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Inspiring Resident Engagement: Identifying Street Tree Stewardship Participation Strategies in Environmental Justice Communities Using a Community-Based Social Marketing Approach

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Abstract. Tree-planting municipalities and organizations face multiple challenges to achieving thriving urban forests, among which is providing establishment-period care to young trees. In arid and semi-arid regions in particular, delivering water to trees is a resource- and time-intensive activity often not covered by funding specified for tree planting. This study sought to address the need for establishment-period care by producing a replicable approach to engaging residents in environmental justice communities to actively care for young street trees planted in front of their homes. Using community-based social marketing in the community of Huntington Park (Los Angeles County, California, U.S.), researchers investigated socioeconomic and cultural characteristics to barriers and motivators regarding tree stewardship (i.e., watering, mulching, and weeding) and developed an outreach program strategy accordingly. The program was pilot-tested and evaluated for effectiveness in changing behaviors. Active, in-person outreach (door-to-door engagement with residents using program materials and demonstrating tree care actions) was tested against passive outreach (program materials were left at the doorstep); both were compared to baseline conditions. Evaluation of soil moisture, tree health, and presence of mulch was conducted over a six-week period after program outreach. Trees at homes in the active outreach group had significantly higher soil moisture, more mulch, and better observed health than trees at homes in the passive outreach group. Both groups had better outcomes as compared to pre-outreach baseline conditions. Results indicate that tree planting programs with limited resources for maintenance may find success in fostering tree stewardship among residents through active engagement.

Key Words. Behavior Change; California; Community Forestry; Community-Based Social Marketing; Environmental Justice; Environmental Psychology; Los Angeles; Nonprofit Organization; Resident Engagement; Social Marketing; Stewardship; Watering.

Newly planted urban trees face multiple challenges, including restrictively small tree wells and risk of damage in high-traffic areas. Trees that reach maturity also face threats from pests and diseases, such as polyphagous shot hole borer and *Xylella fastidiosa*, as well as ongoing challenges of funding adequate for maintenance and pruning cycles in cities like Los Angeles (City of Los Angeles 2015; University of California Division of Agriculture and Natural Resources 2017). In many cities, trees also lack protection in the face of redevelopment trends, which favor larger homes and higher ratios of hardscape, all while tree canopy cover inequity persists between higher- and lower-income neighborhoods (Pincetl 2010; Lee et al. 2017).

In arid and semi-arid regions like Southern California, U.S., tree planting program managers must also contend with the question of how trees will be watered during the multiyear establishment period. Watering is not the only tree maintenance activity required in the establishment period of young trees, but is a frequent action and a determining factor in the ultimate success or failure of a planting program. While establishment is inconsistently defined and measured in the literature, for the purposes of this study researchers define an established tree as one that becomes fully connected to the hydrologic cycle of the growing site and does not need further irrigation, except

in severe drought (Levinsson et al. 2017). In temporal terms, the City of Los Angeles references a three-year watering period, while its permitting process has historically required a five-year watering commitment from homeowners (Pincetl 2010; City of Los Angeles 2015).

Limited funding is a major obstacle to providing establishment care; delivering water to trees is time-intensive and requires sufficient funding resources (Jack-Scott et al. 2013). Because urban tree planting locations are often scattered over large geographic areas rather than concentrated in smaller areas, the task of watering can be logistically complex.

Tree-planting municipalities and organizations operate with limited resources, calling for effective solutions for establishment-period tree care to be identified and adopted. In the absence of readily viable solutions for providing stewardship of young trees, engaging community members emerges as a critically important possibility, which encourages researchers to ask whether behavior change strategies can be used to involve residents in the care of trees so as to allow a larger proportion of resources to be allocated to tree planting. If behavior change strategies prove effective, tree-planting municipalities and organizations may have a choice other than paying for regular rounds of watering, which results in less funding available for new trees. Instead, municipalities may be able to engage in creating a social norm around tree watering and care among residents in the communities they serve.

Social and stewardship factors, including a neighborhood's sociability and signs of direct tree care actions, such as weeding, are predictors of a young tree's success or failure (Lu et al. 2010), and increased tree stewardship by residents is regarded as necessary to sustain potential benefits of tree planting programs (Moskell and Allred 2013). The role of tree care in establishment care of residential trees, too, is well understood (Roman et al. 2014). This study explored the viability of engaging residents in urban tree stewardship by investigating their perspectives, which tree care actions lie within the realm of reasonable expectation, and which strategies organizations and municipalities can use to support residential participation in tree care. The selection of Huntington Park, an under-resourced city in Los Angeles County, California, was deliberate so that viable strategies could be explored for increasing tree canopy and associated benefits in an area disproportionately burdened by environmental inequities.

MATERIALS AND METHODS

Community-Based Social Marketing

A commonly used approach to fostering pro-environmental behaviors is marketing campaigns aimed at increasing awareness through media efforts, but a growing body of scientific research demonstrates that provision of information rarely results in the adoption of such behaviors (McKenzie-Mohr 2011). Community-based social marketing (CBSM) has emerged as an effective alternative to traditional education campaigns (Schultz and Tabanico 2008; McKenzie-Mohr 2011; McKenzie-Mohr et al. 2011). CBSM is based on social science research that demonstrates behavior change can be effectively achieved through initiatives delivered at the community level and focused on removing barriers to an activity while simultaneously enhancing its benefits. CBSM brings together knowledge from the field of social marketing with a variety of behavior change "tools" drawn from social psychology, environmental psychology, and other behavioral sciences.

CBSM has been used by nonprofit organizations to create socially desirable behavior changes to support areas such as safe driving and healthy lifestyles, and by government agencies to increase compliance with environmental laws, where it has been shown to be effective in increasing understanding and compliance with such laws, and in improving cost-effectiveness of programs (Kennedy 2010). Dilley and Wolf (2013) used CBSM to understand homeowner attitudes toward residential trees, but to date it has not been used to investigate residential participation in street tree stewardship. CBSM involves five steps (Figure 1).

Figure 1. Community-Based Social Marketing is an evidence-based approach to fostering sustainable behavior that involves five steps.

The Pilot Community of Huntington Park, California

Huntington Park is an incorporated community located in southeast Los Angeles County, California. With a population of 58,114, this 3 mi^2 (7.77 km^2) city has one of the highest population densities in the county, as well as one of the highest percentages of Latinos: 97.1% of residents identify as Latino, predominantly from Mexico, and many are recent immigrants (U.S. Census Bureau 2010; Los Angeles Times 2017a; Los Angeles Times 2017b). The median age is 24, young compared to the rest of the county (Los Angeles Times 2017c). Almost 60% of households have children under 18, and nearly 95% of residents speak Spanish, with more than half having difficulty with English (U.S. Census Bureau 2010). About 60% of adults have not obtained a high school diploma, and only one in 20 adults has a four-year degree (SCAG 2015).

The median household income is USD $34,887, lower than the county's median of $56,196 and the state's median of $59,540 (U.S. Census Bureau 2010). Nearly three-fourths of homes are renter-occupied (U.S. Census Bureau 2010). Average household size is 3.9 people, which is high for the county, and over one-third of households have five or more occupants (SCAG 2015; Los Angeles Times 2017d). It is not uncommon to have up to 10 people in a home, with multiple generations in a household; non-relatives may also live in the household (C. Basurto, personal communication). As in other parts of southeastern Los Angeles County, concerns over gentrification exist. Huntington Park has no rent control ordinance, and with rent and property costs rising throughout the county the prospect that low-income residents could be priced out of their neighborhoods looms large.

