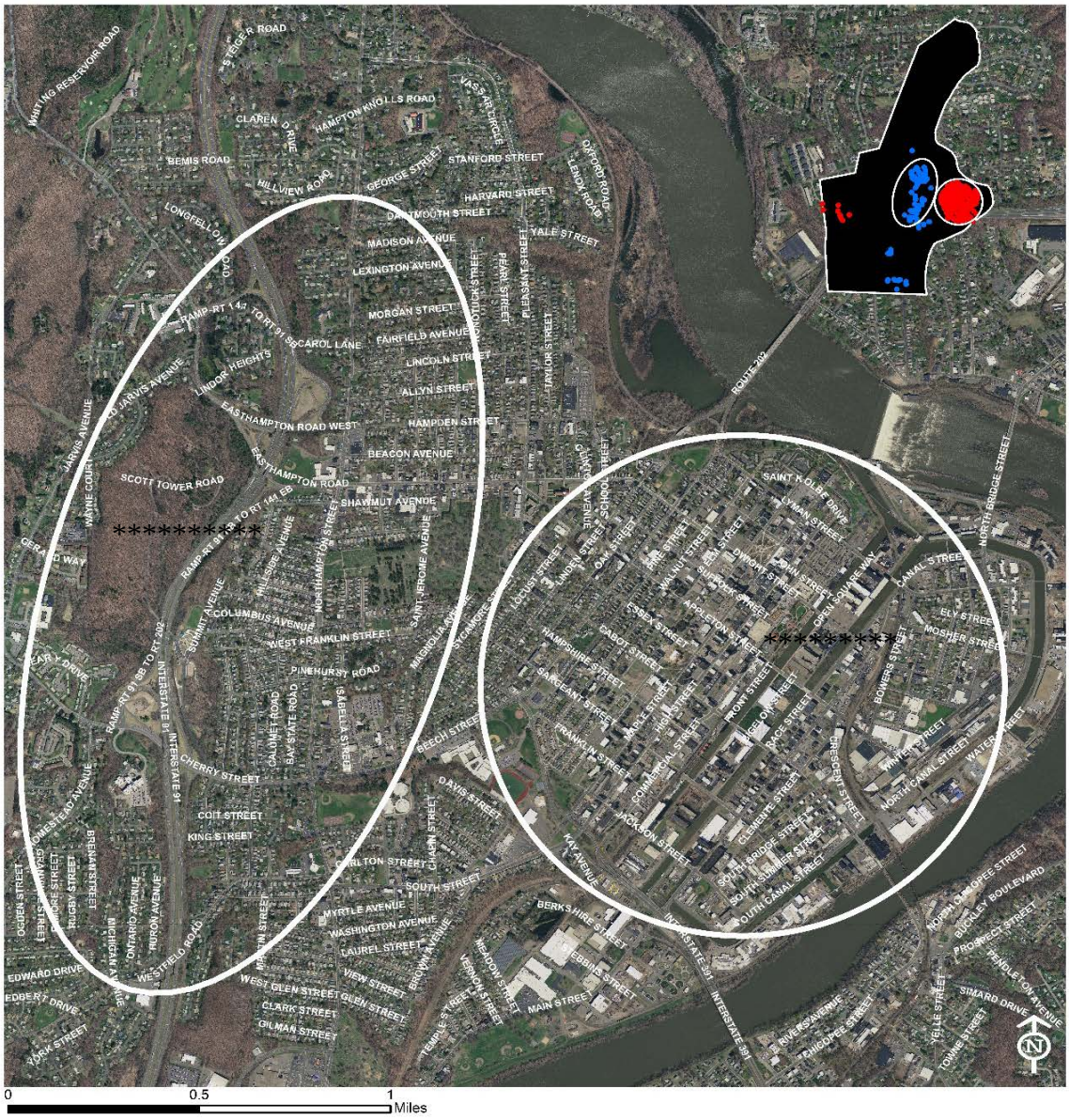


Figure 3.12: Hot spot analysis results, Springfield

3.2.2.1. Study Area for Additional Analysis

A direct corridor from the northern business district of Main Street, this area of Forest Park (known as the "X") is a major node of residential, institutional, and commercial activity in the southern part of Springfield. As noted on the city's web page, "Due to an increase of vehicular and pedestrian traffic along Sumner Avenue, Belmont Avenue, and Dickinson Street in the Forest Park section of the City of Springfield, delays, safety, and connectivity have become a major concern for residents, school-age children, motorists, and business owners" *(90)*. With its many entrance and exit points and counterintuitive "jug handle" turns, the "X" is frequently the site of crashes. The Massachusetts Highway Safety Improvement Program highlighted the main roadway through the South End neighborhood (Main Street) as

a “Top Pedestrian Crash Location.” This area will soon see a $6 million roadway redesign funded by MassDOT *(91)*.

For purposes of this research, the research team chose three major road networks within the South End and Forest Park neighborhoods for analysis: Main Street, Belmont Avenue, Sumner Avenue, and Dickinson Street. The team segmented these streets into approximate two- to three-block “block faces,” following the protocol set by the previously described precedent studies. The team collected, manipulated, and measured the appropriate data, as described in Section 2.4, for these areas. Figure 3.13 shows the frequency distribution of reported pedestrian-vehicle crashes by specific locations, for the 2013-2017 period. Figure 3.14 provides a map of the study area.

Figure 3.13: Frequency distribution of pedestrian crashes by location, 2013-2017

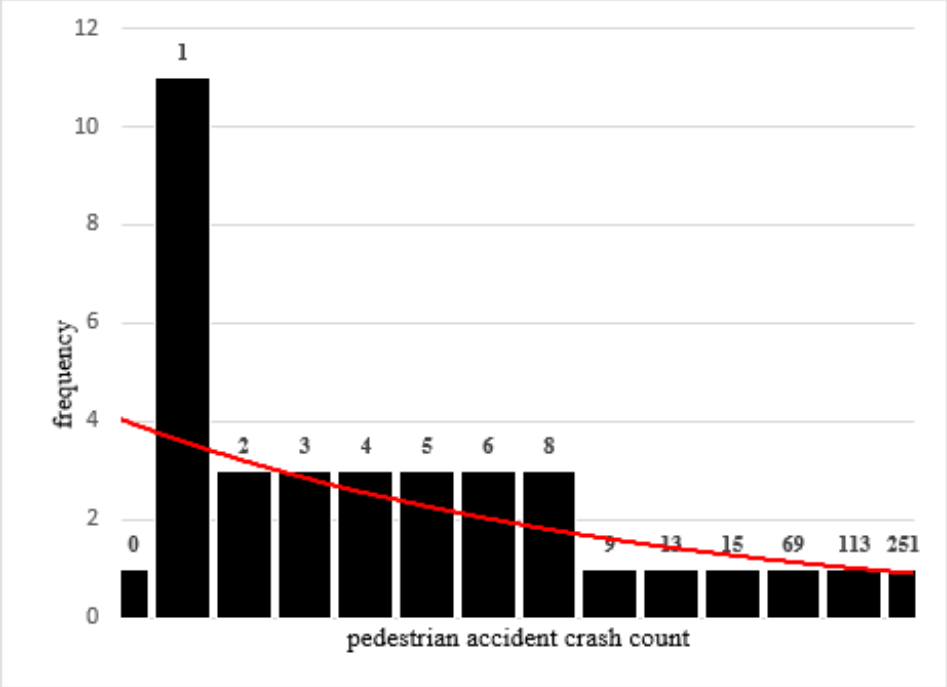
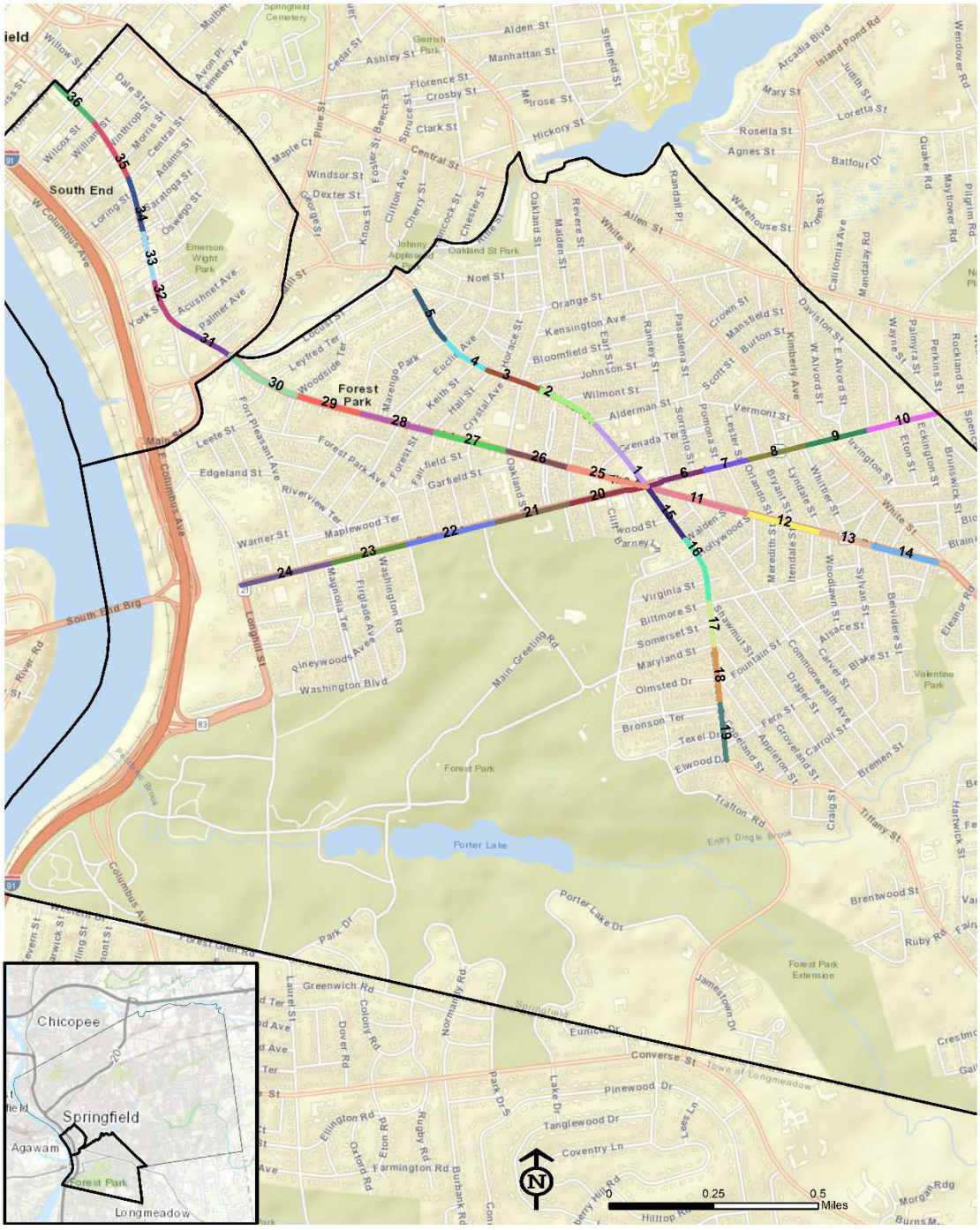


Figure 3.14: Mapping study area



Examples of high and low urban design qualities in the study area are shown in Figure 3.15.

Figure 3.15: Examples of urban design qualities (Google Street View images)

Imageability, high quality

Imageability, low quality

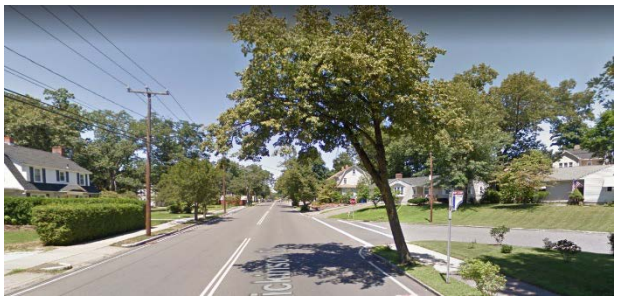
Enclosure, high quality

Enclosure, low quality

Human scale, high quality

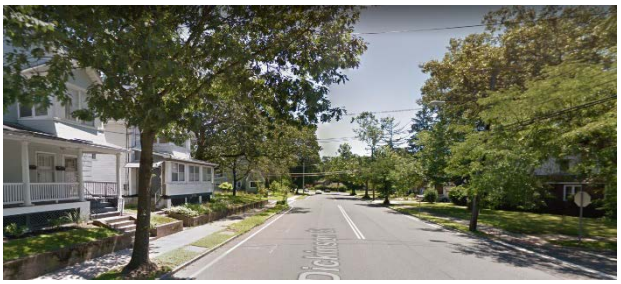
Human scale, low quality

Transparency, high quality



Transparency, low quality

Complexity, high quality



Complexity, low quality

Examples of the street tree projections and allometric equations are shown in Figure 3.16.

Figure 3.16: Examples of allometric equations

Address= 411 Belmont Avenue
Species= White Ash (*Fraxinius americana*)
DBH= 6.28 cm
Height= 5.64 m
Crown spread= 2.77 m

Address= 686 Belmont Avenue
Species= Northern Red Oak (*Quercus rubra*)
DBH= 81.64 cm
Height= 21.13 m
Crown spread= 18.58 m

3.2.3. Mapping Results

The research team estimated three negative binomial models of pedestrian-vehicle crash counts (Table 3.12). Model 1 used the six traditional, control D variables (Density, Diversity, Design, Destination Accessibility, Distance to Transit, and Demographics). Model 2 added the five urban design qualities (imageability, enclosure, human scale, transparency, and complexity) to the D variables. Model 3 added the five street tree characteristics (DBH, crown spread, height, species diversity, and count/12 feet) to the D variables.

All three models resulted in a highly significant likelihood ratio ($p<.001$), indicating a good fit to the data relative to a null model that only uses intercept terms. The likelihood ratio of Model 2 (including urban design qualities) to Model 1 (2.308) and to Model 3 (0.53) indicated that Model 2 significantly better fit the variables.

Distance to closest transit (bus stop) was found to be significant across models, with positive and almost identical coefficients; there are more pedestrian crashes the further one is from a bus stop. Distance to train stations in a Salt Lake City case study *(73)* produced negative coefficients; however, only pedestrian counts (not crash incidents) were part of the dependent variable in that study. In the above models, this is not a surprising finding, considering that bus stops are frequently, though not exclusively, near roadway intersections.

The intersection density within a quarter-mile of the sample areas was also statistically significant in Model 1 and Model 2, but not Model 3. It's negative, though almost zero, coefficients suggest that there are more pedestrian crashes with fewer roadway intersections. This finding aligns with past literature on household travel studies although either intersection variable was insignificant in the New York City precedent study *(71)*; intersection density was only significant in Model 1 for the Salt Lake City case study *(73)*. Considering the amount of 4-way intersections within the study area, none proved to be significant in any of the models.

Block length, as a design variable, is also significant and negative in Models 1 and 2, showing that shorter stretches of roadway increase the incidence of pedestrian crashes. The floor area ratio, or density of development and a proxy of active movement in smaller spaces, is significant within a quarter mile of the sample areas only in Model 1: with a greater amount of buildings, pedestrian crashes increase. This variable becomes insignificant when variables outside of the "controls" are added to the model.

A number of the variables that the research team expected to be significant, especially those that clearly defined heavily commercial areas from heavily residential areas (Walk Score, imageability, transparency) were not. This may be due to the land use matrix for the "X": largely mixed use with isolated pockets of residential-only areas (northern Sumner Avenue, southern Dickinson Street) and commercial- only areas (fragments of Main Street). These trends would seem to be more conducive to the entropy variables to show statistical significance; however, that was not the case here. None of the variables of explicit interest to the research team showed statistical significance. As a whole, however, the five urban design qualities and the street tree characteristics separately did improve the fit of the respective models, which is a meaningful finding.

Table 3.12: Negative binomial models

		Model 1			Model 2			Model 3		
		coefficient	SE	p-value	coefficient	SE	p-value	coefficient	SE	p-value
	intercept	-.586	4.5128	.897	-4.754	5.3936	.378	-.754	4.7059	.873
Density	**Floor area ratio (buffer)**	**17.366**	**8.1561**	**.033 ***	15.234	8.8829	.086	10.444	10.6739	.328
	Floor area ratio (block face)	.096	.8355	.908	.684	1.5745	.664	-.474	1.0606	.655
	Population density (buffer)	-.001	.0012	.385	-.001	.0014	.540	-.001	.0013	.306
Density	Entropy (buffer)	-4.634^{-9}	4.7645^{-9}	.331	-3.629^{-9}	5.2977^{-9}	.493	-3.848^{-9}	4.8563^{-9}	.428
	Entropy (block face)	6.549^{-9}	6.6985^{-9}	.328	2.888^{-9}	8.3949^{-9}	.731	2.556^{-9}	7.8521^{-9}	.745
Design	**Intersection density (buffer)**	**-.022**	**.0080**	**.006 ***	**-.024**	**.0095**	**.013 ***	-.017	.0095	.067
	4-way intersections (buffer)	8.861	12.3628	.474	14.556	15.2850	.341	-.488	14.8869	.974
	Block length (block face)	**-.004**	**.0018**	**.019 ***	**-.004**	**.0019**	**.040 ***	-.003	.0021	.102
Destination accessibility	Walk score	.055	.0646	.391	.044	.0724	.539	.080	.0691	.244
	Retail frontage (block face)	.392	1.0278	.703	1.551	4.6713	.740	.529	1.0255	.606
Distance to transit	**Distance to closest transit (block face)**	**.017**	**.0065**	**.009 ***	**.017**	**.0071**	**.019 ***	**.018**	**.0072**	**.015 ***
Demographics	Household size (buffer)	.007	.0042	.111	.006	.0047	.170	.007	.0044	.130
Urban design qualities	Imageability				.033	.1311	.799			
	Enclosure				-.499	3.8276	.896			
	Human Scale				-1.020	.9937	.305			
	Transparency				-.118	2.3871	.961			
	Complexity				.028	.0996	.782			

		Model 1			Model 2			Model 3		
		coefficient	SE	p-value	coefficient	SE	p-value	coefficient	SE	p-value
Street tree characteristics	DBH							.022	.0343	.523
	Crown spread							-.006	.0212	.770
	Height							.000	.0102	.980
	Species diversity							.075	.1961	.703
	Count/12ft							-2.748	3.4795	.430
Likelihood ratio statistics		**77.232 ***			**79.540 ***			**79.010 ***		

*= significance at the 95% confidence interval (p<.05)

3.2.4. Summary of Mapping Results

In summary, the research team considers the following points to be the most important results related to the role of street trees in pedestrian-vehicle crashes:

1. Street trees may positively influence pedestrian safety when present with other variables typical of a mixed use, urban environment.

2. Street trees should be further considered as part of efforts to improve transparency along a streetscape.

3. There are a number of limitations with this analysis, and more thorough research is needed on a greater number of study sites.

A detailed account of the highlights is reported as follows:

1. The current findings suggest that as separate groups, both urban design qualities and street tree characteristics add to the explanatory power of pedestrian crash incidence while controlling for typical D variables (Density, Diversity, Design, Destination Accessibility, Distance to Transit, and Demographics).

   The improved Likelihood ratio from the D variable model (Model 1) to Model 2 and Model 3 supports summary point 1. As suggested by Ameli et al. *(73)*, it is valuable to see each group of qualities as a suite of conditions that collectively add to safe, walkable environments, which may be more powerful and realistic than compartmentalizing each factor in isolation. This is a practical approach to take when considering the role of street trees and pedestrian safety, since a tree can either be present or absent, and its collective attributes (height, DBH, canopy spread, etc.) are guaranteed to change together as the tree grows over time. With this in mind, the improved model fit with Model 3 indicates that the presence of trees slightly decreases the incidence of pedestrian-vehicle crashes. Additionally, the p-values of both floor area ratio (building density) and retail frontage at the streetscape level move slightly closer to zero with the inclusion of the street tree characteristics, though they are not statistically significant in this model (Model 3). These variables are prominent in the operational definitions of imageability (the quality of a place that makes it distinct and memorable) and complexity (the visual richness of a place), as well as the D control variables. This begin to suggest that street trees may positively influence pedestrian safety when in combination with other environmental variables typical of a mixed use, urbanized environment.

2. Although not reported in the study findings, the research team ran an exploratory fourth model that only considered the urban design qualities and street tree characteristics to explain pedestrian crash incidence without controlling for D variables. Controlling for external factors that influence the independent variables is very important in quasi-experimental research design; however, the variables of tree height and transparency were statistically significant ($p<.05$) in this model. Transparency, or the degree to which activity beyond the edge of a street can be seen

and perceived, was a statistically significant quality in the precedent studies explaining walkability (Ameli et al. *(73)*; Ewing and Handy *(22)*). The authors note that the physical elements that influence transparency include walls, windows, doors, fences, landscaping, and space between buildings, or what can otherwise be interpreted as "cues to care" or physical amenities that are intentionally managed. Street trees and the broader category of landscaping fit within the realm of transparency but were not measured outside of active uses (which only included public parks) during the data collection and aggregation portion of this project. In addition, the idea of tree height is mimicked in the definition of human scale, whereby the size and articulation of physical features match the proportion and speed of walking humans. Street trees have the potential to moderate the perceived scale of tall buildings and wide streets, if they are managed in a way that encourages optimal growth rates. This idea is also similar to that of enclosure, or the quality of features to create a room-like surrounding. Although based on speculative assumptions, these points taken together suggest that street trees should be further considered as part of efforts to improve transparency along a streetscape and support new tree plantings.

3. Those undertaking subsequent research should acknowledge the limitations of this study as those persons develop their own studies. First, the number of sample sites (n=36), while grounded in high-pedestrian crash risk neighborhoods, sites of future roadway redevelopments, and a sufficient size for regression analysis, was still relatively small; the comparable Salt Lake City case study used 179 block face segments, and those authors also felt that their sample should have been larger *(73)*. In addition, readers should note that authors of the precedent studies intended for them to explain walkability, not pedestrian safety. This distinction may require an expanded definition of D variables that contribute to pedestrian safety, such as crosswalks and road bumps (Design), sidewalk connectivity (Diversity), car ownership, and other characteristics that typify a vulnerable pedestrian (Demographics).

   The precedent studies intentionally eliminated quite a few variables related to street trees (e.g. number of trees, number of trees in landscaped beds, proportion of sidewalk shaded by trees) because they proved to be statistically insignificant during the development of initial coefficient weights. The authors absorbed the attributes lost with this removal into related urban design quality features as previously discussed (namely human scale, enclosure, complexity, and transparency). As now operationalized, "parks" are only included in the active use category, and there is no guarantee that a remote measurement of a park can serve as a proxy for vegetation or trees. For the sake of measuring the perceptual qualities of the streetscape, this reallocation is justifiable. However, minimizing the importance of an urban forest canopy and the role of street trees in the pedestrian environment is concerning because of the additional social, environmental, and economic benefits trees can provide. In light of the general consensus that urban greening is a desirable feature in contemporary cities along with the aforementioned urban design qualities, it would be advantageous to recalibrate the original models to include trees and vegetation more directly.

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4.0 Implementation and Technology Transfer

4.1 Lessons Learned

Throughout the course of this research project, there were important points that led to its success and lessons learned. First, working with community partners in the early stages of its development readied the research team with predictable expectations of the conditions of the survey study area locations. Not only were the city planners and municipal staff helpful in providing insights into the people and politics of the selected neighborhoods, these early conversations led to an informed approach for how to assess additional documents and acquire data that were later considered as part of this study.

In addition, given the high proportion of Hispanic, Latino, or Spanish-origin populations in most of the study area communities and neighborhoods of interest, it was crucial for the survey instrument to be adequately translated into Spanish and for the research team to hire a Spanish-speaking student research assistant. Thus, knowing the population and predominant languages of the targeted study areas is critical as is providing materials in alternative language and formats as needed.

The low rates of car ownership in the study areas illustrate the vital importance of improving the pedestrian experience in targeted areas as an environmental justice issue. Planners should include car ownership rates and public transit use as important criteria for prioritizing Complete Street and tree-planting project.

Overall, the study found that safe crossings, crosswalks, and traffic lights were the most important features pedestrians considered when choosing where to walk, followed by sidewalk maintenance. Street trees were also considered to be important, but less so, suggesting that Complete Streets projects and other improvements take a holistic approach to pedestrian planning.

Street trees appeared to make the most difference in perceptions of safety when they provided a buffer between pedestrians and the street. This result suggests that street tree planting and streetscape design incorporate parkway strips and buffer plantings where possible.

A variety of factors influenced perceptions of safety, including the presence and number of trees, overall streetscape design, and adjacent land uses. The initial study results suggest that the cumulative effect of urban design improvements appears to be more than their isolated parts, but researchers note the need for future study in this area.

The study found significant differences in pedestrians' perceptions of safety in a particular street segment compared to their aesthetic responses (e.g., how much pedestrians liked the street). This finding suggests that some pedestrians may choose streets for utilitarian and convenience reasons, due to low rates of car ownership in the study areas, rather than leisure

purposes. Understanding pedestrian motivations can help transportation planners design sidewalk improvements based on important destinations and convenience.

The team found that there was a variation in the amount of pedestrian activity in the study areas, with much lower observed rates of walking in Chicopee, that increased the effort needed to gather survey responses there. This experience suggests the need for future studies of non-walkers to understand the perceived barriers to walking.

4.2 Opportunities for Technology Transfer

The process of transferring the results of this research project to a wider distribution network can occur in a number of ways. From the results of the survey, some findings support the work of previous research and have implications for street redesign standards or planning, especially Complete Streets guidance and technical assistance. Participants preferred to have trees, more than parked cars, buffer them from traffic, which can be useful to keep in mind for "road diets," or streets where parking is reallocated off the street. Participants reported too that traffic speed is less of concern on streets with high tree cover, a finding that suggests that trees moderate perceived safety from vehicular traffic and that supports planting street trees to help create more walkable and livable environments.

In addition, since participants with lower annual income reported greater fear of personal safety from traffic and other streetscape elements than did those of wealthier backgrounds, the findings suggest that socioeconomic status may have a more pervasive influence on perceived sense of safety and that greening and re-greening environmental justice neighborhoods should continue to be a priority at the municipal and state level. Finally, it was surprising to find that on streets with low tree cover, younger adults feel less safe than did both middle-aged and older adults. Given the evidence on the benefits of street tree plantings, this finding offers a compelling reason to plant trees for today's younger generation, so they can be subject to the benefits of the trees within their lifetime.

Since most participants were seemingly supportive of existing street trees and additional tree plantings, the results of this research could serve as a baseline for design charrettes or other participation events that collect public input on the streets or neighborhoods where the researchers distributed surveys. If the goal of a streetscape redevelopment is walkability, the officiating municipal staff member may be able to leverage street tree advocacy with other goals of the new project.

While the MassDOT Complete Streets Funding Program is still in its initial years, it may be unreasonable to expect that every project submission will be funded in full. When a proposed project is not selected for funding, but the need to improve pedestrian safety is apparent, there may be an opportunity for the Complete Streets advising staff to suggest or offer funding resources for the municipality to plant trees or install less permanent tree-based design interventions (e.g., planter boxes) in place of the costlier hard infrastructure. These less costly interventions would still help meet the desired goals of improving pedestrian

safety and extending and supporting Complete Streets principles in participating municipalities.

In addition, there may be ways to leverage existing street tree advocacy and streetscape redevelopment projects that are already happening across major state departments in the Commonwealth of Massachusetts. Programs like Complete Streets and Safe Routes to School are investing in making roadway environments safer for pedestrians, while other public and private tree planting initiatives such as Greening the Gateway Cities and reGreen Springfield are taking strides toward tree installation and survivorship. During the planning and development phases of the street redevelopment projects, there may be opportunities for cross-departmental or community partnerships to support the planting of new trees.

4.3 Implementation Plan

The following details the implementation plan for this research:

1. In late October 2017, the research team presented initial survey results at a poster symposium for the Southern New England American Planning Association (SNEAPA) Conference in Providence, Rhode Island. The team sought professional feedback for interpreting the research results and gained insights on the research objectives' implications for practicing planners.
2. A draft Final Technical Report was presented to MassDOT representatives in February 2018. During this presentation, the team invited study area community partners to review the results and offer feedback.
3. Once the review of the report is completed, the University of Massachusetts Transportation Center will disseminate the Final Technical Report including posting links on its webpage, sending copies to community partners, and creating research briefs for its online newsletter.

4.4 Potential Institutional Barriers

Although the Commonwealth of Massachusetts has progressively offered funding toward a number of initiatives aimed to improve pedestrian safety and plant street trees, a number of potential institutional barriers remain.

As revealed in the literature, pedestrians and planners alike often categorize street trees and vegetation as a form of aesthetics, not a form of infrastructure worth an investment and adequate management planning. Some contemporary planning initiatives, such as MassDOT's Complete Streets Program, are beginning to change this perspective and include trees or planting boxes into the design of pedestrian-friendly streetscapes. During the SNEAPA poster presentation, some planners expressed reluctant excitement for trees, given the need for Americans with Disabilities Act (ADA) Standards for Accessible Design compliance, and constraints when designing for child strollers. Additional concerns related to

trees and pedestrian safety include trees weakened by hazardous weather and natural disasters, and roots buckling sidewalks.

Implementation of new projects may often rely on specific requirements for funding, and if cuts need to be made, planners may substitute trees for other forms of infrastructure that require less maintenance. A planning consultant from the SNEAPA presentation admitted that vegetation and trees are typically the first items they are likely to from a project or design during budget cuts and financial reallocations.

Similarly, as cited by some survey participants, residents and municipal staff alike may hold feelings that there are "enough" trees planted in their neighborhood or city and, subsequently, will not support additional tree plantings. During the SNEAPA presentation, there was mention of one community that has a group of residents interested in establishing a tree committee, especially for the benefit of streetscapes, but they could not garner the political support needed from the Board of Selectmen. In other cases, communities may not have previously funded or have had access to a street tree inventory that would identify the location, health, and characteristics of public shade trees within the municipal limits. One city planner during the SNEAPA conference mentioned that their community needed to partner with a land trust to write a grant for funding to complete such an inventory. The status of these trees would be useful in the planning and design process when pedestrian networks that connect across large spatial areas to practical destinations are a priority.

Another institutional barrier may be the challenges of coordinating between different municipal agencies. Street tree plantings can involve municipal planning, public works and engineering, and city parks and recreation departments, depending upon departments' jurisdiction over public sidewalks and street trees. Some planners at the SNEAPA conference spoke to the management challenges of street trees, such as tree longevity and survivorship, private homeowners' own interventions to replace non-native tree species, or competing interests with overhead utilities. A town tree warden or urban forester can be an important leader in street tree plantings. Holistic streetscape improvements require a collaborative approach to planning, implementation, and maintenance.

Lastly, it is well known that Complete Streets and other initiatives that encourage the planting of street trees represent good planning and design practice. However, it appears that these such initiatives may have the greatest success when incorporated at the beginning of a planning process, such as during Master Plan or Open Space and Recreational Plan updates or alongside other transit-oriented planning phases. In response to the team's SNEPA presentation, some planners recognized how urban trees can bolster other planning initiatives, such as greening within business improvement districts, and the benefit of retaining standing trees during streetscape improvement projects. Others acknowledged how they are slowly beginning to adapt their streetscape design to the management needs of growing trees, such as using "Flexi®-Pave" material around trees to prevent sidewalk buckling or creating a street design manual with robust instructions on how and where to properly plant trees. Since planners can complete the planting of street trees relatively efficiently, it is hoped that street tree planting will be more often be considered in municipal plans and streetscape projects in the future.

4.5 Guidance for Future Planning, Design, and Deployment of Research Findings

With the survey participants' strong support for improve traffic calming on streets, more future planning and design efforts should consider incorporating street trees in redevelopment projects. Many communities in Massachusetts appear amenable to quickbuild or tactical urbanism interventions, whereby planners test a design prototype fairly inexpensively and on a small scale, prior to the full financial and redevelopment commitment to a permanent project. Many planners attending the SNEAPA poster presentation by the research team supported the idea of more trees in their community, citing the air purification benefits from planted trees and the positive influence planted trees often provide for urban wildlife.

The results of this research also support the continued planting of street trees in environmental justice neighborhoods. Attention to urban greening as an effort to improve the quality of life in environmental justice areas is widespread in Massachusetts' Gateway Cities. The current Complete Streets model policies and prioritization protocol in Massachusetts include language on environmental justice/Title VI areas. In line with the results of this research, support for street tree planting should continue in mid-sized cities and neighborhoods where a majority of the population rely on walking as a mode of transportation.

4.6 Guidance for Future Training Associated with This Research

As the MassDOT Complete Streets Funding Program continue to gain momentum, it would be advantageous to include these research findings into the municipal training portion of the program, if the value of street trees is not sufficiently highlighted already. This type of training could also segue into additional material for how to handle situations where there are misconceptions that there are "enough" trees planted.

Similarly, training and workshop opportunities could be initiated at the level of the Regional Planning Commissions (RPCs) and any municipal-based working groups. A number of the RPCs across Massachusetts highlight pedestrian safety and planning as priorities in suburban and urban places, many with recorded written plans. Through subsequent iterations and revisions to these documents, these groups can use the results of this research to link pedestrian safety, street trees, and opportunities for implementation.

Arborists and urban foresters can continue managing urban trees, with attention not only to the health of the plant but also with keeping pedestrians in mind. This means selecting the right tree for the right place and site conditions as well as continually evaluating tree health for potentially hazardous limbs.

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5.0 Conclusions

5.1 Discussion and Recommendations

We present the following highlights as a summary if this research study's discussion and recommendations:

1. The pedestrian survey participants largely used walking for utilitarian purposes and did not own a car, even though they largely did not feel safe walking, suggesting the importance of designing and advocating for spaces that reduce risks to pedestrians.

2. Street trees did positively impact pedestrian safety, but the impact was small and further research is needed

3. Design and policy interventions aiming to enhance neighborhood safety are a first step to encourage walking where it may be inhospitable or improve its existing conditions, and street trees may serve as a compromise towards Complete Streets principles in smaller-scale projects and budgets.

