Tree-Preference Matters: Participation and Stewardship in Urban Tree-Planting Initiatives. A North Adams Case Study

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ABSTRACT

The benefits of urban tree planting programs to improve canopy cover and quality of life in lower-income neighborhoods have been well studied. However, the success of these programs often relies on local residents' participation and stewardship of newly planted trees. The City of North Adams, Massachusetts, is typical of many post-industrial cities in the Northeastern United States where environmental justice neighborhoods have lower tree canopy and tree planting initiatives are challenged by a limited municipal capacity to plant and maintain trees. This project describes an urban tree planting plan in the North Adams that used a landscape preference survey to determine public attitudes toward different tree types and planting configurations. Understanding these attitudes is critical because limited space for street tree plantings necessitated that the majority of trees be planted in private yards.

The study explored local residents' motivations to participate in an urban forestry program and their willingness to have a tree planted in their yards. Participants were asked to rate a series of computer-simulated images that showed different urban tree types that were available (shade, flowering, fruiting, and evergreen) at different locations in the same residential setting, a typical urban multi-family home. The survey was distributed in the lower-income neighborhoods at public locations and events.

A total of 118 residents participated in the study. The results underline a stronger preference for flowering and fruiting trees than for large shade trees despite the fact that the rationale for this initiative is increasing tree canopy to lower energy consumption. Participants indicated that important reasons for their tree choices were aesthetics, benefits to nature, air quality, and helping address climate change. The most preferred landscapes had a mix of different tree types and, in general, had trees with colorful foliage or flowers. Willingness to participate in the program was related to community's awareness of the benefits generated by urban trees, environmental knowledge, and experience in tree care practices. The discussion points to the need to tailor tree planting programs that incorporate local residents' landscape preferences and values as a way to build participation and stewardship for urban trees. Educational efforts about the benefits of urban trees and tree care training also may increase participation.

Keywords: North Adams, urban forestry, environmental justice, environmental stewardship, greening, landscape preference survey

RESUMO

Os benefícios dos programas de plantação de árvores para melhorar a arborização urbana e a qualidade de vida em bairros desfavorecidos têm sido bem estudados. No entanto, o sucesso destes programas depende, geralmente, do envolvimento dos moradores, quer na plantação, quer na posterior manutenção das árvores. A cidade de North Adams, Massachusetts, partilha as características de cidades pós-industriais do nordeste dos Estados Unidos, onde as iniciativas de plantação são confrontadas por uma capacidade municipal reduzida de plantar e manter árvores. Este projeto descreve um plano de arborização urbano em North Adams que fez uso de um inquérito de preferências de paisagem para estudar as atitudes do público face a diferentes tipos de árvore e configurações de plantação. Compreender estas atitudes é importante porque a maioria das árvores terá de ser plantada em propriedade privada pois o espaço público é limitado para o efeito.

O estudo explorou as motivações da população para participar num programa de florestação urbana e a sua disposição de vir a ter uma árvore plantada nas suas propriedades. Foi solicitado aos participantes que classificassem uma série de imagens, simuladas por computador, consoante diferentes tipos de árvores (sombra, flor, fruto e perenifólia) plantadas em diferentes locais no mesmo ambiente residencial, uma típica casa urbana multifamiliar. Os inquéritos foram distribuídos em "bairros de justiça ambiental" em locais e eventos públicos.

Um total de 118 residentes participou no estudo. Os resultados obtidos evidenciam uma maior preferência por árvores de flor e fruto em relação às grandes árvores de sombra, apesar da lógica desta iniciativa ser aumentar a cobertura arbórea para diminuir o consumo de energia. Os participantes indicaram que as razões importantes que motivaram a sua escolha foram as propriedades estéticas da árvore, os seus benefícios para com a natureza, a melhoria da qualidade do ar e a sua capacidade de fazer face às alterações climáticas. As paisagens mais valorizadas apresentavam uma maior diversidade de tipos de árvore que, em geral, tinham folhagem mais colorida ou flores. A disponibilidade evidenciada pelos residentes para participar neste programa esteve diretamente relacionada com a sua consciencialização sobre os benefícios gerados pelas árvores urbanas, o conhecimento sobre tópicos ambientais e a experiência em práticas de gestão paisagística. A discussão aponta para a necessidade de incorporar as preferências paisagísticas dos moradores na iniciativa, de forma a estimular a sua participação e a posterior manutenção das árvores. Esforços educacionais sobre os benefícios das árvores, bem como formação em práticas de manutenção arbórea poderão igualmente aumentar a participação.

Palavras-chave: North Adams, floresta urbana, justiça ambiental, gestão ambiental, inquérito de preferências de paisagem

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ABBREVIATIONS

DCR- Department of Conservation & Recreation

EJP- Environmental Justice Population

FCUP - Faculdade de Ciências da Universidade do Porto

FLT- Franklin Land Trust

GGCP - Greening the Gateway Cities Program

LARP - Landscape Architecture & Regional Planning

MA - Massachusetts

NBCC - Northern Berkshire Community Coalition

UMass - University of Massachusetts

US - United States

USDA - United States Department of Agriculture

1. INTRODUCTION

At a time when more and more people worldwide live within cities, estimated to surpass 68% by 2050 (United Nations, 2018), widespread access to urban green areas is becoming increasingly important for residential satisfaction (Kaplan, 1983; Hägerhäll et al., 2010; Gerstenberg and Hofmann, 2016). In these terms, urban tree-planting initiatives can provide an array of economic, environmental, and social benefits (Nowak and Dwyer, 2006). Economic benefits, such as lower cooling and heating costs (Akbari et al., 2001) and higher property values (Anderson and Cordell, 1985) are well recognized. Awareness of trees' environmental benefits, such as lower stormwater management demands (Sanders, 1986), improved air quality (Nowak and Dwyer, 2006), and ability to combat global warming concerns, such as the urban heat island has led many US cities to embark on ambitious tree-planting programs.

From a social perspective, while trees are well recognized to benefit people living, working in, and visiting cities, tree canopy cover appears to be unevenly distributed throughout urban areas based on varying factors, including land uses, socioeconomic status (Iverson and Cook, 2000), ethnicity, and education level (Heynen and Lindsey, 2003). In short, the most vulnerable communities are less likely to enjoy the many benefits that trees can provide.

Equitable urban forest policies can be decisive, bridging the gap between the most vulnerable people and access to quality environments. Aiming to better serve the environmental needs of the Commonwealth's most disadvantaged communities and foster climate change adaptation, the State of Massachusetts (MA) has developed an Environmental Justice Policy. This policy seeks to fight environmental burdens unduly placed onto low-income urban areas, minorities, and English isolated areas, designated as Environmental Justice Populations (EJP).

With a median household income of 65% lower than the State´s average, the town of North Adams in Western Massachusetts is one of the Environmental Justice Populations. This study will be focusing on its ongoing greening initiative and the role that residents´ landscape preferences might have in making the program successful.

1.1. Goals and Expected Contribution

Taking place in the United States of America, the North Adams study emerges from a larger academic project involving a multidisciplinary team led by Professor Robert Ryan and Professor Theodore Eisenman of the University of Massachusetts, Amherst. The focus of extensive research is to understand public perception of urban greening programs, including residents' decisions and preferences concerning different tree types and planting configurations in disadvantaged neighborhoods. The present research report is focusing on an ongoing tree-planting program in North Adams, MA.

The purpose of this study is to understand the relationship between enrollment in a tree-planting program, stewardship commitment, and landscape preferences, especially towards flowering, fruit, and evergreen trees compared to large deciduous trees. By understanding what motivates residents to plant trees and which trees they prefer, this study will inform the program's leaders and, hopefully, mediate an underlying conflict between community's aspirations and the town's prime goal of city greening by using large shade trees.

Large trees are considered the most environmentally beneficial tree type (McPherson et al., 2005; Pretzsch et al., 2015). However, due to North Adams' street characteristics, where part of the planting sites are either too narrow or beneath utility wires, large trees are not always the most appropriate option, as they can inflict damage to public infrastructure. The use of different kinds of trees, namely small trees, need to be explored. Residents' input on preferences for small flowering or fruit trees might indicate other possibilities to offset the constraints imposed by site characteristics. Moreover, the majority of the plantings will occur on private property, and a compromise over which trees to plant could result in higher compatibility between the different stakeholders' interests and increase residential satisfaction, which, in turn, may lead to higher levels of stewardship commitment.

A resident-centered process should be developed that considers the opinion of those living in the target neighborhoods. To obtain this knowledge, a survey tool was developed based on a literature review covering relevant topics such as the benefits offered by urban trees, patterns in human environmental preferences, and community attitudes about urban forestry programs.

Within the frame of this project, the primary goals are:

- To inform the decision-makers of the tree-planting initiative about residents' general preferences towards different tree types, planting configurations and locations;

- To understand residents' perceptions respecting their concerns and knowledge about tree care activities and maintenance;

- To identify any possible conflict of interest between the urban foresters and the ordinary resident of North Adams underlying the greening program;

- To create a research method for gauging public opinion about urban street trees that can be replicated in other planting programs worldwide.

1.2. The Project

Located in Berkshire County, North Adams is an old mill town surrounded by forests that form an essential part of the town's visual landscape. Some parts of the city have trees lining the streets that seem to bring the forest into the city. However, North Adams´ downtown and many of its residential neighborhoods do not enjoy as much tree coverage, which prevents residents from enjoying the many benefits trees provide.

Funded by a grant from the US Forest Service, over the next three years, the town is planning to plant 800 trees across its low-income neighborhoods, both on private and on public land. Most of the trees will be planted along streets, especially in private yards, due to lower availability of unpaved space in the public right-of-way.

This initiative can be very challenging. Firstly, because private landowners have to agree to plant trees in their yards and then, they have to take care of them, especially in their first years. If they do not, the trees might not survive, and this initiative could be a waste of public funds.

A significant body of literature has suggested that community participation in tree planting projects is necessary for improving the tree canopy coverage in neighborhoods and promote environmental equity (Ryan, 2015; Roman et al., 2015). However, the long-term survival of urban trees often depends on the care and protection provided by residents. Much attention is paid to planting trees, only to have some of those trees deteriorate or die due to lack of watering and basic maintenance (Dwyer, 1997). That been said, stewardship is vital beyond the initial planting.

To achieve a higher level of stewardship towards the newly planted trees, it is necessary to identify community's values and aspirations and understand how they translate themselves into landscape preferences. The following diagram presents the different variables at play.

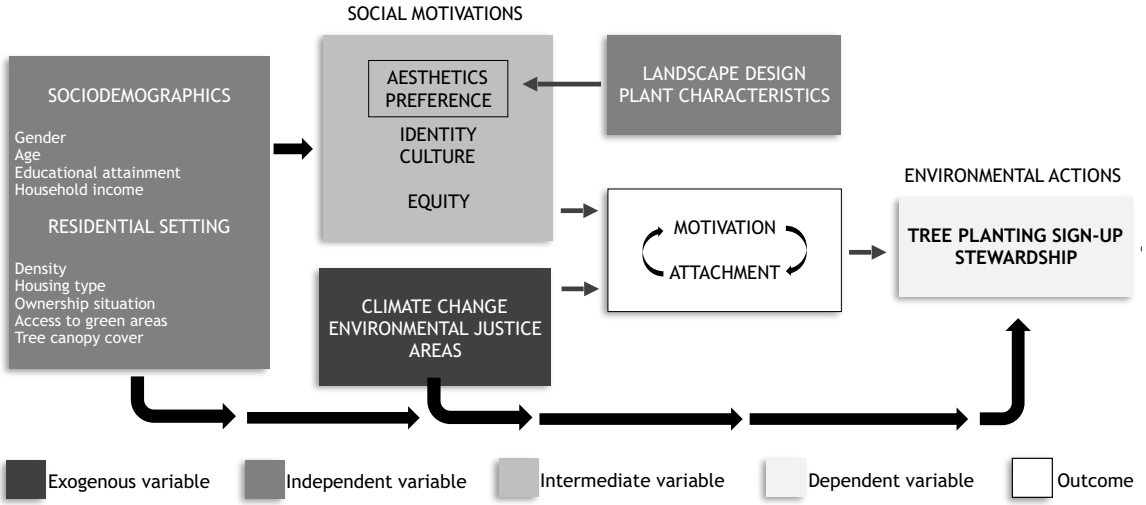

Figure 1 - Conceptual framework showing the factors behind participation in urban forestry initiatives.