With regard to the study topic, there exists within the community a general appreciation for plants, caring for land and community, and enjoying parks and public outdoor spaces, which are frequently used for a range of family and community celebrations (C. Basurto, personal communication). Huntington Park is subject to a number of environmental inequities relative to other communities in the region and state, and has a history of activism aimed at addressing environmental injustices, led by such groups as Communities for a Better Environment. Cal EnviroScreen, a tool developed by the Office of Environmental Health Hazard Assessment (OEHHA) on behalf of the California Environmental Protection Agency to help identify communities disproportionately burdened by multiple sources of pollution and with population characteristics that make them more sensitive to pollution, classifies Huntington Park's neighborhoods in the 81%–85% and 91%–95% groups for experiencing high levels of pollution and vulnerability (OEHHA 2017). Huntington Park is the site of several brownfields, a result of both heavy manufacturing in the community until the 1960s and a proximity to the industrial city of Vernon (U. S. Environmental Protection Agency 2015). Huntington Park has an estimated 15% canopy cover, lower than the county's overall number of 28% (TreePeople 2011). This is consistent with the inequitable distribution of tree canopy in the region, with research confirming that lower-income communities of color, especially those in arid climates, experience disproportionately low levels of canopy cover (Schwarz et al. 2015).

Health and environmental conditions made Huntington Park a compelling candidate for this study. Additionally, City staff was supportive, collaborative, and responsive. As community interest grew in the tree planting program, the City partnered with TreePeople, an urban forestry organization, to plant hundreds of street trees in residential areas and make space available in a Public Works Department yard for trees, mulch, stakes, and secure tool storage for TreePeople staff. Founded in Los Angeles in 1973, TreePeople helped launch a city-based

voluntary urban forestry movement through its signature Citizen Forestry approach of equipping communities to take on planting and caring for trees (Lipkis and Lipkis 1990; Johnston 1996). TreePeople's partnership with the City presented an opportunity to build on its history of shaping the urban forestry movement by testing whether social norms around resident tree stewardship could be fostered.

In the past decade, the City of Los Angeles has been the subject of urban forest efforts, research, and evaluation, particularly connected with the Million Trees Los Angeles initiative (McPherson et al. 2008; Pincetl 2010), but the City of Huntington Park and other neighboring cities lag behind. TreePeople's work in Huntington Park began in 2010 with an opportunity to partner with the nonprofit organization Communities for a Better Environment to quickly bring about tangible improvements as they also worked on longer-term goals to improve air quality and public health. Communities for a Better Environment invited TreePeople to use its *Citizen Forester en Español* program to teach community members how to plan a neighborhood tree planting. Several volunteer planting events were subsequently held, with one of the first projects initiated over community concerns that the City was slated to pave empty tree wells due to an insufficient planting and tree care budget.

In 2014, TreePeople appointed a staff member and Huntington Park resident to the role of Regional Manager for this community. She built an on-the-ground program, starting with five students and growing to 30 eager participants in its first season. At summer's end, some students noted that without their continued volunteering the trees would suffer in the lingering heat, which prompted them to meet regularly to care for the trees. The youth program has since grown to more than 60 regular volunteers, with 30 trained and committed as TreePeople Volunteer Supervisors, and as many as 6 interns at one time. Most volunteers come from two local high schools, which have been instrumental in organizing numerous plantings since the program began. These efforts by the City of Huntington Park, Communities for a Better Environment, TreePeople, and dozens of

regular volunteers point to a commitment for planting public spaces in the community. This commitment has resulted in nearly $1 million in funding and is poised to receive more, making this study's findings immediately applicable to current and future planting efforts.

Research Methodology

TreePeople undertook the responsibility of directing the study's multiple phases of research. Research phases included a literature review, focus groups, a survey, development and implementation of a pilot program, and evaluation of the pilot program.

Literature review

A literature review was conducted and its key findings informed subsequent research through focus groups and surveys. The review pointed to research gaps that warranted further inquiry, such as more granular characterization of attitudes toward trees, perceptions of who should be responsible for trees, and perceived benefits and barriers to tree care within a predominantly Latino, environmental justice community like Huntington Park. The literature shows that, while trees are not seen as problem-free, public perception of trees is generally highly positive both among a volunteering public and a general public (Lohr et al. 2004). Opinions toward trees are more positive for residents who have a tree planted in front of their property (Gorman 2004), and while urban residents may have varying willingness to donate or volunteer in support of urban tree programs, the notion that the government is ultimately responsible for public trees holds strong (Zhang et al. 2007). Volunteer motivation aligns with the desire to improve one's neighborhood, and personal satisfaction is more strongly tied to tree care with existing volunteers and tree planting with potential volunteers (Still and Gerhold 1997). Also relevant was the finding that intervention-focused programs designed to make environmental behaviors easier to engage were more effective than ones focused on consciousness raising and attitude change (Summit and Sommer 1998).

Focus groups

Informed by the literature review, two focus groups were conducted with the aim of uncovering benefits and barriers to stewardship of trees—specifically young street trees in front of residential parcels. Two distinct groups were targeted: Group 1 was a "Tree Care Group," in which people currently or had recently stewarded trees; Group 2 was a "Non-Tree Care Group," in which people had not recently or were not currently conducting such stewardship, either at home or as part of volunteering or work. Holding separate focus groups allowed questions to be tailored for addressing motivations versus barriers in meaningful ways to participants. Further, participants who did not perform tree care could speak freely and not feel social pressure from those who had.

The number of attendees ranged from 8 to 12, and focus groups were conducted largely in Spanish with semi-structured interview questions. Attendees were recruited by TreePeople's regional manager for this community, herself a resident of Huntington Park. Care was taken to include attendees representative of the greater community: a mix of working-class men and women of varying ages, mostly of Latino descent. Most Group 1 attendees had a history of involvement with TreePeople, either as volunteers or educational workshop participants. Many attendees in Group 1 knew one another, whereas Group 2 attendees did not. The two focus groups were held at a community recreation center on two consecutive Thursday evenings in October 2015. Focus groups were facilitated by bilingual anthropology students of California State University Northridge, an advanced graduate student in applied anthropology from California State University Long Beach, and TreePeople staff. Compensation to participants was offered in the form of $25 gift cards to local restaurants and markets. The themes discussed in each focus group are summarized in Table 1.

Surveys

Surveys informed by focus group findings were conducted door-to-door by youth volunteers from the community and while under the supervision of TreePeople's regional manager. Homes on streets with young trees in the parkways were targeted, and pre-notification postcards were sent to alert residents that a survey team would be visiting on a specific date. The survey was crafted to identify barriers to, and motivations for, caring for trees and assessed attitudes toward trees, barriers to caring for trees, yard infrastructure, current plant- and tree-care habits, and demographics. Attitudes toward trees were measured by a series of eight statements (e.g., Having a tree in every yard is good for my neighborhood). Barriers to caring for trees were assessed by a series of 10 statements (e.g., Carrying a 20-L bucket of water would be difficult for me). For both sets of statements, respondents rated their level of agreement using a scale from 1 to 7 (where 1 means *strongly disagree* and 7 means *strongly agree*). Infrastructure and current plant- and tree-care behaviors were measured by asking if respondents had currently cared for plants or trees by mulching, watering, or weeding (each asked separately), and if they had water hoses, the location of spigots, and the type of irrigation system in the yard. Lastly, respondents were asked about demographic classifications, such as age, educational attainment, number in household, home ownership, and income.