We present the following as a general overview of this research study and the broader implications of its findings:

1. Many of the hypotheses originally developed for this research were met with mixed results.

With the survey on perceived pedestrian safety, the research team expected the following:

- Streets with high tree canopy cover would correlate with higher safety-related responses.
- Streets with high street tree cover and streets with low tree cover would have substantively different safety-related responses.
- Streets with trees (high tree cover or new tree plantings) would be the most preferred street type.
- Sociodemographic variables, particularly age, gender, and factors related to poverty (race, income, educational attainment)would drive differences between safety-related responses.

From the mapping exercise analyzing recorded pedestrian safety, the research team expected:

- Street sections with higher quality urban design characteristics and a greater abundance of street trees (indicators of walkability and safer walking conditions) to lead to fewer pedestrian accidents.

  Within the pedestrian survey, there were important sociodemographic differences that emerged with regard to age and income, where younger adults and those with lower

annual income indicated that felt less safe on streets with low tree cover. Additionally, the mapping exercise showed that as a group, street tree characteristics slightly reduced pedestrian-vehicle crashes. Despite some mixed hypothesis results, the findings presented continue to support a positive link between pedestrian safety and the presence of street trees.

The survey participants largely used walking for non-recreational purposes, such as a means to commute to work, to go shopping, or to do other essential tasks; in large part this is due to the fact that only a limited percentage of study participants owned a car. Thus, the study found that participants spent a considerable length of time walking, driven primarily by utilitarian motivations. This is very relevant to consider when assessing the potential vulnerability of the study areas and neighborhood populations; alongside the national household car ownership rate of 91% and the Massachusetts car ownership rate of 87.8%, only 45% of survey participants owned a car. Perhaps those who are walking would prefer to drive, but due to low socioeconomic status cannot afford to do so. Planners have long made efforts to address safety in planning practice, and the authors hope these results and implications help to serve as a reminder to planning and related professionals about the importance of designing spaces that reduce risks to pedestrians. Risk factors of the built environment interact with each other, and planners should consider this while assessing the overall built and natural environment during the planning, implementation, and evaluation of street re-design programs, like Complete Streets.

Since more than half of the participants use the study area sites every day and live in the neighborhoods of interest, the team expected feelings of safety to increase from a sense of comfort and familiarity with these places. The modest survey results do not show this to be true; most participants did not have high feelings of safety across study area sites or their city neighborhoods. This theme may reflect a pervasive theme in contemporary culture, where less communication with neighbors and the general safety concerns do not permit feelings of calm within public spaces. This is an important takeaway for redevelopment projects aimed to encourage walking or pedestrian activity: just because a project is funded and built does not mean people will comfortably use those updated spaces. Concerted efforts to design places with pedestrians and safety in mind also need to consider facets of livability or features of a setting that offer a high quality of life for residents.

Pedestrian safety is an important facet of livability. There is often a need to recognize and improve livability along many urban walking environments, especially for non-vehicular users and commercial activity. While continuing to support and advocate for street trees in the pedestrian realm, planners can use street trees to help meet livability goals by leveraging place-making, walkability, destination accessibility, traffic safety, and provisioning ecosystem services. Again, these goals are critical to meet and recognize for populations who are utilizing the sidewalk networks most and are exposed to the greatest amount of risk.

2. Overall, street trees did positively impact pedestrian safety, but the impact was small and further research is needed. Trees did not appear to pose an impact on pedestrian vision or sightlines, where streets with more mature trees could pose a lateral visual obstruction, or streets with newly planted trees could block sight lines until they have reached a certain maturity and height. Survey respondents reported traffic speed to be of less concern on streets with high tree cover, suggesting that trees moderate perceived safety from vehicular traffic. Also, participants walking on streets with new tree plantings both prefer and feel safer on streets with high tree cover, which suggests a compelling rationale for not only the planting of new street trees but investing in their stewardship and survival. The mapping results show that as separate groups, both urban design qualities and street tree characteristics add to the explanatory power of pedestrian crash incidence, and it is valuable to consider each group of qualities as a suite of conditions that collectively add to safe walking environments. This is a practical approach to take when considering the role of street trees and pedestrian safety, since a tree can either be present or absent, and its collective attributes (height, DBH, canopy spread, etc.) change together as the live plant grows over time.

   In accordance with theories related to "cues to care" and "broken windows," walkers may enjoy the aesthetic amenities and managed appearance provided by young trees and will subsequently feel safer on these streets as the trees mature (*92, 93*). This calls important attention to the role of land and tree management within the pedestrian realm, which is difficult to generalize across streetscapes due to the inconsistent nature of public and private land ownership near a sidewalk. Managing trees in the public realm would often fall to city foresters, departments of public works, or possibly friends groups or neighborhood associations, while landowners regulate private land. Since it is unreasonable to expect every individual involved in tree maintenance to be savvy in arboriculture, public-private partnerships on behalf of tree stewardship will continue to be important to retain tree health.

3. While it may not be economically or physically practical to retrofit every street in every city into an all-inclusive, traffic-calmed redesign project, street trees can serve as a compromise that incorporates Complete Streets principles into smaller-scale projects and budgets, while still meeting goals of improved pedestrian mobility and community livability.

   Design and policy interventions aiming to enhance neighborhood safety are a first step to encourage walking where it may be inhospitable or improve its existing conditions. These interventions should be tailored to the needs of the populations living within the neighborhoods of interest, alongside other characteristics of the neighborhood, while remaining mindful of underserved areas. Following the planning, implementation and installation of street trees, evaluation of the intervention's efficacy is of the utmost importance, especially to ensure that the benefits are actually reaching the intended populations with greatest risk perceptions and physical vulnerabilities on the streetscape; namely, children, women, elderly and disabled persons, and others relying on walking as a mode of transportation.

5.2 Limitations

This research is not without limitations. Most importantly, the intention of this project was to serve as a pilot study, with findings that could help inform the design and approach of future research. Indeed, the results generated here are quite substantive and a meaningful contribution to the literature on these topics. However, readers should be cautious when extending the findings here to larger cities or population-level inferences.

Many of the observed statistical associations (from both the survey instrument and the GIS analysis) were small in magnitude but potentially important determinants at the population level. With a focus on mid-sized cities, the implications of this research are advantageous for similar land-use patterns (such as downtown areas), which extends the applicability of the results. However, many of the implications may not apply in less-developed rural or suburban settings with different land-use types and less pedestrian focus. It might be worthwhile for future research to study these other settings.

The research team distributed the survey instrument in three similar but separate communities, where they posed the same questions (with exception of the photo preference section) in difference places. Preconceived notions, for example about the safety of a particular area, may have carried into the survey responses based on a particular community a participant lived or worked in. From the survey results, the balance of racial groups was not evenly divided, since the team did not target any specific demographics. This may be justifiable as a representative sample of the users of streets that were surveyed, but a larger sample size would improve generalizability. However, known income and ethnic disparities exist in relation to pedestrian accidents and transportation-oriented designs. Considering the importance of including all pedestrian users as part of transportation-oriented design processes, the authors see a continued need for evidence-based attention to environmental justice areas.

In the survey instrument and its implementation or the GIS analysis, little attention given to the directionality of vehicular traffic or pedestrian movement, including the side of the street on which an accident occurred; both sides of the street and either walking direction were generally weighed evenly within the context of data analysis. Similarly, neither analysis considered or referenced planting strips, a strip of bare soil intended for use in planting trees or other vegetation. Given the importance of microscale environments in walkability, this could lead to faulty assumptions or inferences across larger scales.

The GIS analysis offered little consideration to the role of vehicle drivers in pedestrian accidents and how their behavior or individual characteristics were impacted by street trees or the urban design qualities. If drivers adapt their driving behavior to the characteristics of the built environment, there may be an interesting link between the role of the built environment plus street trees and pedestrian crash frequency. Additionally, the GIS analysis was only as good as its data inputs, and a risk of automation compromises efficiency for site-specific accuracy. Again, many of the important facets of a microscale pedestrian environment are simplified or minimized in spatial data (such as building color or material), so this could be an important consideration for site visits in subsequent studies.

5.3 Possibilities for Future Research

A number of possibilities exist to refine and expand this research project. During the survey distribution, future research teams could recruit specific user groups (neighborhood residents, commuters, parents with children, etc.) to develop group-specific inferences and recommendations. If the teams focus on high-traffic locations that are salient across regions, such as crosswalks or bus stops, the research would produce results that are destination specific and typical of roadway improvement projects. They could also expand this to include additional exposure to traffic threats that exacerbate inadequate pedestrian walking environments, particularly traffic volume and speed. Worthwhile study sites would be those where planners planted trees with purpose within the landscape, such as those serving as a stormwater management best management practice.

Similarly, it would be advantageous to locate a subsequent research study on streets where city planners have designated roadway improvements in the near future as part of a longitudinal study. Not only will the results and outcomes of such research directly inform the success and public perceptions of slated projects, the public attention garnered from participatory research may assist with community engagement and acceptance of the project. This timely research may also lead to interesting conclusions about participant responses, since the projects may not have started but the streets will be changing in the near future.

Given the limited amount of vehicular-pedestrian crash data for the selected study area locations, a minimum count or aggregate number of pedestrian accidents could serve as either a study area criterion or as an additional unit of analysis. Since crash records are an objective measure of pedestrian safety, they could be an important start toward determining the factors of the built and natural environment that create safe or unsafe walking conditions.

Within the survey instrument, future researchers could include additional questions to address the specific psychological benefits or drawbacks of street trees (such as directed attention and restoration, sense of enclosure, and perceived nuisance properties) and how these impacts help create safer walking environments or influence walking behaviors. These aspects are particularly relevant to capture the pedestrian's scenic experience of walking, so researchers can make specific recommendations to the managers of the land on either side of the sidewalk. Since there are other trees and pieces of vegetation that impact a pedestrian's perceptual experience but are not in the public right of way, such as those on land directly adjacent to a sidewalk on private property, there are important research and management implications for what role this greenery plays in perceptual and actual pedestrian safety (either in tandem with or isolated from the street trees this report examines). Additionally, understanding the role of enclosed walking spaces created by trees and vegetation would be an important scholarly contribution.

Outside of field research, there is value in conducting remotely based analyses. Using historic crash data of selected study area streets, a replicated study could measure how microscale changes (especially tree planting or growth) influence pedestrian-vehicular crash occurrence change over a designated amount of time. Similarly, research using historic

remote sensing data, including available LiDAR data, could automate the process of extracting data related to landscape history.

Other future research could include participant input in a simulated environment as opposed to a “real world” field setting. Such a controlled setting would eliminate many of the barriers encountered during the site selection process (ensuring constant land use, roadway characteristics, etc.) and possibly permit greater generalizability of the results if a greater sample size could be more efficiently surveyed. It would also allow the research team to control the demographics of the sample, especially for characteristics that may influence the worldview of the participants and that are important determinants of vulnerable pedestrians (age, income, car ownership, race, gender, etc.). Simulation technology may also allow the team to manipulate and change critical variables of a walking experience on a streetscape, especially those related to street trees (presence/absence, height, canopy, DBH, spacing, setback distance, etc.) and Complete Streets (plantings strips, benches, curb bump-outs, crosswalks, parked cars, traffic volume, etc.). The addition, combination, or alteration of any of these elements will help to reveal the preferences of the participants and under which conditions tree plantings are more accepted or desired.

In conclusion, urban street trees are an important aspect of overall pedestrian safety and walkability that planners should include as part of streetscape improvements, especially in neighborhoods where populations rely on walking as their prime mode of transportation. There are a number of ways to expand on this research by targeting specific study area locations, particular pedestrian user groups, or various stages of streetscape planning and development. The authors also suggest the need for studies of newly completed projects to determine if they are achieving their proposed walkability goals.

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7.0 Appendices

7.1 Appendix A: Annotated Bibliography

1. Brooks, K.; Kelley, W.; and Amiri, S. 2016. "Social equity of street trees in the pedestrian realm." ***Papers in Applied Geography*****, 2(2): 216-235.**
The authors hypothesize that SES is negatively correlated with the presence of street trees in Spokane, Washington in a study that highlights the role of public policy in ensuring equitable access to a high-quality pedestrian experience. Analyzing GIS data on pedestrians and street tree presence through an ordinary least squares (OLS) model, spatial autocorrection (SA), and optimized hot spot analysis in order to understand how street trees were distributed through the city. Their findings confirmed their hypothesis that higher SES was more likely to have access to street tree canopy cover, which the authors associate with social and ecological well-being. This study is fairly unique in attaching so much social and ecological value to street trees, especially with regards to social inequity and the role of public policy in democratizing access to the benefits of street trees. Furthermore, the study was conducted in a small city where there is less density and land mix use within neighborhoods, similar to many of the smaller cities in Massachusetts that are potential candidates for our study.

2. Choi, J.; Sanyoup, S.; Dongchan, M.; Lee, D.; and Sungkyu, K. 2016. "Human-centered designs, characteristics of urban streets, and pedestrian perceptions." ***Journal of Advanced Transportation*****, 50: 120-137.**
In Seoul and 3-bedroom communities in South Korea, the authors interviewed pedestrians walking in streets to understand how they felt about the physical conditions and utility of their sidewalks. Referencing classic research by Appleyard and Jacobs, the authors hypothesized that increased levels of pedestrian satisfaction would occur as a consequence of applying human-centered design and that certain street design features would affect pedestrian satisfaction levels more strongly than others. The authors inherited interview data from the Seoul Metropolitan Government, which limited the sample to walking pedestrians, not other transit users. The results indicate that pedestrian satisfaction scores greatly increased when pedestrians used wider sidewalks. In contrast, scores remained low in urban streets where pedestrian volume was high, where many travel lanes (or wider travel lanes) existed, and where vehicle speeds were high. The presence of planting strips was the most important factor for increasing pedestrian scores. Pedestrians encountering conventional street design feel crowded when pedestrian volume increases but pedestrians in human-centered street design feel comfortable regardless of whether they walk within crowded pedestrian flows. The results indicate that human-centered street design is preferred by pedestrians. The authors developed a strong quantitative methodology, but rely on streetscape elements as proxy of satisfaction, and included no emotionally-driven survey questions.

3. Ettema, D.; Friman, M.; Garling, T.; and Olsson, L. 2015. "Travel mode use, travel mode shift and subjective well-being: Overview of theories, empirical findings and policy implications." ***Mobility, Sociability, and Well-Being of Urban Living*****. Ed.**

Wang, D and Shenjing, H. Springer: Berlin.
At Karlstad University in Sweden, Ettema et al. developed a survey tool to measure experienced travel quality (self-reported satisfaction with travel scale, or STS) as a way of understanding how individuals' subjective well-being changes with travel improvements. With the goal of understanding the relationship between switching from driving to using public transport and overall well-being as well as satisfaction with travel, the authors chose to develop the survey tool using theories of subjective well-being, or context-specific life satisfaction (Kahnemann 1999), rather than theories of decision utility (McFadden 1999). Based on a survey of 155 undergraduates at the university in which participants evaluated hypothetical day-long schedules with different mixtures of travel modes, the authors found that participants had the most positive mood associations with cars, short travel times, and easy access to bus stops. They concluded, as does other literature, that there is a relationship between travel quality and overall well-being, but that STS needs further testing in order to evaluate its use and accuracy as a measure of understanding subjective well-being. This study contains deep quantitative analysis and a compelling focus on mood as subjective to travel mode, but the quantitative preference-ranking survey left little room for participants to explain their preferences.

4. Ewing, R.; Handy, S.; Bornson, R.C.; Clemente, O.; and Winston, E. 2006. "Identifying and measuring urban design qualities related to walkability." ***Journal of Physical Activity and Health*****, 3: 223-240.**
This study is Ewing et al.'s attempt to capture individual responses to aspects of the built environment, hypothesizing that pedestrian perceptions of physical features in part constitute overall walkability and thus walking behavior. As in other Ewing studies, the authors collaborated with a panel of urban design experts to operationalize a list of street qualities based on a series of over 200 video clips of streets in cities across the United States. The authors defined the following as quantifiable aspects of the built environment that directly affect pedestrian perception and thus walkability: imageability, or memorable character of the street; visual enclosure, as measured by proportions of vertical and peripheral enclosure; human scale, or how the built environment relates to the size, scale, and movement of the human body; transparency, or how far people can see beyond the edge of the street environment through elements such as windows and fences; complexity, visually speaking; linkage, or connectivity; coherence; and tidiness. The authors claim that these aspects of the built environment account for more than 95% of overall walkability in urban areas based on ratings by the expert panel and repeat similar research on these qualities in "Measuring the Unmeasurable" (Ewing 2009). This study is useful for concrete definitions of urban design qualities, but focuses on large cities, is solely concerned with aesthetics, and uses a small nonrandom focus group sample.

5. Faulkner, G.; Richichi, V.; Buliung, R.; Fusco, C.; and Moola, F. 2010. "What's "quickest and easiest?": Parental decision making about school trip mode." ***International Journal of Behavioral Nutrition and Physical Activity*****, 7 (62): 1-11.**
Active School Transport (AST) is a framework to help understand the influence of policy, neighborhood, and family interaction in a parent's decision in how their children get to school. The parents are the ultimate decision makers, and those decisions can be influenced by the physical and social environment of their neighborhood as well as acknowledged social

norms. The authors recognize that there is not a single answer in decision to have children walk to school, but contextual compounding variables (e.g. inconvenience, inclement weather, and safety concerns) are usually the most important perceived barriers to active school travel. Most of the related research to date has been qualitative, but the goal has been to identify the barriers and facilitators to mode choice. Theories of behavioral economics may be the most compelling to answer these questions, whereby each decision is weighed alongside the characteristics of the circumstance in which the decision is made. In this study, the authors found that convenience was a salient theme amongst parents, especially those that found it necessary to complete multi-activity trip chains. Micro-level urban form features are important to the decisions of walkability, but the correlates of time and convenience are most influential.

6. Harvey, C. and Aultman-Hall, L. 2015. "Urban streetscape design and crash severity." ***Transportation Research Record: Journal of the Transportation Research Board*****, v2500 (201501): 1–8.**

In this study on the relationship between streetscape design and street user safety in New York City, the authors found that crashes on more enclosed, human-scale streetscapes are less likely to be severe, while crashes on or at intersections of arterial streets are more likely to be severe. Specifically, crashes on streets with tree canopy enclosure are 51% less like to result in injury or death than crashes on streetscapes without trees. The authors use a GIS method for block-by-block measurement of fundamental design characteristics (e.g., width, height, continuity of edges) forming a streetscape skeleton that is elemental to user perceptions of spatial scale and enclosure in NYC. The data set underrepresented pedestrian involvement: pedestrians were only counted in the crash statistics if they were injured or killed. Streetscape design variables included: width (distance between edges (building-to-building across street), length (centerline distance between intersections), height (average building height, highest side), cross-section proportion (width/length), street wall continuity (proportion of edge that intersected adjacent or non-adjacent buildings), and buildings per length (#of buildings along both sides of a segment), and tree canopy coverage (proportion of area covered between edges). The perspective is from the driver and only focuses on urban design and crashes that induce injury but speaks explicitly to street trees playing a positive role in street user safety.

7. Henderson, H.; Child, S.; Moore, S.; Moore, J.; and Kaczynski, A. 2016. "The influence of neighborhood aesthetics, safety, and social cohesion on perceived stress in disadvantaged communities." ***American Journal of Community Psychology*****, 58: 80-88.**

Henderson et al. examined the relationship between neighborhood characteristics and perceived stress among primarily low-income African-American women in Greenville, North Carolina, hypothesizing that better aesthetics, higher perceived safety from crime, and greater social cohesion would reduce perceived stress. Their survey of 394 Greenville residents, conducted through the Greenville Healthy Neighborhoods Project, supported this hypothesis, although gender did not appear to be a moderator of perceived stress as they had expected. This study, although locally applicable to Greenville because of its sampling methods, is significant for expanding the literature on mental health and green space to include the relationship between neighborhood design elements and mental health, and also for centering the wellness needs of marginalized populations in a study on urban design.

8. Jung, H.; Sae-Young, L.; Kim, H.; and Lee, J. 2017. "Does improving the physical street environment create satisfactory and active streets? Evidence from Seoul's Design Street project." ***Transportation Research,*** **Part D, 50 (22): 269-79.**
Jung et al. evaluated the impact of the street improvements on pedestrian satisfaction and volume before and after the implementation of Design Street Project initiatives on streets in the city of Seoul, Korea through repeated surveys during 2009 and 2012. Hypothesizing that street improvement projects would lead to both increased pedestrian satisfaction and volume, the authors found that while pedestrian satisfaction levels at Design Street locations increased significantly after improvements, pedestrian volume did not significantly increase at Design Street locations relative to non-improved streets within the same time frame. The study also highlighted the importance of street trees in pedestrian satisfaction levels, while noting that other microscale factors including street furniture and sidewalk width did not appear to significantly affect pedestrian satisfaction, a finding that is inconsistent with Kim et al's research (2014) and other literature. Jung et al emphasize that while the Design Street Project had a significant positive impact on pedestrian experience, the project had a limited ability to cause new pedestrian behavior, and multiple scales of urban design strategies beyond single-street-scale improvements are necessary for developing pedestrian-oriented cities.

9. Lovasi G.; Schwartz-Soicher O.; Neckerman K.; Konty K.; Kerker B.; Quinn J.; and Rundle, A. 2012. "Aesthetic amenities and safety hazards associated with walking and bicycling for transportation in New York City." ***Annals of Behavioral Medicine.*** **45: 76-85.**
With focus on the public health benefits of active living, the authors evaluated the associations of aesthetic and safety characteristics with active transportation by walking or bicycling, while adjusting for potential confounding by neighborhood walkability, neighborhood composition, and individual sociodemographic characteristics. Results of various regression models showed that increased street tree density was more strongly associated with active transportation within low-poverty ZIP codes. Street trees were an insignificant variable in the models, but do show that: for a one unit increase in exposure to traffic risk, street trees only contributed to a 3% higher frequency of traffic risk in women and 2% higher frequency in men; there is a negative association with the presence of street trees in high-poverty neighborhoods and a 10% higher frequency of traffic risk in low-poverty neighborhoods. In terms of those using active transport, street trees only contributed to an 11% higher frequency of traffic risk in women and 3% higher frequency in men; there is a negative association with the presence of street trees in high-poverty neighborhoods and a 10% higher frequency of traffic risk in low-poverty neighborhoods. The authors recognized that these associations were generally small in magnitude, but potentially important determinants of active transportation at a population level.

10. Mjahed, L.; Frei, C.; and Mahmassani, H. 2015. "Walking behavior: The role of childhood travel experience." ***Transportation Research Record: Journal of the Transportation Research Board,*** **No. 2495: 94-100.**
The authors identified an interesting connection between childhood walking behavior and adult walking as a mode of transportation. The related research is typically attributed by themes, each with supporting literature: habits, built environment, self-selection, attitudes,

childhood travel socialization, and the life-course perspective. The results of walkability studies raised ambiguity as to whether individuals walk more because the environment is walkable or whether they chose a walkable environment because they were initially more likely to walk. The survey results suggested the existence of a relationship between travel behavior during childhood and the determinants of walking behavior during adulthood. The results also suggested that the determinants of walking differed on the basis of the individual's region of residence. These results might suggest that transportation policy at the childhood level could result in benefits not only during childhood but also throughout the life cycle of the individual. This study is especially relevant to and supports the mission of MassDOT's Safe Routes to School program.

11. Pollak, K.; Kercher, C.; Frattaroli, S.; Peek-Asa, C.; Sleet., D.; and Rivara, F. 2012. "Toward environments and policies that promote injury-free active living- it wouldn't hurt." ***Health & Place*****, 18: 106-114.**

The authors pointed out the pervasive contradiction between the CDC's recommendation to promote outdoor recreation and activity levels in children and the inadequate policies and infrastructure supporting safe play outdoors. Similar to the ideas of accident risk exposure referenced in the above articles, the field of injury prevention used injury prevention frameworks to identify causes and contributors of injury. The authors used the Haddon Matrix, which also addresses the various phases (pre-/during-/post-accident) and the host, vector, and physical-/socio-cultural environment (which includes the built environment and human interaction with it as well as the availability and access to recreational spaces). Elements of the streetscape, including street trees, fell in the pre-injury phase, or the strategies used to mediate injury to an individual; the authors claim that these offer the most promise in minimizing injury. The most effective interventions for pedestrian safety involved ecologic-level changes to the built environment (physical and policy enforcement). The behavior of pedestrians and activity-goers is influenced by the availability of resources that create contingencies which increase or reduce the likelihood of an injury. While an important article, the authors neglected to report the role of planning in street-based interventions that impact children and safety (alluding to design as 'engineering').

12. Rosenblatt, J.; Kweon, B.; and Maghelal, P. 2008. The street tree effect and driver behavior. ***Institute of Transportation Engineers*****: 69-73.**

This article began, "Street trees are dangerous, difficult to install and expensive to maintain, but there is not a transportation engineer who has not had to negotiate tree planting or tree preservation to reach project completion. Engineering design and transportation planning guidelines consider street trees obstacles in the roadside environment." The authors suggest that the "no trees" guidelines are housed in the American Association of State Highway and Transportation Officials and consistently reiterated into municipal manuals and standards- is this the case in Massachusetts? Traditionally, roadside features were designed for the safety performance of roadway drivers. Considering the work of Berlyne (visual complexity, psychology) and Lynch (legibility, urban design), the authors theoretical claim supported that street trees provide a perceptual edge along the roadway, along with other visual complexities (texture, color) that positively impact attention and alertness while driving while separating the roadway from the contextual environment, offering an edge that contributes to feelings of familiarity and comfort. The results from the driving trials in the

simulator indicated that the street tree effect may provide positive safety benefits for drivers. Increases in driver perception of safety had a significant relationship with increases in driver perception of edge. The addition of curbside trees significantly increased driver perception of spatial edge.

13. Schneider, R. 2013. "Theory of routine mode choice decisions: An operational framework to increase sustainable transportation." ***Transport Policy,*** **25: 128–137.**
The author proposed an operational theory of how people make decisions on their transportation mode. In order: 1. People must be aware of a mode and have it available as an option to travel to an activity and at the beginning of the mode choice process (awareness and availability). 2. People seek to travel to activities using a mode that they perceive to provide a basic level of safety from traffic collisions and security from crime (basic safety and security). 3. People seek travel to activities using a mode that requires less time, effort, and money (convenience and cost). 4. People seek to travel to activities using a mode that provides them with personal, physical, mental or emotional benefits; helps them achieve social status or makes them feel good about benefiting society or the environment (enjoyment). 5. People who choose a mode regularly are more likely to use it as an option in the future (habit). From the author's perspective, street trees fall under "enjoyment." He acknowledges them as a safety and security strategy but does not offer further details on the specific attributes of the trees that enhance perceptions of safety. In his qualitative analysis, quite a few participants mentioned street trees. "Some interviewees mentioned that roadways with high-speed, high-volume automobile traffic prevented them from walking to nearby destinations because they were concerned about safety: 'I can't walk there because of the cars that are speeding…and it really bothers me because it's one little green open space that I could walk to…within 500 yards of my house, but I can't get there because of the traffic.' Interviewees provided many individual, social, and global reasons why they enjoyed walking and biking, e.g. 'It's a beautiful block with beautiful trees, and I love walking down that street.'

14. Stamps, A. and Smith, S. 2002. "Environmental Enclosure in Urban Settings." ***Environment and Behavior,*** **34 (6):781-94.**
Stamps and Smith conducted an international, urban-focused study quantifying the factors affecting individuals' sense of enclosure in urban settings. 36 Queensland University of Technology (Australia) students were asked to judge which of a pair of photos of streets in Paris was more enclosed; photos differed in picture format, amounts of midground and foreground, depth of scene, lightness, and whether movement at the front of the scene was permitted at both sides, one side, and neither side. This study was concerned with the psychological factors affecting preference for different elements of enclosure, as well as codifying those elements as they manifest in the urban environment.

15. St-Louis, E.; Manaugh, K.; Lierop., D.; and El-Geneidy, A. 2014. "The happy commuter: A comparison of commuter satisfaction across modes." ***Transportation Research Record,*** **Part F, 26: 160-170.**
The authors compared the satisfaction levels of people in Montreal, Canada who commute to McGill University as pedestrians, cyclists, train users, drivers, metro riders, or bus riders. The found that pedestrians, train users, and cyclists expressed significantly higher mean

satisfaction levels than drivers, metro users, and bus users. Based on preceding literature and a survey of 3377 single-mode commuters, the researchers defined the factors influencing commuter satisfaction as occupying a spectrum from external (time taken, weather, etc) to internal (personal preferences such as the desire to be productive during a commute, privacy preferences, etc.). People who saw an inherent value in their commute (the ability to be productive on the train, for example), tended to express higher satisfaction levels, and life satisfaction levels also tended to increase with commute satisfaction. This study differentiated between many types of public and active transportation, and the authors' findings on how productivity and privacy preferences influence commuter satisfaction are relatively unique among researchers interested in travel mode choice.

16. Stoker, P.; Garfinkle-Castro, A.; Meleckidzedeck, K.; Odero, W.; Mwangi, M.; Peden, M.; and Ewing, R. 2015. "Pedestrian safety and the built environment: A review of the risk factors." Journal of Planning Literature, 30 (4): 1-16.

In this literature review, the authors supported the ideas that the solutions to reducing pedestrian injuries are within the range and control of planners and that the built environment is a leading factor which supports or reduces physical safety. The authors first categorized pedestrians by type: children have been consistently shown to be at risk for traffic accidents, especially those living in low SES; in low-income places, girls and women use walking as a form of transport more than men (an understudied area of research); walking is an important form of independence for the elderly and is an important transit form, especially when they live near their particular service needs; intoxicated, distracted, and disabled pedestrians are also at a higher risk of traffic accidents. At the regional scale (considering density and sprawl) and the local level (roadway design), the built environment continues to show adverse relationships between pedestrians and traffic safety, in the form of visibility, traffic volume and speed, and distribution of land uses. The authors distinguished engineering approaches of traffic calming (reducing vehicle speed, etc.) from urban design and planning interventions. The authors concluded that the role of planning is to understand pedestrian safety during project implementation and evaluation (monitoring), actively address these risks by supporting mixed use development and accessibility, and to provide strong advocacy for pedestrian safety in the policy and implementation realms.

17. Van Cauwenberg, J.; Van Holle, V.; Simons, D.; Deridder, R.; Clarys, P.; Goubert, L.; Nasar, J.; Salmon, J.; De Bourdeauduij, I.; and Deforchse, B. 2011. "Environmental factors influencing older adults' walking for transportation: A study using walk-along interviews." ***International Journal of Behavioral Nutrition and Physical Activity*****, 9 (85): 1-11.**

Van Cauwenberg et al. conducted an international urban and peri-urban study on walking habits in older adults in various cities in the Netherlands using open-ended walking interviews along routes the participants were familiar with. Factors influencing the decision to walk and the experience of walking that emerged from the interviews included: access to public transit and stores, quality of walking facilities including sidewalks and crosswalks, traffic safety, crime safety, social contacts and a sense of familiarity, aesthetics, and weather. In this study, participants tended to feel positively about trees and other natural elements and grouped them under "aesthetics" along with the attractiveness of the surrounding architecture and sense of openness or enclosure. This study is significant for its focus on older adults and

the rich data captured through the walking interview process.

18. Yu, C. 2014. "Environmental supports for walking/ biking and traffic safety: Income and ethnic disparities." ***Preventive Medicine,*** **67: 12-16.**
Using the "3Ds" transit-oriented development framework of Density, Diversity, and Design, the author studied pedestrian and cyclist traffic safety in the context of economic and racial inequality. The author notes the inequitable distribution of safe walkable and bikeable environments across neighborhoods with different income statuses and ethnic compositions. In the author's study in Austin, TX, the poverty rate and Hispanic population percentage as well as sidewalk completeness and land use mix were simultaneously positively related to the percentage of people that walked to work and subsequent pedestrian crash rates**.** Results supported that people living in high-poverty areas are more likely to bike to work but their environments do not provide enough safety for them, while areas with a whiter population do offer a safe environment for pedestrians. The author viewed this income and ethnic disparity as an environmental justice issue, which is an important link for the synergy of sustainable development, the sustainable city movement, and pedestrian safety in policy, design, and planning.

7.2 Appendix B: Study Area Location Profiles

7.2.1. Neighborhood Sociodemographic Statistics

Here, percentages indicate the percentage of the city represented by each neighborhood. This data was derived from 2010 census *blocks and **block groups. Please note: Census designation boundaries do not perfectly align within neighborhood boundaries, so some data is not exact and may be slightly be over- or underestimated.