Behind the motivation to participate in the program and steward a tree (dependent variables), there are numerous factors (independent, intermediate, and exogenous variables). The first encompasses sociodemographic attributes, plant characteristics, landscape design and housing characteristics. These factors influence people's aesthetic preferences and build their identity and cultural values (intermediate variables) which in turn affect willingness to engage in the program. Neighborhood characteristics, namely low canopy cover and access to green areas (independent variables), can generate the desire of equity and make residents take action by planting trees within their neighborhood. The paradigm of climate change and the designation of environmental justice area, predefined by the state of Massachusetts, form the exogenous variables. We do not measure them intentionally, yet they affect the outcome. Place attachment, the emotional connection between

people and place (Ryan, 2015), is also an important motivation. In fact, according to several scholars, attachment to a physical location increases the likelihood to act on its behalf (Scannell and Gifford, 2010) and volunteer in environmental stewardship programs, like planting urban trees (Ryan et al., 2001; Ryan, 2005).

1.3. Research Questions

The following research questions guide this study:

1. Are participants willing to plant trees in their properties?
2. What kind of trees and planting configurations do residents prefer? Is that affected by sociodemographic and residential characteristics?
3. What reasons motivate residents to plant a tree?
4. In what way do sociodemographic and residential characteristics influence the community's concern to maintain a tree and their willingness to participate in the program?
5. How knowledgeable and experienced are residents about tree care practices and environmental topics? Does that affect their willingness to participate in the program and their attitudes about tree benefits?

2. CONTEXT OF STUDY

2.1. Context of the Project and Current Trends

The state of Massachusetts is actively committed to address climate change and reduce energy waste. Targeting to reduce green gas emission levels by 25% in 2020 and 80% in 2050 (Commonwealth of Massachusetts, 2019), the state has strategically endorsed tree planting programs statewide. This strategy was mainly influenced by one major event that proved how the urban forest could promote energy efficiency and therefore foster climate change adaptation.

In 2009 the MA Department of Conservation and Recreation (DCR) performed a mass harvest of trees in Worcester (44 miles from Boston) to prevent the spread of the Asian Longhorned Beetle, an invasive insect. As a result of this containment effort, the Greendale neighborhood suffered a loss of nearly 80% of its tree canopy. On-the-ground energy measurements revealed a 40% increase in electricity consumption during summertime.

The Greendale event emphasized the strength of trees´ long-term benefits, especially across a neighborhood area. It is estimated that every 1% increase in the tree canopy, above a minimum 10% canopy cover, leads up to a 1.9% reduction in energy usage for cooling and up to a 1.1% reduction for heating. Trees offer benefits to the residents overall, not just the ones with trees directly adjacent (Cahill, 2018). These findings urged the Commonwealth of Massachusetts to create and reinforce existing greening programs.

In place since 2015, the Greening the Gateways Cities Program (GGCP) is a statewide program focusing on increasing tree canopy by 10% in post-industrial and impoverished towns, especially within Environmental Justice neighborhoods that have lower tree canopy, older housing stock, and a larger renter population. The program is administered and funded by the DCR and executed locally by municipal authorities, local non-profit organizations, and community groups. So far, the GGCP has been very successful in multiple towns, such as Holyoke, Fall River, and Chelsea. It is currently active in Pittsfield and Leominster (Commonwealth of Massachusetts, 2019).

Drawn from the GGCP example of success, the North Adams project is a federally-funded greening program aiming to increase tree canopy to benefit the most in need. The initiative is run by the Franklin Land Trust (FLT) and the Northern Berkshire Community Coalition (NBCC) with technical assistance from the DCR and the University of Massachusetts.

Like GGCP in Pittsfield and Leominster, the North Adams program is voluntary. Residents may request a tree to plant either in their front yard or in the public right-of-way. Requesters must

inhabit the designated planting sites to claim a tree at no cost.

Earlier to this report, in the Fall of 2018, a tree planting guide was developed by Prof. Robert Ryan and August Williams-Eynon. The plan was structured to guide the NBCC coordinator in the decision-making process about where to plant trees, and on what kind of trees (small, medium, large) to use according to different site typologies and size constraints. The following map and images illustrate, respectively, the main planting areas and their site configurations. A complete list of tree species is available in Appendix A. This list includes eighty-five species and cultivars well-suited to North Adams' biophysical environment.

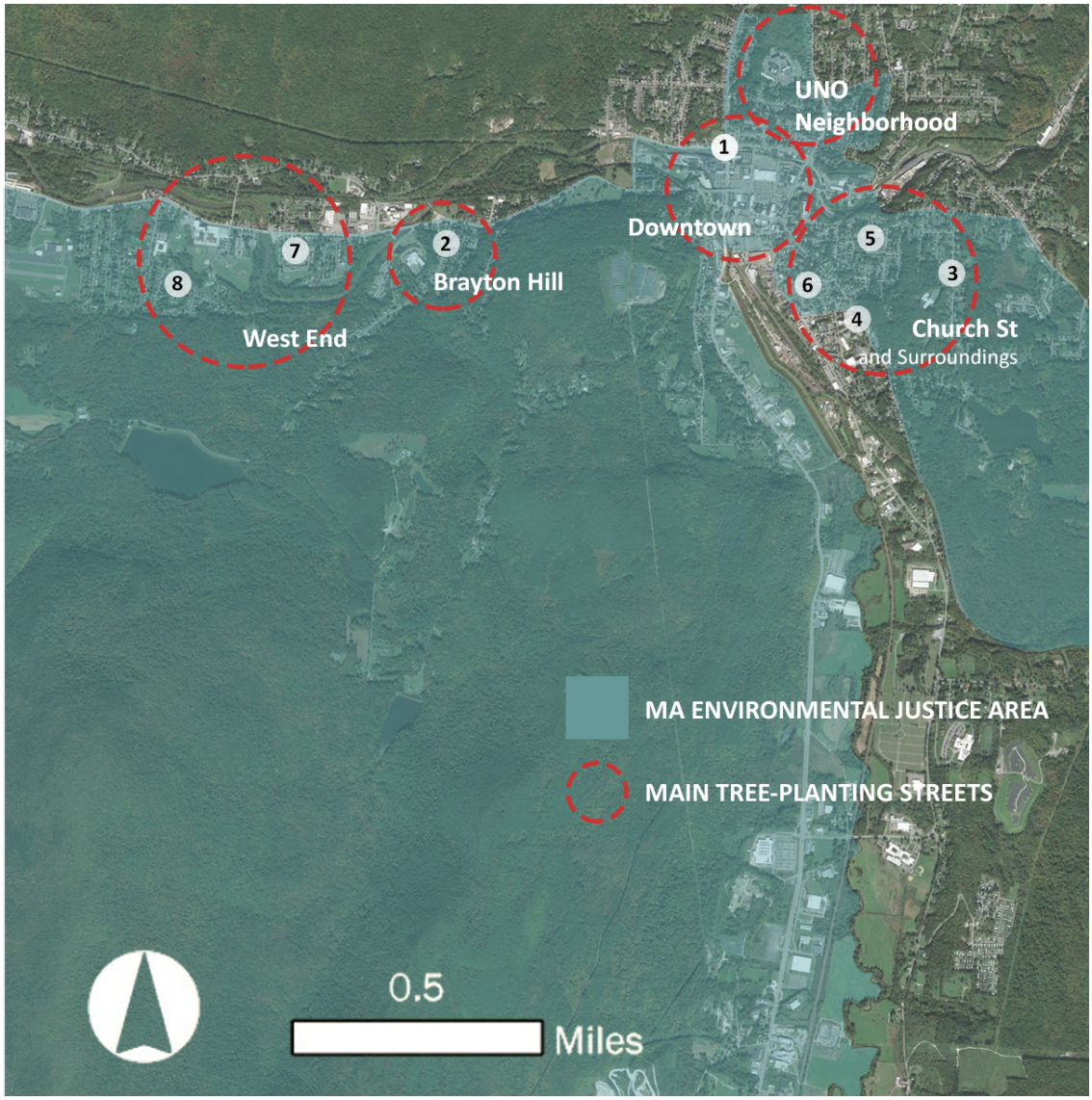

Figure 2 - Ryan, R., Williams-Eynon, A. 2018. North Adams' Urban Tree Plan. University of Massachusetts Amherst.

Downtown

Brayton Hill

Church St and Surroundings - dense residential neighborhood. Here nearly all street planting would likely take place in residential front yards.

Figure 3 - Pictures took during a visit to North Adams, Massachusetts. Courtesy of August Williams-Eynon.

West End area - suburban residential neighborhoods with opportunities to plant medium to large size trees.

Figure 3 - (*Continued*)

2.2. Theoretical Framework

2.2.1. Urban Tree Perception and Preference

Preference is a very complex phenomenon that bears implications for urban planning (Kaplan and Talbot, 1988). Humans judge their nearby environment quickly, with minimal perceptual and cognitive effort (Kaplan and Kaplan, 1989). They have survived and thrived in greener environments, so not surprisingly, for evolutionary reasons people have repeatedly preferred natural scenes over human-made scenes in visual preference studies (Kaplan and Kaplan, 1989; Ulrich, 1993). This preference for natural landscapes extends to trees. Empirical studies, mainly performed through photo-simulations have consistently demonstrated that environments with higher tree cover are preferred over settings with less tree cover, especially within human-made environments, like cities (Todorova et al., 2004; Jiang et al., 2015). According to an extensive literature review conducted by Schroeder et al. (2006), reported acceptance of trees in urban environments is generally positive, and most city dwellers believe that trees' benefits outweigh their problems.

Trees have many meanings for people (Sommer, 2003). Even though some universal values are common in people's environmental preferences (Kaplan and Kaplan, 1989), perceived preference and acceptance of different tree types are not restricted to human genetic inheritance. Site and sociodemographic characteristics play as well an important role in preference for tree attributes and landscape designs. Schroeder et al. (2006) claimed that residents' opinion on street

trees varies geographically and, preferences for tree size, shape, and growth rate are profoundly embedded in the social-ecological context where they occur. Existing conditions, such as the cultural values and practices (Graça et al., 2018), level of education (Fernandes et al., 2019), municipal crime rates (Jansson et al., 2013), and climatic factors (Schroeder et al., 2006; Lo et al., 2017), all influence the level of acceptance of trees and the awareness of their benefits at the urban scale. As an example of this variety, Schroeder et al. (2006) found that people living in colder settings (Northern United Kingdom) are more unlikely to appreciate shade provided by trees in comparison to people living in warmer locations (Midwestern United States).

The planting location is another critical variable that can interfere with perception of trees. Although research has been suggesting that most city residents self-report to like urban trees and value their benefits (Schroeder et al., 2006; Camacho-Cervantes et al., 2014; Gerstenberg and Hofmann, 2016; Fernandes et al., 2019), that does not mean that most people want trees planted in their proprieties or on their streets. The greening of cities through the installation of trees into sidewalks can be very controversial. References to the NIMBY phenomenon "I like trees but… Not-In-My-Back-Yard" is very well documented in the literature and has been found in many preference studies (Schroeder et al., 2006; Nassauer et al., 2009). Conflicts of interest may occur due to people's territorial instincts – planting a new tree in front of one´s house can evoke feelings of intrusion into their "life-space" (Rae et al., 2010).

From a practical standpoint, urban trees require maintenance and imply responsibility (Rae et al., 2010). They may cause disturbances like dirtiness caused by dropped leaves (Sommer, 2003), interference with power lines (Gorman, 2004), sidewalk and sewage damage by roots (McPherson et al., 2007) and they can raise safety issues as they block visibility from properties (Schroeder et al., 2006). Moreover, they can trigger liability issues, as cities own the space between the curb and the building's property line but, in some places, like in New York City (Rae et al., 2010), the responsibility for sidewalk maintenance falls legally onto the property owner. This legal responsibility is not entirely clear as it has been changing over the years. Still, regardless of the actual law, there is a "grey area" between the public and private realm of the sidewalk in North America, that can fuel negative feelings against street trees (Rae et al., 2010) and ultimately, dissuade homeowners from engaging in urban forestry programs.

Adverse emotional reactions against newly- planted trees are more likely to occur in neighborhoods with lower tree canopy (Gorman et al., 2004; Rae et al., 2010). The level of exposure and proximity to environments with trees relates to a greater acknowledgment of benefits generated

by urban trees. One study (Gorman et al., 2004) looked at the way college students perceived gains and losses caused by trees depending on whether they had a tree directly planted in front of their home. Using a three-point scale, the participants rated how valuable the campus` street- trees were. It was found that those who had trees in front of home classified trees as being of greater importance than did students who had not. Likewise, willingness to contribute with time or money to tree maintenance was positively influenced by whether they have trees in their streets.