A total of 88 households participated in the survey. Respondents who completed the survey were offered a $10 gift card to a neighborhood store or restaurant. Survey teams represented TreePeople; it is thus possible that responses were more favorable toward trees as a result. Results are shown in Figure 2 (Attitudes Toward Trees), Figure 3 (Infrastructure for Watering), Figure 4 (Current Plant-Care Behaviors), Figure 5 (Barriers to Caring for a Tree), Figure 6 (Benefits to Caring for a Tree), and Figure 7 (Likelihood of Watering Their Tree). Additionally, when asked if they currently had plants they took care of, 77% of respondents stated that they did. Those who answered yes were then asked if they used mulch or compost, to which 58.2% answered yes.

Table 1. Focus group themes and outcomes.

| Issue	Tree care group (Group 1)	Non-tree care group (Group 2)
Urban forests	Urban forests seen as beneficial. Activity of tree care only mentioned by tree care group; both groups mentioned planting trees. Benefits cited include shade, aesthetic value, climate change mitigation/adaptation, stormwater capture, improving air quality, and providing oxygen.	
Experience with trees	Mentioned rural experiences in which tree care was common; mentioned community programs.	Mentioned recent tree planting community programs.
Sufficiency of trees and tree care	Respondents do not believe there are enough trees in their area or sufficient tree care. Do not think it is a priority of the city to care for trees.	Do not believe there are enough trees in their area. It is often too hot due to lack of shade, so people stay indoors. Do not believe the city takes care of the trees well; youth vandalism of trees is a problem.
Positives about community	Central location. Sociability of people in community	Trees. Residents (calm, safe community).
Negatives about community	Street and sidewalk condition. Stray dogs. Lack of enforcement of city codes. Need for more trees and food gardens	Not enough green spaces. Security cameras not working. People do not clean up after pets.
Perceived benefits to more trees	Improved air quality. More shade. Increased aesthetic and property value. Education of children and residents about tree care. Education of children and residents about gardening and healthy eating (for fruit trees). Increase community involvement. Increase community socialization.	Improved air quality. More park space. Enhanced parks.
Responsible parties for tree care	Community residents. Schools. City.	City (majority of care). Business owners (small portion of care). Community residents (small portion of care).
Tree care actions	Fertilizing. Cleaning up trash. Tree pruning. Watering.	Fertilizing. Tree pruning. Watering.
Why care for trees?	Childhood memories, connection to nostalgia.	n/a
Challenges/barriers	Knowledge transfer—too few parents know or care about trees, so this is passed on to children; lack of land for trees (renting); false idea among residents that city will take care of trees; lack of help or support from city; lack of awareness about which trees to plant that have non-invasive root systems; expense (tree trimming and root damage to pipes can be expensive); city owns trees but does not care for them, which limits what residents feel they can do; lack of time.	City does not care about trees; trees get entangled in power lines; trees leave droppings on sidewalks, cars; trees take more water to care for; residents are lazy; there is a lack of space for new trees; potential danger (possibly in tree trimming); residents believe it is the city's responsibility to care for trees
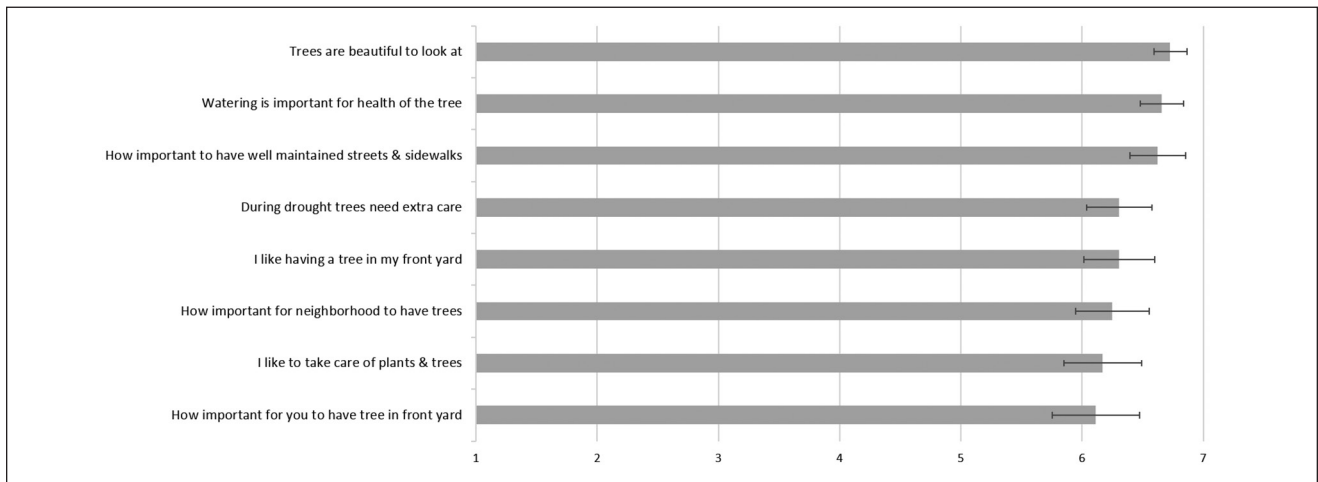
Figure 2. Results of 88 survey responses in Huntington Park. The question asked was: "Using a scale from one to seven, where one means strongly disagree and seven means strongly agree, please tell me how much you agree or disagree with each of the following statements." Response means and distributions are represented.
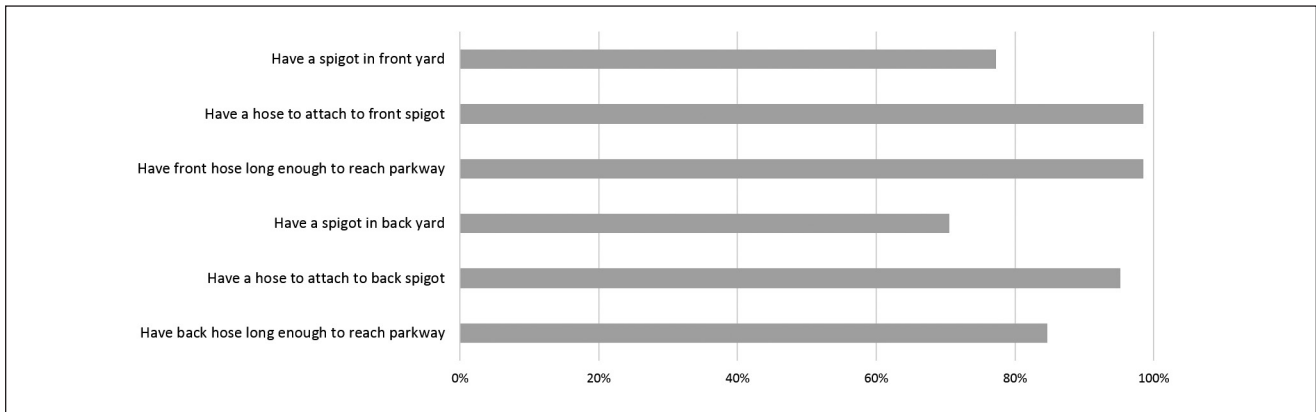
Figure 3. Results of 88 survey responses in Huntington Park. Participants were asked if they have the infrastructure necessary to water a tree. The figure shows the percentage of respondents who answered yes.
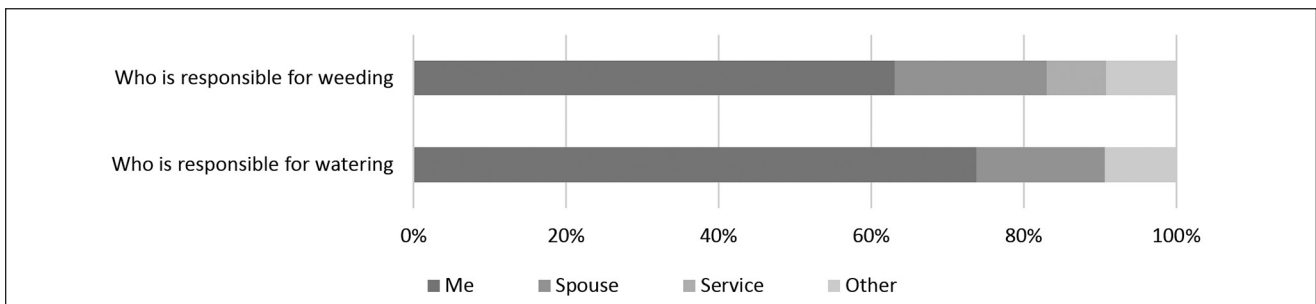

