Does collaborative tree planting between nonprofits and neighborhood groups improve neighborhood community capacity?

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ABSTRACT

In the past decade, urban tree canopy cover goals and tree-planting initiatives have proliferated among local governments and nonprofit organizations across the globe. While research has documented many benefits new trees will provide, less has considered whether active participation of city residents in urban forestry activities might also benefit urban neighborhoods. This paper examines nonprofit tree-planting programs in four cities in the Midwestern and Eastern United States to determine whether and to what extent neighborhood participation in a nonprofit tree-planting project might increase ties between residents, social cohesion, and shared trust in that neighborhood. We leveraged a unique dataset of ecological and social information about tree-planting neighborhoods and matched comparison (non-tree planting) neighborhoods (total neighborhoods = 197; total survey respondents = 1551). The evidence for a social effect of nonprofit tree-planting programs is mixed. When asked directly, neighborhood residents reported observing positive changes. Linear regression analysis reveals significantly higher neighborhood ties reported by individuals in planting neighborhoods. However, we find no significant relationship between tree planting and social cohesion or trust. In single-city models, planting's association with neighborhood ties and social cohesion is only significant in one city, and associations with trust are not significant in any city. Models that aggregate responses at the neighborhood level find no significant association of tree planting. Findings suggest that tree planting may increase neighborhood ties, but that increases in social cohesion and/or trust are not guaranteed.

1. Introduction

In the past several decades, urban greening activities have proliferated in cities across the globe. These activities include the installation of green infrastructure like trees, parks, wetlands, green roofs (Foster, Lowe, & Winkelman, 2011; Kondo, Low, Henning, & Branas, 2015; McPherson, 2014; McPherson & Young, 2010), and recently, forested skyscapers in Italy and China (Zhang, 2017). Trees, greenspaces, and other types of green infrastructure in urban settings can help manage stormwater runoff (Bartens, Day, Harris, Wynn, & Dove, 2009), may improve air quality (Nowak, Hirabayashi, Bodine, & Hoehn, 2013),[3] moderate urban temperatures (Armson, Stringer, & Ennos,

2012; Bowler, Buyung-Ali, Knight, & Pullin, 2010; Declet-Barreto, Brazel, Martin, Chow, & Harlan, 2013), and help mitigate climate change (Baró et al., 2014; Peng & Jim, 2015). Nature in urban settings can improve physiological and psychological health (Haluza, Schönbauer, & Cervinka, 2014) by, for example, lowering incidence of cardiovascular disease (Donovan et al., 2013), lowering body mass index in children (Bell, Wilson, & Liu, 2008), and reducing stress (Hartig, Mitchell, De Vries, & Frumkin, 2014).

City residents play a significant role in the greening of cities, working individually, with neighbors or other residents, and in collaboration with municipal and nonprofit organizations. Individual homeowners independently garden, landscape, perform lawn

maintenance, care for potted plants and trees, and undertake other greening activities on their properties and the lawns and sidewalks in front of their homes (Cook, Hall, & Larson, 2012; Harris et al., 2012; Harris, Martin, Polsky, Denhardt, & Nehring, 2013). Previous studies have examined how neighborhood residents organize collective greening projects like landscaping or tree planting (Kullgren, 2015), develop community rules around managing greenspace (Larsen & Harlan, 2006), and work with municipal governments, nonprofits, and other stewardship organizations in greening activities (Fisher, Svendsen, & Connolly, 2015; Mincey & Vogt, 2014; Vogt, Watkins, Mincey, Patterson, & Fischer, 2015). For example, residents make tree requests via city hotlines, participate in technical assistance programs (Westphal, 2003), and volunteer to inventory and monitor urban trees (Roman, McPherson, Scharenbroch, & Bartens, 2013). At a large scale, coordinated city-wide tree-planting campaigns utilize volunteers to plant and care for trees (*a la* MillionTreesNYC; see Fisher et al., 2015). Often, nonprofit organizations engage citizens in urban greening; for example, the NeighborWoods initiative of US Alliance for Community Trees (ACTrees) involves neighborhood volunteers and community groups (civic associations, schools, churches, etc.) in tree planting and maintenance (http://neighborwoodsmonth.org/).

The benefits provided by the physical presence of trees and other greenspaces in urban environments have been well-studied in an international context. Westphal (2003) describes these benefits as being derived from "passive experience of a green environment" because the benefits accrue to individuals, organizations, and communities whether or not these parties are aware of or involved in the provision or management of the trees and greenspace. However, less is known about benefits from "*active involvement* in greening the environment," such as planting and caring for trees and landscape plants (Westphal, 2003 p. 139, emphasis added). Collective action between members of a community (like that undertaken in many greening projects) has been found to build community capacity and can build connections, trust, and reciprocity among individuals (Adger, 2003; Ostrom, 1996).