2.2.1.1. Tree Characteristics and Preference

Within urban landscape design that considers residential satisfaction, preferences, and benefits of trees should be taken into account. The aesthetic aspects of trees are an influential factor in human perception and, beautification is one of the most frequently cited reasons for why people plant trees (McPherson, 2007). Research has been generating comprehensive knowledge about specific attributes of both single trees and their compositions that are aesthetically attractive. Characteristics, namely tree size, and crown shape, have been well studied (Sommer and Summit, 1995; Sommer, 1997; Williams, 2002; Lohr and Pearson-Mims, 2006; Camacho-Cervantes et al., 2014; Gerstenberg and Hofmann, 2016). An early study, comparing people's perception for computer-generated tree icons, found that larger and round trees are favored over smaller and narrow trees (Sommer and Summit, 1995). Lohr and Pearson-Mims (2006) reached similar results. According to their research, trees having spreading forms are viewed more positively, whereas trees with columnar and conical figures evoke negative emotions. Through these parameters of shape, further research has concluded that deciduous trees are preferred to evergreen coniferous (Gerstenberg and Hofmann, 2016).

In regards to flowering, several studies have been examining how this feature can aesthetically improve the attractiveness of public and private areas (Nassauer, 1995b; Coeterier, 1996; Hands and Brown, 2002; Todorova et al., 2004; Camacho-Cervantes et al., 2014). Hands and Brown (2002), employed computer-simulated images to illustrate the effects of different design treatments on industrial lands. The results point the amount and diversity of color, in the form of flowering forbs, as a visible indicator of preference. Another study (Todorova et al., 2004) examined the effect of flowers as an element of street vegetation. It was found that street scenes featuring flower beds were very popular, particularly those having low compositions of bright colored flowers.

While research suggests that colorful flowers are a desirable landscape element, most of these studies have only been exploring the visual impact of small flowering plants. There is a lack of investigations on the effect of flowering trees in streetscapes. Uniformity of single tree species is considered to be visually attractive in street plantings (Trowbridge and Bassuk, 2004). Therefore, in the photo-preference section, we are only expecting to find positive reactions for flowering compositions on private yards.

2.2. Landscape Preference Approach

People's preferences have implications for landscape management. Firstly, because people's choices are a reliable predictor of how well they will function and act in a specific environment (van den Berg et al., 2003). Second, for ethical reasons – learning about citizens' collective preferences is essential in a democratic society. Substantial differences between the citizens and the experts' aspirations are often encountered in preference studies (Zube, 1984; Daniel, 2001). To this extent, if professionals are to design natural settings for the benefit of the public, awareness of opinions from different segments of the population is of utmost importance to avoid conflicts of interest.

Preference measurement techniques can serve as a vehicle to explore landscape perception (Kaplan, 1985), enabling public feedback to guide planning and decision-making. This methodology, developed in the field of environmental psychology, has been used to explore the values behind preferences for elements in natural and built environments (Gerson et al., 1977; Kaplan and Kaplan, 1989). Preference studies can be conducted in many ways, while direct public questioning is unlikely to be effective (Kaplan, 1985), the use of preference reactions to visual representations (slides or photographs) has been proven to be a worthwhile procedure (Schroeder et al., 2006). This approach can consist of showing people some images and asking them to arrange those according to their preference or, to rate each image individually using a rating scale. From the participant standpoint, this is a simple and straightforward task. However, the methodology behind the selection or creation of the images is intricate. The selected images should be legible and representative of the environment in the study. Extraneous variables should be carefully controlled, as they may lead to response bias.

2.3. Uniqueness of this Study and Hypotheses

So far, we have explored how the perception of attractiveness and awareness of tree benefits varies widely. It is affected by socio-ecological characteristics, including broad cultural values for landscape appearance and climate factors. We looked at some tree attributes that could predict preference, namely tree size, crown shape, and color. However, to the extent of our knowledge, there is little empirical research on trees categorized as shade, evergreen, flowering, and fruit. Although these categories fall, in part, under the umbrella of size, shape, and color, they bear unique aesthetic and functional attributes that are not being visually measured in landscape preference studies.

Within this research, we hypothesize that:

1. Certain tree types will be more preferred than others – large shade trees and flowering trees will be favored over fruit trees and evergreen coniferous. The literature suggests that people prefer deciduous trees over evergreen coniferous. We expect fruit trees to be disfavored, even though they are deciduous trees. This type is not commonly used in New England's residential landscaping and requires skilled maintenance;

2. Residents will prefer designs with higher amounts of tree canopy;

3. The amount and diversity of colorful flowers will have a substantial effect on visual preference, particularly in front yard scenes.

4. There will be a positive relationship between visual landscape preference and people's awareness of trees' environmental benefits;

5. Sociodemographic and housing characteristics will affect the residents' level of concern towards maintaining a new tree and their willingness to participate in the program;

6. The residents' level of knowledge about landscape practices and environmental topics will impact their willingness to participate in the program;

3. METHODS

3.1. Study Area

North Adams is a small city in Berkshire County, Massachusetts, U.S. (Figure 4).

Figure 4 - Study area: Town of North Adams, Massachusetts.

Located in the valley of the Hoosic River, a natural flooding area, for much of its history, North Adams was a mill town. Manufacturing started before the American Revolution as the river confluence provided water power for small-scale industry, especially textiles.

Despite centuries of industrial growth, lingering effects of the Great Depression forced the closure of the local textile factory in 1942 (Dobrowolski, 2013). This event was devastating for the local economy, and the resident population has been declining ever since. In 2017 there were 12,904 people residing in the town of North Adams spread out across an area of 20.6 square miles (53.4 km²). The population density was of 634.2 people per square mile (244.9/km²), ranking it second in the Berkshire county for population, after the city of Pittsfield (U.S. Census Bureau, 2017).

There were 6,958 households out of which 22.2% hold children under the age of 18. The average household size was 2.07 individuals. The median age of the residents was 43. 16.1% were under the age of 18, 15.9% were between 18 to 24, 20.4% ranged from 25 to 44, 28.6% aged

between 45 to 64, and 19% of the population was 65 years of age or older. In terms of racial makeup, 92% of residents self-identify as White. (U.S. Census Bureau, 2017).

The median income per household was $38.774, far below Massachusetts´ average of $77.385 per year. The per capita income for the city was $24.342. About 17.8% of the population lived below the poverty line (U.S. Census Bureau, 2017).

North Adams has a humid continental climate (Dfb, according to Köppen Geiger classification), with temperatures generally ranging between 14 – 44°F in Winter and 49 – 80°F in Summer. The precipitation averages 46.57 inches (1183 mm) annually (NOAA, 2010).

A dense forest belt surrounds the town. The Hoosac Range borders the city to the West and the Clarksburg State Forest to the North. The Appalachian Trail passes through the western part of the town, crossing the summit of Mount Williams before heading North towards Vermont. Some parts of the city have trees lining the streets that seem to bring the forest into the city. However, the downtown and many residential neighborhoods, especially the ones located in lower-income areas, have fewer trees.

3.2. Survey Instrument

3.2.1. Survey Design

Based on a standardized methodology, a single survey instrument was developed and applied in the towns of North Adams, Pittsfield, and Leominster. This eight-page survey primarily contained closed-ended questions designed to gather information on residents´ perceptions, expectations, and attitudes about urban trees. Questions were developed to understand the participants´ perceived tree preferences, benefits, and barriers to stewardship. Simultaneously, other questions sought to determine their level of knowledge and expertise concerning tree care practices and their willingness to care for a newly planted tree. Questions about housing characteristics, including outdoor leisure use and presence of trees, were also asked, but not analyzed in this report as they were developed for parallel academic studies. A significant portion of the survey included a photo preference component, where respondents were asked to rate an everyday urban scene according to their preference for the different tree sets applied. The text of the full survey is included in Appendix B.

Three versions of the survey were developed in which the photographs in the landscape

preference section were randomly ordered to avoid bias. Responses format were either closed in ranking scale or open. Most of the items were presented using a five-point scale. This method was chosen because it provides a measurable response and easier decision-making process when expressing preference or agreement. The survey was organized in four different sections: Part 1: Planting Trees; Part 2: Gardens, Trees, and Landscaping on your property; Part 3: Photos series; Part 4: Socio-demographic background information.

3.2.1.1. Photographic Representation

A significant part of the survey was designed to understand the respondents' tree preferences. To achieve this goal, two sets of questions were developed using visual materials. In the first one, the researchers aimed to know the type of tree people would prefer to plant in their yards. They were asked to pick one of the following options: shade tree, flowering tree, coniferous tree, fruit tree, other trees, and no trees. All the images portrayed in this exercise are trees commonly used in New England's residential landscaping. They were presented without a background context and were human-scaled so that the public could discern them in a glimpse. At the end of the question, the participants were asked to justify their choice to help us understand the factors that had influenced them.

To expand the insights gained from the ratings in the first question, the second part included a photo-preference section. Using a five-point scale (1=not at all to 5=very much), the public rated a street scene according to the tree type applied (shade, flowering, coniferous, fruit and mix trees). To do this exercise, we had first to pick a base photo. Its selection and rendering were challenging. During the process, many variations were created, and the final image had different versions. The picture had to be representative of a multi-family neighborhood and, at the same time, have a neutral appearance so that people responded to the trees and not to the landscape itself. The chosen image is from Lorraine Street, an Environmental Justice area in Springfield, Ma. The original image is included in Appendix C. The image was rendered using Adobe Photoshop (Adobe Inc., 2019, version 20.0.5). The "murky" sky of Autumn was rendered blue and green lawn, and shrubs (*hosta* spp.) were added. We cared to control the image for external variables (cars, people, utility wires) to avoid bias the viewer. Some utility wires remained though, to give a sense of a lower-income area. We included a building in the left and cut part of the skyline, so the landscape appeared more enclosed. Finally, we added the trees in full foliage as they occur in late spring and summer. All the species

applied occur in the USDA Hardiness Zones 5a-5b (United States Department of Agriculture, 2012), where the planting will be done. The final images were reviewed by faculty, graduate students, research partners at Clark University, by the local clients from FLT and NBCC, and by the DCR (state of Massachusetts).

3.2.2. Survey Implementation

In the present research, the target population encompassed the adult public at large. The surveys were distributed on both weekdays and weekends at different public locations within the EJP area. The chosen surveying locations were a public library, a food bank, a weekly farmer's market, and a busy street in Downtown (Main Street). The different sites and days reflect the need to reach different segments of the public and, therefore, to obtain a representative sample of the residents.

In each survey session, people were asked to participate while they were in major public areas. After a brief introduction of themselves and the project, the researchers would ask for people's participation. If they accepted, they would be invited to sit and offered with water and snacks as a sign of gratitude. They were given a clipboard with a survey sample and a consent form (included in Appendix D). They would read the consent form before they started filling in the survey. A map of the town was always shown to verify whether they lived inside the designated planted area. Those that did not live within this area were also allowed to participate because their opinion would enable us to perform a comparative study. The survey was designed to be self-guided, so the researchers could recruit more people while the respondents were completing the survey.

On average, each participant took between eight to ten minutes to complete the survey. The data collection sessions were an effective mechanism to reach out to residents about the tree-planting program. Most of them seemed very supportive of the cause, and some showed interest in receiving a tree to plant in their properties. We gathered a few photographs from these sessions (Figure 5). The pictures were taken in North Adams during the summer of 2019.

Figure 5 - Pictures took during data collection sessions in North Adams, MA.

3.3. Data Analysis

The collected data was analyzed using Statistical Package for Social Science Research (SPSS) version 26. The process started with descriptive analysis. We looked at categorical mean

scores, percentages, frequencies and standard deviations for all the survey results. Next, to help interpret the data set, we conducted a factor analysis on individual multiple-option questions to reduce the dimension of the responses to meaningful groupings. Factor analysis used principal axis factoring with varimax rotation and list-wise suppression of missing data; eigenvalues greater than 1.0 were included, and values under 0.45 were excluded. Variables that loaded on more than one factor were not included in subsequent analysis. Furthermore, Cronbach's coefficient of internal consistency, alpha, was used to evaluate the level of reliability of each category (Cronbach, 1951). Factors whose internal consistency degree (loadings) was below 0.5 were discarded.