			Race*								
City	Neighborhood	Total Pop*	White	Not White	Black	Hispanic	Native	Asian	Pacific Islander	Other	Multiple
Chicopee	Chicopee Center	8230	6107	2123	254	1633	18	63	2	41	112
		15%	74%	26%	3%	20%	0%	1%	0%	0%	1%
Holyoke	Downtown	5312	1043	4269	132	4027	12	37	0	6	55
		13%	20%	80%	2%	76%	0%	1%	0%	0%	1%
Springfield	Forest Park	26431	9664	16767	4350	10141	67	1592	9	55	553
		17%	37%	63%	16%	38%	0%	6%	0%	0%	2%
Springfield	South End	4155	829	3326	590	2593	10	65	1	7	60
		3%	20%	80%	14%	62%	0%	2%	0%	0%	1%

		Age*							**Gender***	
City	Neighborhood	Under 18	18-24	25-34	35-44	45-54	55-64	65+	Male	Female
Chicopee	Chicopee Center	1803	1051	1240	1056	1044	862	1174	3764	4466
		22%	13%	15%	13%	13%	10%	14%	46%	54%
Holyoke	Downtown	1562	762	786	613	607	474	508	2558	2754
		29%	14%	15%	12%	11%	9%	10%	48%	52%

Springfield	Forest Park	7746	3041	3806	3453	3338	2588	2459	12588	13843
		29%	12%	14%	13%	13%	10%	9%	48%	52%
Springfield	South End	1232	574	707	468	515	349	310	1965	2190
		30%	14%	17%	11%	12%	8%	7%	47%	53%

		Residential Household Characteristics*				
City	Neighborhood	Total occupied households	Owner occupied households	Owner occupied households - household size (mean)	Renter occupied households	Renter occupied households - household size (mean)
Chicopee	Chicopee Center	3541	1393	1.36	2148	1.16
			39%		61%	
Holyoke	Downtown	2147	362	0.96	1785	1.37
			17%		83%	
Springfield	Forest Park	9663	4176	1.87	5487	1.70
			43%		57%	
Springfield	South End	1847	159	0.71	1688	1.07
			9%		91%	

		Household Income **						
City	Neighborhood	<$25,000	$25-34,999	$35-49,999	$50-74,999	$75-99,999	$100-149,999	$150,000 +
Chicopee	Chicopee Center	1579	475	418	586	422	216	80
		42%	13%	11%	16%	11%	6%	2%
Holyoke	Downtown	1692	311	360	89	137	28	12
		64%	12%	14%	3%	5%	1%	0%

Springfield	Forest Park	3391	993	1262	1408	1083	775	315
		37%	11%	14%	15%	12%	8%	3%
Springfield	South End	1206	293	138	272	30	8	21
		61%	15%	7%	14%	2%	0%	1%

		Educational Attainment**						
City	Neighborhood	No School	Less than HS	HS grad/ GED	Some College	Associates	Bachelors	Graduate degree
Chicopee	Chicopee Center	82	1251	1915	1127	454	725	290
		1%	22%	33%	20%	8%	13%	5%
Holyoke	Downtown	119	1720	935	494	177	172	97
		3%	48%	26%	14%	5%	5%	3%
Springfield	Forest Park	366	3428	4336	2648	930	1973	1726
		2%	23%	29%	18%	6%	13%	11%
Springfield	South End	118	845	656	364	17	193	155
		5%	38%	29%	16%	1%	9%	7%

		Environmental Justice block groups**				
City	Neighborhood	EJ block groups/ total block groups in neighborhood	Minority	Income	Minority + Income	Minority + Income + English Isolation
Chicopee	Chicopee Center	5/8		3	2	
		63%				
Holyoke	Downtown	8/9			4	4
		88%				
Springfield	Forest Park	19/21	6		12	1
		90%				

Springfield	South End	4/4			3	1
		100%				

7.2.2. Study Area Location Tree Inventory

Street	Tree Cover Type	SPP	DBH (cm)	Spread (ft)	Location	Cond	Deadwood_(%)	Height_(ft)	Description
Appleton Street	new	honey locust	5.26	3.5	street	good	less than 25	6	
Appleton Street	new	oak spp	6.47	5	street	good	0	6	
Appleton Street	new	honey locust	4.85	5	street	good	0	6	
Appleton Street	new	unk	5.26	2.5	street	good	0	6	
Appleton Street	new	maple spp	5.66	4	street	good	0	6	
Appleton Street	new	oak spp	6.07	4.5	street	good	0	6	
Appleton Street	new	oak spp	5.66	4	street	good	0	6	
Appleton Street	new	honey locust	5.26	2.5	street	good	0	6	
Appleton Street	new	honey locust	5.66	4	street	good	0	6	
Appleton Street	new	unk	33.17	13	street	good	less than 25	36	
Appleton Street	new	honey locust	52.58	20	street	good	25-50	36	
Appleton Street	new	unk	64.71	23.5	street	good	less than 25	48	
Appleton Street	new	maple spp	44.09	18.5	street	good	25-50	24	
Appleton Street	new	maple spp	56.62	23.5	street	good	less than 25	42	
Appleton	new	honey	54.60	20.5	street	good	less than 25	48	

Street	Tree Cover Type	SPP	DBH (cm)	Spread (ft)	Location	Cond	Deadwood_(%)	Height_(ft)	Description
Street		locust							
Belmont Avenue East	high	ash spp	7.68	6	street	fair	0	12	
Belmont Avenue East	high	ash spp	7.68	5.5	street	good	less than 25	18	lots of pruning
Belmont Avenue East	high	ash spp	7.28	6	street	good	less than 25	18	in front of 671 belmont ave
Belmont Avenue East	high	ash spp	8.09	6.5	street	good	less than 25	12	
Belmont Avenue East	high	maple spp	30.74	13	street	good	less than 25	36	
Belmont Avenue East	high	maple spp	46.11	23	street	good	less than 25	42	limbs cut over sidwalk
Belmont Avenue East	high	ash spp	9.30	9	street	good	less than 25	12	some puning over sidewalk
Belmont Avenue East	high	ash spp	9.71	7.5	street	good	less than 25	12	
Belmont Avenue East	high	ash spp	8.90	5.5	street	good	less than 25	12	limbs cut over sidewalk
Belmont Avenue East	high	maple spp	31.95	11	street	good	25-50	24	
Belmont Avenue East	high	maple spp	42.06	19.5	street	good	25-50	42	limbs cut over sidewalk
Belmont Avenue East	high	unk	23.05	11.5	street	fair	25-50	18	lots of pruning, dying
Belmont Avenue East	high	unk	34.78	19.5	street	Good	0	24	
Belmont Avenue East	high	unk	25.08	13.5	street	good	less than 25	18	
Belmont Avenue East	high	ash spp	8.90	6	street	good	less than 25	18	
Belmont Avenue East	high	ash spp	8.09	5.5	street	good	less than 25	12	
Belmont Avenue East	high	ash spp	11.32	10.5	street	good	less than 25	12	some pruning over sidewalk

Street	Tree Cover Type	SPP	DBH (cm)	Spread (ft)	Location	Cond	Deadwood_(%)	Height_(ft)	Description
Belmont Avenue East	high	unk	8.49	5.5	street	fair	50-75	12	
Belmont Avenue East	high	unk	19.41	7.5	street	fair	50-75	12	dying
Belmont Avenue East	high	maple spp	38.83	19	street	fair	25-50	36	lots of pruning over sidewalk
Belmont Avenue East	high	ash spp	8.49	7.5	street	good	less than 25	18	
Belmont Avenue East	high	unk	23.86	12	street	good	less than 25	24	
Belmont Avenue East	high	ash spp	8.90	7.5	street	fair	25-50	18	some pruning over sidewalk
Belmont Avenue East	high	oak spp	76.04	26.5	street	good	25-50	30	
Belmont Avenue East	high	ash spp	9.71	8	street	good	less than 25	12	
Belmont Avenue East	high	ash spp	12.54	11.5	street	good	less than 25	12	some pruning over sidewalk
Belmont Avenue East	high	oak spp	55.41	20.5	street	good	0	36	pruning on sidewalk
Belmont Avenue East	high	maple spp	43.68	16	street	good	less than 25	36	in front of 655, pruning over sidewalk
Belmont Avenue East	high	ash spp	11.73	10	street	good	less than 25	24	labeled 126 in id!!!!!
Belmont Avenue East	high	catalpa	37.21	12	property	good	less than 25	36	next to id 106
Belmont Avenue East	high	unk	29.12	13.5	street	fair	25-50	24	near peak closer to dd
Belmont Avenue East	high	maple spp	30.74	15	street	fair	50-75	36	in between 124 and 98
Belmont Avenue West	low	oak spp	64.71	20	property	good	less than 25	48	corner of hsl, next to family dollar
Belmont Avenue West	low	honey locust	38.02	19	property	good	less than 25	24	in front of food zone, next to bus stop, starting at belmont laundry
Belmont	low	honey	34.78	18	property	good	less than 25	24	

Street	Tree Cover Type	SPP	DBH (cm)	Spread (ft)	Location	Cond	Deadwood_(%)	Height_(ft)	Description
Avenue West		locust							
Belmont Avenue West	low	honey locust	42.06	19	property	good	less than 25	24	
Belmont Avenue West	low	honey locust	33.97	15	property	good	less than 25	24	
Belmont Avenue West	low	honey locust	38.83	17.5	property	good	less than 25	24	
Center Street	low	unk cherry	4.85	3.5	street	fair	25-50	12	
Center Street	low	japanese zelkova	4.04	2	street	good	less than 25	12	
Center Street	low	honey locust	7.28	6	street	fair	25-50	24	
Center Street	low	sycamore	5.66	3	property	good	less than 25	12	in front of parking lot
Center Street	low	sycamore	5.66	3	property	good	25-50	12	corner center and school
Center Street	low	unk cherry	60.67	20	property	good	less than 25	30	
Center Street	low	magnolia	61.48	25.5	property	good	less than 25	36	
Center Street	low	honey locust	12.13	9	street	good	less than 25	24	unpruned along sidewalk, branch growing into building
Center Street	low	honey locust	12.13	9	street	good	less than 25	24	pruned over sidewalk
Center Street	low	honey locust	10.52	8.5	street	good	less than 25	24	
Center Street	low	unk cherry	12.54	6.5	street	good	less than 25	24	
Center Street	low	honey locust	10.52	7.5	street	good	less than 25	24	
Center Street	low	honey locust	42.47	15	street	good	0	36	pruned over sidewalk
Center Street	low	honey locust	10.52	8.5	street	good	less than 25	24	pruned over sidewalk
Center Street	low	honey locust	13.75	12	street	good	less than 25	24	pruned over sidewalk

Street	Tree Cover Type	SPP	DBH (cm)	Spread (ft)	Location	Cond	Deadwood_(%)	Height_(ft)	Description
Dwight Street	low	unk	16.18	10	property	good	less than 25	18	
Dwight Street	low	unk	15.37	8.5	property	good	less than 25	18	
Dwight Street	low	unk	19.41	11	property	good	less than 25	18	
Dwight Street	low	unk	17.80	9.5	property	good	25-50	18	
Dwight Street	low	unk	18.61	10.5	property	good	25-50	18	
Dwight Street	low	ash spp	23.86	10.5	street	good	25-50	24	
Dwight Street	low	unk	19.41	10	property	good	0	24	
Dwight Street	low	unk	18.61	10	property	good	less than 25	18	
Front Street	new	river birch	5.26	3.5	street	fair	25-50	12	
Front Street	new	river birch	5.66	4.5	street	fair	25-50	12	
Front Street	new	oak spp	4.45	2.5	street	good	0	12	
Front Street	new	river birch	4.85	4	street	good	25-50	12	
Front Street	new	oak spp	3.44	2.5	street	good	0	12	in front of 39
Front Street	new	oak spp	4.45	3	street	good	0	12	between 36 and 35
Front Street	new	maple spp	76.04	22	property	fair	25-50	36	
Front Street	new	unk	58.24	16	property	good	less than 25	30	
Main Street	new	ginko biloba	6.88	4.5	street	fair	0	6	
Main Street	new	ginko biloba	6.47	3	street	good	0	12	some pruning
Main Street	new	ginko biloba	6.07	3.5	street	good	0	6	

Street	Tree Cover Type	SPP	DBH (cm)	Spread (ft)	Location	Cond	Deadwood_(%)	Height_(ft)	Description
Main Street	new	ginko biloba	6.47	3.5	street	good	0	6	
Main Street	new	ginko biloba	6.07	4	street	good	0	6	
Main Street	new	ginko biloba	6.88	3.5	street	good	0	6	
Main Street	new	ginko biloba	6.47	3.5	street	good	0	12	
Main Street	new	ginko biloba	7.28	4.5	street	good	0	12	
Main Street	new	ginko biloba	8.90	7	street	good	0	12	pruned over sidewalk
Main Street	new	unk	13.75	7.5	street	good	0	24	
Main Street	new	ginko biloba	10.52	6	street	good	0	12	
Main Street	new	unk	28.31	12.5	street	good	0	24	pruning over sidewalk and street
Main Street	new	unk	14.16	6.5	street	good	0	24	
Main Street	new	unk	9.30	5	street	good	0	12	
Main Street	new	unk	13.75	8	street	good	0	12	
Main Street	new	unk	13.75	6.5	street	good	0	12	
Main Street	new	unk	13.75	6.5	street	good	0	12	
Main Street	new	unk	9.71	3	street	good	0	12	
Main Street	new	unk	16.18	9	street	good	0	12	
Springfield Street	high	sugar maple	52.58	16	street	good	0	36	not pruned
Springfield Street	high	unk	29.12	11	street	good	0	36	not pruned
Springfield Street	high	unk	31.14	9	street	good	less than 25	36	not pruned
Springfield Street	high	sugar maple	42.06	14.5	street	good	0	36	not pruned
Springfield	high	sugar	38.02	13	street	good	0	36	not pruned

Street	Tree Cover Type	SPP	DBH (cm)	Spread (ft)	Location	Cond	Deadwood_(%)	Height_(ft)	Description
Street		maple							
Springfield Street	high	sugar maple	30.74	8.5	street	fair	less than 25	24	pruned over sidewalk
Springfield Street	high	ash spp	42.06	16.5	street	good	less than 25	42	
Springfield Street	high	silver maple	79.27	21	street	good	less than 25	42	pruned over sidewalk
Springfield Street	high	sycamore	40.45	10.5	street	good	0	36	pruned over wires
Springfield Street	high	mimosa	21.44	12	property	good	0	36	not pruned
Springfield Street	high	silver maple	56.62	18.5	property	good	0	60	not pruned
Springfield Street	high	maple spp	69.57	15.5	property	fair	less than 25	60	very pruned, looks to be at the end of life
Springfield Street	high	maple spp	78.46	15	property	fair	less than 25	60	very pruned, looks to be at the end of life
Springfield Street	high	maple spp	26.69	11	street	good	0	36	next to high school
Springfield Street	high	maple spp	26.69	11	property	good	0	36	next to high school
Suffolk Street	high	honey locust	38.02	19	street	good	25-50	24	
Suffolk Street	high	honey locust	34.78	17.5	street	good	25-50	24	
Suffolk Street	high	honey locust	23.46	13	street	good	25-50	24	
Suffolk Street	high	honey locust	34.78	17.5	street	good	25-50	24	
Suffolk Street	high	honey locust	33.17	13.5	street	good	25-50	24	
Suffolk Street	high	honey locust	26.69	13	street	good	25-50	24	
Suffolk Street	high	honey locust	36.40	15.5	street	good	25-50	24	pruning over sidewalk

Street	Tree Cover Type	SPP	DBH (cm)	Spread (ft)	Location	Cond	Deadwood_(%)	Height_(ft)	Description
Suffolk Street	high	ash spp	30.74	14.5	street	fair	25-50	24	
Suffolk Street	high	honey locust	16.58	12	street	good	less than 25	24	
Suffolk Street	high	honey locust	21.03	16.5	street	good	less than 25	24	
Suffolk Street	high	oak spp	25.08	9.5	street	good	25-50	30	
Suffolk Street	high	ash spp	19.01	9.5	street	good	less than 25	24	

7.3 Appendix C: Certification of Human Subjects Approval

University of Massachusetts Amherst
108 Research Administration Bldg.
70 Butterfield Terrace
Amherst, MA 01003-9242

Research Compliance
Human Research Protection Office (HRPO)
Telephone: (413) 545-3428
FAX: (413) 577-1728

Certification of Human Subjects Approval

Date:	July 25, 2017
To:	Robert Ryan, Landscape Arch Regional Plan
Other Investigator:	Alicia Coleman, Landscape Arch Regional Plan
From:	Lynnette Leidy Sievert, Chair, UMASS IRB

Protocol Title: The Role of Street Trees for Pedestrian Safety
Protocol ID: 2017-4052
Review Type: EXEMPT - NEW
Paragraph ID: 2
Approval Date: 07/25/2017
Expiration Date: 07/24/2020
OGCA #:

This study has been reviewed and approved by the University of Massachusetts Amherst IRB, Federal Wide Assurance # 00003909. Approval is granted with the understanding that investigator(s) are responsible for:

Modifications - All changes to the study (e.g. protocol, recruitment materials, consent form, additional key personnel), must be submitted for approval in e-protocol before instituting the changes. New personnel must have completed CITI training.

Consent forms - A copy of the approved, validated, consent form (with the IRB stamp) must be used to consent each subject. Investigators must retain copies of signed consent documents for six (6) years after close of the grant, or three (3) years if the study is unfunded.

Adverse Event Reporting - Adverse events occurring in the course of the protocol must be reported in e-protocol as soon as possible, but no later than five (5) working days.

Completion Reports - Notify the IRB when your study is complete by submitting a Final Report Form in e-protocol.

Consent form (when applicable) will be stamped and sent in a separate e-mail. Use only IRB approved copies of the consent forms, questionnaires, letters, advertisements etc. in your research.

Please contact the Human Research Protection Office if you have any further questions. Best wishes for a successful project.

7.4 Appendix D: Survey Instruments

7.4.1. Consent Form

UNIVERSITY OF MASSACHUSETTS AMHERST
CONSENT FORM FOR RESEARCH PARTICIPATION

Study Title: The Role of Street Trees for Pedestrian Safety

Principal Investigator: Robert L. Ryan

Student Researchers: Alicia F. Coleman, Sarah Welch, Jon Bronenkant, Nora Landers

IRB Number:

Sponsor: ISA#92312- One Center: Massachusetts Cooperative Research Program, UMass Amherst Transportation Center. Office of Transportation Planning. Massachusetts Department of Transportation (MassDOT).

I am a student at the University of Massachusetts Amherst, working in conjunction with the UMass Amherst Transportation Center and the Massachusetts Department of Transportation (MassDOT). We are planning to conduct a research study, which I invite you to take part in. This form has important information about the reason for doing this study, what we will ask you to do if you decide to be in this study, and the way we would like to use information about you if you choose to be in the study.

Why are you doing this study?
You are being asked to participate in a research study about the attitudes of pedestrians about the safety, convenience, and aesthetics of local streets, including street trees. The goal is to help inform future planning efforts to improve pedestrian safety and street improvements.

What will I do if I choose to be in this study?
This part of the study involves a survey with participants that will take approximately 15 minutes. If you agree to participate in this study, you will be asked a series of questions about your use of streets in the City/town where the study is being conducted, as well as safety, convenience, and usefulness, and background demographic information. You may choose to respond or not respond at any point during the survey.

Study time: 10-15 minutes

Study location: All study procedures will take place at our present location on the street.

What are the possible risks and benefits?
Participating poses minimal risks. While you may not directly benefit from this study, the overall study results should be extremely useful for future transportation planning efforts. The final study results will be available as a written report to the Mass DOT.

How will you protect the information you collect about me, and how will that information be shared?
It is important to note that we will not share your individual answers directly with the University of Massachusetts, Massachusetts Department of Transportation, other government agencies or anyone else. We will report general findings without attributing comments or perspectives to any particular person. If we quote your comments in articles or reports, we will assign an alias to you. As such, we do not see any known risks to this study, except the time it takes for you to participate.

Furthermore, the following procedures will be used to protect the confidentiality of your study records. The researchers will keep all study records (including any codes to your data) in a secure location (e.g. locking file cabinet). Research records will be labeled with a code. All electronic files (e.g., database, spreadsheet, etc.) will be password protected. Any computer hosting such files will also have password protection to prevent access by unauthorized users. Only the members of the research staff will have access to the passwords. At the conclusion of this study, the researchers may publish their findings. Information will be presented in summary format and you will not be identified in any publications or presentations.

Results of this study may be used in publications and presentations. Your study data will be handled as confidentially as possible. If results of this study are published or presented, individual names and other personally identifiable information will not be used.

Financial Information
Participation in this study will involve no cost to you. You will not be paid for participating in this study.

What are my rights as a research participant?
Participation in this study is voluntary. You do not have to answer any question you do not want to answer. If at any time and for any reason, you would prefer not to participate in this study, please feel free not to. If at any time you would like to stop participating, please tell me. We can take a break, stop and continue at a later date, or stop altogether. You may withdraw from this study at any time, and you will not be penalized in any way for deciding to stop participation.
If you decide to withdraw from this study, the researchers will ask you if the information already collected from you can be used.

Who can I contact if I have questions or concerns about this research study?
If you have questions, you are free to ask them now. If you have further questions about this project or if you have a research-related problem, you may contact the co-principal investigator, Prof. Robert L. Ryan, 413) 545-6633, rlryan@larp.umass.edu. If you have any questions concerning your rights as a research subject, you may contact the University of Massachusetts Amherst Human Research Protection Office (HRPO) at (413) 545-3428 or humansubjects@ora.umass.edu.

Consent
I have read this form and a copy has been provided to me. The research study has been explained to me, and I have been given the opportunity to ask questions. My questions have been answered. If I have additional questions, I have been told whom to contact. I agree to participate in the research study described above and will receive a copy of this consent form.

7.4.2. Research Information Street

UNIVERSITY OF MASSACHUSETTS AMHERST
Department of Landscape Architecture and Regional Planning

210 Design Building
551 North Pleasant Street
Amherst, MA 01003-2901

voice: 413.545.2255
fax: 413.545.1772

RESEARCH INFORMATION SHEET

Principal Investigator:	Robert L. Ryan
Research Assistants:	Alicia F. Coleman, Sarah Welch, Jon Bronenkant, Nora Landers
Study Title:	The Role of Street Trees for Pedestrian Safety
Sponsor:	ISA#92312- One Center: Massachusetts Cooperative Research Program, UMass Amherst Transportation Center. Office of Transportation Planning. Massachusetts Department of Transportation (MassDOT).

Background and Study Population: This form will give you information about the study so you can make an informed decision about participation in this research study. This part of our study is focused on pedestrians who use the streets in sample cities in the Commonwealth of Massachusetts.

Purpose: The purpose of this study is to understand the attitudes of pedestrians about the safety, convenience, and aesthetics of local streets, including street trees. The goal is to help inform future planning efforts to improve pedestrian safety and street improvements.

Study Procedures/ Timeframe: This part of the study will involve a written survey with participants that will take approximately 15 minutes. If you agree to participate in this study, you will be asked a series of questions about your use of streets in the City/town where the study is being conducted, as well as safety, convenience, and usefulness, and background demographic information. You may choose to respond or not respond at any point during the survey.

Study Benefits and Risks: While you may not directly benefit from this study, the overall study results should be extremely useful for future transportation planning efforts. The final study results will be available as a written report to the Mass DOT.

It is important to note that we will not share your individual answers directly with the University of Massachusetts, Massachusetts Department of Transportation, other government agencies or anyone else. We will report general findings without attributing comments or

perspectives to any particular person. If we quote your comments in articles or reports, we will assign an alias to you. As such, we do not see any known risks to this study, except the time it takes for you to participate.

Furthermore, the following procedures will be used to protect the confidentiality of your study records. The researchers will keep all study records (including any codes to your data) in a secure location (e.g. locking file cabinet). Research records will be labeled with a code. A master key that links names and codes will be maintained in a separate and secure location. The master key will be destroyed six (6) years. All electronic files (e.g., database, spreadsheet, etc.) containing identifiable information will be password protected. Any computer hosting such files will also have password protection to prevent access by unauthorized users. Only the members of the research staff will have access to the passwords. At the conclusion of this study, the researchers may publish their findings. Information will be presented in summary format and you will not be identified in any publications or presentations.

Voluntary Withdrawal: Please note that your participation in this study is voluntary. You do not have to be in this study if you do not want to. If you agree to be in the study, but later change your mind, you may drop out at any time. There are no penalties or consequences of any kind if you decide that you do not want to participate.

Questions about This Study: We will be happy to answer any question you have about this study. If you have further questions about this project or if you have a research-related problem, you may contact the co-principal investigator, Prof. Robert L. Ryan, 413) 545-6633, rlryan@larp.umass.edu. If you have any questions concerning your rights as a research subject, you may contact the University of Massachusetts Amherst Human Research Protection Office (HRPO) at (413) 545-3428 or humansubjects@ora.umass.edu.

Subject Statement of Voluntary Participation: Upon reading this form, you may decide to participate in the project described by verbally agreeing to participate in the survey.

> *The general purposes and particulars of the study as well as possible hazards and inconveniences have been explained to my satisfaction. I understand that I can withdraw at any time.*

7.4.3. Survey Instrument: City of Chicopee

7.4.3.1. Center Street

The Role of Street Trees on Pedestrian Safety Survey

Consent
Before we begin, can you provide verbal confirmation that you understand the purpose of this study and that you wish to participate?

_ Yes _ No

How often do you walk on this street?
_ Every day _ A few times a week _ A few times a month _ A few times a year
_ Almost never

How long have you been walking today, and where are you coming from?
_____ minutes
_____

How often do you walk on this street for the following reasons? Check all that apply and circle the main reason.

_ Work _ Home _ School _ Shopping _ Bus/ subway stop _ Leisure _ Exercise
_ Other: ____

How important to you are the following in choosing routes for your walking trips?

	Not at all	A little	Somewhat	Quite a bit	A great deal	N/A
Sidewalk maintenance and repair	1	2	3	4	5	X
Sidewalk width	1	2	3	4	5	X
Safe crossings, crosswalks, and traffic lights	1	2	3	4	5	X
Beauty/aesthetics (pleasant place to walk)	1	2	3	4	5	X

Places to sit/rest (benches)	1	2	3	4	5	X
Tree canopy shade	1	2	3	4	5	X

How well do the following describe your feelings about safety on this street? Please circle your response.

	Not at all	Slightly	Moderately well	Fairly well	Very well	N/A
I feel safe when walking here.	1	2	3	4	5	X
I can safely cross the street.	1	2	3	4	5	X
There are enough crosswalks.	1	2	3	4	5	X
I am concerned about crime or illicit activities.	1	2	3	4	5	X
I am concerned about my safety as a pedestrian.	1	2	3	4	5	X
I can see clearly at all times.	1	2	3	4	5	X
I am concerned that someone could hide where I can't see.	1	2	3	4	5	X
Sidewalks are too crowded with people	1	2	3	4	5	X
Bike riders often disrupt me when I walk on the sidewalks.	1	2	3	4	5	X
The traffic moves at a safe speed.	1	2	3	4	5	X
Trees on this street block my vision.	1	2	3	4	5	X
Trees on this street make me comfortable as a pedestrian.	1	2	3	4	5	X
Parked cars buffer me from traffic.	1	2	3	4	5	X
I like having trees between me and the traffic.	1	2	3	4	5	X
There is enough street lighting at night.	1	2	3	4	5	X

How much would you like to see more trees on the street?

	Not at all	A little	Somewhat	Quite a bit	A great deal	N/A
Large shade trees (40'-100')	1	2	3	4	5	X
Mid-size ornamental trees (20'-50' tall)	1	2	3	4	5	X
A mix of trees	1	2	3	4	5	X

Why or why not?

_____

_____

_____
_____

Do you have anything else to add about how this street can be improved, or how the City can improve walking in this neighborhood?

_____
_____
_____
_____
_____

Front Street

Springfield Street

How often do you walk along each of these streets? See above.

	Never	Once a month or less	A few times a month	A few times a week	Daily or more
The street we are on	1	2	3	4	5
Front Street	1	2	3	4	5
Springfield Street	1	2	3	4	5

How much do you like each of these streets?

1 2 3 4 5 The street we are on
1 2 3 4 5 Front Street
1 2 3 4 5 Springfield Street

Scale: 1=not at all 2=a little 3= somewhat 4= quite a bit 5=a great deal X=N/A

How <u>safe</u> do you feel walking along these sections of streets?

1 2 3 4 5 The street we are on
1 2 3 4 5 Front Street
1 2 3 4 5 Springfield Street

Scale: 1=not at all 2=a little 3= somewhat 4= quite a bit 5=a great deal X=N/A

Optional Background: Socio-Demographic

Please answer the following questions by filling in responses as indicated on the screen. Responses are not mandatory. You may choose to answer as many or as few questions as you are comfortable with. These responses will not be used in any way to identify you, all responses will remain anonymous, but any information you choose to provide will greatly help our research.

Age:

- ☐ 18 to 24 years
- ☐ 25 to 34 years
- ☐ 35 to 44 years
- ☐ 45 to 54 years
- ☐ 55 to 64 years
- ☐ Age 65 or older

What is the highest level of education you have completed?

__ Less than high school __ High school diploma __ Some college
__ Associate's degree __ Bachelor's degree __ Graduate degree

Race/Ethnicity (check all that apply):

- ☐ Black or African American
- ☐ Asian
- ☐ South Asian
- ☐ Pacific Islander/Native Hawaiian
- ☐ Hispanic, Latino, or Spanish Origin
- ☐ Pacific Islander/Native Hawaiian
- ☐ White
- ☐ Middle Eastern
- ☐ American Indian or Alaska Native

Other_____

Language(s) Spoken at Home: _____

Gender: _____

Household Income:
__ Less than $25,000 __ $25,000 to $34,999 __ $35,000 to $49,999
__ $50,000 to $74,999 __ $75,000 to $99,999 __ $100,000 to $149,999
__ $150,000 or more

How many people, including yourself, live in your household? ____ How many are under 18? ___

Do you live in this neighborhood? ☐ Yes ☐ No
Years in residence ____ years

What is your housing situation? ☐ Owner ☐ Renter ☐ Don't pay for housing

Do you own a car? ☐ Yes ☐ No

Thank you! For more information about the study, contact Professor Robert Ryan at rlryan@larp.umass.edu; Tel. (413) 545-6633

7.4.3.2. Springfield Street

The Role of Street Trees on Pedestrian Safety Survey

Consent
Before we begin, can you provide verbal confirmation that you understand the purpose of this study and that you wish to participate?

_ Yes _ No

How often do you walk on this street?
_ Every day _ A few times a week _ A few times a month _ A few times a year
_ Almost never

How long have you been walking today, and where are you coming from?
_____ minutes
_____

How often do you walk on this street for the following reasons? Check all that apply and circle the main reason.

_ Work _ Home _ School _ Shopping _ Bus/ subway stop _ Leisure _ Exercise _ Other: ____

How important to you are the following in choosing routes for your walking trips?

	Not at all	A little	Somewhat	Quite a bit	A great deal	N/A
Sidewalk maintenance and repair	1	2	3	4	5	X
Sidewalk width	1	2	3	4	5	X
Safe crossings, crosswalks, and traffic lights	1	2	3	4	5	X
Beauty/aesthetics (pleasant place to walk)	1	2	3	4	5	X
Places to sit/rest (benches)	1	2	3	4	5	X
Tree canopy shade	1	2	3	4	5	X

How well do the following describe your feelings about safety on this street? Please circle your response.

	Not at all	Slightly	Moderately well	Fairly well	Very well	N/A
I feel safe when walking here.	1	2	3	4	5	X
I can safely cross the street.	1	2	3	4	5	X
There are enough crosswalks.	1	2	3	4	5	X
I am concerned about crime or illicit activities.	1	2	3	4	5	X
I am concerned about my safety as a pedestrian.	1	2	3	4	5	X
I can see clearly at all times.	1	2	3	4	5	X
I am concerned that someone could hide where I can't see.	1	2	3	4	5	X
Sidewalks are too crowded with people	1	2	3	4	5	X
Bike riders often disrupt me when I walk on the sidewalks.	1	2	3	4	5	X
The traffic moves at a safe speed.	1	2	3	4	5	X
Trees on this street block my vision.	1	2	3	4	5	X
Trees on this street make me comfortable	1	2	3	4	5	X

as a pedestrian.						
Parked cars buffer me from traffic.	1	2	3	4	5	X
I like having trees between me and the traffic.	1	2	3	4	5	X
There is enough street lighting at night.	1	2	3	4	5	X

How much would you like to see more trees on the street?

	Not at all	A little	Somewhat	Quite a bit	A great deal	N/A
Large shade trees (40'-100')	1	2	3	4	5	X
Mid-size ornamental trees (20'-50' tall)	1	2	3	4	5	X
A mix of trees	1	2	3	4	5	X

Why or why not?

_____
_____
_____
_____

Do you have anything else to add about how this street can be improved, or how the City can improve walking in this neighborhood?

_____
_____
_____
_____
_____

Front Street

Center Street

How often do you walk along each of these streets? See above.

	Never	Once a month or less	A few times a month	A few times a week	Daily or more
The street we are on	1	2	3	4	5
Front Street	1	2	3	4	5
Center Street	1	2	3	4	5

How much do you like each of these streets?

1 2 3 4 5 The street we are on
1 2 3 4 5 Front Street
1 2 3 4 5 Center Street

Scale: 1=not at all 2=a little 3= somewhat 4= quite a bit 5=a great deal X=N/A

How <u>safe</u> do you feel walking along these sections of streets?

1 2 3 4 5 The street we are on
1 2 3 4 5 Front Street
1 2 3 4 5 Center Street

Scale: 1=not at all 2=a little 3= somewhat 4= quite a bit 5=a great deal X=N/A

Optional Background: Socio-Demographic

Please answer the following questions by filling in responses as indicated on the screen. Responses are not mandatory. You may choose to answer as many or as few questions as you are comfortable with. These responses will not be used in any way to identify you, all responses will remain anonymous, but any information you choose to provide will greatly help our research.

Age:
- ☐ 18 to 24 years
- ☐ 25 to 34 years
- ☐ 35 to 44 years
- ☐ 45 to 54 years
- ☐ 55 to 64 years
- ☐ Age 65 or older

What is the highest level of education you have completed?

__ Less than high school __ High school diploma __ Some college
__ Associate's degree __ Bachelor's degree __ Graduate degree

Race/Ethnicity (check all that apply):
- ☐ Black or African American
- ☐ Asian
- ☐ South Asian
- ☐ Pacific Islander/Native Hawaiian
- ☐ Hispanic, Latino, or Spanish Origin
- ☐ Pacific Islander/Native Hawaiian
- ☐ White
- ☐ Middle Eastern
- ☐ American Indian or Alaska Native

Other_____

Language(s) Spoken at Home: _____

Gender: _____

Household Income:

__ Less than $25,000 __ $25,000 to $34,999 __ $35,000 to $49,999
__ $50,000 to $74,999 __ $75,000 to $99,999 __ $100,000 to $149,999
__ $150,000 or more

How many people, including yourself, live in your household? ____ How many are under 18? ___

Do you live in this neighborhood? ☐ Yes ☐ No
Years in residence ____ years

What is your housing situation? ☐ Owner ☐ Renter ☐ Don't pay for housing

Do you own a car? ☐ Yes ☐ No

Thank you! For more information about the study, contact Professor Robert Ryan at rlryan@larp.umass.edu; Tel. (413) 545-6633

7.4.3.3. Front Street

The Role of Street Trees on Pedestrian Safety Survey

Consent
Before we begin, can you provide verbal confirmation that you understand the purpose of this study and that you wish to participate?

_ Yes _ No

How often do you walk on this street?
_ Every day _ A few times a week _ A few times a month _ A few times a year
_ Almost never

How long have you been walking today, and where are you coming from?
_____ minutes
_____

How often do you walk on this street for the following reasons? Check all that apply and circle the main reason.

_ Work _ Home _ School _ Shopping _ Bus/ subway stop _ Leisure _ Exercise
_ Other: ____

How important to you are the following in choosing routes for your walking trips?