Figure 4. Results of 88 survey responses in Huntington Park. When asked if they currently had plants they took care of, 77% of the respondents stated that they did. Those that answered yes were then asked if they used mulch or compost, to which 58.2% answered yes. Participants who stated that they take care of plants in their yard were asked who takes responsibility for water and weeding. The percentages for the response categories are displayed in the figure.
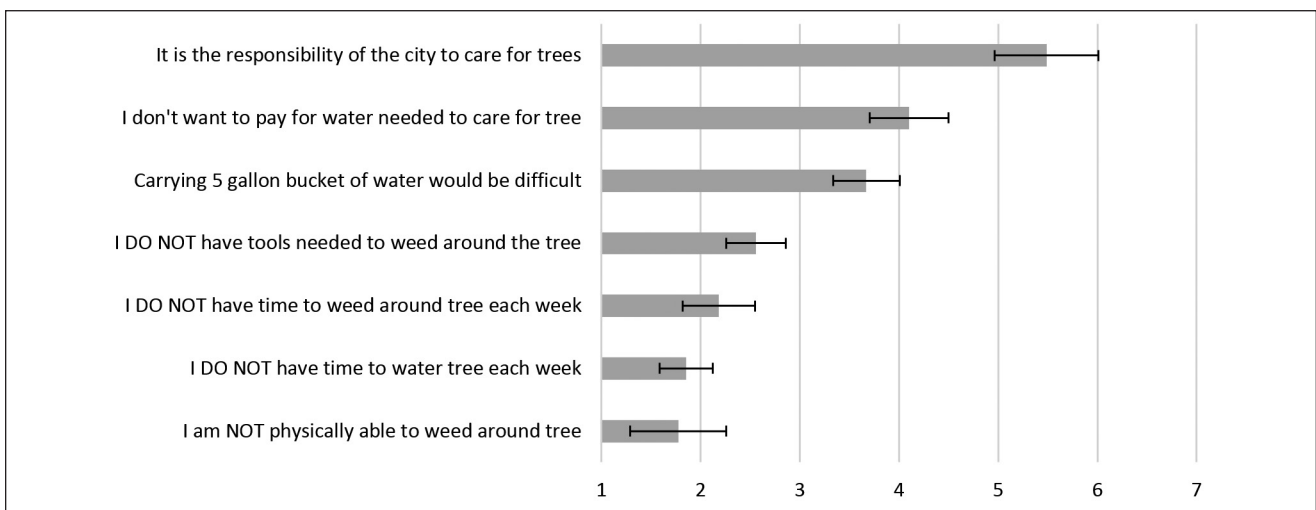
Figure 5. Results of 88 survey responses in Huntington Park. Respondents were asked about a number of barriers to tree care. The question was asked: "Using a scale from one to seven, where one means strongly disagree and seven means strongly agree, please tell me how much you agree or disagree with each of the following statements." There were no notable differences between owners and renters. Response means and distributions are represented.

Figure 6. Results of 88 survey responses in Huntington Park. Respondents were asked about a number of benefits to tree care. The question was asked: "Using a scale from one to seven, where one means strongly disagree and seven means strongly agree, please tell me how much you agree or disagree with each of the following statements." Response means and distributions are displayed, with a higher mean indicating a higher benefit. There were no notable differences between owners and renters.
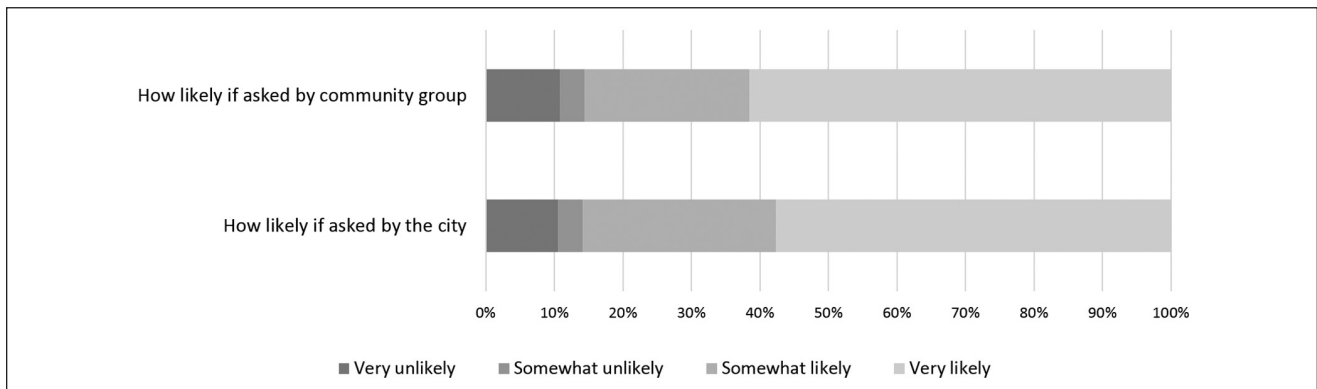

Figure 7. Results of 88 survey responses in Huntington Park. Participants were asked about the likelihood they would water their tree if asked to do so by the city and by a community group. The percentage of respondents in each category is shown here.

Developing Program Strategies

The literature review, focus groups, and survey findings informed the development of the pilot program and related materials. Researchers first identified a short list of non-divisible, end-state behaviors to target. Non-divisible behaviors are actions that cannot be divided further. For example, "caring for a tree" can further be divided into watering, mulching, pruning, and weeding. End-state behaviors are those that produce the desired environmental outcome. Using this approach, care for young trees was defined as performing four distinct actions at specific frequencies, with actions simplified as easy-to-follow instructions: 1) Weekly – Assess the need to water by placing index finger approx. 7.5–10 cm, or 3–4 in, into the soil; 2) Weekly – If needed, use approx. 57 L, or 15 gal, of water delivered by hose, and while on a slow stream, run the water for approximately 15 minutes; 3) Monthly – Remove weeds as needed; 4) Every six months – Spread 10 cm, or 4 in, or the length of an index finger, of mulch from the base of the tree outward to the root line, as needed.