The generated groups were used to create scales by calculating the participant's average rating of the items. Each scale was named according to the common attributes shared by their items. Due to small sample sizing and to facilitate the subsequent analysis, some of the scales were then reduced to nominal variables: willing/ not willing, concerned/ not concerned, knowledgeable/ not knowledgeable.

Once the data was reduced, the Chi-Square test was employed to see if the sociodemographic variables correlate with each other, and if they could significantly predict other categorical variables like tree type choice, concern to maintain a tree, environmental knowledge, tree care experience and willingness to participate in the program. Later, independent means t-tests and one-way analysis of variance (ANOVA) with Bonferroni post-hoc tests were used to compare the scores of independent and intermediate variables to the scores of reasons that influenced tree type choice and to the photo-preference results. These two last categories are both scale variables. A Spearman Rank test evaluated a hypothetical correlation between them. Qualitative data from open-ended questions was assessed for frequency of themes and general trends. The following diagram sums up the variables studied in the survey.

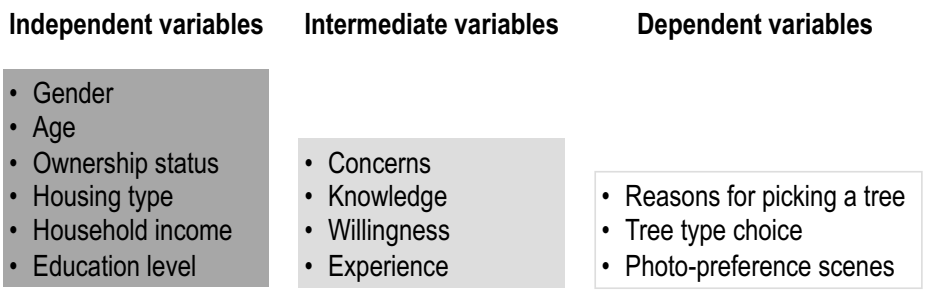

Figure 6 - Variables studied in the survey.

4. RESULTS

4.1. Sample Profile

Table 1

Socioeconomic and residential characterization of 118 people surveyed in North Adams, MA.

Socioeconomic Variables	Sample	North Adams[a]
Gender		
Female	58.4%	52.8%
Male	40.6%	47.2%
Non-binary	1%	
Age (years)[b]		
18-34	32.7%	29.9%
35-54	24%	30.7%
<55	43.3%	39.4%
Race		
White	81%	92.1%
Non-white	19%	7.9%
Languages Spoken at Home		
English	92.6%	93.9%
Other languages	7.4%	6.1%
Household Income ($)		
>25.000	38.2%	33.8%
25.000-75.000	30.3%	42.5%
<75.000	32.6%	23.7%
School Level		
High School or less	24%	51.1%
Some College/ Associate Degree	32.7%	24.5%
College Degree	43.3%	24.5%
Housing Type		
Single-family house	52.9%	42%
Multi-family house	47.1%	58%
Housing Tenure		
Owner	48.7%	55.3%
Renter	51.3%	44.7%

[a] Values from the American Community Survey 2013-2017 5-year Estimates (U.S. Census Bureau, 2017)

[b] The underage group was excluded from the North Adams' sum of age

A total of 118 people participated in the survey. The profile of the respondents can be seen above (Table 1). Overall, the sample was representative of the town's adult population, although some demographic groups were over-represented. In this study, there is a moderate bias towards more highly-educated and female respondents. This inbalance follows the tendency of previous

preference studies (Nassauer et al., 2009; Fernandes et al., 2019), where respondents were more likely to hold a college degree and were women. Also, compared with the Census, our sample presents a different distribution of household income, which may reflect the diverse public places that held the data collection sessions.

Due to insufficient sample size, smaller groups were proportionally aggregated within the categories — non-white; other languages; multi-family house. Likewise, the categories of age and household income were reduced to three groups each. Since the non-white group was only formed by 19 individuals, the variable of race was not further considered to avoid bias results due to small sample sizing.

Subsequent analysis using the Chi-Square test revealed a causal relationship between a few demographic variables. Lower education attainment (high school or less), renter status, and multifamily housing all predict low levels of income. (Chi-Square=18.089; df=4; p=0.001, Chi-Square=23.330; df=2; p=0.000 and Chi-Square=12.520; df=2; p=0.002 respectively). A Z-test with adjusted p-values (Bonferroni method), evidenced a statistical difference between the group whose annual household income is lower than 25 000 dollars and the other two classes of income.

Of all respondents, 51.7% self-reported to live inside the planting zone. Aside from income level (Chi-Square=7.219; df=2; p=0.027) and housing type (Chi-Square=3.878; df=1; p=0.049), no more significant differences were found in responses given by insiders and outsiders. The insiders held lower levels of income (50% earns less than $ 25,000 annually) and were mainly renters (61%), which reflects the economic context of the planting area.

4.2. Participants' Tree Choices

The vast majority of the respondents (93.8%) indicated that they would accept a tree to plant in their yards. Over two-thirds preferred to obtain a small tree, of which 42.5% wanted a flowering tree and 26.5% a fruit tree. Surprisingly, only 15.9% would pick a shade tree and 4.4% an evergreen coniferous. The 4.4% that selected other trees provided examples that fall into the categories of shade and coniferous tree. Qualitative analysis of the open-ended question revealed that the shade tree was picked mostly for its shade benefits. Flowering tree choice because of its aesthetic qualities and fruit trees for the opportunity of obtaining food at no cost. Due to insufficient sample sizing of a few categories, only shade, flowering, and fruit tree scores were considered in subsequent analysis.

Next, using the Chi-Square test, we controlled the scores for independent variables. The

results showed that trees are not preferred differently by social groups. In our analysis, gender was the only variable accounting for a significant difference. (Chi-Square=6.374; df=2; p=0.041). A z- test with adjusted p-values (Bonferroni method) reveled that shade trees scored differently between male and female respondents (Table 2). Although male respondents preferred flowering trees, their overall scores were distributed almost evenly between the tree options.

Table 2

Distribution of tree type scores by gender.

Gender	Shade tree	Flowering tree	Fruit Tree
Female	8.8%	55.6%	35.6%
Male	30.6%	38.8%	30.6%

4.2.1. Reasons that Influenced Tree Choices

Learning more about what tree services are valuable to the residents may provide insights into the population's characteristics and what motives them to plant trees. This input can help formulate a strategy that combines the goals of the program and its beneficiaries. So, drawn from the study of the literature, a multi-option question prompted a list of individual tree services to the respondents.

Using a five-point scale, the participants then rated how important each reason influenced their previous tree choice on the survey. "Benefits nature" (mean = 4.47) was the most praised reason. "Increases real estate value" (mean = 2.90) and "for children to play" (mean = 2.91) were the least important reasons. Factor analysis of the reasons of why people picked a tree formed four categories. The variables, "human health benefits" and "benefits nature", were rejected as they loaded on more than one factor. The category that grouped "improves living on my street" and "food" had a poor internal consistency degree (α =0.45). Thus it was not included in subsequent analysis. The remaining three categories (Table 3) were named according to the common theme of their variables. Aesthetic feelings (mean = 4.22) and environmental benefits (mean = 4.07) were the highest-rated categories. The utilitarian benefits grouped ecosystem regulation variables, economic and cultural tree benefits. It rated significantly lower than others (mean = 3.30).

Table 3

Reasons that influenced tree type choice.

Categories	Cronbach		
	Mean	S.D.	Alpha
Utilitarian benefits	**3.30**	1.01	0.83
Reduces AC bill in summer	3.27		
Provides privacy	3.46		
For children to play	2.91		
Absorbs water from storms	3.46		
Increases real estate value	2.90		
Shading and cooling benefits	3.81		
Environmental benefits	**4.07**	0.88	0.63
Helps address climate change	4.08		
Improves air quality	4.25		
Attracts wildlife	3.87		
Aesthetic feelings	**4.22**	0.84	0.62
Beauty/aesthetics	4.15		
Makes me feel good	4.29		

One-way analysis of variance (ANOVA) with Bonferroni post-hoc test reveled a null dependency between tree type choice (shade, flowering and fruit) and reasons for choosing a tree. The same test pointed towards a connection between household income and awareness of utilitarian benefits ($F= 4.117$; $df=2$; $p=0.020$). Lower-income individuals (>$25.000), valued the utilitarian benefits significantly more ($p=0.017$) than did mid-income ones ($25.000 - $74.999).

The major goals of the greening program are gathered in “helps address climate change” (mean = 4.08), “improves air quality” (mean = 4.25), “reduces AC bill” (mean = 3.27) and “shading and cooling” (mean = 3.81).

4.3. Concerns for Tree Maintenance

A critical piece of this research was to determine what factors could dissuade residents from caring for a tree. A question asked participants to rate seven items according to how much these would influence their willingness to maintain a newly-planted tree. The rating method was a reversed 5-point scale, the higher the number, the more significant the concern.

Table 4

Concerns about maintaining a newly planted tree in one's property.

Category	Cronbach		
	Mean	S.D.	Alpha
Concerns about maintaining a tree	**2.65**[a]	1.01	0.89
Cost of landscape maintenance	2.73		
Having equipment	2.54		
Limited free time	2.56		
Lack of knowledge about tree care	2.67		
My physical capabilities	2.32		
Lack of interest in trees	3.21		
Applying herbicides/pesticides	3.41		

[a] Category with a reversed-scale, the higher the number, the more significant is the level of concern

Factor analysis (Table 4) grouped the items into one single category. The extremely high internal consistency degree (α =0.89), suggests a highly coherent group. Generally, respondents rated the items similarly; their overall level of concern was mid-range on the scale (mean = 2.65). The most severe concerns were "lack of interest in trees" and "applying herbicides/ pesticides" (respective mean = 3.21 and 3.41). This reluctance can perhaps be explained by significant media exposure of human and environmental risks of herbicides and pesticides. More alarming to this study is the somewhat high score of "lack of interest in trees". This result points to the need for the tree-planting program to increase public interest in this subject.

Next, to facilitate data analysis, the scale scores were reduced into two nominal categories: concerned and not concerned (mean: >2.57 and 2.57-5.00, respectively). Each group encompassed 50% of the sample. Further analysis, using the Chi-Square test, revealed that residential characteristics had influenced the level of concern towards maintaining a tree. It was significantly more prominent amongst renters living in a multifamily house (Chi-Square=8.213; df=1; p=0.004 and Chi-Square=5.590; df=1; p=0.018). Over 63% of them self-reported to be concerned, far more than homeowners living in a single-family home (37%).

4.4. Willingness, Knowledge and Tree Care Experience

The program's success will be measured by the extent of planted area and by tree survivorship and health over the establishment period. Factors like landscaping experience, environmental knowledge, and willingness to care, were asserted in previous American tree-planting initiatives whose tree survivor rates were exceptionally high (Roman et al., 2015). According to Ryan (2015), voluntarism in urban forestry programs increases people's environmental knowledge and willingness to maintain trees. We would expect these factors to contribute to participation in the first place. Thus, we developed a series of questions to measure them.

4.4.1. Knowledge and Expertise

One of the questions asked the public to rate a list of items according to their perceived knowledge and expertise about landscape management and environmental topics. Factor analysis revealed a single category (Table 5). This category (mean=2.94) had a very satisfactory internal consistency degree (α =0.91), suggesting a high association between expertise and knowledge. Individually, the "tree maintenance" item had a low rating (mean=2.60). Gardening scored higher (mean=3.22), suggesting that the residents already have some landscaping knowledge and could learn tree care practices quickly. The highest-rated topic was "climate change" (mean=3.33).

Table 5

Knowledge and expertise about environmental issues and landscape practices.

Category	Cronbach		
	Mean	S.D.	Alpha
Knowledge and expertise	**2.94**	0.87	0.91
Native plants	2.79		
Tree maintenace/care	2.60		
Bird identification	2.83		
Natural history of the area	2.97		
Plant/tree identification	2.83		
Gardening	3.22		
Climate change	3.33		

4.4.2. Experience in Tree Care

Another question explored experience caring for trees. In this survey, about 50% of the participants self-reported having tree care experience. By experience, it means someone in the household is currently taking care of yard trees. At the time, only 22.8% of the participants indicated that their yard trees were not being maintained at all.