	Not at all	A little	Somewhat	Quite a bit	A great deal	N/A
Sidewalk maintenance and repair	1	2	3	4	5	X
Sidewalk width	1	2	3	4	5	X
Safe crossings, crosswalks, and traffic lights	1	2	3	4	5	X
Beauty/aesthetics (pleasant place to walk)	1	2	3	4	5	X
Places to sit/rest (benches)	1	2	3	4	5	X
Tree canopy shade	1	2	3	4	5	X

How well do the following describe your feelings about safety on this street? Please circle your response.

	Not at all	Slightly	Moderately well	Fairly well	Very well	N/A
I feel safe when walking here.	1	2	3	4	5	X
I can safely cross the street.	1	2	3	4	5	X
There are enough crosswalks.	1	2	3	4	5	X
I am concerned about crime or illicit activities.	1	2	3	4	5	X
I am concerned about my safety as a pedestrian.	1	2	3	4	5	X
I can see clearly at all times.	1	2	3	4	5	X
I am concerned that someone could hide where I can't see.	1	2	3	4	5	X
Sidewalks are too crowded with people	1	2	3	4	5	X
Bike riders often disrupt me when I walk on the sidewalks.	1	2	3	4	5	X
The traffic moves at a safe speed.	1	2	3	4	5	X
Trees on this street block my vision.	1	2	3	4	5	X
Trees on this street make me comfortable as a pedestrian.	1	2	3	4	5	X
Parked cars buffer me from traffic.	1	2	3	4	5	X
I like having trees between me and the traffic.	1	2	3	4	5	X
There is enough street lighting at night.	1	2	3	4	5	X

How much would you like to see more trees on the street?

	Not at all	A little	Somewhat	Quite a bit	A great deal	N/A
Large shade trees (40'-100')	1	2	3	4	5	X
Mid-size ornamental trees (20'-50' tall)	1	2	3	4	5	X
A mix of trees	1	2	3	4	5	X

Why or why not?

_____
_____
_____
_____

Do you have anything else to add about how this street can be improved, or how the City can improve walking in this neighborhood?

_____
_____
_____
_____
_____

Springfield Street

Center Street

How often do you walk along each of these streets? See above.

	Never	Once a month or less	A few times a month	A few times a week	Daily or more
The street we are on	1	2	3	4	5
Springfield Street	1	2	3	4	5
Center Street	1	2	3	4	5

How much do you like each of these streets?

1 2 3 4 5 The street we are on
1 2 3 4 5 Springfield Street
1 2 3 4 5 CenterStreet

Scale: 1=not at all 2=a little 3= somewhat 4= quite a bit 5=a great deal X=N/A

How <u>safe</u> do you feel walking along these sections of streets?

1 2 3 4 5 The street we are on
1 2 3 4 5 Springfield Street
1 2 3 4 5 Center Street

Scale: 1=not at all 2=a little 3= somewhat 4= quite a bit 5=a great deal X=N/A

Optional Background: Socio-Demographic

Please answer the following questions by filling in responses as indicated on the screen. Responses are not mandatory. You may choose to answer as many or as few questions as you are comfortable with. These responses will not be used in any way to identify you, all responses will remain anonymous, but any information you choose to provide will greatly help our research.

Age:
- ☐ 18 to 24 years
- ☐ 25 to 34 years
- ☐ 35 to 44 years
- ☐ 45 to 54 years
- ☐ 55 to 64 years
- ☐ Age 65 or older

What is the highest level of education you have completed?

__ Less than high school __ High school diploma __ Some college
__ Associate's degree __ Bachelor's degree __ Graduate degree

Race/Ethnicity (check all that apply):
- ☐ Black or African American
- ☐ Asian
- ☐ South Asian
- ☐ Pacific Islander/Native Hawaiian
- ☐ Hispanic, Latino, or Spanish Origin
- ☐ Pacific Islander/Native Hawaiian
- ☐ White
- ☐ Middle Eastern
- ☐ American Indian or Alaska Native

Other_____

Language(s) Spoken at Home: _____

Gender: _____

Household Income:

__ Less than $25,000 __ $25,000 to $34,999 __ $35,000 to $49,999
__ $50,000 to $74,999 __ $75,000 to $99,999 __ $100,000 to $149,999
__ $150,000 or more

How many people, including yourself, live in your household? ____ How many are under 18? ___

Do you live in this neighborhood? ☐ Yes ☐ No
Years in residence ____ years

What is your housing situation? ☐ Owner ☐ Renter ☐ Don't pay for housing

Do you own a car? ☐ Yes ☐ No

Thank you! For more information about the study, contact Professor Robert Ryan at rlryan@larp.umass.edu; Tel. (413) 545-6633

7.4.4. Survey Instrument: City of Holyoke

7.4.4.1. Dwight Street

The Role of Street Trees on Pedestrian Safety Survey

Consent
Before we begin, can you provide verbal confirmation that you understand the purpose of this study and that you wish to participate?

_ Yes _ No

How often do you walk on this street?
_ Every day _ A few times a week _ A few times a month _ A few times a year
_ Almost never

How long have you been walking today, and where are you coming from?
_____ minutes
_____

How often do you walk on this street for the following reasons? Check all that apply and circle the main reason.

_ Work _ Home _ School _ Shopping _ Bus/ subway stop _ Leisure _ Exercise
_ Other: ____

How important to you are the following in choosing routes for your walking trips?

	Not at all	A little	Somewhat	Quite a bit	A great deal	N/A
Sidewalk maintenance and repair	1	2	3	4	5	X
Sidewalk width	1	2	3	4	5	X
Safe crossings, crosswalks, and traffic lights	1	2	3	4	5	X
Beauty/aesthetics (pleasant place to walk)	1	2	3	4	5	X

Places to sit/rest (benches)	1	2	3	4	5	X
Tree canopy shade	1	2	3	4	5	X

How well do the following describe your feelings about safety on this street? Please circle your response.

	Not at all	Slightly	Moderately well	Fairly well	Very well	N/A
I feel safe when walking here.	1	2	3	4	5	X
I can safely cross the street.	1	2	3	4	5	X
There are enough crosswalks.	1	2	3	4	5	X
I am concerned about crime or illicit activities.	1	2	3	4	5	X
I am concerned about my safety as a pedestrian.	1	2	3	4	5	X
I can see clearly at all times.	1	2	3	4	5	X
I am concerned that someone could hide where I can't see.	1	2	3	4	5	X
Sidewalks are too crowded with people	1	2	3	4	5	X
Bike riders often disrupt me when I walk on the sidewalks.	1	2	3	4	5	X
The traffic moves at a safe speed.	1	2	3	4	5	X
Trees on this street block my vision.	1	2	3	4	5	X
Trees on this street make me comfortable as a pedestrian.	1	2	3	4	5	X
Parked cars buffer me from traffic.	1	2	3	4	5	X
I like having trees between me and the traffic.	1	2	3	4	5	X
There is enough street lighting at night.	1	2	3	4	5	X

How much would you like to see more trees on the street?

	Not at all	A little	Somewhat	Quite a bit	A great deal	N/A
Large shade trees (40'-100')	1	2	3	4	5	X
Mid-size ornamental trees (20'-50' tall)	1	2	3	4	5	X
A mix of trees	1	2	3	4	5	X

Why or why not?

_____

_____

_____
_____

Do you have anything else to add about how this street can be improved, or how the City can improve walking in this neighborhood?

_____
_____
_____
_____
_____

Appleton Street

Suffolk Street

How often do you walk along each of these streets? See above.

	Never	Once a month or less	A few times a month	A few times a week	Daily or more
The street we are on	1	2	3	4	5
Appleton Street	1	2	3	4	5
Suffolk Street	1	2	3	4	5

How much do you like each of these streets?

1 2 3 4 5 The street we are on
1 2 3 4 5 Appleton Street
1 2 3 4 5 Suffolk Street

Scale: 1=not at all 2=a little 3= somewhat 4= quite a bit 5=a great deal X=N/A

How <u>safe</u> do you feel walking along these sections of streets?

1 2 3 4 5 The street we are on
1 2 3 4 5 Appleton Street
1 2 3 4 5 Suffolk Street

Scale: 1=not at all 2=a little 3= somewhat 4= quite a bit 5=a great deal X=N/A

7.4.4.2. Dwight Street (Spanish)

Encuesta acerca del Rol de los Árboles de la Calle en la Seguridad de los Peatones

Consentimiento

¿Antes de empezar, podría darnos su confirmación verbal de que usted entiende el propósito de este estudio y que desea participar en él?

_ Sí _ No

¿Qué tan a menudo camina por esta calle?

_ Todos los días _ Pocas veces a la semana _ Semanalmente _ Pocas veces al mes _ Pocas veces al año _ Casi nunca

¿Cuánto tiempo ha caminado hoy (y de dónde viene)?

_____ minutos _____

¿Cuán a menudo camina en esta calle por las siguientes razones? Seleccione todas las que apliquen y circule la razón principal.

_ Trabajo _ Casa _ Escuela _ Compras _ Parada de Bus/Metro _ Placer _ Ejercicio _ Otro: ____

¿Qué tan <u>importante</u> son para usted los siguientes aspectos al escoger las rutas para sus caminatas?

	Para nada	Un poco	Algo	Bastante	Muchísimo	N/A
El mantenimiento y la reparación de aceras	1	2	3	4	5	X
El ancho de la acera	1	2	3	4	5	X
Cruces seguros, cruces peatonales y semáforos	1	2	3	4	5	X
Belleza/Estética (lugar agradable para caminar)	1	2	3	4	5	X
Lugares para sentarse/descansar (bancos)	1	2	3	4	5	X
Sombra del dosel de los árboles	1	2	3	4	5	X

Las afirmaciones a continuación, ¿qué tan bien describen sus sentimientos acerca de la seguridad en esta calle?

	Para nada	Un poco	Moderadamente bien	Bastante bien	Muy bien	N/A
Me siento seguro caminando aquí.	1	2	3	4	5	X
Me preocupa el crimen y las actividades ilícitas.	1	2	3	4	5	X
Me preocupa mi seguridad como peatón.	1	2	3	4	5	X
Puedo ver claramente todo el tiempo.	1	2	3	4	5	X
Me preocupa que alguien se esconda donde no puedo ver.	1	2	3	4	5	X
Las aceras están muy llenas de gente.	1	2	3	4	5	X
Los que montan bicicletas a menudo me molestan cuando camino en la acera.	1	2	3	4	5	X
Puedo cruzar la calle de manera segura.	1	2	3	4	5	X
Hay suficientes cruces peatonales.	1	2	3	4	5	X
El tráfico se mueve a una velocidad segura.	1	2	3	4	5	X
Los árboles en esta calle bloquean mi visión.	1	2	3	4	5	X

Los árboles en esta calle me hacen sentir cómodo como peatón.	1	2	3	4	5	X
Los carros estacionados me protegen del tráfico.	1	2	3	4	5	X
Me gusta tener árboles entre el tráfico y yo.	1	2	3	4	5	X
Hay suficiente iluminación nocturna en la calle.	1	2	3	4	5	X

¿Qué tanto le gustaría ver más árboles en la calle?

	Para nada	Un poco	Algo	Bastante	Muchisimo	N/A
Árboles que den mucha sombra (40-100 pies de alto)	1	2	3	4	5	X
Árboles de tamaño mediano, decorativos (20-50 pies de alto)	1	2	3	4	5	X
Una mezcla de árboles	1	2	3	4	5	X

¿Por qué?

_____

¿Hay algo más que le gustaría añadir acerca de cómo esta calle puede ser mejorada, o de cómo la ciudad puede mejorar la movilidad del vecindario?

_____

_____

Appleton Street

Suffolk Street

¿Qué tanto le gusta cada una de estas calles? Ver arriba.

	Para nada	Un poco	Algo	Bastante	Muchísimo	No sé
La calle en la que estamos	1	2	3	4	5	X
Appleton Street	1	2	3	4	5	X
Suffolk Street	1	2	3	4	5	X

¿Qué tan <u>seguro</u> se siente al caminar en estos tramos de calles?

	Para nada	Un poco	Algo	Bastante	Muchísimo	N/A
La calle en la que estamos	1	2	3	4	5	X
Appleton Street	1	2	3	4	5	X
Suffolk Street	1	2	3	4	5	X

<u>Sección 8: Origen: sociodemográfico</u>

Por favor responda las siguientes preguntas señalando sus respuestas como se indica en la pantalla. No es obligatorio responder. Usted decide cuántas preguntas se siente cómodo respondiendo. Estas respuestas no serán usadas para identificarlo a usted y todas las respuestas permanecerán anónimas, pero cualquier información que usted provea nos ayudará inmensamente en nuestra investigación.

Edad:

- ☐ 18 a 24 años
- ☐ 25 a 34 años
- ☐ 35 a 44 años
- ☐ 45 a 54 años
- ☐ 55 a 64 años
- ☐ 65 años o más

¿Cuál es el nivel más alto de educación que ha completado?

- ☐ Menos de Escuela Secundaria
- ☐ Diploma de Escuela Secundaria
- ☐ Grado de Asociado
- ☐ Grado Universitario
- ☐ Título de Posgrado

Raza/Grupo Étnico (marque todas las que apliquen):

- ☐ negro o afroamericano
- ☐ asiático
- ☐ asiático del Sur
- ☐ isleño del Pacifico /nativo hawaiano
- ☐ hispano, latino, o de origen español
- ☐ blanco del Medio Oriente
- ☐ Indígena americano o nativo de Alaska

Otro:_____

Idioma(s) que hablan en casa: _____

Género: _____

Ingreso del Hogar:

- ☐ Menos de $25,000
- ☐ $25,000 a $34,999
- ☐ $35,000 a $49,999
- ☐ $50,000 a $74,999
- ☐ $75,000 a $99,999
- ☐ $100,000 a $149,999
- ☐ $150,000 o mas

¿Cuántas personas, incluyéndose usted, viven en su hogar? ____ ¿Cuántas tienen menos de 18 años? ___

¿Vive usted en este vecindario? ☐ Sí ☐ No
Años de residencia: ____ años

¿Cuál es su situación de vivienda? ☐ Propietario ☐ Inquilino ☐ No paga por vivienda

¿Es usted propietario de un carro? ☐ Sí ☐ No

¡Gracias! Para mayor información acerca de este estudio, contacte al Profesor Robert Ryan a rlryan@larp.umass.edu; Tel. (413) 545-6633

7.4.4.3. Suffolk Street

The Role of Street Trees on Pedestrian Safety Survey

Consent

Before we begin, can you provide verbal confirmation that you understand the purpose of this study and that you wish to participate?

_ Yes _ No

How often do you walk on this street?
_ Every day _ A few times a week _ A few times a month _ A few times a year
_ Almost never

How long have you been walking today, and where are you coming from?
_____ minutes
_____

How often do you walk on this street for the following reasons? Check all that apply and circle the main reason.

_ Work _ Home _ School _ Shopping _ Bus/ subway stop _ Leisure _ Exercise
_ Other: ____

How important to you are the following in choosing routes for your walking trips?

	Not at all	A little	Somewhat	Quite a bit	A great deal	N/A
Sidewalk maintenance and repair	1	2	3	4	5	X
Sidewalk width	1	2	3	4	5	X
Safe crossings, crosswalks, and traffic lights	1	2	3	4	5	X
Beauty/aesthetics (pleasant place to walk)	1	2	3	4	5	X
Places to sit/rest (benches)	1	2	3	4	5	X
Tree canopy shade	1	2	3	4	5	X

How well do the following describe your feelings about safety on this street? Please circle your response.

	Not at all	Slightly	Moderately well	Fairly well	Very well	N/A
I feel safe when walking here.	1	2	3	4	5	X
I can safely cross the street.	1	2	3	4	5	X
There are enough crosswalks.	1	2	3	4	5	X
I am concerned about crime or illicit activities.	1	2	3	4	5	X
I am concerned about my safety as a pedestrian.	1	2	3	4	5	X
I can see clearly at all times.	1	2	3	4	5	X
I am concerned that someone could hide where I can't see.	1	2	3	4	5	X
Sidewalks are too crowded with people	1	2	3	4	5	X
Bike riders often disrupt me when I walk on the sidewalks.	1	2	3	4	5	X
The traffic moves at a safe speed.	1	2	3	4	5	X
Trees on this street block my vision.	1	2	3	4	5	X
Trees on this street make me comfortable as a pedestrian.	1	2	3	4	5	X
Parked cars buffer me from traffic.	1	2	3	4	5	X
I like having trees between me and the traffic.	1	2	3	4	5	X
There is enough street lighting at night.	1	2	3	4	5	X

How much would you like to see more trees on the street?

	Not at all	A little	Somewhat	Quite a bit	A great deal	N/A
Large shade trees (40'-100')	1	2	3	4	5	X
Mid-size ornamental trees (20'-50' tall)	1	2	3	4	5	X
A mix of trees	1	2	3	4	5	X

Why or why not?

_____
_____
_____
_____

Do you have anything else to add about how this street can be improved, or how the City can improve walking in this neighborhood?

_____
_____
_____
_____
_____

Appleton Street

Dwight Street

How often do you walk along each of these streets? See above.

	Never	Once a month or less	A few times a month	A few times a week	Daily or more
The street we are on	1	2	3	4	5
Appleton Street	1	2	3	4	5
Dwight Street	1	2	3	4	5

How much do you like each of these streets?

1 2 3 4 5 The street we are on
1 2 3 4 5 Appleton Street
1 2 3 4 5 Dwight Street

Scale: 1=not at all 2=a little 3= somewhat 4= quite a bit 5=a great deal X=N/A

How <u>safe</u> do you feel walking along these sections of streets?

1 2 3 4 5 The street we are on
1 2 3 4 5 Appleton Street
1 2 3 4 5 Dwight Street

Scale: 1=not at all 2=a little 3= somewhat 4= quite a bit 5=a great deal X=N/A

Optional Background: Socio-Demographic

Please answer the following questions by filling in responses as indicated on the screen. Responses are not mandatory. You may choose to answer as many or as few questions as you are comfortable with. These responses will not be used in any way to identify you, all responses will remain anonymous, but any information you choose to provide will greatly help our research.

Age:

- ☐ 18 to 24 years
- ☐ 25 to 34 years
- ☐ 35 to 44 years
- ☐ 45 to 54 years
- ☐ 55 to 64 years
- ☐ Age 65 or older

What is the highest level of education you have completed?

__ Less than high school __ High school diploma __ Some college
__ Associate's degree __ Bachelor's degree __ Graduate degree

Race/Ethnicity (check all that apply):

- ☐ Black or African American
- ☐ Asian
- ☐ South Asian
- ☐ Pacific Islander/Native Hawaiian
- ☐ Hispanic, Latino, or Spanish Origin
- ☐ Pacific Islander/Native Hawaiian
- ☐ White
- ☐ Middle Eastern
- ☐ American Indian or Alaska Native

Other_____

Language(s) Spoken at Home: _____

Gender: _____

Household Income:
__ Less than $25,000 __ $25,000 to $34,999 __ $35,000 to $49,999
__ $50,000 to $74,999 __ $75,000 to $99,999 __ $100,000 to $149,999
__ $150,000 or more

How many people, including yourself, live in your household? ____ How many are under 18? ___

Do you live in this neighborhood? ☐ Yes ☐ No
Years in residence ____ years

What is your housing situation? ☐ Owner ☐ Renter ☐ Don't pay for housing

Do you own a car? ☐ Yes ☐ No

Thank you! For more information about the study, contact Professor Robert Ryan at rlryan@larp.umass.edu; Tel. (413) 545-6633

7.4.4.4. Suffolk Street (Spanish)

Encuesta acerca del Rol de los Árboles de la Calle en la Seguridad de los Peatones

Consentimiento
¿Antes de empezar, podría darnos su confirmación verbal de que usted entiende el propósito de este estudio y que desea participar en él?
_ Sí _ No

¿Qué tan a menudo camina por esta calle?
_ Todos los días _ Pocas veces a la semana _ Semanalmente _ Pocas veces al mes
_ Pocas veces al año _ Casi nunca

¿Cuánto tiempo ha caminado hoy (y de dónde viene)?
_____ minutos _____

¿Cuán a menudo camina en esta calle por las siguientes razones? Seleccione todas las que apliquen y circule la razón principal.

_ Trabajo _ Casa _ Escuela _ Compras _ Parada de Bus/Metro _ Placer _ Ejercicio
_ Otro: ____

¿Qué tan <u>importante</u> son para usted los siguientes aspectos al escoger las rutas para sus caminatas?

	Para nada	Un poco	Algo	Bastante	Muchísimo	N/A
El mantenimiento y la reparación de aceras	1	2	3	4	5	X
El ancho de la acera	1	2	3	4	5	X
Cruces seguros, cruces peatonales y semáforos	1	2	3	4	5	X
Belleza/Estética (lugar agradable para caminar)	1	2	3	4	5	X
Lugares para sentarse/descansar (bancos)	1	2	3	4	5	X
Sombra del dosel de los árboles	1	2	3	4	5	X

Las afirmaciones a continuación, ¿qué tan bien describen sus sentimientos acerca de la seguridad en esta calle?

	Para nada	Un poco	Moderadamente bien	Bastante bien	Muy bien	N/A
Me siento seguro caminando aquí.	1	2	3	4	5	X
Me preocupa el crimen y las actividades ilícitas.	1	2	3	4	5	X
Me preocupa mi seguridad como peatón.	1	2	3	4	5	X
Puedo ver claramente todo el tiempo.	1	2	3	4	5	X
Me preocupa que alguien se esconda donde no puedo ver.	1	2	3	4	5	X
Las aceras están muy llenas de gente.	1	2	3	4	5	X
Los que montan bicicletas a menudo me molestan cuando camino en la acera.	1	2	3	4	5	X
Puedo cruzar la calle de manera segura.	1	2	3	4	5	X
Hay suficientes cruces peatonales.	1	2	3	4	5	X
El tráfico se mueve a una velocidad segura.	1	2	3	4	5	X
Los árboles en esta calle bloquean mi visión.	1	2	3	4	5	X
Los árboles en esta calle me hacen sentir cómodo como peatón.	1	2	3	4	5	X
Los carros estacionados me protegen del tráfico.	1	2	3	4	5	X

Me gusta tener árboles entre el tráfico y yo.	1	2	3	4	5	X
Hay suficiente iluminación nocturna en la calle.	1	2	3	4	5	X

¿Qué tanto le gustaría ver más árboles en la calle?

	Para nada	Un poco	Algo	Bastante	Muchísimo	N/A
Árboles que den mucha sombra (40-100 pies de alto)	1	2	3	4	5	X
Árboles de tamaño mediano, decorativos (20-50 pies de alto)	1	2	3	4	5	X
Una mezcla de árboles	1	2	3	4	5	X

¿Por qué?

_____

¿Hay algo más que le gustaría añadir acerca de cómo esta calle puede ser mejorada, o de cómo la ciudad puede mejorar la movilidad del vecindario?

_____

_____

Appleton Street

Dwight Street

¿Qué tanto le gusta cada una de estas calles? Ver arriba

	Para nada	Un poco	Algo	Bastante	Muchísimo	No sé
La calle en la que estamos	1	2	3	4	5	X
Appleton Street	1	2	3	4	5	X
Dwight Street	1	2	3	4	5	X

¿Qué tan seguro se siente al caminar en estos tramos de calles?

	Para nada	Un poco	Algo	Bastante	Muchísimo	N/A
La calle en la que estamos	1	2	3	4	5	X
Appleton Street	1	2	3	4	5	X
Dwight Street	1	2	3	4	5	X

Sección 8: Origen: sociodemográfico

Por favor responda las siguientes preguntas señalando sus respuestas como se indica en la pantalla. No es obligatorio responder. Usted decide cuántas preguntas se siente cómodo respondiendo. Estas respuestas no serán usadas para identificarlo a usted y todas las respuestas permanecerán anónimas, pero cualquier información que usted provea nos ayudará inmensamente en nuestra investigación.

Edad:

- ☐ 18 a 24 años
- ☐ 25 a 34 años
- ☐ 35 a 44 años
- ☐ 45 a 54 años
- ☐ 55 a 64 años
- ☐ 65 años o más

¿Cuál es el nivel más alto de educación que ha completado?

- ☐ Menos de Escuela Secundaria
- ☐ Diploma de Escuela Secundaria
- ☐ Grado de Asociado
- ☐ Grado Universitario
- ☐ Título de Posgrado

Raza/Grupo Étnico (marque todas las que apliquen):

- ☐ negro o afroamericano
- ☐ asiático
- ☐ asiático del Sur
- ☐ isleño del Pacifico /nativo hawaiano
- ☐ hispano, latino, o de origen español
- ☐ blanco del Medio Oriente
- ☐ Indígena americano o nativo de Alaska

Otro:_____

Idioma(s) que hablan en casa: _____

Género: _____

Ingreso del Hogar:

- ☐ Menos de $25,000
- ☐ $25,000 a $34,999
- ☐ $35,000 a $49,999
- ☐ $50,000 a $74,999
- ☐ $75,000 a $99,999
- ☐ $100,000 a $149,999
- ☐ $150,000 o mas

¿Cuántas personas, incluyéndose usted, viven en su hogar? ____ ¿Cuántas tienen menos de 18 años? ___

¿Vive usted en este vecindario? ☐ Sí ☐ No
Años de residencia: ____ años

¿Cuál es su situación de vivienda? ☐ Propietario ☐ Inquilino ☐ No paga por vivienda

¿Es usted propietario de un carro? ☐ Sí ☐ No

¡Gracias! Para mayor información acerca de este estudio, contacte al Profesor Robert Ryan a rlryan@larp.umass.edu; Tel. (413) 545-6633

7.4.4.5. Appleton Street

The Role of Street Trees on Pedestrian Safety Survey

Consent

Before we begin, can you provide verbal confirmation that you understand the purpose of this study and that you wish to participate?

_ Yes _ No

How often do you walk on this street?
_ Every day _ A few times a week _ A few times a month _ A few times a year
_ Almost never

How long have you been walking today, and where are you coming from?
_____ minutes
_____

How often do you walk on this street for the following reasons? Check all that apply and circle the main reason.

_ Work _ Home _ School _ Shopping _ Bus/ subway stop _ Leisure _ Exercise
_ Other: ____

How important to you are the following in choosing routes for your walking trips?

	Not at all	A little	Somewhat	Quite a bit	A great deal	N/A
Sidewalk maintenance and repair	1	2	3	4	5	X
Sidewalk width	1	2	3	4	5	X
Safe crossings, crosswalks, and traffic lights	1	2	3	4	5	X
Beauty/aesthetics (pleasant place to walk)	1	2	3	4	5	X
Places to sit/rest (benches)	1	2	3	4	5	X
Tree canopy shade	1	2	3	4	5	X

How well do the following describe your feelings about safety on this street? Please circle your response.

	Not at all	Slightly	Moderately well	Fairly well	Very well	N/A
I feel safe when walking here.	1	2	3	4	5	X
I can safely cross the street.	1	2	3	4	5	X
There are enough crosswalks.	1	2	3	4	5	X
I am concerned about crime or illicit activities.	1	2	3	4	5	X
I am concerned about my safety as a pedestrian.	1	2	3	4	5	X
I can see clearly at all times.	1	2	3	4	5	X
I am concerned that someone could hide where I can't see.	1	2	3	4	5	X
Sidewalks are too crowded with people	1	2	3	4	5	X
Bike riders often disrupt me when I walk on the sidewalks.	1	2	3	4	5	X
The traffic moves at a safe speed.	1	2	3	4	5	X
Trees on this street block my vision.	1	2	3	4	5	X
Trees on this street make me comfortable as a pedestrian.	1	2	3	4	5	X
Parked cars buffer me from traffic.	1	2	3	4	5	X
I like having trees between me and the traffic.	1	2	3	4	5	X
There is enough street lighting at night.	1	2	3	4	5	X

How much would you like to see more trees on the street?

	Not at all	A little	Somewhat	Quite a bit	A great deal	N/A
Large shade trees (40'-100')	1	2	3	4	5	X
Mid-size ornamental trees (20'-50' tall)	1	2	3	4	5	X
A mix of trees	1	2	3	4	5	X

Why or why not?

_____
_____
_____
_____

Do you have anything else to add about how this street can be improved, or how the City can improve walking in this neighborhood?

_____
_____
_____
_____
_____

Suffolk Street

Dwight Street

How often do you walk along each of these streets? See above.

	Never	Once a month or less	A few times a month	A few times a week	Daily or more
The street we are on	1	2	3	4	5
Suffolk Street	1	2	3	4	5
Dwight Street	1	2	3	4	5

How much do you like each of these streets?

1 2 3 4 5 The street we are on
1 2 3 4 5 Suffolk Street
1 2 3 4 5 Dwight Street

Scale: 1=not at all 2=a little 3= somewhat 4= quite a bit 5=a great deal X=N/A

How <u>safe</u> do you feel walking along these sections of streets?

1 2 3 4 5 The street we are on
1 2 3 4 5 Suffolk Street
1 2 3 4 5 Dwight Street

Scale: 1=not at all 2=a little 3= somewhat 4= quite a bit 5=a great deal X=N/A

Optional Background: Socio-Demographic

Please answer the following questions by filling in responses as indicated on the screen. Responses are not mandatory. You may choose to answer as many or as few questions as you are comfortable with. These responses will not be used in any way to identify you, all responses will remain anonymous, but any information you choose to provide will greatly help our research.

Age:
- ☐ 18 to 24 years
- ☐ 25 to 34 years
- ☐ 35 to 44 years
- ☐ 45 to 54 years
- ☐ 55 to 64 years
- ☐ Age 65 or older

What is the highest level of education you have completed?

__ Less than high school __ High school diploma __ Some college
__ Associate's degree __ Bachelor's degree __ Graduate degree

Race/Ethnicity (check all that apply):
- ☐ Black or African American
- ☐ Asian
- ☐ South Asian
- ☐ Pacific Islander/Native Hawaiian
- ☐ Hispanic, Latino, or Spanish Origin
- ☐ Pacific Islander/Native Hawaiian
- ☐ White
- ☐ Middle Eastern
- ☐ American Indian or Alaska Native

Other_____

Language(s) Spoken at Home: _____

Gender: _____

Household Income:
__ Less than $25,000 __ $25,000 to $34,999 __ $35,000 to $49,999
__ $50,000 to $74,999 __ $75,000 to $99,999 __ $100,000 to $149,999
__ $150,000 or more

How many people, including yourself, live in your household? ____ How many are under 18? ___

Do you live in this neighborhood? ☐ Yes ☐ No
Years in residence ____ years

What is your housing situation? ☐ Owner ☐ Renter ☐ Don't pay for housing

Do you own a car? ☐ Yes ☐ No

Thank you! For more information about the study, contact Professor Robert Ryan at rlryan@larp.umass.edu; Tel. (413) 545-6633

7.4.4.6. Appleton Street (Spanish)

Encuesta acerca del Rol de los Árboles de la Calle en la Seguridad de los Peatones

Consentimiento
¿Antes de empezar, podría darnos su confirmación verbal de que usted entiende el propósito de este estudio y que desea participar en él?
_ Sí _ No

¿Qué tan a menudo camina por esta calle?
_ Todos los días _ Pocas veces a la semana _ Semanalmente _ Pocas veces al mes
_ Pocas veces al año _ Casi nunca

¿Cuánto tiempo ha caminado hoy (y de dónde viene)?
_____ minutos _____

¿Cuán a menudo camina en esta calle por las siguientes razones? Seleccione todas las que apliquen y circule la razón principal.

_ Trabajo _ Casa _ Escuela _ Compras _ Parada de Bus/Metro _ Placer _ Ejercicio
_ Otro: ____

¿Qué tan <u>importante</u> son para usted los siguientes aspectos al escoger las rutas para sus caminatas?

	Para nada	Un poco	Algo	Bastante	Muchísimo	N/A
El mantenimiento y la reparación de aceras	1	2	3	4	5	X
El ancho de la acera	1	2	3	4	5	X
Cruces seguros, cruces peatonales y semáforos	1	2	3	4	5	X
Belleza/Estética (lugar agradable para caminar)	1	2	3	4	5	X
Lugares para sentarse/descansar (bancos)	1	2	3	4	5	X
Sombra del dosel de los árboles	1	2	3	4	5	X

Las afirmaciones a continuación, ¿qué tan bien describen sus sentimientos acerca de la seguridad en esta calle?

	Para nada	Un poco	Moderadamente bien	Bastante bien	Muy bien	N/A
Me siento seguro caminando aquí.	1	2	3	4	5	X
Me preocupa el crimen y las actividades ilícitas.	1	2	3	4	5	X
Me preocupa mi seguridad como peatón.	1	2	3	4	5	X
Puedo ver claramente todo el tiempo.	1	2	3	4	5	X
Me preocupa que alguien se esconda donde no puedo ver.	1	2	3	4	5	X
Las aceras están muy llenas de gente.	1	2	3	4	5	X
Los que montan bicicletas a menudo me molestan cuando camino en la acera.	1	2	3	4	5	X
Puedo cruzar la calle de manera segura.	1	2	3	4	5	X
Hay suficientes cruces peatonales.	1	2	3	4	5	X
El tráfico se mueve a una velocidad segura.	1	2	3	4	5	X
Los árboles en esta calle bloquean mi visión.	1	2	3	4	5	X
Los árboles en esta calle me hacen sentir cómodo como peatón.	1	2	3	4	5	X
Los carros estacionados me protegen del tráfico.	1	2	3	4	5	X
Me gusta tener árboles entre el tráfico y yo.	1	2	3	4	5	X

Hay suficiente iluminación nocturna en la calle.	1	2	3	4	5	X

¿Qué tanto le gustaría ver más árboles en la calle?

	Para nada	Un poco	Algo	Bastante	Muchismo	N/A
Árboles que den mucha sombra (40-100 pies de alto)	1	2	3	4	5	X
Árboles de tamaño mediano, decorativos (20-50 pies de alto)	1	2	3	4	5	X
Una mezcla de árboles	1	2	3	4	5	X

¿Por qué?

_____

¿Hay algo más que le gustaría añadir acerca de cómo esta calle puede ser mejorada, o de cómo la ciudad puede mejorar la movilidad del vecindario?

_____

_____

Suffolk Street

Dwight Street

¿Qué tanto le gusta cada una de estas calles? Ver arriba

	Para nada	Un poco	Algo	Bastante	Muchísimo	No sé
La calle en la que estamos	1	2	3	4	5	X
Suffolk Street	1	2	3	4	5	X
Dwight Street	1	2	3	4	5	X

¿Qué tan <u>seguro</u> se siente al caminar en estos tramos de calles?