Addressing barriers and leveraging benefits

Next, researchers outlined findings and strategies to address practical and perceived barriers to mulching, watering, and weeding young trees, as identified in the survey. Among these barriers, three findings emerged as most significant:

- Finding 1: "It is the responsibility of the city to care for trees"
- Finding 2: "I don't want to pay for water needed to care for trees."
- Finding 3: "Carrying a bucket is difficult."

Numerous strategies were identified to address each of these findings, including:

- Demonstrating a *social norm* by showing the high percentage of residents currently caring for plants.
- Using *testimonials* to communicate that residents value the trees and want to take care of them.
- *Educating* residents about what it takes to care for the tree and that the responsibility for *taking care of the trees is consistent with community values*.
- Utilizing *vivid communication* (an educational strategy that uses graphics) to demonstrate that watering a young tree costs less than $5 per year annually, using local water rates. The cost was compared to that of a common, relatable grocery item—in this case a dozen eggs, so that the per-month cost was the equivalent of one egg.
- Using a hose to water the tree, or if using a bucket is desirable, filling the bucket at the tree with a hose so carrying a full bucket is not necessary.

In addition to these strategies, a prompt was developed to help remind residents to check their tree weekly. A weekly activity that occurs commonly in the community, and to which a tree care prompt could be tethered, was identified: street cleaning. Most Huntington Park residents do not have private parking and are prompted to move their cars to avoid a ticket, and so associating tree care with this weekly behavior was logical.

In addition to barriers, Huntington Park residents widely associate many benefits with performing tree care. To leverage this finding, *commitment* was used to encourage engagement in tree care, coupled with self-perception language that explains how tree care behaviors are consistent with current community plant-care behaviors and values. CBSM posits that commitment is a powerful tool to encourage behavior change, especially when the commitment is visible to others (McKenzie-Mohr 2011). Residents were asked to commit to tak-

ing care of their trees and make their commitment public by placing a static-cling sticker in their front window to display their commitment.

Another consideration was to determine which entity would be the face of the program. Surveys indicated that "the city" (City of Huntington Park) and a "community group" (TreePeople) would be equally good messengers. The project team made the decision to use TreePeople in the branding of the materials so they could be used in communities outside of Huntington Park if the program was found to be successful.

Testing Outreach Methods: No Outreach Versus Passive Versus Active

The study tested whether outreach produced better results than no outreach, and further, whether in-person, active outreach was more effective than passive outreach. Both outreach strategies included distribution of program materials between 10 a.m. and 1 p.m. on a Saturday in March 2017, but differed in the approach used. Three neighborhoods in the area were identified as having recently-planted parkway trees. One had been targeted for surveys and thus residents were potentially influenced, leaving the two remaining neighborhoods available for the pilot.

Neighborhood 1: Active outreach via in-person engagement. An effort was made to speak in person with residents in the area assigned to receive active outreach (36 homes). Pre-notification fliers were left on the doors of the homes prior to the pilot outreach date to alert residents in advance. During outreach, teams knocked on doors or spoke with residents if they happened to intercept them outside, delivered a script verbally, offered and explained the materials package, and invited residents to observe a demonstration of tree care. Outreach teams were bilingual, and conversations with residents were held in either English or Spanish to accommodate resident preference. If residents did not answer, an outreach package was left at the door containing an instructional magnet (Figure 8a), air freshener prompt (Figure 8b), commitment sticker (Figure 8c), and a letter that reinforced the messages delivered in the in-person script. Teams performed tree care whether the resident was present or not.

Neighborhood 2: Passive outreach via a package of materials left at the door or doorstep, with no effort to engage with residents. This group also consisted of 36 homes. Teams left a package containing the same materials listed for Neighborhood 1 at the door or doorstep. Teams made no attempt to interact with residents. Residents did not receive in-person engagement and teams did not conduct tree care activities.
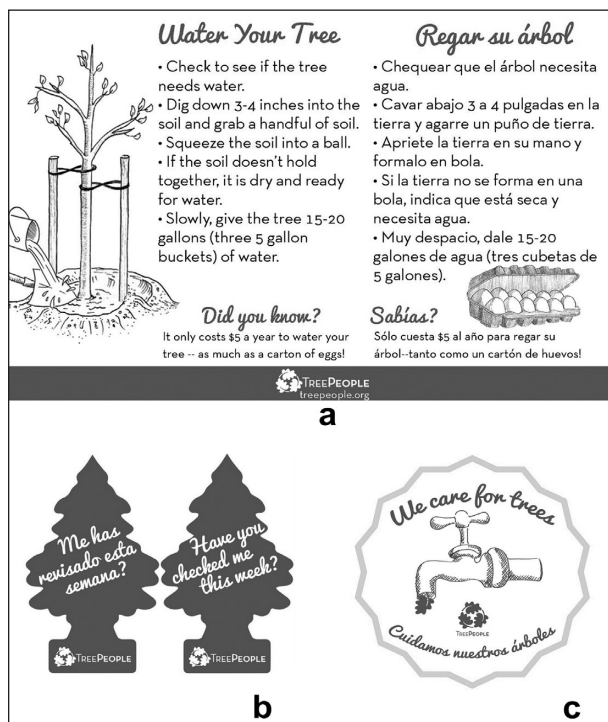

Figure 8. Strategy a) instructional magnet, b) air freshener prompt, and c) commitment sticker.

Evaluation Methodology

Baseline observations were collected at each site prior to the pilot program launch, and evaluation of the two program strategies was conducted over a six-week period following outreach. Evaluation consisted of: 1) moisture meter readings taken every other day; and 2) weekly observations made on presence of mulch and weeds, as well as tree health (using observations of trunk, branch and leaf health). Photos were also taken to document tree health and any other observed issues were noted. The same teams conducted the observations throughout the period for consistency.

RESULTS AND DISCUSSION

Findings

Data analyses of the three outcomes—soil moisture, tree health, and presence of mulch—were conducted to determine whether statistically significant differences existed between the two outreach methods. Baseline data were collected at only one time-point and thus not included in the statistical analyses but are nevertheless presented in the figures for visual contrast to the evaluation data. In addition to the three outcomes listed above, observations were made regarding the presence of weeds, but those data were not ultimately reported in analyses because weeds were removed by outreach teams on the pilot launch day for the active group but not for the passive group sample, making the data inconclusive.

Sixteen of 36 households in the active outreach group opened their doors and received the communication in-person. At six weeks following outreach, trees at homes in this outreach group had significantly higher soil moisture, more mulch, and better observed health than trees at homes in the passive outreach group. However, as some residents in this outreach group were not reached, two sets of analyses were conducted. A set of primary analyses compared all residents in Neighborhood 1 in the active outreach group (N = 36) with all residents in Neighborhood 2 in the passive outreach group (N = 36). A set of secondary analyses excluded from the active outreach group the 20 residents in Neighborhood 1 who did not answer their doors. Treatment of those 20 residents resembled that of the passive outreach group in that they had no in-person interaction. Treatment of these residents differed from the passive outreach group in that they received pre-outreach notifications, so data from this subgroup were thus excluded from the analysis rather than combined with data from the passive outreach group. Consequently, the secondary analysis compared the original passive outreach group (N = 36) with a smaller active outreach group (N = 16). Results of the primary analyses are shown in Figure 9 (soil moisture), Figure 10 (mulch), and Figure 11 (tree health). Results of the secondary analyses, excluding residents who did not answer their doors in Neighborhood 1,

resulting in a small active outreach group (N = 16), are shown in Figure 12 (soil moisture), Figure 13 (mulch), and Figure 14 (tree health).