Subsequent analysis revealed that inexperience in the matter prevails in vulnerable social groups. For instance, the renter population was twice as inexperienced than homeowners (32.8% and 72.7% respectively) and, about 31% of them rely exclusively on the landlord to care for the yard trees. Those living in a multifamily house were also affected (Chi-Square=5.416; df=1; p=0.020), so were low-income (Chi-Square=6.869; df=2; p=0.032) and less educated individuals (Chi-Square=8.553; df=2; p=0.014). Respondents holding a college degree were two times more likely to be experienced than people with high school level or less (69.9% to 33.3% respectively).

4.4.3. Willingness to Stewardship

It is statistically well documented that regular stewardship actively contributes to tree survival in urban forestry programs. (Boyce, 2010; Roman et al., 2014b; Roman et al., 2015; Vogt et al., 2015). Therefore, higher levels of willingness would reflect a favorable opportunity for residential participation and an increased chance of tree survivorship and vigor. With this in mind, the study asked how willing the participants would be to care for a new tree. The result received a mean score of 3.80 on a five-point scale, which is a very positive support for the program. This willingness to care for a tree did not differ across any of the sociodemographic variables.

4.5. Landscape Preference

In the next section, we asked participants to rate how much they liked different tree types and planting configurations for a typical urban yard. The results were first analyzed by looking at the mean score of each scene and then by the mean score of the aggregated scenes of shade, flowering, fruit, mixed and evergreen trees. The scores were compared to the participants' tree type choices (described above in Section 4.2.). The aggregated flowering tree scenes were the

highest-rated group (mean= 3.37), followed by the mixed tree scenes (mean= 3.32) and fruit tree scenes (mean= 3.21). The least preferred were shade (mean=3.04) and coniferous tree scenes (mean=2.60). The treeless scene was overwhelmingly disliked by the respondents (mean= 1.35).

Next, we analyzed the scenes by aggregating the responses to the different planting locations. Scenes featuring front yard trees scored higher than those showing sidewalk trees (mean: 3.35 and 2.54, respectively). The most popular pictures included both yard and street trees (mean=3.40). The first analysis suggests that visual preference gradually increases according to tree canopy level, and that deciduous trees are substantially more valued than evergreen coniferous. In other words, increased tree cover was associated with higher levels of preference.

Factor analysis revealed further cues about the way the public perceived the scenes. Five categories derived from this analysis: green high-canopy scenes, low-canopy scenes, colorful mid-canopy scenes, colorful high-canopy scenes, and treeless scene. The names given to the categories expressed the dominant qualities of each group. The categories can be found below.

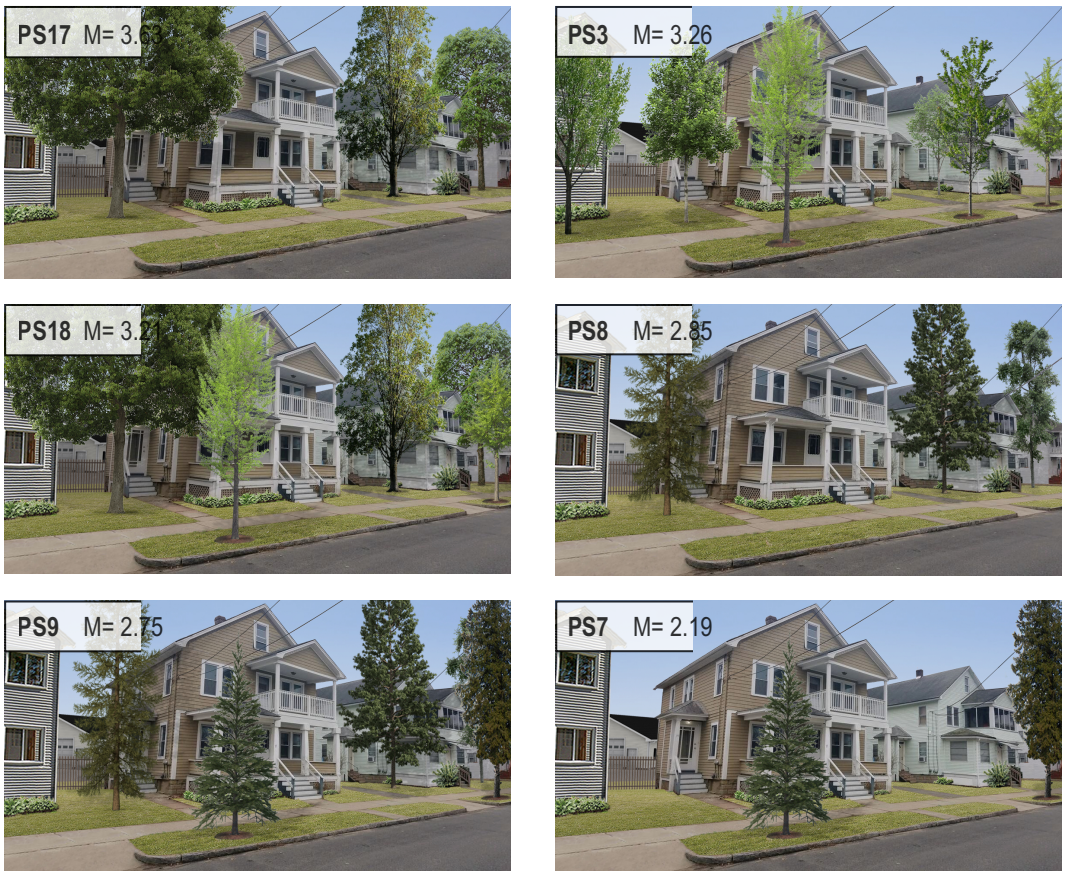

Figure 7 - Green high-canopy scenes category **[Mean= 2.98; S.D.=1.03; α =0.87]**.

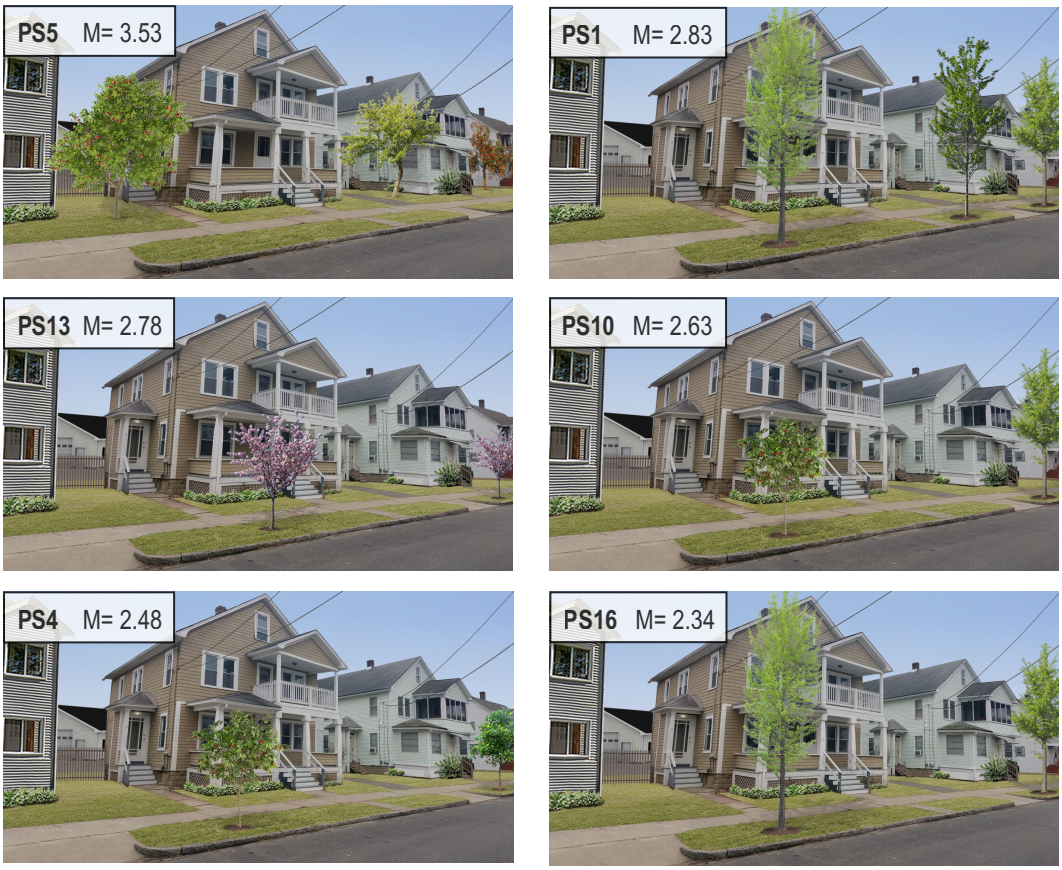

Figure 8 - Low-canopy scenes category **[M= 2.77; S.D.=0.85; α =0.79].**

Figure 9 - Colorful mid-canopy scenes category **[M= 3.53; S.D.=1.04; α =0.75].**

Figure 10 - Colorful high-canopy scenes category **[M= 3.76; S.D.=0.96; α =0.69].**

Figure 11 - Treeless scene category **[M= 1.35; S.D.=0.86].**

The overall leaf color and flowers, rather than shape or size, appeared to have more of an impact on perception. Colorful tree scenes formed the highest-rated clusters (Figures 9 and 10), supporting our previous hypotheses about color diversity effect on visual preference, particularly in the front yard scenes.

Shade and coniferous compositions were grouped in the "green high-canopy scenes" (Figure 7). People responded similarly to both tree types; they denote dark shades of green and were less valued (mean=2.98) than the previous categories. The “low-canopy scenes" (Figure 8) is dominated by views with trees planted on the public right-of-way. Despite the apparent tree type diversity, this category was given a significantly lower rating (mean = 2.77). The treeless landscape (Figure 11) was the most distinguishing amongst all photos. It formed a group by itself and was unanimously disliked by the residents (mean = 1.35; df=0.86).

4.6. Exploring the Factors that Influenced Landscape Preferences

An essential part of this study was to determine how residents differed in their perception according to their sociodemographic characteristics (independent variables). While the study did not find relevant differences in residents' responses based on these variables, the level of environmental knowledge, concern, and willingness to steward a tree (intermediate variables) were the most important factors predicting landscape preferences.

As hypothesized, residents with experience in tree care practices were significantly more knowledgeable about environmental issues. A Chi-Square test revealed a positive effect of experience (Chi-Square=5.762; df=1; p=0.016) and knowledge (Chi-Square=6.673; df=1; p=0.010) on willingness to care for a newly-planted tree, suggesting that educational campaigns about care practices could empower residents to engage in the program. This is especially important as participants were overall willing to care for trees (mean=3.80), but many lack the knowledge or skills.

4.6.1. Exploring Factors that Influenced Attitudes about Tree Benefits

Participants' choices for different tree types (described above in Section 4.2) were not influenced by any of the intermediate variables (concern, knowledge, and willingness). However, all of them made an apparent difference in the reasons why people picked a tree. An independent T-test showed that residents who were more concerned about how to steward a tree indicated higher appreciation for trees' utilitarian benefits (t= -2.109-; df=97; p=0.038). This result makes sense considering that renter individuals significantly favored the same benefits. This group was innately more concerned about maintaining a tree. The economic dimension of these benefits can perhaps explain the scores of the unserved social group.

The variables of knowledge and willingness have also an extensive influence on the reasons why people choose a tree. Not surprisingly, knowledge about environmental issues predicted favorability for all three categories of benefits generated by urban trees. (utilitarian benefits: t= -3.347; df=98; p=0.001, environmental benefits: (t= -3.499-; df=99; p=0.001), aesthetic feelings: (t= -2.862; df=102; p=0.005). Since knowledge predicts willingness to maintain a tree, we would have expected willingness also to predict favorability for all categories of benefits. That held true for both environmental (t= -4.398; df=93; p=0.000) and aesthetic (t= -2.481; df=95; p=0.015) benefits but did

not make any difference for utilitarian benefits.

While trees' benefits were generally highly rated, half of the renter participants self-reported to need landlord permission to plant a tree in their yard. This necessity may pose a challenge to the implementation of the greening program as landlords might not see any direct benefit from that and even consider it a liability (31% of the renters indicated that the landlord was the one in charge of tree care). The economic benefits generated by yard trees, including energy savings and increased real estate value, could be a more tangible reason for allowing their tenants to plant trees rather than aesthetics or environmental motivations.