	Para nada	Un poco	Algo	Bastante	Muchísimo	N/A
La calle en la que estamos	1	2	3	4	5	X
Suffolk Street	1	2	3	4	5	X
Dwight Street	1	2	3	4	5	X

<u>Sección 8: Origen: sociodemográfico</u>

Por favor responda las siguientes preguntas señalando sus respuestas como se indica en la pantalla. No es obligatorio responder. Usted decide cuántas preguntas se siente cómodo respondiendo. Estas respuestas no serán usadas para identificarlo a usted y todas las respuestas permanecerán anónimas, pero cualquier información que usted provea nos ayudará inmensamente en nuestra investigación.

Edad:

- ☐ 18 a 24 años
- ☐ 25 a 34 años
- ☐ 35 a 44 años
- ☐ 45 a 54 años
- ☐ 55 a 64 años
- ☐ 65 años o más

¿Cuál es el nivel más alto de educación que ha completado?

- ☐ Menos de Escuela Secundaria
- ☐ Diploma de Escuela Secundaria
- ☐ Grado de Asociado
- ☐ Grado Universitario
- ☐ Título de Posgrado

Raza/Grupo Étnico (marque todas las que apliquen):

- ☐ negro o afroamericano
- ☐ asiático
- ☐ asiático del Sur
- ☐ isleño del Pacifico /nativo hawaiano
- ☐ hispano, latino, o de origen español
- ☐ blanco del Medio Oriente
- ☐ Indígena americano o nativo de Alaska

Otro:_____

Idioma(s) que hablan en casa: _____

Género: _____

Ingreso del Hogar:

- ☐ Menos de $25,000
- ☐ $25,000 a $34,999
- ☐ $35,000 a $49,999
- ☐ $50,000 a $74,999
- ☐ $75,000 a $99,999
- ☐ $100,000 a $149,999
- ☐ $150,000 o mas

¿Cuántas personas, incluyéndose usted, viven en su hogar? ____ ¿Cuántas tienen menos de 18 años? ___

¿Vive usted en este vecindario? ☐ Sí ☐ No

Años de residencia: ____ años

¿Cuál es su situación de vivienda? ☐ Propietario ☐ Inquilino ☐ No paga por vivienda

¿Es usted propietario de un carro? ☐ Sí ☐ No

¡Gracias! Para mayor información acerca de este estudio, contacte al Profesor Robert Ryan a rlryan@larp.umass.edu; Tel. (413) 545-6633

7.4.5. Survey Instrument: City of Springfield

7.4.5.1. Belmont Avenue (west)

The Role of Street Trees on Pedestrian Safety Survey

Consent
Before we begin, can you provide verbal confirmation that you understand the purpose of this study and that you wish to participate?

_ Yes _ No

How often do you walk on this street?
_ Every day _ A few times a week _ A few times a month _ A few times a year
_ Almost never

How long have you been walking today, and where are you coming from?
_____ minutes
_____

How often do you walk on this street for the following reasons? Check all that apply and circle the main reason.

_ Work _ Home _ School _ Shopping _ Bus/ subway stop _ Leisure _ Exercise
_ Other: ____

How important to you are the following in choosing routes for your walking trips?

	Not at all	A little	Somewhat	Quite a bit	A great deal	N/A
Sidewalk maintenance and repair	1	2	3	4	5	X
Sidewalk width	1	2	3	4	5	X
Safe crossings, crosswalks, and traffic lights	1	2	3	4	5	X
Beauty/aesthetics (pleasant place to walk)	1	2	3	4	5	X

Places to sit/rest (benches)	1	2	3	4	5	X
Tree canopy shade	1	2	3	4	5	X

How well do the following describe your feelings about safety on this street? Please circle your response.

	Not at all	Slightly	Moderately well	Fairly well	Very well	N/A
I feel safe when walking here.	1	2	3	4	5	X
I can safely cross the street.	1	2	3	4	5	X
There are enough crosswalks.	1	2	3	4	5	X
I am concerned about crime or illicit activities.	1	2	3	4	5	X
I am concerned about my safety as a pedestrian.	1	2	3	4	5	X
I can see clearly at all times.	1	2	3	4	5	X
I am concerned that someone could hide where I can't see.	1	2	3	4	5	X
Sidewalks are too crowded with people	1	2	3	4	5	X
Bike riders often disrupt me when I walk on the sidewalks.	1	2	3	4	5	X
The traffic moves at a safe speed.	1	2	3	4	5	X
Trees on this street block my vision.	1	2	3	4	5	X
Trees on this street make me comfortable as a pedestrian.	1	2	3	4	5	X
Parked cars buffer me from traffic.	1	2	3	4	5	X
I like having trees between me and the traffic.	1	2	3	4	5	X
There is enough street lighting at night.	1	2	3	4	5	X

How much would you like to see more trees on the street?

	Not at all	A little	Somewhat	Quite a bit	A great deal	N/A
Large shade trees (40'-100')	1	2	3	4	5	X
Mid-size ornamental trees (20'-50' tall)	1	2	3	4	5	X
A mix of trees	1	2	3	4	5	X

Why or why not?

_____

_____

_____
_____

Do you have anything else to add about how this street can be improved, or how the City can improve walking in this neighborhood?

_____
_____
_____
_____
_____

Main Street

Belmont Avenue (East)

How often do you walk along each of these streets? See above.

	Never	Once a month or less	A few times a month	A few times a week	Daily or more
The street we are on	1	2	3	4	5
Main Street	1	2	3	4	5
Belmont Street (East)	1	2	3	4	5

How much do you like each of these streets?

1 2 3 4 5 The street we are on
1 2 3 4 5 Main Street
1 2 3 4 5 Belmont Avenue (East)

Scale: 1=not at all 2=a little 3= somewhat 4= quite a bit 5=a great deal X=N/A

How <u>safe</u> do you feel walking along these sections of streets?

1 2 3 4 5 The street we are on
1 2 3 4 5 Main Street
1 2 3 4 5 Belmont Avenue (East)

Scale: 1=not at all 2=a little 3= somewhat 4= quite a bit 5=a great deal X=N/A

Optional Background: Socio-Demographic

Please answer the following questions by filling in responses as indicated on the screen. Responses are not mandatory. You may choose to answer as many or as few questions as you are comfortable with. These responses will not be used in any way to identify you, all responses will remain anonymous, but any information you choose to provide will greatly help our research.

Age:

- ☐ 18 to 24 years
- ☐ 25 to 34 years
- ☐ 35 to 44 years
- ☐ 45 to 54 years
- ☐ 55 to 64 years
- ☐ Age 65 or older

What is the highest level of education you have completed?

__ Less than high school __ High school diploma __ Some college
__ Associate's degree __ Bachelor's degree __ Graduate degree

Race/Ethnicity (check all that apply):

- ☐ Black or African American
- ☐ Asian
- ☐ South Asian
- ☐ Pacific Islander/Native Hawaiian
- ☐ Hispanic, Latino, or Spanish Origin
- ☐ Pacific Islander/Native Hawaiian
- ☐ White
- ☐ Middle Eastern
- ☐ American Indian or Alaska Native

Other_____

Language(s) Spoken at Home: _____

Gender: _____

Household Income:
__ Less than $25,000 __ $25,000 to $34,999 __ $35,000 to $49,999
__ $50,000 to $74,999 __ $75,000 to $99,999 __ $100,000 to $149,999
__ $150,000 or more

How many people, including yourself, live in your household? ____ How many are under 18? ___

Do you live in this neighborhood? ☐ Yes ☐ No
Years in residence ____ years

What is your housing situation? ☐ Owner ☐ Renter ☐ Don't pay for housing

Do you own a car? ☐ Yes ☐ No

Thank you! For more information about the study, contact Professor Robert Ryan at rlryan@larp.umass.edu; Tel. (413) 545-6633

7.4.5.2. Belmont Avenue (west) (Spanish)

Encuesta acerca del Rol de los Árboles de la Calle en la Seguridad de los Peatones

Consentimiento
¿Antes de empezar, podría darnos su confirmación verbal de que usted entiende el propósito de este estudio y que desea participar en él?
_ Sí _ No

¿Qué tan a menudo camina por esta calle?
_ Todos los días _ Pocas veces a la semana _ Semanalmente _ Pocas veces al mes
_ Pocas veces al año _ Casi nunca

¿Cuánto tiempo ha caminado hoy (y de dónde viene)?
_____ minutos _____

¿Cuán a menudo camina en esta calle por las siguientes razones? Seleccione todas las que apliquen y circule la razón principal.

_ Trabajo _ Casa _ Escuela _ Compras _ Parada de Bus/Metro _ Placer _ Ejercicio
_ Otro: ____

¿Qué tan <u>importante</u> son para usted los siguientes aspectos al escoger las rutas para sus caminatas?

	Para nada	Un poco	Algo	Bastante	Muchísimo	N/A
El mantenimiento y la reparación de aceras	1	2	3	4	5	X
El ancho de la acera	1	2	3	4	5	X
Cruces seguros, cruces peatonales y semáforos	1	2	3	4	5	X
Belleza/Estética (lugar agradable para caminar)	1	2	3	4	5	X
Lugares para sentarse/descansar (bancos)	1	2	3	4	5	X
Sombra del dosel de los árboles	1	2	3	4	5	X

Las afirmaciones a continuación, ¿qué tan bien describen sus sentimientos acerca de la seguridad en esta calle?

	Para nada	Un poco	Moderadamente bien	Bastante bien	Muy bien	N/A
Me siento seguro caminando aquí.	1	2	3	4	5	X
Me preocupa el crimen y las actividades ilícitas.	1	2	3	4	5	X
Me preocupa mi seguridad como peatón.	1	2	3	4	5	X
Puedo ver claramente todo el tiempo.	1	2	3	4	5	X
Me preocupa que alguien se esconda donde no puedo ver.	1	2	3	4	5	X
Las aceras están muy llenas de gente.	1	2	3	4	5	X
Los que montan bicicletas a menudo me molestan cuando camino en la acera.	1	2	3	4	5	X
Puedo cruzar la calle de manera segura.	1	2	3	4	5	X
Hay suficientes cruces peatonales.	1	2	3	4	5	X
El tráfico se mueve a una velocidad segura.	1	2	3	4	5	X
Los árboles en esta calle bloquean mi visión.	1	2	3	4	5	X

Los árboles en esta calle me hacen sentir cómodo como peatón.	1	2	3	4	5	X
Los carros estacionados me protegen del tráfico.	1	2	3	4	5	X
Me gusta tener árboles entre el tráfico y yo.	1	2	3	4	5	X
Hay suficiente iluminación nocturna en la calle.	1	2	3	4	5	X

¿Qué tanto le gustaría ver más árboles en la calle?

	Para nada	Un poco	Algo	Bastante	Muchismo	N/A
Árboles que den mucha sombra (40-100 pies de alto)	1	2	3	4	5	X
Árboles de tamaño mediano, decorativos (20-50 pies de alto)	1	2	3	4	5	X
Una mezcla de árboles	1	2	3	4	5	X

¿Por qué?

_____

¿Hay algo más que le gustaría añadir acerca de cómo esta calle puede ser mejorada, o de cómo la ciudad puede mejorar la movilidad del vecindario?

_____

_____

Main Street

Belmont Avenue (East)

¿Qué tanto le gusta cada una de estas calles? Ver arriba

	Para nada	Un poco	Algo	Bastante	Muchísimo	No sé
La calle en la que estamos	1	2	3	4	5	X
Main Street	1	2	3	4	5	X
Belmont Avenue (East)	1	2	3	4	5	X

¿Qué tan <u>seguro</u> se siente al caminar en estos tramos de calles?

	Para nada	Un poco	Algo	Bastante	Muchismo	N/A
La calle en la que estamos	1	2	3	4	5	X
Main Street	1	2	3	4	5	X
Belmont Avenue (East)	1	2	3	4	5	X

<u>Sección 8: Origen: sociodemográfico</u>

Por favor responda las siguientes preguntas señalando sus respuestas como se indica en la pantalla. No es obligatorio responder. Usted decide cuántas preguntas se siente cómodo respondiendo. Estas respuestas no serán usadas para identificarlo a usted y todas las respuestas permanecerán anónimas, pero cualquier información que usted provea nos ayudará inmensamente en nuestra investigación.

Edad:

- ☐ 18 a 24 años
- ☐ 25 a 34 años
- ☐ 35 a 44 años
- ☐ 45 a 54 años
- ☐ 55 a 64 años
- ☐ 65 años o más

¿Cuál es el nivel más alto de educación que ha completado?

- ☐ Menos de Escuela Secundaria
- ☐ Diploma de Escuela Secundaria
- ☐ Grado de Asociado
- ☐ Grado Universitario
- ☐ Título de Posgrado

Raza/Grupo Étnico (marque todas las que apliquen):

- ☐ negro o afroamericano
- ☐ asiático
- ☐ asiático del Sur
- ☐ isleño del Pacifico /nativo hawaiano
- ☐ hispano, latino, o de origen español
- ☐ blanco del Medio Oriente
- ☐ Indígena americano o nativo de Alaska

Otro:_____

Idioma(s) que hablan en casa: _____

Género: _____

Ingreso del Hogar:

- ☐ Menos de $25,000
- ☐ $25,000 a $34,999
- ☐ $35,000 a $49,999
- ☐ $50,000 a $74,999
- ☐ $75,000 a $99,999
- ☐ $100,000 a $149,999
- ☐ $150,000 o mas

¿Cuántas personas, incluyéndose usted, viven en su hogar? ____ ¿Cuántas tienen menos de 18 años? ___

¿Vive usted en este vecindario? ☐ Sí ☐ No
Años de residencia: ____ años

¿Cuál es su situación de vivienda? ☐ Propietario ☐ Inquilino ☐ No paga por vivienda

¿Es usted propietario de un carro? ☐ Sí ☐ No

¡Gracias! Para mayor información acerca de este estudio, contacte al Profesor Robert Ryan a rlryan@larp.umass.edu; Tel. (413) 545-6633

7.4.5.3. Belmont Avenue (east)

The Role of Street Trees on Pedestrian Safety Survey

Consent
Before we begin, can you provide verbal confirmation that you understand the purpose of this study and that you wish to participate?

_ Yes _ No

How often do you walk on this street?
_ Every day _ A few times a week _ A few times a month _ A few times a year
_ Almost never

How long have you been walking today, and where are you coming from?
_____ minutes
_____

How often do you walk on this street for the following reasons? Check all that apply and circle the main reason.

_ Work _ Home _ School _ Shopping _ Bus/ subway stop _ Leisure _ Exercise
_ Other: ____

How important to you are the following in choosing routes for your walking trips?

	Not at all	A little	Somewhat	Quite a bit	A great deal	N/A
Sidewalk maintenance and repair	1	2	3	4	5	X
Sidewalk width	1	2	3	4	5	X
Safe crossings, crosswalks, and traffic lights	1	2	3	4	5	X
Beauty/aesthetics (pleasant place to walk)	1	2	3	4	5	X
Places to sit/rest (benches)	1	2	3	4	5	X

Tree canopy shade	1	2	3	4	5	X

How well do the following describe your feelings about safety on this street? Please circle your response.

	Not at all	Slightly	Moderately well	Fairly well	Very well	N/A
I feel safe when walking here.	1	2	3	4	5	X
I can safely cross the street.	1	2	3	4	5	X
There are enough crosswalks.	1	2	3	4	5	X
I am concerned about crime or illicit activities.	1	2	3	4	5	X
I am concerned about my safety as a pedestrian.	1	2	3	4	5	X
I can see clearly at all times.	1	2	3	4	5	X
I am concerned that someone could hide where I can't see.	1	2	3	4	5	X
Sidewalks are too crowded with people	1	2	3	4	5	X
Bike riders often disrupt me when I walk on the sidewalks.	1	2	3	4	5	X
The traffic moves at a safe speed.	1	2	3	4	5	X
Trees on this street block my vision.	1	2	3	4	5	X
Trees on this street make me comfortable as a pedestrian.	1	2	3	4	5	X
Parked cars buffer me from traffic.	1	2	3	4	5	X
I like having trees between me and the traffic.	1	2	3	4	5	X
There is enough street lighting at night.	1	2	3	4	5	X

How much would you like to see more trees on the street?

	Not at all	A little	Somewhat	Quite a bit	A great deal	N/A
Large shade trees (40'-100')	1	2	3	4	5	X
Mid-size ornamental trees (20'-50' tall)	1	2	3	4	5	X
A mix of trees	1	2	3	4	5	X

Why or why not?

_____

_____

_____
_____

Do you have anything else to add about how this street can be improved, or how the City can improve walking in this neighborhood?

_____
_____
_____
_____
_____

Main Street

Belmont Avenue (West)

How often do you walk along each of these streets? See above.

	Never	Once a month or less	A few times a month	A few times a week	Daily or more
The street we are on	1	2	3	4	5
Main Street	1	2	3	4	5
Belmont Avenue (West)	1	2	3	4	5

How much do you like each of these streets?

1 2 3 4 5 The street we are on
1 2 3 4 5 Main Street
1 2 3 4 5 Belmont Avenue (West)

Scale: 1=not at all 2=a little 3= somewhat 4= quite a bit 5=a great deal X=N/A

How <u>safe</u> do you feel walking along these sections of streets?

1 2 3 4 5 The street we are on
1 2 3 4 5 Main Street
1 2 3 4 5 Belmont Avenue (West)

Scale: 1=not at all 2=a little 3= somewhat 4= quite a bit 5=a great deal X=N/A

Optional Background: Socio-Demographic

Please answer the following questions by filling in responses as indicated on the screen. Responses are not mandatory. You may choose to answer as many or as few questions as you are comfortable with. These responses will not be used in any way to identify you, all responses will remain anonymous, but any information you choose to provide will greatly help our research.

Age:

- ☐ 18 to 24 years
- ☐ 25 to 34 years
- ☐ 35 to 44 years
- ☐ 45 to 54 years
- ☐ 55 to 64 years
- ☐ Age 65 or older

What is the highest level of education you have completed?

__ Less than high school __ High school diploma __ Some college
__ Associate's degree __ Bachelor's degree __ Graduate degree

Race/Ethnicity (check all that apply):

- ☐ Black or African American
- ☐ Asian
- ☐ South Asian
- ☐ Pacific Islander/Native Hawaiian
- ☐ Hispanic, Latino, or Spanish Origin
- ☐ Pacific Islander/Native Hawaiian
- ☐ White
- ☐ Middle Eastern
- ☐ American Indian or Alaska Native

Other_____

Language(s) Spoken at Home: _____

Gender: _____

Household Income:
__ Less than $25,000 __ $25,000 to $34,999 __ $35,000 to $49,999
__ $50,000 to $74,999 __ $75,000 to $99,999 __ $100,000 to $149,999
__ $150,000 or more

How many people, including yourself, live in your household? ____ How many are under 18? ___

Do you live in this neighborhood? ☐ Yes ☐ No
Years in residence ____ years

What is your housing situation? ☐ Owner ☐ Renter ☐ Don't pay for housing

Do you own a car? ☐ Yes ☐ No

Thank you! For more information about the study, contact Professor Robert Ryan at rlryan@larp.umass.edu; Tel. (413) 545-6633

7.4.5.4. Belmont Avenue (east) (Spanish)

Encuesta acerca del Rol de los Árboles de la Calle en la Seguridad de los Peatones

Consentimiento
¿Antes de empezar, podría darnos su confirmación verbal de que usted entiende el propósito de este estudio y que desea participar en él?
_ Sí _ No

¿Qué tan a menudo camina por esta calle?
_ Todos los días _ Pocas veces a la semana _ Semanalmente _ Pocas veces al mes
_ Pocas veces al año _ Casi nunca

¿Cuánto tiempo ha caminado hoy (y de dónde viene)?
_____ minutos _____

¿Cuán a menudo camina en esta calle por las siguientes razones? Seleccione todas las que apliquen y circule la razón principal.

_ Trabajo _ Casa _ Escuela _ Compras _ Parada de Bus/Metro _ Placer _ Ejercicio
_ Otro: ____

¿Qué tan <u>importante</u> son para usted los siguientes aspectos al escoger las rutas para sus caminatas?

	Para nada	Un poco	Algo	Bastante	Muchísimo	N/A
El mantenimiento y la reparación de aceras	1	2	3	4	5	X
El ancho de la acera	1	2	3	4	5	X
Cruces seguros, cruces peatonales y semáforos	1	2	3	4	5	X
Belleza/Estética (lugar agradable para caminar)	1	2	3	4	5	X
Lugares para sentarse/descansar (bancos)	1	2	3	4	5	X
Sombra del dosel de los árboles	1	2	3	4	5	X

Las afirmaciones a continuación, ¿qué tan bien describen sus sentimientos acerca de la seguridad en esta calle?

	Para nada	Un poco	Moderadamente bien	Bastante bien	Muy bien	N/A
Me siento seguro caminando aquí.	1	2	3	4	5	X
Me preocupa el crimen y las actividades ilícitas.	1	2	3	4	5	X
Me preocupa mi seguridad como peatón.	1	2	3	4	5	X
Puedo ver claramente todo el tiempo.	1	2	3	4	5	X
Me preocupa que alguien se esconda donde no puedo ver.	1	2	3	4	5	X
Las aceras están muy llenas de gente.	1	2	3	4	5	X
Los que montan bicicletas a menudo me molestan cuando camino en la acera.	1	2	3	4	5	X
Puedo cruzar la calle de manera segura.	1	2	3	4	5	X
Hay suficientes cruces peatonales.	1	2	3	4	5	X
El tráfico se mueve a una velocidad segura.	1	2	3	4	5	X
Los árboles en esta calle bloquean mi visión.	1	2	3	4	5	X

Los árboles en esta calle me hacen sentir cómodo como peatón.	1	2	3	4	5	X
Los carros estacionados me protegen del tráfico.	1	2	3	4	5	X
Me gusta tener árboles entre el tráfico y yo.	1	2	3	4	5	X
Hay suficiente iluminación nocturna en la calle.	1	2	3	4	5	X

¿Qué tanto le gustaría ver más árboles en la calle?

	Para nada	Un poco	Algo	Bastante	Muchismo	N/A
Árboles que den mucha sombra (40-100 pies de alto)	1	2	3	4	5	X
Árboles de tamaño mediano, decorativos (20-50 pies de alto)	1	2	3	4	5	X
Una mezcla de árboles	1	2	3	4	5	X

¿Por qué?

_____

¿Hay algo más que le gustaría añadir acerca de cómo esta calle puede ser mejorada, o de cómo la ciudad puede mejorar la movilidad del vecindario?

_____

_____

Main Street

Belmont Avenue (West)

¿Qué tanto le gusta cada una de estas calles? Ver arriba

	Para nada	Un poco	Algo	Bastante	Muchísimo	No sé
La calle en la que estamos	1	2	3	4	5	X
Main Street	1	2	3	4	5	X
Belmont Avenue (West)	1	2	3	4	5	X

¿Qué tan <u>seguro</u> se siente al caminar en estos tramos de calles?

	Para nada	Un poco	Algo	Bastante	Muchismo	N/A
La calle en la que estamos	1	2	3	4	5	X
Main Street	1	2	3	4	5	X
Belmont t (West)	1	2	3	4	5	X

<u>Sección 8: Origen: sociodemográfico</u>

Por favor responda las siguientes preguntas señalando sus respuestas como se indica en la pantalla. No es obligatorio responder. Usted decide cuántas preguntas se siente cómodo respondiendo. Estas respuestas no serán usadas para identificarlo a usted y todas las respuestas permanecerán anónimas, pero cualquier información que usted provea nos ayudará inmensamente en nuestra investigación.

Edad:

- ☐ 18 a 24 años
- ☐ 25 a 34 años
- ☐ 35 a 44 años
- ☐ 45 a 54 años
- ☐ 55 a 64 años
- ☐ 65 años o más

¿Cuál es el nivel más alto de educación que ha completado?

- ☐ Menos de Escuela Secundaria
- ☐ Diploma de Escuela Secundaria
- ☐ Grado de Asociado
- ☐ Grado Universitario
- ☐ Título de Posgrado

Raza/Grupo Étnico (marque todas las que apliquen):

- ☐ negro o afroamericano
- ☐ asiático
- ☐ asiático del Sur
- ☐ isleño del Pacifico /nativo hawaiano
- ☐ hispano, latino, o de origen español
- ☐ blanco del Medio Oriente
- ☐ Indígena americano o nativo de Alaska

Otro:_____

Idioma(s) que hablan en casa: _____

Género: _____

Ingreso del Hogar:

- ☐ Menos de $25,000
- ☐ $25,000 a $34,999
- ☐ $35,000 a $49,999
- ☐ $50,000 a $74,999
- ☐ $75,000 a $99,999
- ☐ $100,000 a $149,999
- ☐ $150,000 o mas

¿Cuántas personas, incluyéndose usted, viven en su hogar? ____ ¿Cuántas tienen menos de 18 años? ___

¿Vive usted en este vecindario? ☐ Sí ☐ No

Años de residencia: ____ años

¿Cuál es su situación de vivienda? ☐ Propietario ☐ Inquilino ☐ No paga por vivienda

¿Es usted propietario de un carro? ☐ Sí ☐ No

¡Gracias! Para mayor información acerca de este estudio, contacte al Profesor Robert Ryan a rlryan@larp.umass.edu; Tel. (413) 545-6633

7.4.5.5. Main Street

The Role of Street Trees on Pedestrian Safety Survey

Consent
Before we begin, can you provide verbal confirmation that you understand the purpose of this study and that you wish to participate?

_ Yes _ No

How often do you walk on this street?
_ Every day _ A few times a week _ A few times a month _ A few times a year
_ Almost never

How long have you been walking today, and where are you coming from?
_____ minutes
_____

How often do you walk on this street for the following reasons? Check all that apply and circle the main reason.

_ Work _ Home _ School _ Shopping _ Bus/ subway stop _ Leisure _ Exercise
_ Other: ____

How important to you are the following in choosing routes for your walking trips?

	Not at all	A little	Somewhat	Quite a bit	A great deal	N/A
Sidewalk maintenance and repair	1	2	3	4	5	X
Sidewalk width	1	2	3	4	5	X
Safe crossings, crosswalks, and traffic lights	1	2	3	4	5	X
Beauty/aesthetics (pleasant place to walk)	1	2	3	4	5	X
Places to sit/rest (benches)	1	2	3	4	5	X
Tree canopy shade	1	2	3	4	5	X

How well do the following describe your feelings about safety on this street? Please circle your response.

	Not at all	Slightly	Moderately well	Fairly well	Very well	N/A
I feel safe when walking here.	1	2	3	4	5	X
I can safely cross the street.	1	2	3	4	5	X
There are enough crosswalks.	1	2	3	4	5	X
I am concerned about crime or illicit activities.	1	2	3	4	5	X
I am concerned about my safety as a pedestrian.	1	2	3	4	5	X
I can see clearly at all times.	1	2	3	4	5	X
I am concerned that someone could hide where I can't see.	1	2	3	4	5	X
Sidewalks are too crowded with people	1	2	3	4	5	X
Bike riders often disrupt me when I walk on the sidewalks.	1	2	3	4	5	X
The traffic moves at a safe speed.	1	2	3	4	5	X
Trees on this street block my vision.	1	2	3	4	5	X
Trees on this street make me comfortable as a pedestrian.	1	2	3	4	5	X
Parked cars buffer me from traffic.	1	2	3	4	5	X
I like having trees between me and the traffic.	1	2	3	4	5	X
There is enough street lighting at night.	1	2	3	4	5	X

How much would you like to see more trees on the street?

	Not at all	A little	Somewhat	Quite a bit	A great deal	N/A
Large shade trees (40'-100')	1	2	3	4	5	X
Mid-size ornamental trees (20'-50' tall)	1	2	3	4	5	X
A mix of trees	1	2	3	4	5	X

Why or why not?

_____
_____
_____
_____

Do you have anything else to add about how this street can be improved, or how the City can improve walking in this neighborhood?

_____
_____
_____
_____
_____

Belmont Avenue (East)

Belmont Avenue (West)

How often do you walk along each of these streets? See above.

	Never	Once a month or less	A few times a month	A few times a week	Daily or more
The street we are on	1	2	3	4	5
Belmont Street (East)	1	2	3	4	5
Belmont Street (West)	1	2	3	4	5

How much do you like each of these streets?

1 2 3 4 5 The street we are on
1 2 3 4 5 Belmont Avenue (East)
1 2 3 4 5 Belmont Avenue (West)

Scale: 1=not at all 2=a little 3= somewhat 4= quite a bit 5=a great deal X=N/A

How <u>safe</u> do you feel walking along these sections of streets?

1 2 3 4 5 The street we are on
1 2 3 4 5 Belmont Avenue (East)
1 2 3 4 5 Belmont Avenue (West)

Scale: 1=not at all 2=a little 3= somewhat 4= quite a bit 5=a great deal X=N/A

Optional Background: Socio-Demographic

Please answer the following questions by filling in responses as indicated on the screen. Responses are not mandatory. You may choose to answer as many or as few questions as you are comfortable with. These responses will not be used in any way to identify you, all responses will remain anonymous, but any information you choose to provide will greatly help our research.

Age:

- ☐ 18 to 24 years
- ☐ 25 to 34 years
- ☐ 35 to 44 years
- ☐ 45 to 54 years
- ☐ 55 to 64 years
- ☐ Age 65 or older

What is the highest level of education you have completed?

__ Less than high school __ High school diploma __ Some college
__ Associate's degree __ Bachelor's degree __ Graduate degree

Race/Ethnicity (check all that apply):

- ☐ Black or African American
- ☐ Asian
- ☐ South Asian
- ☐ Pacific Islander/Native Hawaiian
- ☐ Hispanic, Latino, or Spanish Origin
- ☐ Pacific Islander/Native Hawaiian
- ☐ White
- ☐ Middle Eastern
- ☐ American Indian or Alaska Native

Other_____

Language(s) Spoken at Home: _____

Gender: _____

Household Income:

__ Less than $25,000 __ $25,000 to $34,999 __ $35,000 to $49,999
__ $50,000 to $74,999 __ $75,000 to $99,999 __ $100,000 to $149,999
__ $150,000 or more

How many people, including yourself, live in your household? ____ How many are under 18? ___

Do you live in this neighborhood? ☐ Yes ☐ No
Years in residence ____ years

What is your housing situation? ☐ Owner ☐ Renter ☐ Don't pay for housing

Do you own a car? ☐ Yes ☐ No

Thank you! For more information about the study, contact Professor Robert Ryan at rlryan@larp.umass.edu; Tel. (413) 545-6633

7.4.5.6. Main Street (Spanish)

Encuesta acerca del Rol de los Árboles de la Calle en la Seguridad de los Peatones

Consentimiento
¿Antes de empezar, podría darnos su confirmación verbal de que usted entiende el propósito de este estudio y que desea participar en él?
_ Sí _ No

¿Qué tan a menudo camina por esta calle?
_ Todos los días _ Pocas veces a la semana _ Semanalmente _ Pocas veces al mes
_ Pocas veces al año _ Casi nunca

¿Cuánto tiempo ha caminado hoy (y de dónde viene)?
_____ minutos _____

¿Cuán a menudo camina en esta calle por las siguientes razones? Seleccione todas las que apliquen y circule la razón principal.

_ Trabajo _ Casa _ Escuela _ Compras _ Parada de Bus/Metro _ Placer _ Ejercicio
_ Otro: ____

¿Qué tan <u>importante</u> son para usted los siguientes aspectos al escoger las rutas para sus caminatas?

	Para nada	Un poco	Algo	Bastante	Muchísimo	N/A
El mantenimiento y la reparación de aceras	1	2	3	4	5	X

El ancho de la acera	1	2	3	4	5	X
Cruces seguros, cruces peatonales y semáforos	1	2	3	4	5	X
Belleza/Estética (lugar agradable para caminar)	1	2	3	4	5	X
Lugares para sentarse/descansar (bancos)	1	2	3	4	5	X
Sombra del dosel de los árboles	1	2	3	4	5	X

Las afirmaciones a continuación, ¿qué tan bien describen sus sentimientos acerca de la seguridad en esta calle?

	Para nada	Un poco	Moderadamente bien	Bastante bien	Muy bien	N/A
Me siento seguro caminando aquí.	1	2	3	4	5	X
Me preocupa el crimen y las actividades ilícitas.	1	2	3	4	5	X
Me preocupa mi seguridad como peatón.	1	2	3	4	5	X
Puedo ver claramente todo el tiempo.	1	2	3	4	5	X
Me preocupa que alguien se esconda donde no puedo ver.	1	2	3	4	5	X
Las aceras están muy llenas de gente.	1	2	3	4	5	X
Los que montan bicicletas a menudo me molestan cuando camino en la acera.	1	2	3	4	5	X
Puedo cruzar la calle de manera segura.	1	2	3	4	5	X
Hay suficientes cruces peatonales.	1	2	3	4	5	X
El tráfico se mueve a una velocidad segura.	1	2	3	4	5	X
Los árboles en esta calle bloquean mi visión.	1	2	3	4	5	X
Los árboles en esta calle me hacen sentir cómodo como peatón.	1	2	3	4	5	X
Los carros estacionados me protegen del tráfico.	1	2	3	4	5	X
Me gusta tener árboles entre el tráfico y yo.	1	2	3	4	5	X
Hay suficiente iluminación nocturna en la calle.	1	2	3	4	5	X

¿Qué tanto le gustaría ver más árboles en la calle?

	Para nada	Un poco	Algo	Bastante	Muchismo	N/A
Árboles que den mucha sombra (40-100 pies de alto)	1	2	3	4	5	X
Árboles de tamaño mediano, decorativos (20-50 pies de alto)	1	2	3	4	5	X
Una mezcla de árboles	1	2	3	4	5	X

¿Por qué?

_____

¿Hay algo más que le gustaría añadir acerca de cómo esta calle puede ser mejorada, o de cómo la ciudad puede mejorar la movilidad del vecindario?

_____

_____

Belmont Avenue (East)

Belmont Avenue (West)

¿Qué tanto le gusta cada una de estas calles? Ver arriba

	Para nada	Un poco	Algo	Bastante	Muchísimo	No sé
La calle en la que estamos	1	2	3	4	5	X
Belmont Avenue (East)	1	2	3	4	5	X
Belmont Avenue (West)	1	2	3	4	5	X

¿Qué tan <u>seguro</u> se siente al caminar en estos tramos de calles?