This paper contributes to the growing literature on the social benefits of active involvement in urban greening by examining whether collaborative nonprofit and neighborhood tree planting and subsequent tree care improves neighborhood community capacity. Tree planting, an activity with substantial engagement of US municipalities and nonprofits, provides an interesting case to examine the effects of neighborhood-level engagement in urban greening. In this study, we combine original data on neighborhood characteristics via a household survey with tree locations from nonprofit partners, land cover data, and socioeconomic data for 1551 individuals in 197 neighborhoods (Census block groups) in four cities in the Midwestern and Eastern United States. Survey responses from residents in neighborhoods that planted trees (i.e., planting neighborhoods) and in matched neighborhoods that did not plant trees (i.e., comparison neighborhoods) allow us to measure neighborhood characteristics that are not captured in existing administrative datasets like the US Census (Raudenbush & Sampson, 1999). Using regression analysis, we estimate the relationship between neighborhoods' participation in tree planting and three indicators of neighborhood community capacity. This study's novel approach that includes multiple cities and conducts within-city comparisons of planting and non-planting neighborhoods allows this research to get closer than previous studies in estimating the causal effect of neighborhood tree planting on neighborhood social outcomes.

2. Study motivation

Neighborhoods leverage human capital, organizational resources, trust, and social capital to achieve common goals that improve community well-being and address collective challenges (Chaskin, 2001; Sampson, Raudenbush, & Earls, 1997). Sampson and colleagues have described a neighborhood's capacity to achieve these common goals as collective efficacy (Sampson et al., 1997), and have identified two

linked components of collective efficacy: social cohesion and social control (Sampson, 2004). Social cohesion is high when neighbors know each other, trust each other, and have shared values (Raudenbush & Sampson, 1999; Sampson, 2004). Social control is the ability of the neighborhood to intervene in a particular problem (Sampson, 2004) and regulate its members according to desired principles (Sampson et al., 1997).

These neighborhood social and institutional characteristics serve an important role in community and individual well-being (Gieryn, 2000; Sampson, 2012). For example, collective efficacy has been found to be positively related to self-rated health (Moore et al., 2011) and child well-being (Sampson, Morenoff, & Gannon-Rowley, 2002), and negatively related to incidence of violent crime in a neighborhood (Sampson et al., 1997). A neighborhood's ability to face challenges and changes is increasingly important as global climate change places urban communities at greater risk of disturbances (Adger, 2003; Foster et al., 2011; Wickes, Zahnow, & Mazerolle, 2010).

Scholars in the field of urban forestry – the transdisciplinary science of the planting, preservation, and restoration of trees, forests, and other natural areas in cities – are increasingly recognizing the links between the environment and social systems in the urban forest (Campbell & Wiesen, 2009; Moskell & Allred, 2013; Vogt & Fischer, 2014). Scholars have examined the nature of civic stewardship in urban forestry (Ames, 1980; Connolly, Svendsen, Fisher, & Campbell, 2013; Fisher et al., 2015; Sommer, Learey, Summit, & Tirrell, 1994a; Westphal, 2003) and how civic engagement can influence tree success (Lu et al., 2010; Sklar & Ames, 1985; Vogt et al., 2015). Scholars in urban forestry have also proposed that tree planting can build community capacity by providing a venue for community members to interact (Elmendorf, 2008) and might encourage future engagement of community organizations in other issues (Summit & Sommer, 1998).

Several studies have examined dimensions of the social outcomes of urban greening activities. For example, research has found that individuals that participated in tree planting reported higher satisfaction with tree-planting projects (Sommer et al., 1994a; Summit & Sommer, 1998), had higher satisfaction if they plant with a group rather than alone (Sommer, Learey, Summit, & Tirrell, 1994b), and engaged in future civic activities because of tree planting (Fisher et al., 2015; Stone, 2009). Other studies examined the effect of participation in urban greening on community-level outcomes. In Chicago, Westphal (2003) found that urban landscaping, gardening, and vacant lot clean-up projects could increase empowerment in participating communities. However, she found that positive outcomes were not inevitable and the magnitude of social benefits varied across types of groups and projects. In a study of tree planting in Indianapolis, Indiana, Mincey and Vogt (2014) found that neighborhood groups that worked together to water trees they had planted engaged in significantly more collective activities (e.g., neighborhood cleanups, block parties) after the project than before. A study of community gardening in New York City found that environmental stewardship helped to renew trust, connections, and efficacy between neighbors (Svendsen, 2009). These largely single-city studies focused on neighborhood and resident urban greening participants.

This study contributes to this growing field by considering the influence of urban forestry activities on a novel outcome, community capacity, and by using a novel multi-city approach. Drawing from previous work that emphasizes the benefits of collective action and building on a pilot study conducted by several of this paper's authors (see Mincey & Vogt, 2014), this study focuses on the social outcomes of collective activities between neighborhoods and nonprofits to plant trees. To our knowledge, no previous research has investigated neighborhood-level social effects of tree planting using a comparison population of non-tree planting neighborhoods. By studying similar activities in four different cities and including a comparison group of non-tree-planting neighborhoods, this study presents a more robust case than previous single-city studies.