4.6.2. Exploring Factors that Influenced Photo-Series Preference

In order to understand the factors that influenced preference for the photo-series (described above in Section 4.5), comparisons were made between participants' willingness to maintain a tree and responses of the photo-preference section. The results indicate that those willing to care for a young tree scored the following categories higher: "green high-canopy scenes" (t= -3.763-; df=95; p=0.000) and "colorful high- canopy scenes" (t= -2.891-; df=95; p=0.005) than did those who were less willing to care for a new tree. Both categories have scenes with high tree cover, which reinforces the finding described in Section 4.5 - denser tree compositions predict preference.

The results indicate that environmental knowledge influenced the ratings of the "colorful mid-canopy scenes" category (t= -2.035-; df=103; p=0.044). Not surprisingly, those who were more knowledgeable about landscape practices and environmental topics had a higher preference for more diverse tree compositions. A mixed tree canopy promotes biodiversity and creates a more resilient urban forest. The scores of the photo-series were not influenced by any independent variable, which suggests a lack of variability across a range of socio-demographic factors.

5. DISCUSSION

5.1. Summary of Results

In summary, the most relevant features of the individuals living inside the designated planting area are the lower-income (50% earns less than $ 25.000 annually) and being renters (61%). These same groups self-reported higher levels of concern and inexperience towards maintaining a tree. The study also found that an essential criterion in being willing to steward a tree is currently being taking care of one and having knowledge about landscape characteristics and environmental issues. Participants' willingness to steward a tree was generally at the mid-high level (mean= 3.80 out of 5.0) and was not dependent on any demographic or housing attributes.

The survey results point toward a stronger preference for flowering and fruit trees than for large shade trees even though the rationale for this tree planting initiative is increasing tree canopy to lower energy consumption. Participants indicated that important reasons for their tree choices were aesthetics, benefits to nature, air quality, and helping address climate change. They appreciated landscapes with higher tree cover, especially those having trees with colorful leaves and flowers. Their sociodemographic characteristics (except gender) did not affect their tree type choices and the reasons why they picked a tree. Participant's awareness of the benefits generated by yard trees had a positive impact on their willingness to participate in the program.

Based on the survey results, we can infer that landscape preferences are a crucial factor influencing participation in the program – denser and more colorful tree landscapes seem to predict willingness to plant and care for a tree. The following diagram sums up the dynamics between the variables in the study.

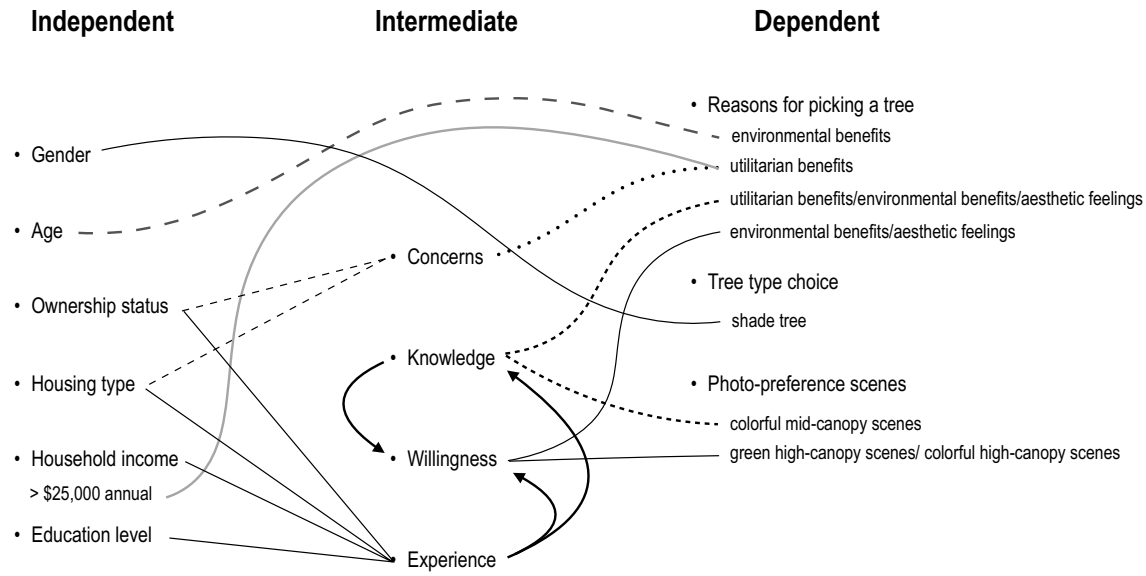

Figure 12 - Positive dynamics between the variables in study.

5.2. Answering the Research Questions

1. Are participants willing to have a tree planted in their yard?

The vast majority of the respondents (93.8%) indicated they would accept a tree to plant in their yards.

2. What kind of trees and planting configurations do residents prefer? Is that affected by sociodemographic and residential characteristics?

Over two-thirds of the participants preferred to obtain a small tree, of which 42.5% wanted a flowering tree and 26.5% a fruit tree. Only 15.9% picked a shade tree and 4.4% an evergreen coniferous (Figure 13).

The scores of the photo-series corresponded to the participants' tree choices (Figure 14). Scenes featuring front yard trees scored higher than scenes showing street trees (mean: 3.35 and 2.54, respectively). The most popular views included both yard and street trees (mean=3.40). Participants' sociodemographic attributes (except gender) did not affect their answers.

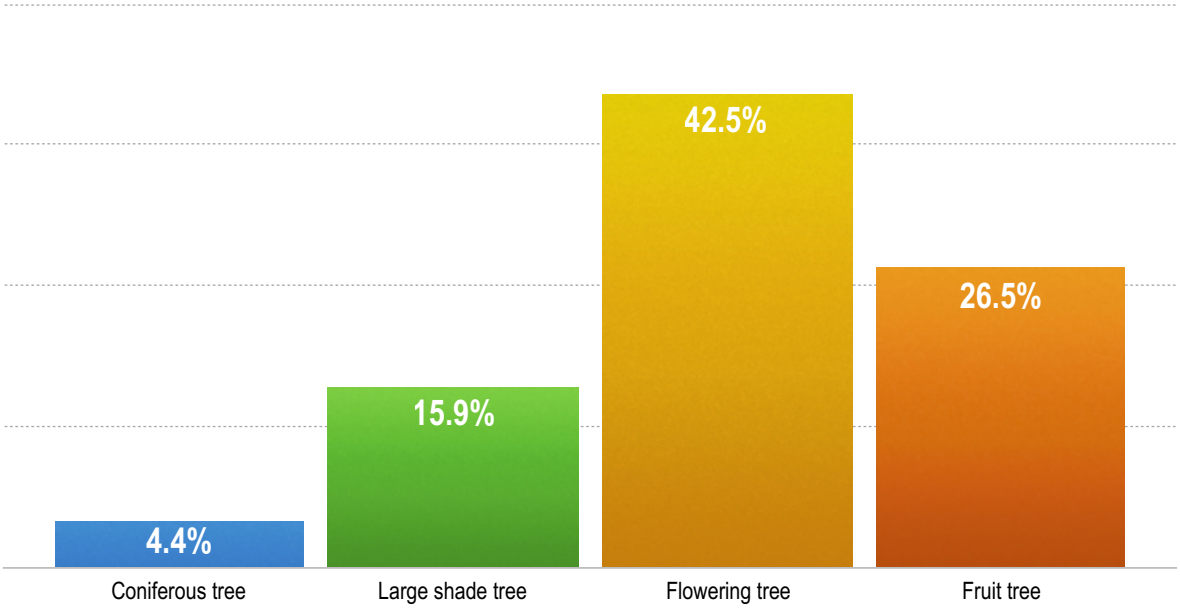

Figure 13 - Distribution, in percentage, of tree type scores (the variables 'other trees' and 'no trees' were excluded).

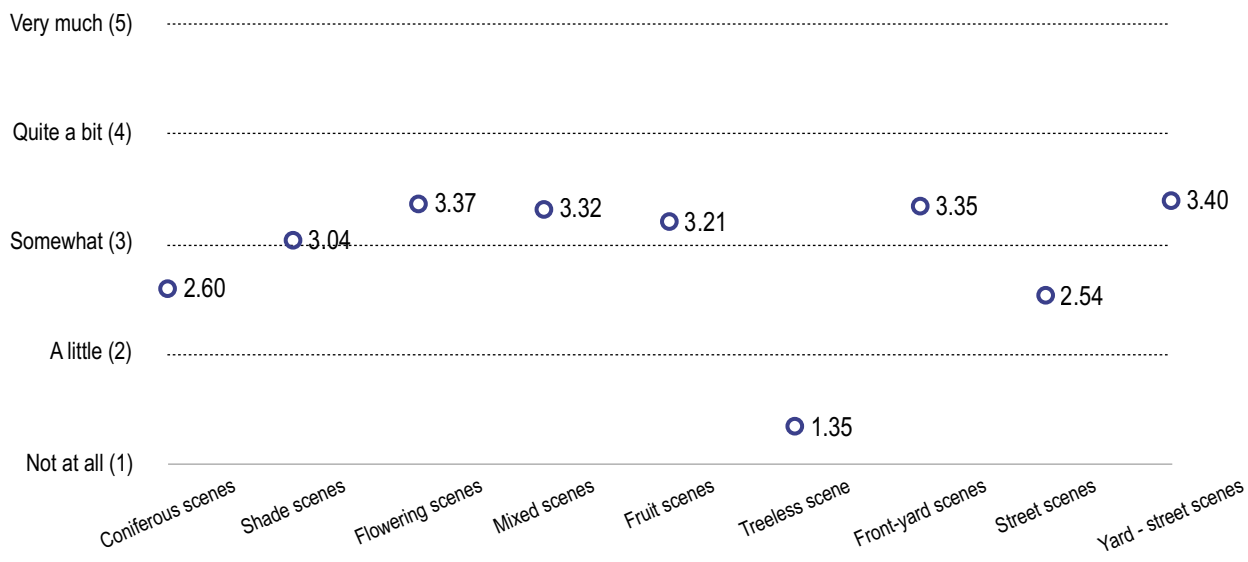

Figure 14 - Preference scores of the aggregated scenes based on tree type and planting location.

3. What reasons motivate residents to plant trees?

The participants indicated that important reasons why they would pick a tree are aesthetics (mean= 4.15), benefits to nature (mean= 4.47), air quality (mean= 4.25), and helping address climate change (mean= 4.08). Factor analysis (Figure 15) revealed three categories of benefits: utilitarian (mean = 3.30), environmental (mean = 4.07), and aesthetics (mean = 4.22). People who were more aware of trees' environmental and aesthetic qualities were more willing to participate in the program.

Figure 15 - Importance given to the aggregated reasons of why residents picked a tree.

4. In what way do sociodemographic and residential characteristics influence the community's concern to maintain a tree and their willingness to participate in the program?

The overall level of concern towards maintaining a tree is mid-range (mean = 2.65 out of 5.0). People's housing characteristics influenced their answers (Figure 16) – renter individuals that live in a multifamily unit were more concerned than homeowners living in a single-family home (63% and 37%, respectively). Willingness to participate in the program received a mean score of 3.80 on a five-point scale. It did not differ across any of the sociodemographic groups.

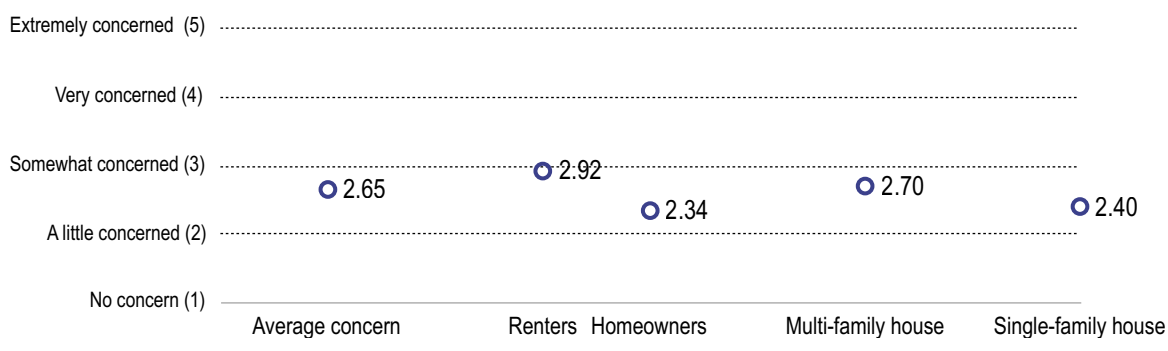

Figure 16 - Concern about maintaining a newly-planted tree.