	Para nada	Un poco	Algo	Bastante	Muchismo	N/A
La calle en la que estamos	1	2	3	4	5	X
Belmont Avenue (East)	1	2	3	4	5	X
Belmont Avenue (West)	1	2	3	4	5	X

<u>Sección 8: Origen: sociodemográfico</u>

Por favor responda las siguientes preguntas señalando sus respuestas como se indica en la pantalla. No es obligatorio responder. Usted decide cuántas preguntas se siente cómodo respondiendo. Estas respuestas no serán usadas para identificarlo a usted y todas las respuestas permanecerán anónimas, pero cualquier información que usted provea nos ayudará inmensamente en nuestra investigación.

Edad:

- ☐ 18 a 24 años
- ☐ 25 a 34 años
- ☐ 35 a 44 años
- ☐ 45 a 54 años
- ☐ 55 a 64 años
- ☐ 65 años o más

¿Cuál es el nivel más alto de educación que ha completado?

- ☐ Menos de Escuela Secundaria
- ☐ Diploma de Escuela Secundaria
- ☐ Grado de Asociado
- ☐ Grado Universitario
- ☐ Título de Posgrado

Raza/Grupo Étnico (marque todas las que apliquen):

- ☐ negro o afroamericano
- ☐ asiático
- ☐ asiático del Sur
- ☐ isleño del Pacifico /nativo hawaiano
- ☐ hispano, latino, o de origen español
- ☐ blanco del Medio Oriente
- ☐ Indígena americano o nativo de Alaska

Otro:_____

Idioma(s) que hablan en casa: _____

Género: _____

Ingreso del Hogar:

- ☐ Menos de $25,000
- ☐ $25,000 a $34,999
- ☐ $35,000 a $49,999
- ☐ $50,000 a $74,999
- ☐ $75,000 a $99,999
- ☐ $100,000 a $149,999
- ☐ $150,000 o mas

¿Cuántas personas, incluyéndose usted, viven en su hogar? ____ ¿Cuántas tienen menos de 18 años? ___

¿Vive usted en este vecindario? ☐ Sí ☐ No

Años de residencia: ____ años

¿Cuál es su situación de vivienda? ☐ Propietario ☐ Inquilino ☐ No paga por vivienda

¿Es usted propietario de un carro? ☐ Sí ☐ No

¡Gracias! Para mayor información acerca de este estudio, contacte al Profesor Robert Ryan a rlryan@larp.umass.edu; Tel. (413) 545-6633

7.5 Appendix D: Summary of Mapping Variables

	Variable	Definition	Data Type	Data Source(s)
Dependent measure				
	Pedestrian-vehicular crashes	All crash reports containing the word "pedestrian" in the column "Vehicle Sequence of Events"	Count of pedestrian-vehicular accidents, point GIS shapefile	MassDOT Registry of Motor Vehicles[1]
Independent measures				
Imageability	Number of courtyards, plazas and parks	Parks and gardens on the block face	Count of Level 3 (L3) assessors' parcels falling within the Protected and Recreational Open Space GIS) layer, plus those with City of Springfield, City of Chicopee, or City of Holyoke ownership	MassGIS[2] Bureau of Geographic Information
	Number of major visible landscape features	Unobstructed view of key landscape features, such as major bodies of water or major changes in topography	Count of major hydrography or changes in topography, none were found in the study area	MassGIS
	Number of buildings with identifiers	Buildings with signage that clearly indicates building use, including those with retail uses or others expected to be identifiable, such as gas stations, hotels, theaters, or places of worship	Count of L3 assessors' parcels with land use codes related to commercial properties or religious worship	MassGIS

	Variable	Definition	Data Type	Data Source(s)
	Presence of outdoor dining	Legally operating sidewalk cafes	Count of eating and drinking establishments defined from the L3 assessors' parcels, verified by Google Street View	MassGIS, Google Street View[3]
	Number of people	100% population	Count of population from US Census block population count	2010 U.S. Census via MassGIS
	Noise level estimate	Based on the assumption that urban noise is primarily a function of vehicular traffic, three noise "levels" were created as a relative index to the roads in the study area	Three levels (Purciel et al. 2009), where 1= low 2= moderate 3=high based on the Average Daily Traffic (ADT) derived from the MassDOT road inventory	MassDOT GeoDOT: GIS for Transportation[4]
Enclosure	Number of long sight lines visible in three directions	The ability to see into the distance	Count derived from the ability of a constructed "sightline" to not be obstructed by a building or street tree in 15 ft. interval; a code of 0, 1, 2, or 3 was given based on the number of uninterrupted directions that could be "seen" on the line	MassGIS
	Proportion of street segment with street wall	The amount of building frontage and space between buildings	Ratio between the summed areas of the building footprints and of the corresponding L3 assessors' parcel areas	MassGIS
Human scale	Number of long sight lines visible in three directions	The amount of building frontage and space between buildings	Ratio between the summed areas of the building footprints and of the corresponding L3 assessors' parcel areas	MassGIS

	Variable	Definition	Data Type	Data Source(s)
	Proportion of street segment with building windows	Building frontage with retail use, assuming that if a building contains a retail business, the business is likely to display goods in a large street-level window	Ratio of retail building frontage (defined from L3 assessors' parcels land use codes) to the block face length	MassGIS
	Average height of building weighted by building frontage	The relationship of building height to the length of block face	Proportion of the number of floors per building in the block face multiplied by 3.7m (12 ft.), averaged across the block face then multiplied by the proportion of the building's frontage along the block face	Data could not be collected remotely, approximated by viewing the average building height per street in the study area
Transparency	Proportion of street segment with building windows	The relationship of building height to the length of block face	Proportion of the number of floors per building in the block face multiplied by 3.7m (12 ft.), averaged across the block face then multiplied by the proportion of the building's frontage along the block face	Data could not be collected remotely, approximated by viewing the average building height per street in the study area
	Proportion of street segment with street wall	The relationship of building height to the length of block face	Proportion of the number of floors per building in the block face multiplied by 3.7m (12 ft.), averaged across the block face then multiplied by the proportion of the building's frontage along the block face	Data could not be collected remotely, approximated by viewing the average building height per street in the study area

	Variable	Definition	Data Type	Data Source(s)
	Proportion of street segment with active uses	Active use buildings include those with frequent pedestrian traffic: stores, restaurants, attached apartment style residential buildings, hospitals, schools, and parks.	Proportion created by the building frontage associated with active uses, defined from land use codes in the L3 assessors' parcels, divided by the block face line	MassGIS
Complexity	Number of buildings	The total number of buildings present on both side of the street	Count of the number of buildings per L3 assessors' parcel summarized by block face	MassGIS
	Presence of outdoor dining	Legally operating sidewalk cafes	Count of eating and drinking establishments defined from the L3 assessors' parcels, verified by Google Street View	MassGIS, Google Street View[3]
	Number of people	100% population	Count of population from US Census block population count	2010 U.S. Census via MassGIS
Density	Floor area ratio (buffer)	The number of buildings within the buffer	Total building floor area for all parcels within a quarter-mile buffer divided by total area of the parcels	MassGIS
	Floor area ratio (block face)	The number of buildings on the adjacent block face	Total building floor area for parcels abutting the street divided by total area of the lots	MassGIS
	Population density (buffer)	Total population density of the buffer	Population of all census blocks whose centroids fell within the buffer divided by the total area of residential lots whose centroids fell within the buffer	2010 U.S. Census via MassGIS

	Variable	Definition	Data Type	Data Source(s)
Diversity	Entropy (buffer)	Number of different land uses in a given area and the degree to which they are balanced in land area for parcels in the buffer	Entropy = [(residential* ln(residential)) + (retail *ln(retail)) + (office*ln(office))]/ln(3), where each land use was computed as the floor area per buffer. L3 assessors' parcel Land Use Codes used to determine land use	MassGIS
	Entropy (block face)	Number of different land uses in a given area and the degree to which they are balanced in land area for parcels abutting the street	Entropy = [(residential* ln(residential)) + (retail *ln(retail)) + (office*ln(office))]/ln(3), where each land use was computed as the floor area per block face. L3 assessors' parcel Land Use Codes used to determine land use	MassGIS
Design	Intersection density (buffer)	Density of roadway intersections	Number of intersections within a quarter mile buffer of the block face, divided by the gross area of the buffer in square miles	MassGIS
	Four-way intersections (buffer)	Density of four-way intersections	Proportion of four-way intersections within a buffer	MassGIS
	Block length (block face)	Length of a given block face, measured in feet	2–3 block lengths of roadway segments	MassGIS
Destination accessibility	Walk score	Walk score metric	Taken at the address at the approximate midpoint of each block face	Walk Score, Inc.[5]
	Retail frontage (block face)	Building frontage with retail use, assuming that if a building contains a retail business, the business is likely to display goods in a large street-level window	Ratio of retail building frontage (defined from L3 assessors' parcels Land Use Codes) to the block face length	MassGIS

	Variable	Definition	Data Type	Data Source(s)
Distance to transit	Distance to closest transit (block face)	The shortest length of distance between the block face center and a bus stop	Bus stops were manually created using reference maps	Created data
Demographics	Household size (buffer)	Average household size	Count of the households whose centroids fell within the quarter mile buffer	2010 U.S. Census via MassGIS
Street tree attributes(only available for Springfield)	DBH (cm) (Tree diameter measured from 4.5 feet above the ground)	Diameter at breast height, a standard method of expressing the diameter of a standing tree trunk	Measure included in original dataset	City of Springfield[6]
	Crown spread (m)	The full length of the foliage and branches growing outward from a tree trunk	Using the DBH, modeled metric using appropriate allometric equation for each tree species	McPherson et al. 2016[7]; City of Springfield
	Height (m)	From ground level to tree top, to nearest 0.5 m	Using the DBH, modeled metric using appropriate allometric equation for each tree species	McPherson et al. 2016; City of Springfield
	Species diversity	The total number of individual tree species along a block face	Count, derived by manual assessment	City of Springfield
	Count / 12 feet	The abundance of trees along a block face	The ratio of trees per 12 linear feet	City of Springfield

Mapping variables sources:

[1] Registry of Motor Vehicles (MassDOT), Commonwealth of Massachusetts, Executive Office of Transportation. 2017. MassDOT Crash Portal. https://services.massdot.state.ma.us/crashportal/

[2] Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services. 2017. MassGIS Data Layers. http://www.mass.gov/service-details/massgis-data-layers

[3] Google Maps. 2017. Google Street View. http:// www.google.com/maps

[4] Department of Transportation (MassDOT), Commonwealth of Massachusetts, Executive Office of Transportation. 2017. MassDOT Open Data Portal. http://geo-massdot.opendata.arcgis.com/

[5] Walk Score, Inc. 2017. 2017 City and Neighborhood Ranking. http:// www.walkscore.com/cities-and-neighborhoods/

[6] City of Springfield. 2017. Street Tree Inventory. From correspondence with the Office of Planning and Economic Development.

[7] McPherson, E. Gregory; van Doorn, Natalie S.; Peper, Paula J. 2016. *Urban Tree Database and Allometric Equations*

7.6 Appendix E: Additional Survey Results

7.6.1. By Sociodemographic Profile

7.6.1.1. Age

	Total		Chicopee		Holyoke		Springfield		Trees- high		Trees - low		Trees- new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
18-24	17	9.4	5	8.5	6	10.0	6	9.7	6	10.3	6	9.8	5	8.1
25-34	25	13.8	4	6.8	10	16.7	11	17.7	7	12.1	7	11.5	11	17.7
35-44	32	17.7	9	15.3	11	18.3	12	19.4	14	24.1	5	8.2	13	21.0
45-54	42	23.2	15	25.4	14	23.3	13	21.0	16	27.6	15	24.6	11	17.7
55-64	34	18.8	14	23.7	8	13.3	12	19.4	11	19.0	12	19.7	11	17.7
65+	14	7.7	9	15.3	4	6.7	1	1.6	4	6.9	6	9.8	4	6.5
Total	164	90.6	56	94.9	53	88.3	55	88.7	58	100.0	51	83.6	55	88.7
Missing	17	9.4	3	5.1	7	11.7	7	11.3	6	10.3	10	16.4	7	11.3

7.6.1.2. Education

	Total		Chicopee		Holyoke		Springfield		Trees- high		Trees - low		Trees- new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Less than high school	23	12.7	4	6.8	12	20.0	7	11.3	2	3.4	12	19.7	9	14.5
High school diploma	50	27.6	12	20.3	18	30.0	20	32.3	18	31.0	10	16.4	22	35.5
Some college	32	17.7	14	23.7	5	8.3	13	21.0	9	15.5	17	27.9	6	9.7
Associate’s degree	21	11.6	8	13.6	9	15.0	4	6.5	8	13.8	6	9.8	7	11.3

	Total		Chicopee		Holyoke		Springfield		Trees- high		Trees - low		Trees- new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Bachelor's degree	20	11.0	11	18.6	3	5.0	6	9.7	11	19.0	3	4.9	6	9.7
Graduate degree	17	9.4	5	8.5	6	10.0	6	9.7	10	17.2	4	6.6	3	4.8
Total	163	90.1	54	91.5	53	88.3	56	90.3	58	100.0	52	85.2	53	85.5
Missing	18	9.9	5	8.5	7	11.7	6	9.7	2	3.4	9	14.8	9	14.5

7.6.1.3. Race

	Total		Chicopee		Holyoke		Springfield		Trees- high		Trees - low		Trees- new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
White	75	41.4	39	66.1	12	20.0	24	38.7	33	56.9	20	32.8	22	35.5
Black	16	8.8	3	5.1	4	6.7	9	14.5	5	8.6	8	13.1	3	4.8
Hispanic, Latino, or Spanish origin	54	29.8	10	16.9	31	51.7	13	21.0	14	24.1	17	27.9	23	37.1
Other	18	10	4	6.8	7	11.7	7	11.3	6	10.3	4	6.6	7	11.3
Total	163	90.1	56	94.9	54	90.0	53	85.5	58	100.0	50	82.0	55	88.7
Missing	18	9.9	3	5.1	6	10.0	9	14.5	-	-	11	18.0	7	11.3

7.6.1.4. Languages(s) Spoken at Home

	Total		Chicopee		Holyoke		Springfield		Trees- high		Trees - low		Trees- new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
English	109	60.2	44	74.6	28	46.7	37	59.7	43	74.1	38	62.3	28	45.2
Spanish	18	9.9	3	5.1	9	15.0	6	9.7	4	6.9	5	8.2	9	14.5
Other	4	2.2	2	3.4	1	1.7	1	1.6	1	1.7	5	8.2	2	3.2
More than one	21	11.7	3	5.1	14	23.4	4	6.4	4	6.9	1	1.6	10	16.1
Total	181	100.0	59	100.0	60	100.0	62	100.0	58	100.0	61	100.0	62	100
Missing	-	-	-	-	-	-	-	-	-	-	-	-	-	-

7.6.1.5. Gender

	Total		Chicopee		Holyoke		Springfield		Trees- high		Trees - low		Trees- new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Male	62	34.3	23	39.0	24	40.0	15	24.2	22	37.9	19	31.1	21	33.9
Female	77	42.5	24	40.7	24	40.0	29	46.8	30	51.7	28	45.9	19	30.6
Male/Female	1	0.6	1	1.7	-	-	-	-	-	-	-	-	1	1.6
Total	140	77.3	48	81.4	48	80.0	44	71.0	6	10.3	14	23.0	41	66.1
Missing	41	22.7	11	18.6	12	20.0	18	29.0	58	100.0	61	100.0	21	33.9

7.6.1.6. Income

	Total		Chicopee		Holyoke		Springfield		Trees- high		Trees - low		Trees- new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
< $25,000	57	31.5	11	18.6	25	41.7	21	33.9	17	29.3	15	24.6	25	40.3
$25,000-34,999	28	15.5	11	18.6	7	11.7	10	16.1	14	24.1	7	11.5	7	11.3
$35,000- 49,999	15	8.3	5	8.5	5	8.3	5	8.1	5	8.6	5	8.2	5	8.1
$50,000-74,999	23	12.7	10	16.9	7	11.7	6	9.7	10	17.2	9	14.8	4	6.5
$75,000-99,999	8	4.4	6	10.2	1	1.7	1	1.6	3	5.2	2	3.3	3	4.8
$100,000-149,000	5	2.8	2	3.4	1	1.7	2	3.2	3	5.2	1	1.6	1	1.6
$150,000+	6	3.3	2	3.4	3	5.0	1	1.6	4	6.9	1	1.6	1	1.6
Total	142	78.5	47	79.7	49	81.7	46	74.2	56	96.6	40	65.6	46	74.2
Missing	39	21.5	12	20.3	11	18.3	16	25.8	2	3.4	21	34.4	16	25.8

7.6.1.7. Household Size

	Total	Chicopee	Holyoke	Springfield	Trees – high	Trees – low	Trees - new
mean	2.83	2.55	2.96	3.00	2.70	3.31	2.53
sd	2.78	1.43	4.19	1.93	1.77	4.35	1.63
n	148	51	50	47	54	45	49

7.6.1.8. Number of Children

	Total		Chicopee		Holyoke		Springfield		Trees — high		Trees — low		Trees — new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
0	79	43.6	34	57.6	18	30.0	27	43.5	34	58.6	22	36.1	23	37.1
1	11	6.1	1	1.7	6	10.0	4	6.5	4	6.9	2	3.3	5	8.1
2+	14	7.9	5	8.5	8	13.3	10	17.7	6	18.9	10	16.3	6	9.6
Total	114	63.0	40	67.8	32	53.3	42	67.7	46	79.3	34	55.7	34	54.8
Missing	67	37.0	19	32.2	28	46.7	20	32.3	12	20.7	27	44.3	28	45.2

7.6.1.9. Neighborhood Resident

	Total		Chicopee		Holyoke		Springfield		Trees — high		Trees — low		Trees — new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Yes	106	58.6	31	52.5	35	58.3	40	64.5	31	53.4	30	49.2	45	72.6
No	55	30.4	24	40.7	19	31.7	12	19.4	27	46.6	20	32.8	8	12.9
Total	161	89.0	55	93.2	54	90.0	52	83.9	58	100.0	50	82.0	53	85.5
Missing	20	11.0	4	6.8	6	10.0	10	16.1	-	-	11	18.0	9	14.5

7.6.1.10. Years in Residence

	Total		Chicopee		Holyoke		Springfield		Trees — high		Trees — low		Trees — new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Less than 1 year	7	3.9	-	-	1	1.7	6	9.7	4	6.9	3	4.9	-	-
1-5 years	40	22.1	14	23.7	13	21.7	13	21.0	12	20.7	14	23.0	14	22.6
5-10 years	10	5.5	4	6.8	3	5.0	3	4.8	3	5.2	5	8.2	2	3.2
10-20 years	15	8.3	6	10.2	2	3.3	7	11.3	3	5.2	4	6.6	8	12.9
20+ years	26	14.4	11	18.6	7	11.7	8	12.9	10	17.2	6	9.8	10	16.1
Total	98	54.1	35	59.3	26	43.3	37	59.7	32	55.2	32	52.5	34	54.8
Missing	83	45.9	24	40.7	34	56.7	25	40.3	26	44.8	29	47.5	28	45.2

7.6.1.11. Years in Residence (of neighborhood residents only)

	Total		Chicopee		Holyoke		Springfield		Trees — high		Trees — low		Trees — new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Less than 1 year	5	4.7	-	-	-	-	5	12.5	4	12.9	1	3.3	-	-
1-5 years	35	33.0	12	38.7	13	37.1	10	25.0	9	29.0	12	40.0	14	31.1
5-10 years	10	9.4	4	12.9	3	8.6	3	7.5	3	9.7	5	16.7	2	4.4
10-20 years	11	10.4	3	9.7	2	5.7	6	15.0	3	9.7	4	13.3	4	8.9
20+ years	20	18.9	7	22.6	6	17.1	7	17.5	8	25.8	4	13.3	8	17.8
Total	81	76.4	26	83.9	24	68.6	31	77.5	27	87.1	26	86.7	28	62.2
Missing	25	23.6	5	16.1	11	31.4	5	12.5	4	12.9	4	13.3	17	37.8

7.6.1.12. Housing Ownership

	Total		Chicopee		Holyoke		Springfield		Trees — high		Trees — low		Trees — new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Own	42	23.2	24	40.7	10	16.7	8	12.9	22	37.9	10	16.4	10	16.1
Rent	100	55.2	26	44.1	38	63.3	36	58.1	33	56.9	33	54.1	34	54.8
Don’t pay for housing	17	9.4	4	6.8	5	8.3	8	12.9	3	5.2	6	9.8	8	12.9
Total	159	87.8	54	91.5	53	88.3	52	83.9	58	100.0	49	80.3	52	83.9
Missing	22	12.2	5	8.5	7	11.7	10	16.1	-	-	12	19.7	10	16.1

7.6.1.13. Car Ownership

	Total		Chicopee		Holyoke		Springfield		Trees — high		Trees — low		Trees — new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Yes	81	44.8	43	72.9	19	31.7	19	30.6	37	63.8	20	32.8	24	38.7
No	82	45.3	14	23.7	34	56.7	34	54.8	19	32.8	30	49.2	33	53.2
Total	163	90.1	57	96.6	53	88.3	53	85.5	56	96.6	50	82.0	57	91.9

Missing	18	9.9	2	3.4	7	11.7	9	14.5	2	3.4	11	18.0	5	8.1

7.6.2. Survey Results: Full Sample

7.6.2.1. Survey Language

	Total		Chicopee		Holyoke		Springfield		Trees — high		Trees — low		Trees — new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
English	162	89.5	59	100	52	86.7	51	82.3	57	98.3	55	90.2	50	80.6
Spanish	19	10.5	-	-	8	13.3	11	17.7	1	1.7	6	9.8	12	19.4

7.6.2.2. How often do you walk on this street?

[median= 1 (every day)]

	Total		Chicopee		Holyoke		Springfield		Trees- high		Trees - low		Trees- new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Every day	101	55.8	26	44.1	40	66.7	35	56.5	29	50	33	54.1	39	62.9
A few times a week + month + year	73	40.4	30	50.8	19	31.7	24	38.7	27	46.6	27	44.3	19	30.7
Almost never	3	1.7	-	-	-	-	3	4.8	1	1.7	-	-	2	3.2
Total	177	97.9	56	94.9	59	98.3	62	100	57	98.3	1	1.6	60	98.6
Missing	4	2.2	3	5.1	1	1.7	-	-	1	1.7	61	100.0	2	3.2

7.6.2.3. How long have you been walking today (in minutes), and where are you coming from?

	Total	Chicopee	Holyoke	Springfield	Trees – high	Trees – low	Trees - new
mean	34.52	24.38	53.7	26.09	18.91	40.93	44.64
sd	57.69	27.18	88.34	34.37	25.50	63.06	72.64
n	160	52	52	56	55	55	50

	Total		Chicopee		Holyoke		Springfield		Trees — high		Trees — low		Trees — new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Work	10	5.5	3	5.1	5	8.3	2	3.2	5	8.6	2	3.3	3	4.8
Home	28	15.5	9	15.3	8	13.3	11	17.7	4	6.9	15	24.6	9	14.5
School	1	.6	1	1.7	2	3.3	6	9.7	-	-	1	1.6	4	6.5
Shopping	11	6.1	3	5.1	2	3.3	22	35.5	6	10.3	1	1.6	1	1.6
Bus	2	1.1	28	47.5	24	40.0	41	66.1	-	-	1	1.6	21	33.9
Other local destination (address or landmark)	74	40.9	44	74.6	41	68.3	21	33.9	31	53.4	22	36.1	38	61.3
Total	126	69.6	15	25.4	19	31.7	2	3.2	46	79.3	42	68.9	24	38.7
Missing	55	30.4	3	5.1	5	8.3	11	17.7	12	20.7	19	31.1	3	4.8

7.6.2.4. How often do you walk on this street for the following reasons? (all that apply)

	Total		Chicopee		Holyoke		Springfield		Trees — high		Trees — low		Trees — new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Work	50	27.6	11	18.6	22	36.7	17	27.4	23	39.7	16	26.2	11	17.7
Home	59	32.6	9	15.3	21	35.0	29	46.8	23	39.7	23	37.7	19	30.6
School	22	12.2	6	10.2	8	13.3	8	12.9	5	8.6	14	23.0	3	4.8
Shopping	58	32.0	8	13.6	19	31.7	31	50.0	16	27.6	23	37.7	19	30.6
Bus	43	23.8	7	11.9	17	28.3	19	30.6	7	12.1	17	27.9	19	30.6
Leisure	47	26.0	11	18.6	15	25.0	21	33.9	14	24.1	18	29.5	15	24.2
Exercise	57	31.5	12	20.3	24	40.0	21	33.9	18	31.0	20	32.8	19	30.6
Other	32	17.7	7	11.9	14	23.3	11	17.7	6	10.3	15	24.6	11	17.7

7.6.2.5 How important to you are the following in choosing routes for your walking trips?

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Sidewalk maintenance and repair	153	4.04	1.26	31	3.97	1.38	60	4.15	1.19	62	3.97	1.27	48	4.10	1.13	55	4.24	1.09	50	3.76	1.49
Sidewalk width	145	3.52	1.41	29	3.34	1.40	57	3.63	1.41	59	3.49	1.43	48	3.33	1.48	53	3.89	1.24	44	3.27	1.47
Safe crossings, crosswalks, and traffic lights	149	4.13	1.25	30	3.90	1.47	59	4.27	0.98	60	4.12	1.35	48	4.13	1.23	54	4.35	1.12	47	3.89	1.37
Beauty/ aesthetics (pleasant place to walk)	145	3.81	1.25	28	3.46	1.35	56	3.89	1.17	61	3.90	1.26	47	3.89	1.20	53	3.87	1.16	45	3.67	1.40
Places to sit/rest (benches)	151	3.39	1.47	31	2.81	1.38	58	3.84	1.31	62	3.26	1.54	48	3.13	1.53	54	3.52	1.27	49	3.51	1.60
Tree canopy shade	151	3.64	1.27	29	3.14	1.13	60	4.07	1.07	62	3.45	1.40	48	3.63	1.21	55	3.62	1.21	48	3.67	1.42

7.6.2.6. How well do the following describe your feelings about safety on this street?

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
I feel safe when walking here.	177	3.72	1.24	59	3.88	1.18	59	3.83	1.22	59	3.44	1.29	58	3.79	1.07	59	3.63	1.27	60	3.73	1.36
I can safely cross the street.	169	3.50	1.27	57	3.63	1.28	56	3.64	1.27	56	3.21	1.25	57	3.46	1.24	58	3.36	1.27	54	3.69	1.32

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
There are enough crosswalks.	171	3.29	1.37	58	3.41	1.36	56	3.46	1.40	57	3.00	1.32	57	3.32	1.33	57	3.12	1.38	57	3.44	1.41
I am concerned about crime or illicit activities.	169	3.27	1.42	55	2.96	1.37	55	3.58	1.33	59	3.25	1.49	57	3.30	1.35	56	3.45	1.35	56	3.05	1.54
I am concerned about my safety as a pedestrian.	171	3.20	1.45	58	2.84	1.51	55	3.42	1.44	58	3.34	1.35	57	3.00	1.41	55	3.42	1.37	59	3.19	1.54
I can see clearly at all times.	165	3.48	1.26	55	3.56	1.24	54	3.54	1.27	56	3.36	1.29	57	3.56	1.12	55	3.45	1.21	53	3.43	1.46
I am concerned that someone could hide where I can't see.	170	2.69	1.40	57	2.19	1.19	56	2.98	1.42	57	2.91	1.46	58	2.84	1.44	55	2.47	1.25	57	2.75	1.49
Sidewalks are too crowded with people.	172	2.20	1.33	57	1.53	0.95	57	2.68	1.35	58	2.38	1.37	57	1.91	1.09	58	2.17	1.40	57	2.51	1.42
Bike riders often disrupt me when I walk on the sidewalks.	171	2.39	1.43	56	1.68	0.96	56	2.75	1.43	59	2.71	1.57	57	1.84	0.94	56	2.57	1.56	58	2.74	1.55
The traffic moves at a safe speed.	174	3.13	1.34	58	3.12	1.23	57	3.54	1.18	59	2.75	1.48	58	2.84	1.28	58	3.10	1.33	58	3.45	1.35

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Trees on this street block my vision.	162	2.06	1.25	55	1.80	1.10	55	2.09	1.25	52	2.31	1.37	53	2.02	1.20	54	1.87	1.13	55	2.29	1.38
Trees on this street make me comfortable as a pedestrian.	174	3.47	1.33	57	3.46	1.32	57	3.72	1.33	60	3.23	1.31	58	3.48	1.20	56	3.36	1.33	60	3.55	1.46
Parked cars buffer me from traffic.	168	2.83	1.33	55	2.65	1.47	56	3.07	1.22	57	2.77	1.28	55	2.78	1.21	56	2.80	1.34	57	2.91	1.44
I like having trees between me and the traffic.	167	3.19	1.45	54	3.20	1.32	57	3.33	1.47	56	3.04	1.56	56	2.98	1.45	52	3.17	1.42	59	3.41	1.48
There is enough street lighting at night.	157	3.27	1.29	51	3.63	1.17	53	3.47	1.17	53	2.72	1.35	47	2.89	1.24	55	3.20	1.25	55	3.65	1.28

7.6.2.7. How much would you like to see more trees on the street?

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Large shade trees (40’-100’)	168	3.23	1.40	52	3.19	1.31	57	3.28	1.49	59	3.20	1.40	56	2.98	1.46	55	3.18	1.45	57	3.51	1.24
Mid-size ornamental trees (20’-50’ tall)	161	3.35	1.26	50	3.32	1.20	56	3.25	1.33	55	3.49	1.25	55	3.27	1.28	51	3.20	1.33	55	3.58	1.15

A mix of trees	164	3.45	1.32	53	3.51	1.20	55	3.31	1.35	56	3.52	1.40	56	3.32	1.31	52	3.52	1.35	56	3.50	1.31

Why or why not?

	Total		Chicopee		Holyoke		Springfield		Trees — high		Trees — low		Trees — new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Aesthetics/ managed appearance	33	18.2	13	22.0	3	5.0	17	27.4	9	15.5	12	19.7	12	19.4
Cultural symbol	1	0.6	-	-	-	-	1	1.6	1	1.7	-	-	-	-
Environmental benefits	19	10.5	6	10.2	3	5.0	10	16.1	10	17.2	4	6.6	5	8.1
“Just because”	20	11.0	9	15.3	6	10.0	5	8.1	8	13.8	5	8.2	7	11.3
Need more	5	2.8	2	3.4	1	1.7	2	3.2	2	3.4	1	1.6	2	3.2
Safety (benefit)	8	4.4	2	3.4	4	6.7	2	3.2	1	1.7	5	8.2	2	3.2
Shade	27	14.9	10	16.9	10	16.7	7	11.3	7	12.1	9	14.8	11	17.7
“It depends”	3	1.7	1	1.7	1	1.7	1	1.6	-	-	2	3.3	1	1.6
Don’t care	2	1.1	2	3.4	-	-	-	-	-	-	2	3.3	-	-
Don’t know	2	1.1	-	-	1	1.7	1	1.6	-	-	1	1.6	1	1.6
Have plenty	10	5.5	5	8.5	4	6.7	1	1.6	4	6.9	2	3.3	4	6.5
Safety (disbenefit)	4	2.2	1	1.7	-	-	3	4.8	3	5.2	-	-	1	1.6

7.6.2.8. Do you have anything else to add about how this street can be improved, or how the City can improve walking in this neighborhood?