While members of the evaluation team were trained to conduct standardized observations on mulch and tree health, it should be noted that observations may nevertheless be subject to observer differences. The soil moisture metric is thus a more objective form of measurement. There was a statistically significant difference in soil moisture between the active group and the passive group at both three weeks and six weeks following outreach. Like many studies, the scope of this project was limited by available resources. The evaluation period was limited to six weeks, and observations on whether outreach materials were used as intended were not included. Observing these behaviors would inform which outreach materials better resonate with the target community, and thus which materials tree-planting municipalities or organizations would be advised to select. Such observations should be included as part of an evaluation plan in future behavior change efforts.

Broad Implementation and Transferability to Other Communities

A modification that could be adopted in future implementation of the study's strategies is that active, in-person engagement with residents could be tested on planting day rather than in the days or weeks following a planting. On planting day, community members may already be participating in planting and may be even more receptive to in-person interaction. Given the effective use of peer-to-peer, community-based communications observed in the pilot, this model will continue to be used and expanded to support the growth of Huntington Park's urban forest.

Transferability to communities beyond Huntington Park can be tested if, at a minimum, the necessary infrastructure and barriers to engagement are identified as similar. The following characteristics were among the factors identified in the pilot neighborhoods of this study: residents have water spigots and hoses; the cost of watering trees is perceived as a barrier; trees are seen as important and desirable neighborhood components; city government is seen as responsible for tree care; and many residents already provide care for other trees and plants. These factors were used to craft messages and develop program elements. To apply this same program approach, a next step would be to confirm that these and other elements are relevant in other target communities. If these elements are found to be relevant, widespread implementation is simplified. If there is a potential mismatch, a next step would be to gather additional data to provide direction for retooling messaging or program elements.
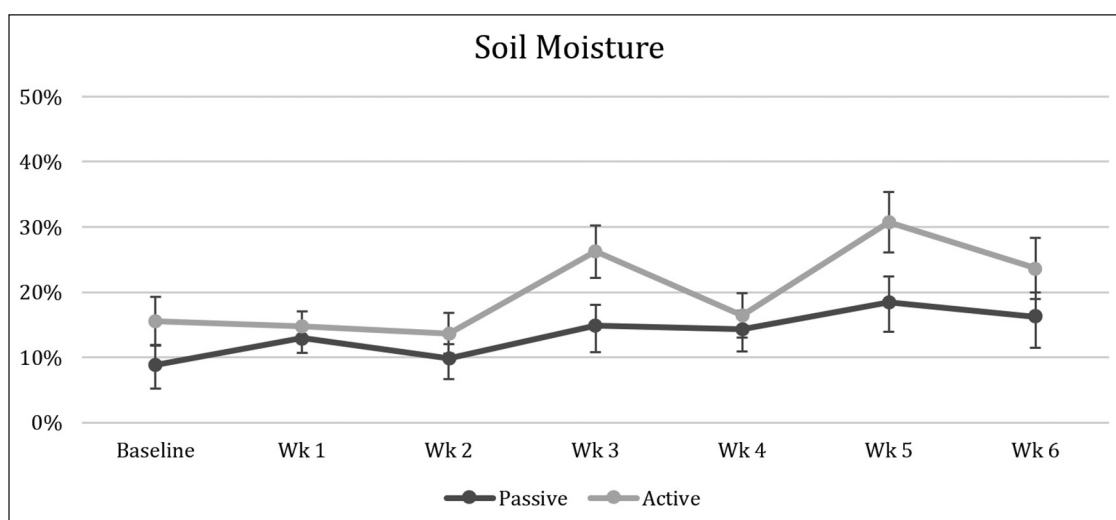

Figure 9. Soil moisture as volumetric water content following outreach (active, N = 36; passive, N = 36) (primary analysis).
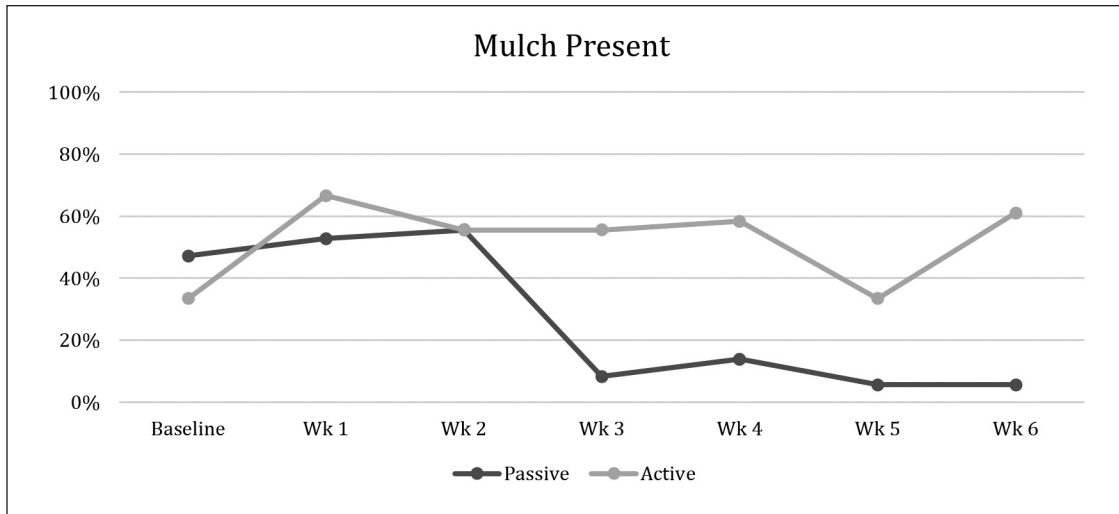
Mulch Present