5. How knowledgeable and experienced are residents about tree care practices and environmental topics? Does that affect their willingness to participate in the program and their attitudes about tree benefits?

Participants' overall knowledge about landscaping and environmental topics scored 2.94 on a five-point scale. It did not differ across any of the sociodemographic groups. About 50% of the participants self-reported to be experienced in tree care practices. Inexperience prevails in vulnerable social groups. Willingness to engage in the program and awareness of tree benefits were positively affected by people's level of knowledge about environmental issues (Figure 17).

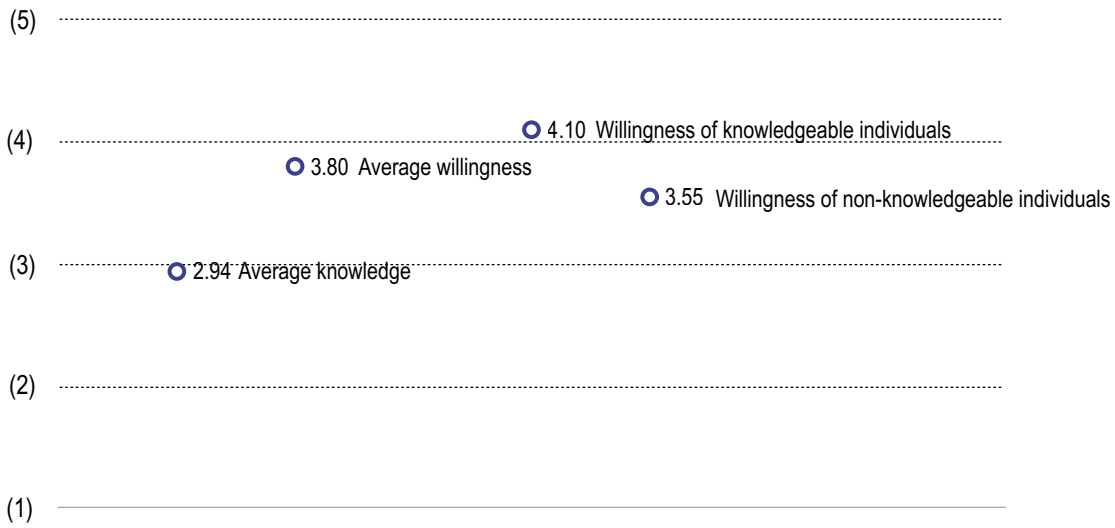

Figure 17 - Connection between environmental knowledge and willingness to steward a tree.

5.3. Implications and Opportunities to the North Adams' Tree-Planting Program

The results of this survey revealed new insights about residents' attitudes about tree care practices. The findings reinforce the idea that educational campaigns may increase participation in tree-planting programs. As we expected, acknowledgment of trees' environmental properties, as well as knowledge about landscape management and environmental topics, led to a higher willingness to care for a newly-planted tree. This is a noteworthy finding suggesting that marketing campaigns advocating the benefits generated by urban trees may be an opportunity to foster participation amongst residents. This is especially relevant as participants were overall willing to care for trees (mean=3.80), but many lack the knowledge or skills.

It is important to note that, in the sample, the population living inside the designated planting

area had a majority of renters (61%), which is a challenge to the program's implementation. Firstly, because half of them self-reported to need landlord approval to plant a tree, and second, 72.7% do not have experience stewarding trees. On the positive side, their overall willingness to take care of a tree and their awareness of trees' benefits were not lower than the rest of the groups. Meaning, they are willing to plant trees, yet, they lack the care skills, and many are uncertain about their rights to modify the yard with plantings.

To address the challenge of inexperience in tree care practices, we strongly recommend that future planting activities in North Adams provide tree care training (pruning, watering, and mulching in season) to all interested residents. Acquainting residents with these activities will broaden their sense of motivation and self-confidence, and ultimately, engage them into regular stewardship, which according to Roman et al. (2015), is a factor that contributes to higher levels of survivor and vigor during trees' establishment period.

The volunteer motivation literature suggests that volunteers are initially drawn into urban green projects motivated by the desire to help the environment and learn more about ecology (Grese et al., 2000; Ryan et al., 2001). With this in mind, promotional campaigns and training activities should have an educational component on trees' environmental benefits and ecosystem dynamics to motivate participation in the program. We also suggest targeted campaigns focusing on individual interests of different segments of the public, namely landlords. Although we did not ask them directly, we believe they would not be as willing to participate in the program. They might not see any direct benefit from doing so and even see it as a liability. We encourage the program planners to develop marketing strategies that advertise the multiple economic benefits that trees can provide, including increased real estate value of 3-5% (Anderson and Cordell, 1985) and up to 1.9% on energy savings during summer (Cahill, 2018). Our results underline that these benefits are not so evident to the public as are the environmental and aesthetic qualities of trees. Educational campaigns conveying them may serve as a solution to improving access and participation of all interested. Making sure that renters understand their rights to plant trees may also be critical to increasing engagement.

Community involvement, in post-planting activities, is a management aspect associated with successful tree-planting programs (Ryan, 2015; Roman et al., 2015). A key to promoting the vigor and survival of the young trees is to have a network of volunteers to check on newly-planted trees regularly and guide the residents into the best care practices. We encourage the current tree committee in North Adams to assume this function over the next three years (establishment period). Alternatively, this network could be led by a neighborhood group with experience in the field. These

actives can integrate high school students in the context of seasonal school projects. According to the literature (Ryan et al., 2001; Ryan, 2005), volunteering in environmental stewardship is associated with increased environmental advocacy, and changes in environmental attitudes. By educating younger people into the program, we would expect a long-term shift in urban forest perception within unserved urban neighborhoods.

Regarding the tree type choices, over two-thirds of the respondents preferred to obtain a small tree to plant in their yards. The results point to a disconnection with the program's goal of increasing tree canopy by planting large shade trees. The overall scores do not support the suggestions of previous studies concerning preference for larger trees (Sommer and Summit, 1995; Sommer, 1997; Lohr and Pearson-Mims, 2006; Gerstenberg and Hofmann 2016).

While the public's tree choices indicated favorability for smaller trees, the photo-series' scores (described above in Section 4.5), suggest that this result was partially influenced by the colorful foliage and flowers rather than the size of the trees. Pictures of higher and colorful canopy trees were the most valued. As such, this work validates the findings of similar studies, such as Hands and Brown (2002) and Todorova et al. (2004), who suggested that colorful plants increase the public's ratings on rendered street pictures. And, the results of Jiang et al. (2015), who found a connection between higher tree density and preference for residential streets.

Despite the residents' preferences, larger trees should still be prioritized in the plantings as they provide more ecological and human benefits. A compromise should be built with the community to increase participation and stewardship of urban trees. Given the high preference for mixed tree compositions (described in Section 4.5), we can assume that, in a residential context, people respond better to large shade trees when planted near smaller and colorful trees. Thus, as an incentive, residents who agree to plant a large shade tree in their property or alongside the street in front of their home could receive a flowering or fruit tree at no cost. Since there was no difference in preference for sidewalk tree scenes based on the tree type depicted, shade trees should be prioritized on sidewalk plantings, regardless of who is taking care for the tree. When the planting site is either narrow or beneath utility wires, smaller trees (except fruit type) can be used instead. Fruit trees should only be planted in community gardens or in private yards with committed homeowners as they require more intensive care.

Based on our findings, we stress the need to implement educational campaigns to inform the community about the benefits generated by urban trees and to incorporate their input in the plan to foster democratic solutions and the adoption of trees. Since people had very similar responses to

the photo-preference scenes, the planting patterns adopted by this program may work well in different neighborhoods and for different social groups. However, in the future, there is a need for larger-scale research studies to support the initial findings of this pilot study.

Increased urbanization calls for urban forestry policies to address the impacts of climate change and to extend the multiple benefits of trees to everyone in a city. This study shows that learning more about the residents' preferences is essential to help promote long-term stewardship of the urban forest.

5.4. Limitations and Future Research Opportunities

A limitation of the study is the external validity. Trees serve for multiple purposes and are perceived differently worldwide. Visual preference was accessed using photos of a residential street corridor in New England, North America. Therefore, the findings might not generalize to other urban environments in various world regions that vary in their biophysical makeup. Future research should duplicate this study in non-residential urban contexts (public parks, commercial streets, school lawns), where the residents are not expected to steward the trees. It seems democratic to involve residents in the discussion of what trees to plant regardless of who is maintaining them. In the scenarios mentioned above, hypothetically preference for flowering and fruit trees could disappear and even reverse to larger trees.

Other limitations raise questions for the future. We recruited individuals with a similar cultural background. Thus, the findings may not apply to more diverse towns, even within the state of Massachusetts. We believe that further research should examine how cultural differences affect individual preferences. By using the methods of this study, researchers will be able to identify the attitudes of certain groups and develop more effective greening campaigns.

Trees change their appearance over their lifespan and annual cycle. The findings of this research are based on evaluations of trees in full foliage as they occur in late spring and summer. Thus, the results may not apply for tree preference in autumn and winter, when leaves change their color and fall. It may be interesting to study the response to tree appearance over autumn and winter. For most deciduous trees, foliage depends on the season. If they are leafless in winter, people’s preferences could reverse to evergreen coniferous. Replicating this exercise with leafless trees could provide new insight into the way people perceive tree size and shape.

6. CONCLUSION

The present study provided evidence that community environmental preferences can bring meaningful input to urban planning, generating inclusive solutions that promote equitable access to the multiple benefits that urban trees can provide. By including the residents in the conversation of which trees to plant, we could understand their attitudes about urban trees and built democratic solutions in light of local problems and needs. This study showed how awareness of trees' benefits and environmental knowledge are necessary to fuel willingness to take care of a newly-planted tree. Educational efforts may be the missing piece to increase community engagement into the program and motivate the residents into regular stewardship. To reach a beneficial compromise between the program's policy and community's expectations, we encourage the planners to include both flowering and fruit trees in the inventory and make them available as an incentive to plant large shade trees.

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APPENDICES

Appendix A. Complete tree list.

Park Trees (for areas with ample space away from pedestrian and motor traffic).

Scientific Name	Common Name
Acer griseum	Paperbark Maple
Acer palmatum	Japanese Maple
Acer rubrum (n)	Red Maple
Aesculus x carnea	Red Horsechestnut
Aesculus hippocastanum	Horsechestnut
Amelanchier arborea	Downy Serviceberry
Betula nigra (n)	River Birch
Celtis occidentalis (n)	Hackberry
Carya ovata (n)	Shagbark Hickory
Castanea mollissima	Chinese Chestnut
Fagus grandifolia (n)	American Beech
Halesia carolina (n)	Carolina Silverbell
Liquidambar styraciflua (n)	Sweetgum
Magnolia acuminata (n)	Cucumbertree
Metasequoia glyptostroboides	Dawn Redwood
Pinus strobus (n)	Eastern White Pine
Pinus thunbergii	Japanese Black Pine
Platanus occidentalis (n)	American Sycamore
Prunus sargentii	Sargent Cherry
Quercus alba (n)	White Oak
Quercus macrocarpa (n)	Bur Oak

Ryan, R., Williams-Eynon, A., 2018. North Adams' Urban Tree Plan, Complete Tree List Category. University of Massachusetts Amherst.

Large Trees (Mature height of 50+ feet, adequate rooting space, no overhead obstructions/wires).

Scientific Name	Common Name
Acer saccharum (n)	Sugar Maple
Carpinus betulus	European Hornbeam
Cercidiphylum japonicum	Katsura
Ginkgo biloba	Ginkgo (Male Only)
Gleditsia triacanthos var. inermis (thornless, fruitless)	Honeylocust
Gymnocladus dioicus (n)	Kentucky Coffeetree
Liriodendron tulipifera (n)	Tulip Tree
Plantanus x acerifolia	London Planetree
Quercus acutissima	Sawtooth Oak
Quercus bicolor (n)	Swamp White Oak
Quercus coccinea (n)	Scarlet Oak
Quercus imbricaria (n)	Shingle Oak
Quercus palustris (n)	Pin Oak
Quercus phellos	Willow Oak
Quercus rubra (n)	Red Oak
Quercus robur	English Oak
Styphnolobium japonicum	Japanese Pagoda Tree
Tilia americana (n)	American Linden
Tilia cordata	Little-Leaf Linden
Tilia x euchlora	Crimean Linden
Tilia tomentosa	Silver Linden
Ulmus americana (n)	American Elm
Zelkova serrata	Japanese Zelkova

Ryan, R., Williams-Eynon, A., 2018. North Adams' Urban Tree Plan, Complete Tree List Category. University of Massachusetts Amherst.