	Total		Chicopee		Holyoke		Springfield		Trees — high		Trees — low		Trees — new	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Enforce laws pertaining to pedestrian safety	6	3.3	3	5.1	-	-	3	4.8	3	5.2	3	4.9	-	-
Improve commercial and community amenities	10	5.5	2	3.4	3	5.0	5	8.1	3	5.2	3	4.9	4	6.5
Improve maintenance and stewardship in the pedestrian realm	9	5.0	2	3.4	2	3.3	5	8.1	4	6.9	1	1.6	4	6.5
Improve traffic calming and pedestrian safety amenities	36	19.9	16	27.1	5	8.3	15	24.2	13	22.4	15	24.6	8	12.9
Increase police presence/ install amenities that improve personal safety	15	8.3	5	8.5	4	6.7	6	9.7	8	13.8	4	6.6	3	4.8
Repair sidewalks and roadways	11	6.1	2	3.4	5	8.3	4	6.5	4	6.9	4	6.6	3	4.8
All is good	5	2.8	2	3.4	2	3.3	1	1.6	-	-	1	1.6	4	6.5

7.6.3. Survey Results: By Age

7.6.3.1. How important to you are the following in choosing routes for your walking trips?

18-34

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Sidewalk maintenance and repair	40	3.87	1.22	7	4.14	1.46	16	3.69	1.14	17	3.94	1.25	13	4.00	1.08	13	4.00	1.16	14	3.64	1.45
Sidewalk width	37	3.24	1.32	7	3.00	1.53	14	3.21	1.42	16	3.38	1.20	13	3.38	1.19	11	3.18	1.33	13	3.15	1.52
Safe crossings, crosswalks, and traffic lights	39	3.90	1.25	7	3.71	1.60	16	3.94	1.06	16	3.94	1.34	13	3.92	1.12	13	3.77	1.48	13	4.00	1.23
Beauty/ aesthetics (pleasant place to walk)	38	3.61	1.31	7	3.00	1.53	14	3.71	1.07	17	3.76	1.39	13	3.85	1.21	12	3.50	1.17	13	3.46	1.56
Places to sit/rest (benches)	38	3.47	1.27	7	3.14	1.22	14	3.86	1.03	17	3.29	1.45	13	3.31	1.25	12	3.33	0.89	13	3.77	1.59
Tree canopy shade	40	3.43	1.30	7	2.57	0.98	16	3.87	1.03	17	3.35	1.50	13	3.54	1.13	13	3.23	1.30	14	3.50	1.51

35-54

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Sidewalk maintenance and repair	61	4.02	1.27	11	3.36	1.43	25	4.40	1.16	25	3.92	1.22	23	4.22	1.13	19	4.32	1.11	19	3.47	1.47
Sidewalk width	58	3.60	1.40	10	3.10	1.29	25	3.88	1.36	23	3.52	1.47	23	3.52	1.56	19	4.00	1.05	16	3.25	1.48
Safe crossings, crosswalks, and traffic lights	60	4.07	1.31	11	3.36	1.57	25	4.36	1.04	24	4.08	1.38	23	4.17	1.30	19	4.63	0.83	18	3.33	1.46
Beauty/ aesthetics (pleasant place to walk)	59	3.85	1.17	10	3.70	1.06	24	3.79	1.25	25	3.96	1.17	22	3.82	1.26	19	4.05	1.03	18	3.67	1.24
Places to sit/rest (benches)	61	3.51	1.40	11	2.82	1.54	25	3.60	1.38	25	3.72	1.31	23	3.39	1.53	19	3.84	1.12	19	3.32	1.49
Tree canopy shade	60	3.77	1.20	10	3.30	1.06	25	4.08	1.04	25	3.64	1.35	23	3.83	0.98	19	3.84	1.21	18	3.61	1.46

55+

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Sidewalk maintenance and repair	37	4.16	1.26	12	4.33	1.23	12	4.33	1.23	13	3.85	1.35	12	4.00	1.28	15	4.47	0.74	10	3.90	1.79
Sidewalk width	35	3.51	1.44	11	3.64	1.43	11	3.82	1.33	13	3.15	1.57	12	2.92	1.62	15	4.13	1.06	8	3.25	1.49
Safe crossings, crosswalks, and traffic lights	35	4.34	1.14	11	4.45	1.21	11	4.36	0.81	13	4.23	1.36	12	4.25	1.29	14	4.57	0.65	9	4.11	1.54
Beauty/ aesthetics (pleasant place to walk)	33	3.97	1.21	10	3.50	1.58	11	4.36	0.81	12	4.00	1.13	12	4.08	1.17	14	3.86	1.23	7	4.00	1.41
Places to sit/rest (benches)	37	2.97	1.64	12	2.58	1.44	12	4.33	1.23	13	2.08	1.38	12	2.42	1.68	15	3.20	1.57	10	3.30	1.70
Tree canopy shade	36	3.50	1.44	11	3.36	1.29	12	4.17	1.34	13	3.00	1.53	12	3.33	1.67	15	3.47	1.19	9	3.78	1.64

7.6.3.2. How well do the following describe your feelings about safety on this street?

18-34

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
I feel safe when walking here.	42	3.33	1.26	9	3.67	1.23	16	3.13	1.26	17	3.35	1.32	13	3.77	1.01	13	2.77	1.17	16	3.44	1.41
I can safely cross the street.	40	3.22	1.23	9	3.56	1.01	15	3.00	1.13	16	3.25	1.44	12	3.25	1.14	13	2.92	1.44	15	3.47	1.13
There are enough crosswalks.	40	3.05	1.30	9	3.56	1.42	16	2.94	1.39	15	2.87	1.13	13	3.15	1.14	12	2.58	1.24	15	3.33	1.45
I am concerned about crime or illicit activities.	41	2.83	1.28	9	3.00	1.32	15	2.80	1.21	17	2.76	1.39	12	3.17	1.19	13	2.85	1.41	16	2.56	1.26
I am concerned about my safety as a pedestrian.	41	2.98	1.44	9	2.67	1.66	16	2.94	1.39	16	3.19	1.42	13	2.69	1.18	12	3.58	1.38	16	2.75	1.61
I can see clearly at all times.	37	3.35	1.30	9	3.89	1.05	13	3.23	1.42	15	3.13	1.30	13	3.69	1.18	12	3.42	1.24	12	2.92	1.44
I am concerned that someone could hide where I can’t see.	42	2.60	1.33	9	1.78	0.83	16	2.88	1.31	17	2.76	1.44	13	2.08	1.32	13	3.23	1.17	16	2.50	1.32
Sidewalks are too crowded with people.	41	2.17	1.26	9	1.33	1.00	15	2.67	1.35	17	2.18	1.13	13	1.69	0.86	13	2.31	1.38	15	2.47	1.41
Bike riders often disrupt me when I walk on the sidewalks.	42	2.40	1.42	9	1.44	0.53	16	2.63	1.31	17	2.71	1.65	13	1.69	0.75	13	2.85	1.57	16	2.63	1.54

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
The traffic moves at a safe speed.	41	2.95	1.26	9	3.33	0.50	15	3.20	1.27	17	2.53	1.46	13	2.54	1.05	13	3.00	1.47	15	3.27	1.22
Trees on this street block my vision.	41	2.10	1.18	8	1.63	0.74	16	2.31	1.30	17	2.12	1.22	12	1.75	0.75	13	1.77	1.01	16	2.63	1.41
Trees on this street make me comfortable as a pedestrian.	42	3.31	1.32	9	2.67	1.12	16	3.75	1.44	17	3.24	1.20	13	3.38	1.12	13	2.69	1.32	16	3.75	1.34
Parked cars buffer me from traffic.	40	3.00	1.22	9	3.11	1.27	15	3.13	1.06	16	2.81	1.38	11	2.55	1.04	13	3.23	1.30	16	3.13	1.26
I like having trees between me and the traffic.	39	3.15	1.48	9	2.67	1.32	16	3.19	1.47	14	3.43	1.60	12	2.83	1.40	12	3.08	1.56	15	3.47	1.51
There is enough street lighting at night.	39	3.05	1.17	8	3.13	1.25	16	3.38	1.03	15	2.67	1.23	12	2.75	0.87	13	2.54	1.27	14	3.79	0.98

35-54

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
I feel safe when walking here.	74	3.80	1.12	24	3.79	1.02	25	4.00	1.04	25	3.60	1.29	30	3.90	1.00	20	20	20	24	3.71	1.33
I can safely cross the street.	71	3.59	1.20	23	3.57	1.38	25	3.80	1.12	23	3.39	1.12	30	3.60	1.28	20	20	20	21	3.62	1.36
There are enough crosswalks.	71	3.31	1.32	23	3.43	1.38	23	3.61	1.12	25	2.92	1.38	29	3.24	1.48	20	20	20	22	3.36	1.40

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
I am concerned about crime or illicit activities.	71	3.31	1.41	21	2.95	1.40	25	3.48	1.33	25	3.44	1.50	30	3.43	1.38	19	19	19	22	2.86	1.55
I am concerned about my safety as a pedestrian.	71	3.18	1.41	24	2.75	1.45	23	3.61	1.34	24	3.21	1.35	29	3.24	1.53	20	20	20	22	2.91	1.41
I can see clearly at all times.	71	3.54	1.18	23	3.43	1.24	25	3.72	1.06	23	3.43	1.27	30	3.53	1.07	19	19	19	22	3.36	1.50
I am concerned that someone could hide where I can’t see.	71	2.96	1.35	23	2.39	1.16	25	3.24	1.30	23	3.22	1.45	30	3.17	1.32	20	20	20	21	3.00	1.48
Sidewalks are too crowded with people.	70	2.17	1.29	22	1.73	1.16	25	2.28	1.06	23	2.48	1.53	29	2.17	1.23	20	20	20	21	2.43	1.43
Bike riders often disrupt me when I walk on the sidewalks.	71	2.31	1.27	22	1.73	1.03	25	2.32	1.07	24	2.83	1.47	29	2.07	1.03	20	20	20	22	2.59	1.47
The traffic moves at a safe speed.	72	3.00	1.33	23	2.78	1.17	25	3.40	1.23	24	2.79	1.53	30	2.93	1.31	20	20	20	22	3.18	1.53
Trees on this street block my vision.	67	2.06	1.22	22	1.77	0.92	24	2.00	1.18	21	2.43	1.47	28	2.00	1.31	19	19	19	20	2.35	1.31
Trees on this street make me comfortable as a pedestrian.	72	3.53	1.24	22	3.77	1.11	25	3.52	1.26	25	3.32	1.35	30	3.67	1.06	19	19	19	23	3.26	1.54
Parked cars buffer me from traffic.	71	2.83	1.31	22	2.77	1.60	25	3.12	1.09	24	2.58	1.21	29	3.03	1.27	20	20	20	22	2.95	1.53
I like having trees between me and the traffic.	71	3.17	1.38	23	3.35	1.37	25	3.44	1.26	23	2.70	1.46	29	2.93	1.41	20	20	20	22	3.32	1.52

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
There is enough street lighting at night.	66	3.08	1.34	21	3.57	1.33	21	3.05	1.07	24	2.67	1.47	23	2.87	1.36	20	20	20	23	3.17	1.53

55+

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
I feel safe when walking here.	46	3.98	1.26	23	4.17	1.19	11	4.36	1.03	12	3.25	1.36	15	3.60	1.30	17	4.29	1.11	14	4.00	1.36
I can safely cross the street.	43	3.70	1.28	22	3.73	1.32	9	4.56	0.73	12	3.00	1.21	15	3.33	1.29	16	3.88	1.20	12	3.92	1.38
There are enough crosswalks.	45	3.49	1.41	23	3.43	1.38	10	4.00	1.49	12	3.17	1.40	15	3.60	1.18	16	3.50	1.59	14	3.36	1.50
I am concerned about crime or illicit activities.	43	3.30	1.47	22	2.91	1.48	9	4.33	1.00	12	3.25	1.49	15	3.13	1.46	16	3.56	1.37	12	3.17	1.70
I am concerned about my safety as a pedestrian.	45	3.20	1.47	23	3.09	1.59	10	3.20	1.48	12	3.42	1.31	15	2.80	1.37	16	3.50	1.51	14	3.29	1.54
I can see clearly at all times.	42	3.57	1.38	20	3.80	1.28	10	3.30	1.70	12	3.42	1.31	14	3.50	1.23	15	3.47	1.46	13	3.77	1.54
I am concerned that someone could hide where I can’t see.	42	2.33	1.44	22	2.18	1.37	8	2.25	1.58	12	2.67	1.56	15	2.87	1.60	14	1.86	1.17	13	2.23	1.42
Sidewalks are too crowded with people.	45	1.96	1.24	23	1.48	0.73	10	3.10	1.45	12	1.92	1.31	15	1.60	0.91	16	2.13	1.54	14	2.14	1.17
Bike riders often disrupt me when I walk on the sidewalks.	42	2.07	1.44	22	1.77	1.07	8	3.13	1.89	12	1.92	1.51	15	1.53	0.83	14	2.14	1.66	13	2.62	1.61
The traffic moves at a	45	3.33	1.40	23	3.43	1.41	10	4.00	0.94	12	2.58	1.44	15	2.93	1.44	16	3.38	1.41	14	3.71	1.33

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
safe speed.																					
Trees on this street block my vision.	40	1.97	1.33	22	1.95	1.40	9	2.22	1.56	9	1.78	0.97	13	2.31	1.32	14	1.86	1.35	13	1.77	1.36
Trees on this street make me comfortable as a pedestrian.	45	3.51	1.46	23	3.57	1.50	10	4.50	0.71	12	2.58	1.31	15	3.20	1.52	16	3.56	1.37	14	3.79	1.53
Parked cars buffer me from traffic.	43	2.35	1.25	21	2.24	1.38	10	2.50	1.51	12	2.42	0.79	15	2.47	1.19	15	2.27	1.34	13	2.31	1.32
I like having trees between me and the traffic.	44	3.02	1.53	21	3.29	1.31	10	2.80	1.81	13	2.77	1.69	15	3.20	1.61	14	2.64	1.60	15	3.20	1.42
There is enough street lighting at night.	38	3.63	1.28	19	4.00	0.94	10	4.00	1.41	9	2.44	1.13	12	3.08	1.38	14	3.71	1.33	12	4.08	1.00

7.6.3.3. How much would you like to see more trees on the street?

18-34

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Large shade trees (40’-100’ tall)	41	3.20	1.27	9	3.11	1.17	16	3.13	1.31	16	3.31	1.35	13	3.15	1.21	12	2.92	1.51	16	3.44	1.15
Mid-size ornamental trees (20’-50’ tall)	40	3.33	1.07	9	3.33	0.87	16	3.12	1.09	15	3.53	1.19	13	3.38	0.87	11	2.91	1.38	16	3.56	0.96
A mix of trees	40	3.40	1.17	8	3.62	0.92	16	3.12	1.15	16	3.56	1.32	13	3.46	0.97	11	3.27	1.49	16	3.44	1.15

35-54

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Large shade trees (40’-100’ tall)	66	3.08	1.34	19	3.26	1.49	25	3.08	1.55	25	3.16	1.25	29	3.03	1.52	20	3.15	1.46	20	3.35	1.23
Mid-size ornamental trees (20’-50’ tall)	69	3.16	1.41	19	3.26	1.56	25	3.28	1.43	24	3.46	1.14	28	3.21	1.50	20	3.30	1.30	20	3.55	1.23
A mix of trees	68	3.34	1.36	20	3.60	1.39	24	3.42	1.41	24	3.67	1.24	28	3.36	1.31	20	3.90	1.17	20	3.50	1.50

55+

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Large shade trees (40’-100’ tall)	43	3.33	1.51	21	3.29	1.27	10	4.20	1.32	12	2.67	1.78	14	2.71	1.59	15	3.20	1.52	14	4.07	1.14
Mid-size ornamental trees (20’-50’ tall)	39	3.41	1.27	19	3.42	1.02	9	3.78	1.39	11	3.09	1.58	14	3.29	1.20	13	3.15	1.57	12	3.83	0.94
A mix of trees	42	3.33	1.43	22	3.50	1.19	9	3.56	1.42	11	2.82	1.83	15	3.13	1.60	14	3.14	1.56	13	3.77	1.01

7.6.4. Survey Results: By Race

7.6.4.1. How important to you are the following in choosing routes for your walking trips?

White

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Sidewalk maintenance and repair	58	4.21	1.02	22	4.27	1.12	12	4.25	1.14	24	4.12	0.90	26	26	26	18	4.39	0.78	14	4.14	1.17
Sidewalk width	57	3.25	1.34	22	3.27	1.35	12	3.25	1.42	23	3.22	1.35	26	26	26	18	3.44	1.10	13	3.46	1.51
Safe crossings, crosswalks, and traffic lights	56	4.39	0.95	21	4.33	1.16	12	4.33	0.78	23	4.48	0.85	26	26	26	18	4.56	0.86	12	4.17	1.03
Beauty/ aesthetics (pleasant place to walk)	57	3.88	1.12	21	3.52	1.37	12	3.67	0.99	24	4.29	0.81	26	26	26	17	3.53	1.07	14	4.00	1.18
Places to sit/rest (benches)	58	3.12	1.38	22	2.82	1.44	12	3.33	1.30	24	3.29	1.37	26	26	26	18	3.28	1.18	14	3.50	1.40
Tree canopy shade	58	3.59	1.20	22	3.23	1.27	12	4.00	0.85	24	3.71	1.23	26	26	26	18	3.22	1.17	14	4.00	1.18

Black

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Sidewalk maintenance and repair	14	4.43	0.85	1	5.00	.	4	4.50	1.00	9	4.33	0.87	4	4.25	0.96	7	4.57	0.79	3	4.33	1.16
Sidewalk width	14	3.86	1.41	1	5.00	.	4	3.75	1.89	9	3.78	1.30	4	5.00	0.00	7	3.86	1.22	3	2.33	1.53
Safe crossings, crosswalks, and traffic lights	14	4.43	1.16	1	5.00	.	4	4.75	0.50	9	4.22	1.39	4	4.75	0.50	7	4.29	1.50	3	4.33	1.16
Beauty/ aesthetics (pleasant place to walk)	14	4.07	1.21	1	5.00	.	4	3.50	1.73	9	4.22	0.97	4	4.50	0.58	7	4.29	1.11	3	3.00	1.73

Places to sit/rest (benches)	14	3.21	1.25	1	4.00	.	4	3.00	0.82	9	3.22	1.48	4	3.00	1.41	7	3.57	1.40	3	2.67	0.58
Tree canopy shade	14	3.64	1.50	1	3.00	.	4	4.25	0.96	9	3.44	1.74	4	2.75	1.26	7	4.00	1.53	3	4.00	1.73

Hispanic/ Latino/ Spanish origin

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Sidewalk maintenance and repair	49	3.73	1.47	5	2.40	1.95	31	4.06	1.18	13	3.46	1.66	13	4.31	1.11	16	4.19	1.11	20	3.00	1.65
Sidewalk width	42	3.50	1.45	3	3.00	2.00	28	3.68	1.34	11	3.18	1.66	13	3.54	1.45	14	4.14	1.35	15	2.87	1.36
Safe crossings, crosswalks, and traffic lights	48	3.62	1.48	5	2.00	1.73	30	4.00	1.15	13	3.38	1.71	13	3.62	1.50	15	4.20	1.27	20	3.20	1.54
Beauty/ aesthetics (pleasant place to walk)	43	3.67	1.38	3	3.00	1.73	27	3.96	1.19	13	3.23	1.59	12	3.58	1.38	15	4.07	1.16	16	3.38	1.54
Places to sit/rest (benches)	47	3.51	1.56	5	2.20	1.10	29	4.00	1.31	13	2.92	1.80	13	3.62	1.61	15	3.67	1.18	19	3.32	1.83
Tree canopy shade	47	3.55	1.36	3	2.67	0.58	31	3.84	1.24	13	3.08	1.61	13	4.15	1.07	16	3.56	1.26	18	3.11	1.53

Other

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Sidewalk maintenance and repair	17	4.12	1.36	3	4.00	0.00	7	4.43	1.51	7	3.86	1.57	5	3.40	1.52	5	4.00	1.73	7	4.71	0.76
Sidewalk width	17	3.94	1.25	3	3.67	1.53	7	4.29	1.11	7	3.71	1.38	5	3.20	1.79	5	4.40	0.55	7	4.14	1.07
Safe crossings, crosswalks, and traffic lights	16	4.44	1.09	3	3.67	0.58	7	4.86	0.38	6	4.33	1.63	5	3.60	1.67	5	4.60	0.55	6	5.00	0.00
Beauty/ aesthetics (pleasant place to walk)	17	3.71	1.21	3	3.00	1.00	7	4.14	0.69	7	3.57	1.62	5	3.40	1.52	5	3.60	1.34	7	4.00	1.00

Places to sit/rest (benches)	17	4.00	1.41	3	3.33	1.53	7	4.71	0.49	7	3.57	1.81	5	3.60	1.67	5	3.40	1.82	7	4.71	0.49
Tree canopy shade	17	3.71	1.31	3	3.00	0.00	7	4.71	0.49	7	3.00	1.53	5	3.00	1.23	5	4.00	1.00	7	4.00	1.53

7.6.4.2. How well do the following describe your feelings about safety on this street?

White

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
I feel safe when walking here.	75	4.00	1.01	39	4.26	0.85	12	3.67	0.99	24	3.75	1.19	33	3.79	1.05	20	4.10	0.91	22	4.23	1.02
I can safely cross the street.	74	3.53	1.22	39	3.72	1.34	12	3.75	1.06	23	3.09	1.00	33	3.42	1.23	20	3.50	1.10	21	3.71	1.35
There are enough crosswalks.	73	3.38	1.30	39	3.64	1.35	11	3.45	1.29	23	2.91	1.13	33	3.21	1.41	20	3.25	1.21	20	3.80	1.15
I am concerned about crime or illicit activities.	73	3.15	1.43	37	3.00	1.49	12	3.42	1.31	24	3.25	1.42	33	3.21	1.36	19	3.32	1.46	21	2.90	1.55
I am concerned about my safety as a pedestrian.	71	3.04	1.43	39	2.90	1.54	10	3.50	1.18	22	3.09	1.34	32	2.84	1.37	19	3.26	1.37	20	3.15	1.60
I can see clearly at all times.	74	3.62	1.07	38	3.82	1.06	12	3.50	1.00	24	3.38	1.10	32	3.56	0.98	20	3.50	1.00	22	3.82	1.26
I am concerned that someone could hide where I can’t see.	75	2.65	1.40	39	2.28	1.19	12	3.58	1.38	24	2.79	1.53	33	2.88	1.56	20	2.35	1.04	22	2.59	1.44
Sidewalks are too crowded with people.	74	1.73	1.06	38	1.55	0.98	12	2.25	1.22	24	1.75	1.07	32	1.78	1.10	20	1.35	0.67	22	2.00	1.23
Bike riders often disrupt me when I walk on the sidewalks.	74	1.96	1.16	38	1.61	0.76	12	2.08	1.17	24	2.46	1.50	32	1.78	0.94	20	1.95	1.23	22	2.23	1.38

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
The traffic moves at a safe speed.	75	2.89	1.26	39	3.13	1.24	12	2.67	0.89	24	2.63	1.41	33	2.82	1.24	20	2.85	1.18	22	3.05	1.40
Trees on this street block my vision.	72	1.99	1.23	37	1.92	1.23	12	2.00	1.21	23	2.09	1.28	30	2.17	1.32	20	1.45	0.69	22	2.23	1.38
Trees on this street make me comfortable as a pedestrian.	74	3.51	1.32	38	3.50	1.35	12	3.42	1.51	24	3.58	1.21	33	3.67	1.22	19	3.47	1.26	22	3.32	1.52
Parked cars buffer me from traffic.	73	2.78	1.29	38	2.63	1.48	12	3.25	1.14	23	2.78	1.00	32	3.00	1.30	20	2.35	1.09	21	2.86	1.42
I like having trees between me and the traffic.	71	3.39	1.39	38	3.26	1.35	12	3.33	1.50	21	3.67	1.43	32	3.38	1.45	18	3.39	1.20	21	3.43	1.50
There is enough street lighting at night.	60	3.32	1.33	32	3.84	1.19	8	3.38	0.92	20	2.45	1.28	22	3.00	1.35	19	3.16	1.34	19	3.84	1.21

Black

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
I feel safe when walking here.	16	3.56	1.09	3	4.00	1.00	4	3.75	1.26	9	3.33	1.12	5	4.00	0.71	8	3.38	1.19	3	3.33	1.53
I can safely cross the street.	15	4.07	1.16	3	4.33	0.58	3	4.67	0.58	9	3.78	1.39	4	3.75	0.50	8	4.13	1.46	3	4.33	1.16
There are enough crosswalks.	15	3.67	1.11	3	4.00	0.00	4	4.25	0.96	8	3.25	1.28	5	3.60	0.55	7	3.43	1.40	3	4.33	1.16
I am concerned about crime or illicit activities.	16	2.94	1.06	3	3.00	0.00	4	3.50	1.00	9	2.67	1.23	5	3.60	0.55	8	2.50	1.20	3	3.00	1.00
I am concerned about my safety as a pedestrian.	16	3.13	1.26	3	3.33	1.16	4	3.25	1.71	9	3.00	1.23	5	3.20	1.30	8	3.25	1.28	3	2.67	1.53
I can see clearly at all times.	14	3.86	1.23	3	4.33	1.16	4	4.00	1.16	7	3.57	1.40	5	3.80	1.10	6	4.00	1.55	3	3.67	1.16

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
I am concerned that someone could hide where I can't see.	16	2.94	1.39	3	1.67	1.16	4	3.25	1.50	9	3.22	1.30	5	3.20	1.30	8	2.88	1.55	3	2.67	1.53
Sidewalks are too crowded with people.	16	2.19	1.17	3	1.33	0.58	4	2.50	1.29	9	2.33	1.23	5	1.80	0.84	8	2.25	1.28	3	2.67	1.53
Bike riders often disrupt me when I walk on the sidewalks.	15	2.33	1.50	3	1.33	0.58	4	2.25	1.26	8	2.75	1.75	5	1.60	0.55	8	2.75	1.75	2	2.50	2.12
The traffic moves at a safe speed.	16	2.56	1.32	3	3.00	0.00	4	3.00	1.41	9	2.22	1.48	5	3.00	0.71	8	2.13	1.46	3	3.00	1.73
Trees on this street block my vision.	14	1.93	0.92	2	1.50	0.71	4	1.75	0.96	8	2.13	0.99	4	2.00	0.82	7	1.71	0.95	3	2.33	1.16
Trees on this street make me comfortable as a pedestrian.	16	3.06	1.39	3	3.67	2.31	4	4.00	0.82	9	2.44	1.01	5	3.20	1.48	8	2.63	1.41	3	4.00	1.00
Parked cars buffer me from traffic.	15	2.67	1.35	3	2.00	1.00	3	4.00	1.00	9	2.44	1.33	4	2.75	0.50	8	2.25	1.49	3	3.67	1.53
I like having trees between me and the traffic.	16	2.88	1.46	3	3.33	0.58	4	3.25	1.71	9	2.56	1.59	5	3.20	0.45	8	2.75	1.75	3	2.67	2.08
There is enough street lighting at night.	16	2.87	1.03	3	3.00	0.00	4	3.00	0.82	9	2.78	1.30	5	2.80	0.45	8	3.00	1.31	3	2.67	1.16

Hispanic/ Latino/ Spanish origin

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
I feel safe when walking here.	53	3.43	1.39	10	2.40	1.35	30	3.87	1.22	13	3.23	1.42	14	3.93	1.07	16	3.06	1.48	23	3.39	1.47
I can safely cross the street.	47	3.38	1.24	8	3.00	0.93	28	3.54	1.26	11	3.27	1.42	14	3.79	1.19	15	2.93	1.16	18	3.44	1.29

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
There are enough crosswalks.	52	3.23	1.42	10	2.80	1.62	29	3.41	1.38	13	3.15	1.41	14	3.93	1.14	15	3.13	1.46	23	2.87	1.46
I am concerned about my safety as a pedestrian.	51	3.16	1.48	9	2.00	1.32	29	3.48	1.41	13	3.23	1.42	14	3.29	1.44	14	3.86	1.35	23	2.65	1.43
I can see clearly at all times.	47	3.30	1.46	8	2.88	1.64	27	3.48	1.42	12	3.17	1.47	14	3.71	1.20	14	3.43	1.40	19	2.89	1.63
I am concerned that someone could hide where I can’t see.	47	2.68	1.43	9	1.56	0.73	27	2.81	1.42	11	3.27	1.49	14	2.71	1.20	13	2.62	1.56	20	2.70	1.56
Sidewalks are too crowded with people.	49	2.57	1.37	10	1.60	1.08	28	2.75	1.32	11	3.00	1.41	14	2.43	1.16	15	2.87	1.60	20	2.45	1.36
Bike riders often disrupt me when I walk on the sidewalks.	49	2.67	1.38	9	2.33	1.58	27	2.63	1.31	13	3.00	1.41	14	2.14	1.10	13	3.00	1.35	22	2.82	1.50
The traffic moves at a safe speed.	50	3.50	1.36	10	3.50	1.43	28	3.79	1.17	12	2.83	1.59	14	3.14	1.41	15	3.53	1.30	21	3.71	1.38
Trees on this street block my vision.	47	2.21	1.33	10	1.60	0.84	27	2.33	1.39	10	2.50	1.51	13	2.00	1.23	15	2.33	1.35	19	2.26	1.45
Trees on this street make me comfortable as a pedestrian.	52	3.46	1.31	10	3.60	1.08	29	3.69	1.29	13	2.85	1.41	14	3.36	1.01	15	3.60	1.24	23	3.43	1.53
Parked cars buffer me from traffic.	50	2.80	1.36	9	3.11	1.83	29	2.83	1.20	12	2.50	1.38	14	2.57	1.16	14	3.29	1.33	22	2.64	1.47
I like having trees between me and the traffic.	49	2.82	1.47	8	3.38	1.19	29	2.97	1.55	12	2.08	1.24	14	2.50	1.45	13	2.92	1.61	22	2.95	1.43

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
There is enough street lighting at night.	51	3.27	1.25	10	3.80	1.03	29	3.28	1.22	12	2.83	1.40	14	3.21	1.19	15	3.33	1.23	22	3.27	1.35

Other

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
I feel safe when walking here.	18	3.61	1.34	4	3.50	1.00	7	3.86	1.46	7	3.43	1.51	6	3.33	1.51	5	4.60	0.55	7	3.14	1.35
I can safely cross the street.	18	3.39	1.34	4	2.75	1.26	7	4.00	1.16	7	3.14	1.46	6	2.67	1.63	5	4.00	1.00	7	3.57	1.13
There are enough crosswalks.	17	2.88	1.45	4	2.25	0.50	6	3.50	1.52	7	2.71	1.70	5	2.00	0.71	5	3.00	1.58	7	3.43	1.62
I am concerned about crime or illicit activities.	18	3.33	1.50	4	3.25	1.26	7	3.00	1.53	7	3.71	1.70	6	2.83	1.84	5	3.80	0.84	7	3.43	1.62
I am concerned about my safety as a pedestrian.	18	3.33	1.50	4	3.75	1.50	7	2.57	1.51	7	3.86	1.35	6	3.00	1.90	5	3.20	1.48	7	3.71	1.25
I can see clearly at all times.	15	3.13	1.46	4	2.75	1.26	5	3.20	1.64	6	3.33	1.63	6	3.00	1.67	5	3.60	1.14	4	2.75	1.71
I am concerned that someone could hide where I can't see.	18	2.72	1.49	4	3.00	1.83	7	2.57	1.13	7	2.71	1.80	6	2.67	1.63	5	2.00	1.23	7	3.29	1.50
Sidewalks are too crowded with people.	18	2.22	1.31	4	1.50	1.00	7	2.29	0.95	7	2.57	1.72	6	1.50	0.84	5	1.60	0.89	7	3.29	1.25
Bike riders often disrupt me when I walk on the sidewalks.	18	2.28	1.53	4	1.50	1.00	7	3.00	1.63	7	2.00	1.53	6	1.67	0.82	5	2.00	1.73	7	3.00	1.73
The traffic moves at a safe speed.	18	3.22	1.48	4	2.00	0.82	7	4.00	1.16	7	3.14	1.68	6	2.17	1.60	5	4.00	1.23	7	3.57	1.13
Trees on this street block my vision.	17	2.06	1.20	4	1.50	0.58	7	2.00	1.16	6	2.50	1.52	6	1.33	0.52	4	2.00	1.41	7	2.71	1.25
Trees on this street make me comfortable as a pedestrian.	18	3.72	1.27	4	3.25	1.26	7	4.57	0.54	7	3.14	1.46	6	3.00	1.41	5	3.80	1.30	7	4.29	0.95

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Parked cars buffer me from traffic.	17	2.59	1.18	3	2.33	1.16	7	2.86	1.07	7	2.43	1.40	5	2.00	1.00	5	2.60	1.52	7	3.00	1.00
There is enough street lighting at night.	17	3.24	1.39	4	2.25	0.96	7	3.86	1.35	6	3.17	1.47	6	1.83	0.98	4	3.75	0.50	7	4.14	1.07

7.6.4.3. How much would you like to see more trees on the street?

White

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Large shade trees (40’-100’ tall)	72	3.25	1.34	37	3.30	1.27	12	2.67	1.30	23	3.48	1.44	32	3.22	1.45	19	3.00	1.25	21	3.52	1.25
Mid-size ornamental trees (20’-50’ tall)	71	3.48	1.21	36	3.39	1.18	12	2.92	1.44	23	3.91	1.00	31	3.65	1.20	19	3.11	1.24	21	3.57	1.17
A mix of trees	72	3.68	1.27	37	3.54	1.26	11	3.18	1.40	24	4.13	1.12	31	3.61	1.33	20	3.75	1.29	21	3.71	1.19

Black

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Large shade trees (40’-100’ tall)	16	2.62	1.46	3	3.00	1.73	4	3.00	1.41	9	2.33	1.50	5	2.40	1.67	8	2.50	1.51	3	3.33	1.16
Mid-size ornamental trees (20’-50’ tall)	16	2.75	1.34	3	3.00	1.73	4	2.75	1.26	9	2.67	1.41	5	2.60	1.82	8	2.75	1.39	3	3.00	0.00
A mix of trees	16	2.69	1.35	3	3.33	1.53	4	2.50	1.00	9	2.56	1.51	5	2.60	1.67	8	2.75	1.49	3	2.67	0.58

Hispanic/ Latino/ Spanish origin

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Large shade trees (40'-100' tall)	49	3.33	1.42	7	3.29	1.50	29	3.48	1.48	13	3.00	1.29	13	3.00	1.47	16	3.31	1.66	20	3.55	1.19
Mid-size ornamental trees (20'-50' tall)	45	3.38	1.25	5	3.60	1.14	28	3.39	1.32	12	3.25	1.22	13	3.08	1.19	14	3.43	1.60	18	3.56	0.98
A mix of trees	47	3.45	1.30	7	3.86	1.22	28	3.46	1.35	12	3.17	1.27	14	3.14	1.17	13	3.69	1.49	20	3.50	1.28

Other

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Large shade trees (40'-100' tall)	16	3.44	1.41	3	2.67	1.53	7	3.86	1.57	6	3.33	1.21	6	2.17	1.17	3	4.33	1.16	7	4.14	0.90
Mid-size ornamental trees (20'-50' tall)	16	3.38	1.20	3	2.33	1.16	7	4.00	0.82	6	3.17	1.33	6	2.33	0.82	3	4.00	1.00	7	4.00	1.00
A mix of trees	17	3.24	1.20	4	3.25	0.50	7	3.57	1.13	6	2.83	1.60	6	2.83	0.98	4	3.50	1.00	7	3.43	1.51

7.6.5. Survey Results: By Income

7.6.5.1. How much would you like to see more trees on the street?

< $35,000

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Sidewalk maintenance and repair	75	3.99	1.25	12	3.83	1.59	32	4.19	1.03	31	3.84	1.32	26	4.08	1.16	20	4.20	1.06	29	3.76	1.43
Sidewalk width	71	3.55	1.39	11	3.55	1.64	30	3.63	1.25	30	3.47	1.48	26	3.42	1.42	18	4.06	1.35	27	3.33	1.36

Safe crossings, crosswalks, and traffic lights	73	4.03	1.28	11	3.82	1.60	32	4.06	1.11	30	4.07	1.36	26	3.96	1.37	20	4.30	1.26	27	3.89	1.22
Beauty/ aesthetics (pleasant place to walk)	71	3.79	1.31	11	3.18	1.54	29	3.93	1.13	31	3.87	1.36	25	3.92	1.29	19	3.89	1.33	27	3.59	1.34
Places to sit/rest (benches)	73	3.60	1.46	12	3.42	1.51	30	3.80	1.32	31	3.48	1.59	26	3.35	1.60	19	3.79	1.23	28	3.71	1.49
Tree canopy shade	74	3.55	1.38	11	3.36	1.21	32	3.87	1.19	31	3.29	1.58	26	3.54	1.33	20	3.65	1.35	28	3.50	1.48