Figure 10. Presence of mulch following outreach (active, N = 36; passive, N = 36) (primary analysis).
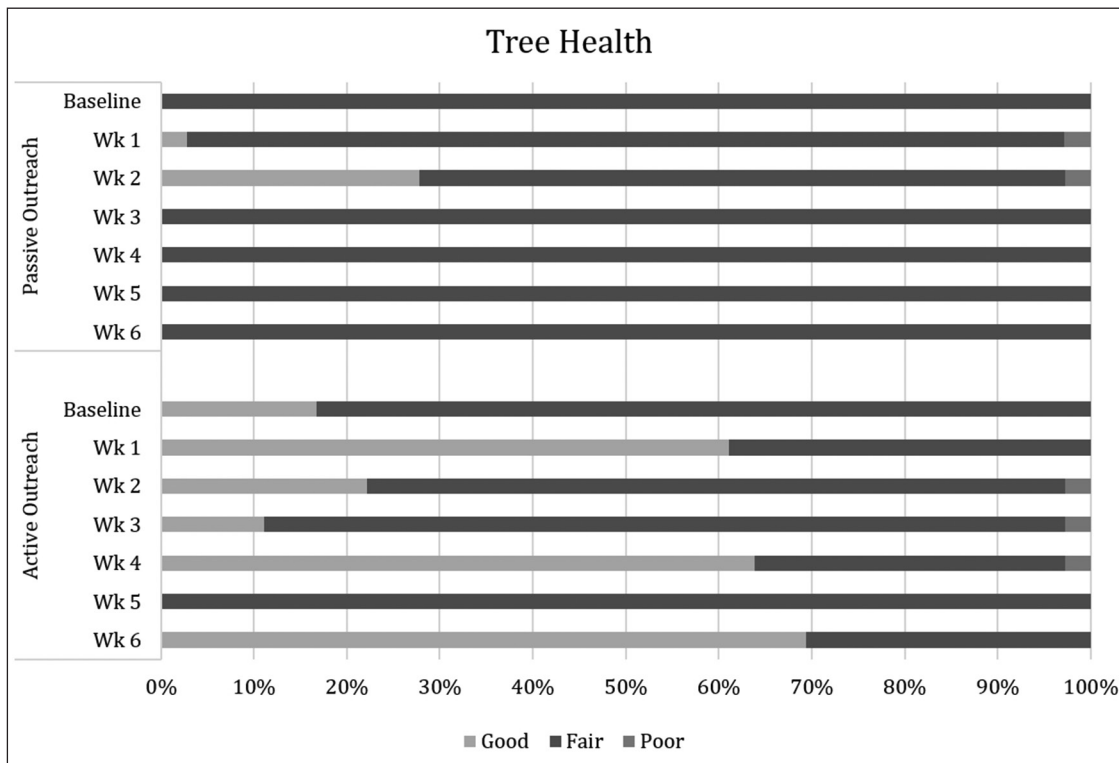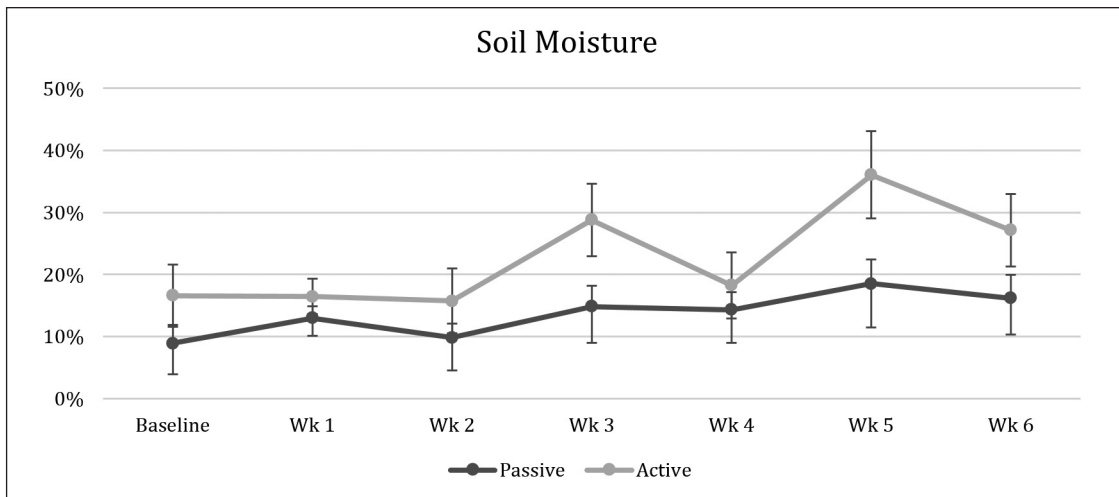
Tree Health

Figure 11. Tree health following outreach (N = 36) (primary analysis).

The study findings indicate both active and passive outreach produced better soil moisture and tree health outcomes than no outreach, with trees at homes in the active outreach group showing significantly higher soil moisture, more mulch, and better observed health than trees at homes in the passive outreach group. Results suggest that tree planting programs with limited resources for maintenance may find success in fostering tree stewardship among residents through active engagement. As of the writing of this article, several major urban forestry projects are in planning or implementation phases in Southern California and may provide opportunities to test the transferability of the strategies and approaches developed for this study. Projects of

Figure 12. Soil moisture as volumetric water content following outreach (active, N = 16; passive, N = 36) (secondary analysis).
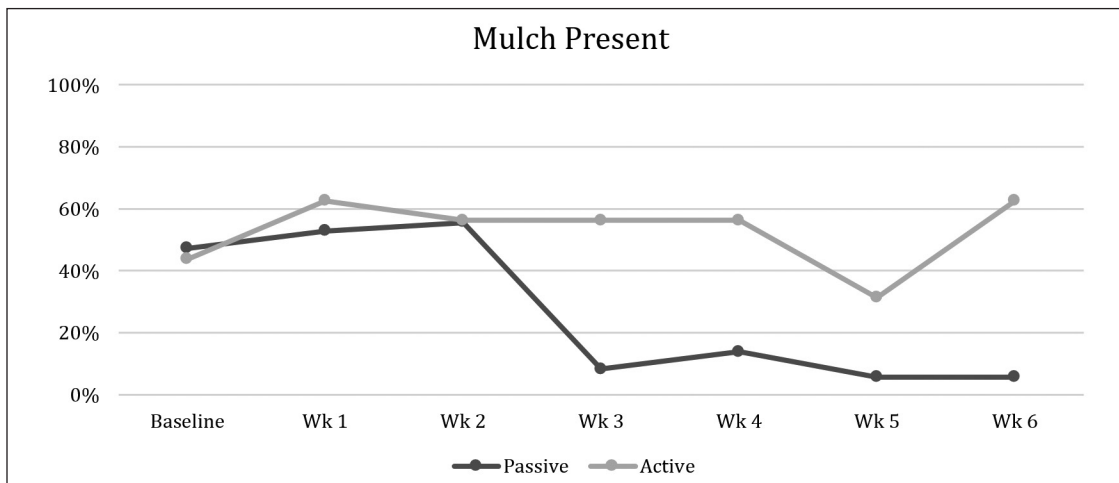

Figure 13. Presence of mulch following outreach (active, N = 16; passive, N = 36) (secondary analysis).
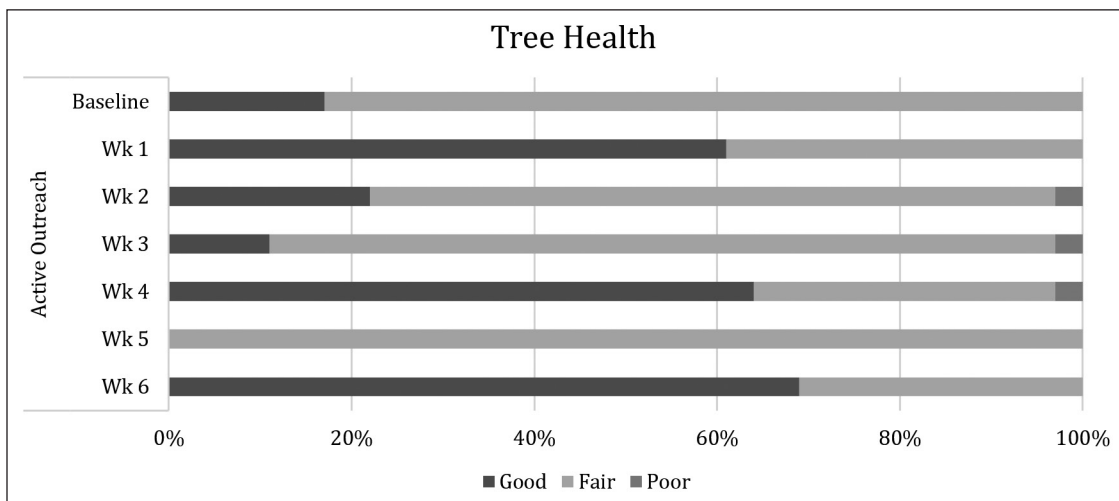

Figure 14. Tree health following outreach (active, N = 16) (secondary analysis).

the City of Los Angeles City Plants collaborative and those funded through CAL FIRE Greenhouse Gas Reduction Funds, as well as other efforts in the region and beyond, should be considered as opportunities to advance, refine, and improve upon the approaches presented in this study.