Medium Trees (mature height 35-50 feet, continue avoiding wires/obstructions).

Scientific Name	Common Name
Cladastris kentukea (syn. C. lutea)	Yellowwood
Corylus colurna	Turkish Filbert
Nyssa sylvatica (n)	Black Gum
Prunus subhirtella	Higan Cherry

Ryan, R., Williams-Eynon, A., 2018. North Adams' Urban Tree Plan, Complete Tree List Category. University of Massachusetts Amherst.

Intermediate Trees (mature height 25-35 feet, may be appropriate near wires or obstructions).

Scientific Name	Common Name
Acer triflorum	Three Flower Maple
Carpinus caroliniana (n)	American Hornbeam
Cornus kousa	Kousa Dogwood
Crataegus phaenopyrum	Washington Hawthorn
Maackia amurense	Amur Maackia
Koelreuteria paniculata	Goldenraintree
Parrotia persica	Persian Ironwood
Ostrya virginiana (n)	American Hophornbeam
Syringa reticulata	Japanese Tree Lilac

Ryan, R., Williams-Eynon, A., 2018. North Adams' Urban Tree Plan, Complete Tree List Category. University of Massachusetts Amherst.

Small Trees (mature height less than 25 feet, appropriate near wires or small spaces).

Scientific Name	Common Name
Acer pseudosieboldianum	Korean Maple
Amelanchier canadensis	Canada Serviceberry
Amelanchier x grandiflora	Apple Serviceberry
Amelanchier laevis	Allegheny Serviceberry
Cercis canadensis	Eastern Redbud
Chionanthus virginicus	Fringetree
Clethra barbinervis	Pagoda Dogwood
Cornus mas	Cornelian-Cherry Dogwood
Cotinus coggygria	Smoke Tree
Hamamelis virginiana	Common Witch Hazel
Hydrangea paniculata	Panicle Hydrangea
Malus sp. 'Adirondack'	Crabapple 'Adirondack'
Magnolia soulangiana	Saucer Magnolia
Magnolia stellata	Star Magnolia
Magnolia virginiana	Sweet Bay Magnolia
Pinus cembra	Swiss Stone Pine 'Glauca'
Prunus cerasifera	Cherry Plum 'Thundercloud'
Prunus serrulata 'Kwanzan'	Kwanzan Cherry
Prunus virginiana	Chokecherry
Thuja occidentalis (small cultivar only)	Arborvitae (Small Cultivar Only)
Viburnum prunifolium	Blackhaw Viburnum
Malus domestica 'Gala'	Apple 'Gala'
Malus domestica 'Fuji'	Apple 'Fuji'
Prunus avium 'Stella'	Cherry 'Stella'
Prunus persica 'Redhaven'	Peach 'Redhaven'
Pyrus communis 'Bartlett'	Pear 'Bartlett'

Ryan, R., Williams-Eynon, A., 2018. North Adams' Urban Tree Plan, Complete Tree List Category. University of Massachusetts Amherst.

Appendix B. North Adams' survey (version #1).

University of Massachusetts Amherst
College of Social and Behavioral Sciences
Department of Landscape Architecture and Regional Planning

Part 1: Planting Trees

1) As part of a North Adams federally- funded program, you may be eligible to receive a tree for your home free of charge. This program is administered by the Franklin Land Trust in collaboration with the MA Department of Conservation and Recreation and the city´s Department of Public Works.

a. Using the map provided, do you live **inside** or **outside** the planting zone? ☐ INSIDE ☐ OUTSIDE

b. Have you or someone in your household participated in this program?
☐ YES ☐ NO ☐ DON'T KNOW

c. No matter where you live...if you had the chance to pick ONE (1) type of tree to be planted in your yard, what kind of tree would you choose? This tree would be planted at no cost to you (it's free).

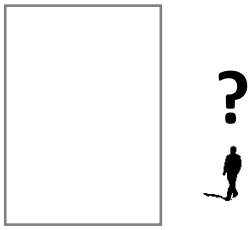
Please select **one** option below.

☐ a) Shade tree

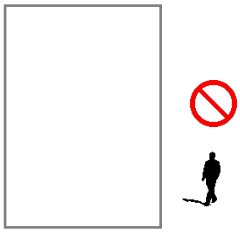
☐ b) Flowering tree

☐ c) Evergreen/ conifer

☐ d) Fruit tree



☐ e) other: _____



☐ f) None. I don´t want a tree.

d. In a few words, why did you choose this tree?

_____

_____

2) How **willing** would you be to take care of a newly planted tree?

□ not at all (1) □ a little (2) □ somewhat (3) □ very (4) □ extremely (5)

3) How **important** are the following statements for why you picked this tree for your yard?

	not important	a little important	somewhat important	very important	extremely important	does not apply
Food (edible fruit, nuts, leaves, or tea)	1	2	3	4	5	x
Shading and cooling benefits	1	2	3	4	5	x
Benefits to nature	1	2	3	4	5	x
Beauty/ aesthetics	1	2	3	4	5	x
Reduces AC bill in summer (shade)	1	2	3	4	5	x
Increases real estate value	1	2	3	4	5	x
Attracts wildlife	1	2	3	4	5	x
Human health benefits	1	2	3	4	5	x
For children to play (climbing/ swings/ treehouse)	1	2	3	4	5	x
Improves living on my street	1	2	3	4	5	x
Makes me feel good	1	2	3	4	5	x
Provides privacy	1	2	3	4	5	x
Improves air quality	1	2	3	4	5	x
Helps address climate change	1	2	3	4	5	x
Absorbs water from storms	1	2	3	4	5	x
other: 1.	1	2	3	4	5	x
2.	1	2	3	4	5	x
3.	1	2	3	4	5	x

4) How **concerning** are the following items when it comes to **maintaining** a newly planted tree in your yard? (Maintenance can mean fertilizing, mulching, watering, and/or providing other care to the tree.)

	no concern	a little concerned	somewhat concerned	very concerned	extremely concerned	does not apply
Limited free time	1	2	3	4	5	x
Cost of landscape maintenance	1	2	3	4	5	x
Lack of interest in trees	1	2	3	4	5	x
My physical capabilities	1	2	3	4	5	x
Having equipment (i.e. ladder, saw)	1	2	3	4	5	x
Lack of knowledge about tree care	1	2	3	4	5	x
Applying herbicides/ pesticides	1	2	3	4	5	x
other:	1	2	3	4	5	x

Part 2: Gardens, Trees, and Landscaping on your property

1) How often do you use your yard for the following activities?

	not at all	a little	sometimes	a lot	a great deal
Appreciating nature/ beauty	1	2	3	4	5
Watching or feeding wildlife	1	2	3	4	5
Socializing and entertaining	1	2	3	4	5
Recreation	1	2	3	4	5
Gardening	1	2	3	4	5
other:	1	2	3	4	5

2) Which statement best describes your current living arrangement?

- ☐ I pay rent for my housing
- ☐ I own my home
- ☐ I live in housing where I do not pay rent
- ☐ other:_____

3) If you rent your home, are you able to change the landscaping or gardens in your yard without special permission from your landlord (to plant a tree, mulch a flower bed, tend vegetables, etc.?)

☐ YES ☐ NO ☐ DON'T KNOW

4) a. What type(s) of tree(s) are planted in your yard? **Check all that apply.**

		front yard	back yard
	Large shade trees	☐	☐
	Evergreen trees (conifers)	☐	☐
	Fruit trees	☐	☐
	Flowering trees	☐	☐
	None	☐	☐

b. How much do you **like** the trees in your yard?

☐ strongly dislike ☐ dislike ☐ somewhat like ☐ like ☐ strongly like
1 2 3 4 5

c. In a few words, what do you like AND dislike about the tree(s) in your yard?

like(s):_____

_____

dislike(s):_____

_____

5) Who **maintains** the trees AND all other landscaping in your yard? **Maintenance** can mean, pruning, fertilizing, mulching, or providing other care to the trees in your yard. **Check all that apply.**

	Trees	All other landscaping	N/A
Me, or someone in our family/ household	☐	☐	☐
My landlord	☐	☐	☐
A paid company (tree service, landscaping company)	☐	☐	☐
No one (no maintenance)	☐	☐	☐
Don't know	☐	☐	☐
other:	☐	☐	☐

6) How much **knowledge/ expertise** do you have with respect to each of these?

	no knowledge	a little knowledge	some knowledge	quite a bit of knowledge	high level of expertise
Tree maintenance/care	1	2	3	4	5
Gardening	1	2	3	4	5
Plant/tree identification	1	2	3	4	5
Native plants	1	2	3	4	5
Bird identification	1	2	3	4	5
Climate change	1	2	3	4	5
Natural history of the area	1	2	3	4	5

Part 3: Photo series

We are interested in your perceptions of different tree choices and planting locations.

The photos here show the same front yard with different tree patterns. Using this scale, please rate how much you **like** each landscape by circling the numbers below each photo.

not at all	a little	somewhat	quite a bit	very much
1	2	3	4	5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

Part 4: Socio-demographic background information

Please answer the following questions by checking or filling in responses as indicated [hand over demographics sheet]. 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.

1) 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

2) Highest level of education:
   - ☐ Less than high school ☐ High school/GED ☐ Some college
   - ☐ Trade/technical/vocational training ☐ Associate's degree ☐ Bachelor's degree
   - ☐ Master's degree ☐ Doctoral degree

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

4) Language(s) spoken at home:
   _____

5) Gender:
   - ☐ female ☐ male ☐ non-binary ☐ other: _____

6) 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

7) What type of house do you live in?
   - ☐ Single family house ☐ Multi-family house
   - ☐ Townhome ☐ Apartment complex
   - ☐ other: _____

8) How would you describe your neighborhood?
   - ☐ urban ☐ rural ☐ suburban

9) How many people, including yourself, live in your household? _____

10) How long have you been living in your house? _____ ☐ month or ☐ years

Appendix C. Rendered image (Lorraine Street, Springfield, MA).

Appendix D. Survey consent form.

Survey Consent Form

You are being invited to participate in a research study titled "Tree preferences across a stakeholder gradient". This study is being done by Professor Robert L. Ryan and Asst. Professor Theodore S. Eisenman from the University of Massachusetts Amherst. You were selected to participate in this study because you live in a city we are interested in studying.

Why are we doing this research study? The purpose of this research study is to better understand the preferences and values of different types of trees in cities with active tree planting programs.

Who can participate in this research study? A resident of your city that is over 18 years old can participation in this research study

What will I be asked to do and how much time will it take? If you agree to take part in this study, you will be asked to complete an online survey/questionnaire. This survey/questionnaire will ask about your likes and dislikes about trees, your concerns about tree maintenance, the landscaping at your home, and it will take you approximately 10 minutes to complete.

Will being in this research study help me in any way? You may not directly benefit from this research; however, we hope that your participation in the study may improve the MA Greening the Gateway Cities program and may be helpful for other tree planting programs around the world.

What are my risks of being in this research study? We believe there are minimal risks associated with this research study; however, a risk of breach of confidentiality always exists and we have taken the steps to minimize this risk as outlined in a section below.

How will my personal information be protected? To the best of our ability your answers in this study will remain confidential. We will minimize any risks by not sharing your individual answers directly with the University of Massachusetts, government agencies or anyone else. We will keep all study records in a secure location, including a locked file cabinet. All electronic files (e.g., databases, spreadsheets, etc.) will be password protected and digitally stored on the secure UMass Box website. Any computer hosting such files will also have password protection to prevent access by unauthorized users. Only 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 will be available as a written report

Will I be given any money or other compensation for being in this research study? Participants will not receive payment for this research study. We are offering snacks and soft beverages to incentivize your time.

What happens if I say yes, but I change my mind later? 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. If at any time you would like to withdraw from the study, please call 978-593-4365 or e-mail afcoleman@umass.edu.

Who can I talk to if I have questions? If you have questions about this project or if you have a research-related problem, you may contact the researcher(s), please contact the graduate research assistant, Alicia Coleman, at 978-593-4365 or Professor Robert at 413-545-6633. 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. By selecting "I agree" below you are indicating that you are at least 18 years old, have read this consent form and agree to participate in this research study. You are free to skip any question that you choose. Please print or keep a copy of this page for your records.