>$35,000

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Sidewalk maintenance and repair	46	4.24	1.10	14	4.21	1.19	17	4.24	1.35	15	4.27	0.70	21	4.10	1.14	17	4.29	1.16	8	4.50	0.93
Sidewalk width	45	3.47	1.36	14	3.14	1.29	17	3.88	1.58	14	3.29	1.07	21	3.33	1.53	17	3.65	1.06	7	3.43	1.62
Safe crossings, crosswalks, and traffic lights	45	4.49	0.92	14	4.14	1.29	17	4.65	0.70	14	4.64	0.63	21	4.38	1.02	17	4.53	0.87	7	4.71	0.76
Beauty/ aesthetics (pleasant place to walk)	45	3.89	1.11	13	3.69	1.32	17	3.76	1.15	15	4.20	0.86	21	3.90	1.14	16	3.81	1.05	8	4.00	1.31
Places to sit/rest (benches)	46	3.11	1.29	14	2.57	1.22	17	3.71	1.26	15	2.93	1.16	21	2.76	1.38	17	3.41	1.06	8	3.38	1.41
Tree canopy shade	46	3.78	1.15	14	3.14	1.17	17	4.29	0.85	15	3.80	1.21	21	3.67	1.07	17	3.59	1.28	8	4.50	0.93

7.6.5.2. How well do the following describe your feelings about safety on this street?

<$35,000

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
I feel safe when walking here.	85	3.53	1.21	22	3.68	1.29	32	3.69	1.18	31	3.26	1.18	31	3.45	1.18	22	3.59	1.22	32	3.56	1.27
I can safely cross the street.	83	3.36	1.23	21	3.38	1.28	31	3.55	1.18	31	3.16	1.24	31	3.13	1.20	21	3.48	1.17	31	3.52	1.29
There are enough crosswalks.	82	3.20	1.35	22	3.14	1.36	30	3.43	1.38	30	3.00	1.31	31	3.00	1.29	21	3.24	1.45	30	3.37	1.35
I am concerned about crime or illicit activities.	80	3.51	1.29	19	3.05	1.22	30	3.57	1.28	31	3.74	1.32	30	3.80	1.19	20	3.40	1.27	30	3.30	1.39
I am concerned that someone could hide where I can’t see.	82	3.12	1.41	22	2.68	1.21	30	3.20	1.38	30	3.37	1.54	31	3.23	1.38	20	2.70	1.49	31	3.29	1.37
Sidewalks are too crowded with people.	81	2.48	1.31	21	1.76	0.89	30	2.87	1.28	30	2.60	1.40	30	2.30	1.15	21	2.48	1.60	30	2.67	1.24
Bike riders often disrupt me when I walk on the sidewalks.	81	2.52	1.38	21	1.86	1.11	30	2.80	1.27	30	2.70	1.54	30	2.10	1.09	20	2.65	1.50	31	2.84	1.49
The traffic moves at a safe speed.	83	3.05	1.36	22	3.09	1.34	30	3.40	1.16	31	2.68	1.49	31	2.45	1.34	21	3.10	1.09	31	3.61	1.33
Trees on this street block my vision.	79	2.32	1.31	21	2.05	1.28	30	2.23	1.31	28	2.61	1.32	28	2.07	1.18	21	1.90	1.09	30	2.83	1.42
Trees on this street make me comfortable as a pedestrian.	83	3.40	1.39	21	3.38	1.50	31	3.48	1.39	31	3.32	1.35	31	3.39	1.20	20	3.40	1.54	32	3.41	1.50
Parked cars buffer me from traffic.	82	2.77	1.30	21	2.48	1.57	31	3.00	1.18	30	2.73	1.20	29	2.69	1.17	21	2.48	1.40	32	3.03	1.33

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
I like having trees between me and the traffic.	78	2.94	1.43	20	2.95	1.15	31	3.00	1.57	27	2.85	1.49	29	2.62	1.37	20	3.05	1.43	29	3.17	1.47
There is enough street lighting at night.	80	3.05	1.25	20	3.30	1.30	31	3.10	1.11	29	2.83	1.37	29	2.69	1.11	20	3.10	1.45	31	3.35	1.20

>$35,000

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
I feel safe when walking here.	57	3.93	1.07	25	4.16	0.80	17	3.76	1.20	15	3.73	1.28	25	4.16	0.80	18	3.72	1.23	14	3.79	1.25
I can safely cross the street.	55	3.67	1.20	25	3.88	1.20	16	3.81	1.17	14	3.14	1.17	24	3.92	1.06	18	3.28	1.23	13	3.77	1.36
There are enough crosswalks.	55	3.58	1.18	25	3.68	1.28	16	3.81	1.11	14	3.14	1.03	24	3.58	1.28	17	3.24	1.03	14	4.00	1.11
I am concerned about crime or illicit activities.	57	2.84	1.41	25	2.88	1.48	17	3.06	1.39	15	2.53	1.36	25	2.68	1.28	18	3.33	1.46	14	2.50	1.51
I am concerned about my safety as a pedestrian.	56	2.80	1.47	25	2.48	1.50	17	3.12	1.54	14	3.00	1.30	25	2.72	1.37	17	3.41	1.33	14	2.21	1.63
I can see clearly at all times.	51	3.65	1.11	23	3.83	1.07	15	3.80	1.15	13	3.15	1.07	24	3.96	0.91	15	3.27	0.88	12	3.50	1.57
I am concerned that someone could hide where I can’t see.	56	2.30	1.25	24	2.04	1.20	17	2.71	1.31	15	2.27	1.22	25	2.48	1.42	17	2.47	1.07	14	1.79	1.05
Sidewalks are too crowded with people.	57	1.60	0.92	25	1.32	0.85	17	2.00	1.00	15	1.60	0.83	25	1.40	0.71	18	1.67	0.84	14	1.86	1.29

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Bike riders often disrupt me when I walk on the sidewalks.	56	1.93	1.13	24	1.50	0.59	17	2.06	1.14	15	2.47	1.51	25	1.52	0.59	17	2.24	1.30	14	2.29	1.44
The traffic moves at a safe speed.	57	3.07	1.27	25	3.04	1.17	17	3.35	1.27	15	2.80	1.42	25	3.24	1.05	18	3.11	1.53	14	2.71	1.27
Trees on this street block my vision.	54	1.87	1.10	23	1.87	1.06	17	2.06	1.20	14	1.64	1.08	23	2.04	1.26	17	1.88	1.11	14	1.57	0.76
Parked cars buffer me from traffic.	55	2.85	1.24	24	2.71	1.43	16	3.19	1.05	15	2.73	1.10	24	3.04	1.20	17	2.82	1.13	14	2.57	1.45
I like having trees between me and the traffic.	55	3.47	1.36	24	3.29	1.37	17	3.59	1.12	14	3.64	1.65	25	3.56	1.33	16	3.37	1.36	14	3.43	1.51
There is enough street lighting at night.	46	3.43	1.28	21	3.86	1.11	13	3.62	1.19	12	2.50	1.24	16	3.06	1.39	18	3.22	1.17	12	4.25	0.97

7.6.5.3. How much would you like to see more trees on the street?

<$35,000

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Large shade trees (40’-100’)	83	3.17	1.35	20	3.10	1.45	32	3.19	1.40	31	3.19	1.28	31	3.03	1.38	22	2.91	1.66	30	3.50	1.01
Mid-size ornamental trees (20’-50’ tall)	80	3.30	1.29	18	3.06	1.35	31	3.23	1.38	31	3.52	1.15	30	3.27	1.26	21	3.14	1.65	29	3.45	1.02
A mix of trees	83	3.47	1.33	21	3.43	1.33	31	3.39	1.36	31	3.58	1.34	31	3.32	1.22	21	3.76	1.64	31	3.42	1.21

>$35,000

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Large shade trees (40'-100' tall)	54	3.31	1.45	23	3.30	1.19	17	3.35	1.62	14	3.29	1.73	24	3.00	1.56	17	3.35	1.32	13	3.85	1.35
Mid-size ornamental trees (20'-50' tall)	53	3.53	1.17	22	3.50	1.06	17	3.47	1.28	14	3.64	1.28	24	3.38	1.28	16	3.31	1.14	13	4.08	0.86
A mix of trees	53	3.58	1.25	22	3.73	1.08	16	3.31	1.30	15	3.67	1.45	23	3.39	1.41	17	3.59	1.06	13	3.92	1.19

7.6.6. Survey Results: By Gender

7.6.6.1. How important to you are the following in choosing routes for your walking trips?

Male

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Sidewalk maintenance and repair	53	4.00	1.32	14	3.79	1.48	24	4.21	1.29	15	3.87	1.25	20	4.10	1.07	16	4.19	1.33	17	3.71	1.57
Sidewalk width	52	3.56	1.35	13	2.85	1.46	24	4.08	1.18	15	3.33	1.23	20	3.90	1.33	16	3.75	1.34	16	2.94	1.24
Safe crossings, crosswalks, and traffic lights	53	4.15	1.22	14	3.64	1.60	24	4.42	0.93	15	4.20	1.15	20	4.00	1.21	16	4.56	1.03	17	3.94	1.35
Beauty/ aesthetics (pleasant place to walk)	51	3.80	1.33	12	3.17	1.47	24	4.04	1.20	15	3.93	1.34	20	4.10	1.02	15	3.80	1.32	16	3.44	1.63
Places to sit/rest (benches)	53	3.17	1.46	14	2.57	1.40	24	3.96	1.16	15	2.47	1.41	20	3.20	1.47	16	3.31	1.30	17	3.00	1.66
Tree canopy shade	52	3.67	1.28	13	3.23	1.17	24	4.29	0.86	15	3.07	1.53	20	3.75	1.12	16	3.69	1.14	16	3.56	1.63

Female

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Sidewalk maintenance and repair	67	4.13	1.13	14	4.21	1.12	24	4.12	1.12	29	4.10	1.18	24	3.96	1.23	27	4.26	0.86	16	4.19	1.38
Sidewalk width	65	3.52	1.34	14	3.79	1.19	22	3.55	1.37	29	3.38	1.40	24	3.00	1.45	25	3.84	1.11	16	3.81	1.33

Safe crossings, crosswalks, and traffic lights	66	4.24	1.20	13	4.31	1.18	24	4.17	1.13	29	4.28	1.31	24	4.25	1.33	27	4.26	1.13	15	4.20	1.21
Beauty/ aesthetics (pleasant place to walk)	65	3.89	1.15	14	3.86	1.10	22	3.77	1.07	29	4.00	1.25	24	3.83	1.24	26	3.85	1.08	15	4.07	1.16
Places to sit/rest (benches)	65	3.51	1.42	14	3.29	1.27	22	3.59	1.44	29	3.55	1.50	24	3.00	1.56	26	3.58	1.24	15	4.20	1.21
Tree canopy shade	67	3.61	1.27	14	3.29	0.99	24	3.79	1.25	29	3.62	1.40	24	3.54	1.22	27	3.52	1.34	16	3.88	1.26

7.6.6.2. How well do the following describe your feelings about safety on this street?

Male

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
I feel safe when walking here.	62	3.98	1.09	23	4.26	1.05	24	3.83	1.20	15	3.80	0.94	22	3.91	0.92	19	4.00	1.05	21	4.05	1.32
I can safely cross the street.	60	3.60	1.17	22	3.95	1.17	23	3.65	1.11	15	3.00	1.07	21	3.57	1.17	19	3.42	1.07	20	3.80	1.28
There are enough crosswalks.	61	3.36	1.25	23	3.43	1.47	23	3.35	1.15	15	3.27	1.10	21	3.29	1.01	19	3.21	1.18	21	3.57	1.54
I am concerned about crime or illicit activities.	61	3.10	1.39	23	2.65	1.43	23	3.61	1.27	15	3.00	1.31	21	3.14	1.20	19	3.47	1.39	21	2.71	1.52
I am concerned about my safety as a pedestrian.	60	2.93	1.43	23	2.52	1.59	24	3.33	1.37	13	2.92	1.04	21	2.67	1.32	18	3.44	1.38	21	2.76	1.51
I can see clearly at all times.	57	3.67	1.22	21	3.76	1.22	22	3.59	1.37	14	3.64	1.01	21	3.67	1.16	18	3.44	1.15	18	3.89	1.37
I am concerned that someone could hide where I can’t see.	58	2.52	1.33	22	2.09	1.27	23	2.96	1.36	13	2.46	1.20	22	2.91	1.27	17	2.29	0.99	19	2.26	1.59
Sidewalks are too crowded with people.	61	1.90	1.04	22	1.45	0.74	24	2.38	1.06	15	1.80	1.15	21	1.76	0.94	19	1.79	0.98	21	2.14	1.20
Bike riders often disrupt me when I walk on the sidewalks.	58	2.02	1.15	21	1.67	1.02	23	2.22	1.09	14	2.21	1.37	21	1.90	0.89	17	1.76	0.90	20	2.35	1.50
The traffic moves at a safe speed.	62	3.23	1.36	23	3.22	1.24	24	3.71	1.27	15	2.47	1.41	22	3.00	1.31	19	3.26	1.41	21	3.43	1.40
Trees on this street block my vision.	59	1.93	1.07	22	1.64	1.00	24	2.12	1.15	13	2.08	0.95	21	2.10	1.14	18	1.83	0.99	20	1.85	1.09

Trees on this street make me comfortable as a pedestrian.	62	3.65	1.23	23	3.70	1.30	24	3.88	0.90	15	3.20	1.52	22	3.82	0.96	19	3.53	1.22	21	3.57	1.50
Parked cars buffer me from traffic.	58	2.74	1.24	21	2.71	1.42	23	3.00	1.17	14	2.36	1.01	20	2.90	1.12	18	2.39	1.20	20	2.90	1.37
I like having trees between me and the traffic.	58	3.34	1.40	21	3.33	1.35	24	3.58	1.32	13	2.92	1.61	21	3.33	1.35	16	3.44	1.15	21	3.29	1.65
There is enough street lighting at night.	56	3.38	1.20	19	4.11	0.94	24	3.33	1.09	13	2.38	1.04	20	2.95	1.23	17	3.82	0.88	19	3.42	1.31

Female

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
I feel safe when walking here.	77	3.56	1.25	24	3.63	1.14	24	3.58	1.18	29	3.48	1.43	30	3.53	1.17	28	3.39	1.40	19	3.84	1.17
I can safely cross the street.	76	3.33	1.26	24	3.25	1.23	23	3.61	1.27	29	3.17	1.28	30	3.20	1.16	27	3.41	1.31	19	3.42	1.39
There are enough crosswalks.	73	3.23	1.40	24	3.42	1.25	22	3.68	1.46	27	2.70	1.35	30	3.03	1.45	26	3.23	1.37	17	3.59	1.37
I am concerned about crime or illicit activities.	74	3.36	1.40	22	3.45	1.10	23	3.22	1.45	29	3.41	1.59	30	3.47	1.41	26	3.31	1.35	18	3.28	1.53
I am concerned about my safety as a pedestrian.	73	3.42	1.35	23	3.26	1.32	21	3.52	1.37	29	3.48	1.41	30	3.30	1.37	26	3.50	1.30	17	3.53	1.46
I can see clearly at all times.	71	3.34	1.20	24	3.46	1.22	21	3.29	1.27	26	3.27	1.15	30	3.30	1.06	25	3.60	1.26	16	3.00	1.32
I am concerned that someone could hide where I can't see.	76	2.86	1.48	24	2.42	1.25	23	3.22	1.45	29	2.93	1.62	30	2.93	1.55	27	2.59	1.50	19	3.11	1.33
Sidewalks are too crowded with people.	75	2.27	1.42	24	1.67	1.13	22	2.77	1.45	29	2.38	1.47	30	2.00	1.17	27	2.30	1.61	18	2.67	1.46
Bike riders often disrupt me when I walk on the sidewalks.	76	2.38	1.45	24	1.50	0.72	23	2.74	1.45	29	2.83	1.61	30	1.80	1.00	27	2.85	1.61	19	2.63	1.57
The traffic moves at a safe speed.	75	2.91	1.38	24	3.00	1.38	22	3.09	1.11	29	2.69	1.56	30	2.63	1.33	27	2.96	1.32	18	3.28	1.53
Trees on this street block my vision.	70	2.19	1.34	23	2.22	1.24	22	2.09	1.41	25	2.24	1.42	27	2.07	1.30	25	1.80	1.12	18	2.89	1.49

Trees on this street make me comfortable as a pedestrian.	75	3.31	1.40	23	3.43	1.34	23	3.52	1.59	29	3.03	1.27	30	3.30	1.37	26	3.31	1.32	19	3.32	1.60
Parked cars buffer me from traffic.	75	2.77	1.34	23	2.65	1.56	23	3.04	1.22	29	2.66	1.26	29	2.72	1.28	27	2.70	1.38	19	2.95	1.43
I like having trees between me and the traffic.	74	3.00	1.49	22	3.05	1.29	23	2.91	1.59	29	3.03	1.59	29	2.97	1.45	26	2.85	1.57	19	3.26	1.49
There is enough street lighting at night.	68	3.09	1.27	22	3.23	1.15	19	3.26	1.28	27	2.85	1.35	22	2.59	1.14	27	2.89	1.28	19	3.95	0.97

7.6.6.3. How much would you like to see more trees on the street?

Male

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Large shade trees (40’-100’)	58	3.43	1.43	21	3.67	1.28	24	3.46	1.50	13	3.00	1.53	21	3.14	1.62	17	3.41	1.46	20	3.75	1.16
Mid-size ornamental trees (20’-50’ tall)	56	3.59	1.19	20	3.70	1.13	24	3.50	1.25	12	3.58	1.24	21	3.57	1.29	16	3.50	1.37	19	3.68	0.95
A mix of trees	57	3.67	1.27	21	3.95	1.24	23	3.39	1.27	13	3.69	1.32	21	3.62	1.36	17	3.65	1.37	19	3.74	1.15

Female

	Total			Chicopee			Holyoke			Springfield			Trees — high			Trees — low			Trees — new		
	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd	n	mean	sd
Large shade trees (40’-100’)	75	3.12	1.38	22	2.95	1.25	24	3.08	1.50	29	3.28	1.39	30	3.00	1.41	27	3.00	1.47	18	3.50	1.15
Mid-size ornamental trees (20’-50’ tall)	73	3.23	1.29	21	3.00	1.18	23	3.09	1.44	29	3.52	1.21	29	3.17	1.31	26	3.08	1.38	18	3.56	1.10
A mix of trees	73	3.32	1.29	22	3.09	0.97	22	3.27	1.45	29	3.52	1.38	29	3.17	1.31	26	3.46	1.36	18	3.33	1.19

7.6.7. Open-Ended Responses: Comment Codes and Verbatim Responses:

7.6.7.1. Do you have anything else to add about how this street can be improved, or how the City can improve walking in this neighborhood?

Enforce laws pertaining to pedestrian safety

Chicopee	Speed enforcement - bumps and radars
Chicopee	tighter speed enforcement, growing awareness for pedestrians
Holyoke	I think we should have more laws against Loitering in hudee crowds on the street
Holyoke	inforce crosswalk laws
Springfield	Make drivers ober the cross walk law
Springfield	enfore pedestrian laws

Improve commercial and community amenities

Chicopee	Improving commerce chicopee in general more small shops and resturants
Chicopee	There should be a stop to going activity
Chicopee	Deveria ver mas seguridad en las calles y haber mas parques y programas para la comunidad - There should be more security on the streets and should have more parks and programs for the community
Springfield	There is a definat problem on meadow st hillimansett area. More guiders, children playing on streets. More peple walking. Need more pedestrain walks
Springfield	more stores - too many closing nice, like it here
Springfield	Problems with dogs. Change in activities an appleton
Springfield	People shoul dbe cleaning stretts- participation odor through windows in apt. like sewer- need to check liner. Police neglective prostitution + secual assult on the street Harrassment- address
Springfield	Less police, building structures and help the homeless
Springfield	more walkers, kid esp. like in need more families. City is beautiful
Springfield	Address deteruared vacant stores

Improve maintenance and stewardship in the pedestrian realm

Holyoke	Plant the trees somewhere along the city when you remove one
Holyoke	Trash Cans dog bags on poles
Holyoke	Cleanliness and less dog mess on sidewalk
Holyoke	garbage cans for litter
Springfield	Dogs - Pick up after Pipe music - Laughter
Springfield	We should have more trash can and the city should clean the streets more
Springfield	Cleaning walkways more
Springfield	Yes, people do not clean the yards infront of their houses, there is a lot of insects
Springfield	People shoul dbe cleaning stretts- participation odor through windows in apt. like sewer- need to check liner. Police neglective prostitution + secual assult on the street Harrassment- address

Improve traffic calming and pedestrian safety amenities

Chicopee	tighter speed enforcement, growing awareness for pedestrians
Chicopee	Maybe a bike lane
Chicopee	Cars near crosswalks make it hard to cross street at times by the churches. Cars go getting fast here
Chicopee	Front street is very busy but most drivers stop to allow pedestrians to crss
Chicopee	More lights around cross walks
Chicopee	put more stop signs
Chicopee	The city can try to put in a few more lights and make sure the traffic lights are always working
Chicopee	more corssing faurds
Chicopee	A few more crosswalks, snowpiles can be an issue
Chicopee	crosswalk button in tight traffice areas
Chicopee	Some streets need speed bumps and slow children signs
Chicopee	Reading the lines to make them more clear would make them clear and look nice
Chicopee	Not enough crosswalks. Not enough inbetween streets. People drive way too fast
Holyoke	road near the cvs there are many times you cannot cross w/o being nearly ran over - er/exchange lights seem to not be connected - I get signal to walk and cars still come through intersection
Holyoke	Speed zone signs
Holyoke	Nope other than slow traffic
Holyoke	more crosswalks - police take notice of the speed on this street
Holyoke	the "high tech" light at springfield st + south will stop you every time travelling along springfield st
Holyoke	Just during school time - to many cars (traffic) and in considerate students working
Holyoke	Narrow the street lkane with sidelines tand a bike lane. Or just to create space between pedestrian spaces and moving cars
Holyoke	small transportation to places or handicap/elderly and mothers - keeps them safe in cold winters
Holyoke	Towards high street- Hear harpdem, need more traffic lights
Holyoke	Add bike lanes to encourage fewer car trails. Thereby making a safer, envt for pedestrians. Add bulbouts and wider pedestrian islands. Accommodate for the older and disabilitied
Holyoke	You can add more street lights to neighborhoods that need more nightime lighting
Holyoke	More walk signs also for blind the noise that tells you to go w/ walk signs
Holyoke	Crime, People stop blocking cross walks
Holyoke	Speed is the Biggest Problem here
Holyoke	Solo de trafico - Only the traffic
Springfield	Crosswalks on every corner flashing lights. Noisce, chicopee does pretty good
Springfield	Cars don’t look when people are crossing got hit while crossing

Springfield	westfield bank sign on the corner of school st and center st blocks vehicale vision and is dangerous to vehicles and pedestrians
Springfield	1-way makes difference - Can't do much cameras downtown are good. More on cabot + Central st.
Springfield	Walking safely
Springfield	more street lights and repairs to lights
Springfield	They are fixing the road all over the place and I think they should have cordinated that so walkers are not in danger
Springfield	There is a definat problem on meadow st hillimansett area. More guiders, children playing on streets. More peple walking. Need more pedestrain walks

Increase police presence/ install amenities that improve personal safety

Chicopee	Deveria ver mas seguridad en las calles y haber mas parques y programas para la comunidad - There should be more security on the streets and should have more parks and programs for the community
Chicopee	Maybe more lights
Chicopee	Lights!! More on the main rods curtain sidestreets. Pearl, chapin, cinder, front, school, spriungfield, exchange st.
Chicopee	Safe for the town/people
Holyoke	putting in call boxes
Holyoke	cameras in plain view to deter crime
Holyoke	See more police officers visible, especially at dusk and between 4-5pm more pedestrian and traffic
Holyoke	More neighborhood police set up in downtown
Holyoke	Call boxes for safety
Holyoke	More police prescence
Holyoke	Gun fire on daytime too dangerous just moved feel very unsafe
Holyoke	Crime, People stop blocking cross walks
Springfield	Not a safe neighborhood, too many people yelling
Springfield	Lighting perhaps police prescence after dark
Springfield	Clean up the streets - more about safety crime

Repair sidewalks and roadways

Chicopee	pot holes plz fix
Chicopee	Improve the sidewalks
Chicopee	Fix all sidewalks + Streets for pot Hols bumps and unlevelness
Chicopee	mostly sidewalk maintance
Chicopee	Yes, cracks in side walk needs fixing
Chicopee	Curb cuts to define sidewalks/road
Holyoke	fix holes in street
Holyoke	sidewalk improvement in residential areas
Holyoke	Fix and repair many of the sidewalks as many are in need of it
Holyoke	Fix brick sidewalks
Holyoke	Repair any broken sidewalks

All is good

Chicopee	Not really
Chicopee	not really
Chicopee	Todo Bien - All is good
Springfield	Not really - walking for years like the river - shadier
Springfield	The way it is is good I love it. I don't want to go to to PR

7.6.7.2. How much would you like to see more trees on the street? Why or why not?

Aesthetics/Managed Appearance

Chicopee	Enhance the look of the community + help environment
Chicopee	Aesthetics
Chicopee	It would look nice
Chicopee	We need more trees to make the drive look nicer
Chicopee	Frankly, the more trees the better, well maintained helps
Chicopee	Natural bueaty, air quality, shade, escape from weahter
Chicopee	Trees are good for the envt and they look nice
Chicopee	Depressing without, bring back natives
Holyoke	Looks better
Holyoke	Shade/classier look
Holyoke	Looks - Good - Shade
Holyoke	Trees provide a safer, cooler and more attractive street
Holyoke	Trees increase the beauty of the street
Holyoke	O2 they look nice
Holyoke	Pollution offset, shade, aestetics
Holyoke	Decorative
Springfield	Beautiful
Springfield	Trees are asthetically pleasing
Springfield	Better for atmosphere, everything, air quality depends on type of tree
Springfield	The trees will help enhance the beauty of chicopee
Springfield	Adds beauty
Springfield	large trees can cover your view of the street
Springfield	Shade, beautiful, makes you feel good about life
Springfield	Loves trees, wants more shade, safety
Springfield	beautiful clear sky
Springfield	Enjoy seeing people, walking; Safety
Springfield	El ornato es importante - The decoration/aesthetic of the trees is imporant
Springfield	Because I love nature and shade
Springfield	Only for beautification not shade
Springfield	Good height
Springfield	Canopy/ speed control
Springfield	I feel good, the scent, I love it. I came from the island and there was a lot of green
Springfield	Safety vs aestetics

Cultural Symbol

Springfield	We live in New Enland, people come here to see the trees

Environmental Benefits

Chicopee	Enhance the look of the community + help environment
Chicopee	Natural bueaty, air quality, shade, escape from weahter
Chicopee	Trees are good for the envt and they look nice
Chicopee	I like trees and nature. Also the crossing guard should have shade
Chicopee	Trees add shade, life and better air quality
Chicopee	For Shade + Fresh Air
Chicopee	I am a tree huger
Chicopee	El ambiente seria major y el aire mucho mejor - The atmosphere would be better and the air much better/cleaner
Holyoke	O2 they look nice
Holyoke	Pollution offset, shade, aestetics
Holyoke	I don't like insects, but I Like birds. I would lke to see trees, because They add shade
Holyoke	Trees are good for environment
Holyoke	Trees are vey important for the environment
Holyoke	I love oxygen and nature
Holyoke	Need more I like nature and being outside
Holyoke	Porque dan aire - Because they give air
Springfield	Because I love nature and shade
Springfield	Need air and more trees, decidious not evergreen. Fruit bearing for food and wild life take care of the existing trees try imo farming delivers more life to the tree
Springfield	Trees improve aestetisc and air quality

"Just Because"

Chicopee	I like trees and nature. Also the crossing guard should have shade
Chicopee	Trees add shade, life and better air quality
Chicopee	It would look nice
Chicopee	Frankly, the more trees the better, well maintained helps
Chicopee	I like trees
Chicopee	Always nice to have more trees around
Chicopee	Trees are out friends and proved shade
Chicopee	Trees are always welcome
Chicopee	We need more green
Chicopee	Trees are good
Holyoke	Replanting the trees, they've been doing that pretty well 5 to 1 ratio
Holyoke	More people
Holyoke	Better for everyone
Holyoke	Small Tres are welcoming
Holyoke	People need the trees

Springfield	Better for atmosphere, everything, air quality depends on type of tree
Springfield	Shade, beautiful, makes you feel good about life
Springfield	I feel good, the scent, I love it. I came from the island and there was a lot of green
Springfield	Da Plase
Springfield	Trees are good and lighting more

Need More

Chicopee	We need more trees to make the drive look nicer
Holyoke	We need more trees, especially high street. Why did they knock those down, these are missing trees
Holyoke	Needs more treets
Springfield	Palm trees
Springfield	Not enough trees - global warming

Safety (Benefit)

Chicopee	Biger trees taller less obsticals for cars, safer for peds to hide behind in case of a car out of control
Chicopee	Cars safety and people
Chicopee	Why because there people all over the street
Holyoke	Trees provide a safer, cooler and more attractive street
Holyoke	Make oxygen, more trees looks better
Holyoke	healthy
Springfield	Enjoy seeing people, walking; Safety
Springfield	Canopy/ speed control

Shade

Chicopee	I like trees and nature. Also the crossing guard should have shade
Chicopee	Trees add shade, life and better air quality
Chicopee	Trees are out friends and proved shade
Chicopee	Natural bueaty, air quality, shade, escape from weahter
Chicopee	For Shade + Fresh Air
Chicopee	The trees are good for shade in the summertime
Chicopee	Shade for summer
Chicopee	Shade is important
Chicopee	To hide from the sun
Chicopee	threes give me and the kids shade when walking
Holyoke	Trees provide a safer, cooler and more attractive street
Holyoke	Make oxygen, more trees looks better
Holyoke	Pollution offset, shade, aestetics
Holyoke	I don’t like insects, but I Like birds. I would lke to see trees, because They add shade
Holyoke	Looks better
Holyoke	Shade/classier look

Holyoke	Looks - Good - Shade
Holyoke	I like more shade
Holyoke	More shade
Holyoke	Porque dan sombra - Because they give shade
Springfield	Shade, beautiful, makes you feel good about life
Springfield	Trees improve aestetisc and air quality
Springfield	Shade
Springfield	Por la sombra - The shade is good
Springfield	sombra - Shade
Springfield	Shade Activist- like to see trees loves nature likes clean sidewalks
Springfield	Sombra - Shade

"It Depends"

Springfield	Better for atmosphere, everything, air quality depends on type of tree

Don't Care

Holyoke	Don’t care
Holyoke	Don’t care

Don't Know

Chicopee	Don’t know!
Holyoke	never given any real thought either way to be honest

Have Plenty

Chicopee	There is enough trees
Chicopee	Na
Holyoke	Seems like there are enough now
Holyoke	Plenty already
Holyoke	Plenty of trees already
Holyoke	I believe we have more than enough
Springfield	Enough Trees that don’t grow overpower the area
Springfield	Hay sufficiente arboles - There are plenty of/ enough trees
Springfield	I don’t like a lot of trees
Springfield	trees were planted already

Safety (Disbenefit)

Chicopee	I don’t like my vision to be blocked
Holyoke	Hard see cars are coming people don’t stop while crossing
Springfield	Safety vs aestetics
Springfield	Some Block vision

7.6.8. Additional Photo Preference Results

7.6.8.1. Average Score by Study Area Location

		mean	sd	n
Chicopee	Springfield Street	3.43	1.19	35
Chicopee	Center Street	3.52	0.833	34
Chicopee	Front Street	2.97	0.897	34
Holyoke	Suffolk Street	3.63	0.904	35
Holyoke	Dwight Street	3.44	1.08	35
Holyoke	Appleton Street	3.66	1.33	32
Springfield	Belmont Avenue (east)	3.59	1.04	40
Springfield	Belmont Avenue (west)	3.25	1.11	36
Springfield	Main Street	3.06	1.25	37

7.6.8.2. Average Scores While Walking on Street of Interest

	Standing on…	preference			safety			frequency		
		mean	sd	n	mean	sd	n	mean	sd	n
Chicopee	Springfield Street	3.94	1.08	17	3.53	1.28	17	4.00	0.97	18
Chicopee	Center Street	3.53	1.50	17	3.65	1.37	17	4.12	0.70	17
Chicopee	Front Street	4.00	0.79	17	4.16	1.26	19	3.35	1.17	17
Holyoke	Suffolk Street	3.41	1.28	17	4.18	1.02	17	4.00	1.09	18
Holyoke	Dwight Street	4.40	0.63	15	4.00	1.13	15	4.06	1.03	17
Holyoke	Appleton Street	3.56	1.38	18	4.00	1.00	11	3.75	1.34	16
Springfield	Belmont Avenue (east)	3.37	1.01	19	3.37	1.21	19	3.65	1.35	20
Springfield	Belmont Avenue (west)	3.16	1.12	19	3.37	1.30	19	3.94	1.26	18
Springfield	Main Street	3.26	1.19	19	3.8	1.62	10	3.21	1.48	19

7.6.8.3. Average Scores While Off-Site of the Street of Interest

	Not standing on…	preference			safety			frequency		
		mean	sd	n	mean	sd	n	mean	sd	n
Chicopee	Springfield Street	3.18	1.38	17	3.41	1.37	17	3.39	1.29	17
Chicopee	Center Street	3.71	0.85	17	4.29	0.985	17	3.06	1.08	17
Chicopee	Front Street	3.47	1.01	17	3.17	1.15	18	3.00	1.41	17
Holyoke	Suffolk Street	3.81	1.22	16	3.41	1.37	17	3.18	1.29	17
Holyoke	Dwight Street	3.53	1.25	15	3.00	1.1	11	3.61	1.34	18
Holyoke	Appleton Street	3.22	1.59	18	3.33	1.5	15	3.63	1.15	16
Springfield	Belmont Avenue (east)	2.89	1.20	19	2.75	1.37	20	3.15	1.31	20
Springfield	Belmont Avenue (west)	2.58	1.50	19	3.00	1.50	17	2.89	1.41	18
Springfield	Main Street	2.74	1.33	19	2.73	1.27	11	3.00	1.41	18

7.6.8.4. Does (In)Frequent Use Impact Differences between Preference and Feelings of Safety?

	preference + frequency		safety+ frequency	
Walking on streets with..	p-value	R^2	p-value	R^2
High tree cover	0.956	0.008	0.428	0.109
Low tree cover	0.087	0.244	0.776	0.044
New tree plantings	0.993	-.001	0.450	0.117