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Résumé. Les municipalités et les organismes actifs pour la plantation d'arbres sont confrontés à de nombreux défis avant de bénéficier d'une forêt prospère, parmi lesquels figure l'entretien des jeunes plantations durant la période de reprise. Dans les régions arides et semi-arides en particulier, la distribution de l'eau d'un arbre à l'autre est une activité intense monopolisant du temps et des ressources souvent non prise en compte lors du financement de programmes de plantation. La présente étude cherche à répondre au besoin de cette activité en développant un modèle de stratégie afin d'engager les résidents de communautés désavantagées sur le plan environnemental à s'impliquer activement dans l'entretien des jeunes arbres d'alignement plantés en façade de leurs résidences. Recourant au marketing social communautaire dans la ville de Huntington Park (Comté de Los Angeles, Californie), nous firent enquête sur les caractéristiques socioéconomiques et culturelles quant aux obstacles et aux incitatifs visant la prise en charge des arbres (c'est-à-dire, l'arrosage, le paillage et le désherbage) puis nous élaborâmes conséquemment un programme stratégique de sensibilisation. Un projet pilote fut développé et évalué quant à son efficacité pour la modification des comportements. Une sensibilisation active, personnalisée (approche porte-à-porte avec les résidents en recourant à du matériel publicitaire et par la démonstration de gestes d'entretien) fut testée en comparaison avec une sensibilisation davantage passive (matériel publicitaire déposé à la porte); les deux approches furent comparées avec les conditions de référence (aucune approche). Une évaluation de l'humidité du sol, de la santé des arbres et de la présence de paillis fut effectuée pendant une période de six semaines suivant le projet pilote de sensibilisation. Les arbres situés devant les maisons du groupe de sensibilisation active montrèrent un taux d'humidité du sol significativement plus élevé, plus de paillis et un constat de meilleure santé que les arbres du groupe de sensibilisation passive. Cependant, les deux groupes affichèrent un meilleur résultat que les arbres de référence. Ces résultats indiquent que les programmes de plantations d'arbres, malgré des ressources limitées pour leur entretien, peuvent réussir en promouvant la prise en charge et l'implication active de citoyens.

Zusammenfassung. Stadtverwaltungen und Organisationen, die Bäume pflanzen, sind multiplen Herausforderungen ausgesetzt, um blühende urbane Forste zu erzielen, wovon eines die die Etablierung einer Anwachsphase für junge Bäume ist. Besonders in ariden und semiariden Regionen ist die Bereitstellung und Lieferung von Wasser eine resourcen- und zeitintensive Tätigkeit, die oftmals nicht von den zur Verfügung stehenden Mitteln gedeckt ist. Diese Studie strebte an, dem Bedarf nach einer Anwachspflege entgegen zu kommen, indem ein reproduzierbarer Ansatz zur Involvierung von Anwohnern in umweltgerechten Kommunen erzeugt wird, die aktiv eine Jungbaumpflege vor ihrem Haus durchführen. Unter Verwendung von Community-Based Social Marketing in der Stadt von Huntington Park (Los Angeles County, California), untersuchten wir sozioökonomische und kulturelle Charakteristika zu Barrieren und Motivatoren rund um Baumpatenschaften (z. B. Bewässerung, Mulchen und Krauten) und entwickelten entsprechend eine weit reichende Programmstrategie. Wir führten einen Pilottest durch und bew-

erteten das Programm bzgl. seiner Effektivität, Verhaltensweisen zu verändern. Aktive, persönliche Ansprache (Tür-zu-Tür-Engagement mit den Anwohnern, unter Verwendung von Programmmaterialien und dem Demonstrieren von Baumpflegeaktionen) wurden getestet gegenüber passiver Ansprache (Programmmaterial an der Türschwelle anlegen); beide wurden unter Basiskonditionen verglichen. Die Bewertung der Bodenfeuchte, Baumgesundheit und Vorhandensein von Mulch wurde über einen sechswöchigen Zeitraum nach der Programmveröffentlichung durchgeführt. Bäume vor den Häusern mit aktiver Ansprache hatten signifikant höhere Bodenfeuchte, mehr Mulch und eine besser beobachtete Baumgesundheit als die Bäume vor den Häusern mit passiver Ansprache. Beide Gruppen hatten bessere Ergebnisse im Vergleich zu der Baseline vor der Ansprache. Die Ergebnisse zeigen, dass Baumpflanzprogramme mit begrenzten Resourcen für die Erhaltungspflege möglicherweise einen Erfolg darin finden, die Anwohner durch Baumpatenschaften zu aktivem Engagement zu bewegen.

Resumen. Los municipios y las organizaciones de plantación de árboles enfrentan múltiples desafíos para lograr bosques urbanos prósperos, entre los que se encuentra el cuidado durante el período de establecimiento para los árboles jóvenes. En particular, en las regiones áridas y semiáridas, el suministro de agua de árbol a árbol es una actividad que requiere recursos y tiempo, y que a menudo no está cubierta por los fondos específicos para la plantación de árboles. Este estudio buscó abordar la necesidad de atención durante el período de establecimiento al producir un enfoque replicable para involucrar a los residentes en comunidades ambientales para que cuiden activamente a los árboles jóvenes de las calles plantados frente a sus hogares. Utilizando datos de mercadeo social en la comunidad de la ciudad de Huntington Park (Condado de Los Ángeles, California), investigamos las características socioeconómicas y culturales de las barreras y motivadores en torno a la administración de los árboles (es decir, riego, acolchado y deshierbe) y desarrollamos una estrategia de programa de extensión en consecuencia. Realizamos pruebas piloto y evaluamos el programa para conocer la efectividad de los comportamientos cambiantes. La participación activa, en persona (compromiso puerta a puerta con los residentes que usen los materiales del programa y demostrando las acciones de cuidado de los árboles) se evaluó en comparación con la divulgación pasiva (los materiales del programa se dejaron en la puerta); ambos se compararon con las condiciones base. La evaluación de la humedad del suelo, la salud de los árboles y la presencia de mantillo se realizó durante un período de seis semanas después del alcance del programa. Los árboles en los hogares en el grupo de alcance activo tuvieron una humedad del suelo significativamente mayor, más mantillo y una mejor salud observada que los árboles en los hogares que en el grupo de alcance pasivo. Ambos grupos tuvieron mejores resultados en comparación con las condiciones de referencia previas al alcance. Los resultados indican que los programas de plantación de árboles con recursos limitados para el mantenimiento pueden tener éxito en fomentar la administración de árboles entre los residentes a través de la participación activa.