



Exploring ecological, emotional and social levers of self-rated health for urban gardeners and non-gardeners: A path analysis



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ABSTRACT

Rationale: The social, emotional, and mental health benefits associated with gardening have been well documented. However, the processes underlying the relationship between garden participation and improvements in health status have not been sufficiently studied.

Methods: Using population-based survey data ($n = 469$ urban residents), objective street environment data, and area-level measures, this research used a path analytic framework to examine several theoretically based constructs as mediators between gardening history and self-reported health.

Results: The results showed that garden participation influenced health status indirectly through social involvement with one's community, perceived aesthetic appeal of the neighborhood, and perceived collective efficacy. Gardeners, compared to non-gardeners, reported higher ratings of neighborhood aesthetics and more involvement in social activities, whereas aesthetics and involvement were associated with higher ratings of collective efficacy and neighborhood attachment. Collective efficacy, but not neighborhood attachment, predicted self-rated health. Gardening also directly influenced improved fruit and vegetable intake. The physical and social qualities of garden participation may therefore stimulate a range of interpersonal and social responses that are supportive of positive ratings of health.

Conclusion: This research suggests that community planners and health professionals should aim to strengthen the social and aesthetic relationships while designing environments and policies as a way to ignite intermediate processes that may lead to improved health status.

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1. Introduction

Over the past decade, there has been growing interest by the public health and planning communities to better understand how modifications to the built environment and related policies influence obesity, other chronic diseases and overall health (Cummins et al., 2007; Diez Roux, 2003; Jackson and Kochtitzky, 2003; Northridge et al., 2003; Sallis et al., 2006; Srinivasan et al., 2003). What is largely absent from the scientific literature is empirical research that examines the underlying ecological, emotional, and social processes that help realize the community health benefits from physical and natural features of the local

environment (Blacksher and Lovasi, 2012; Pereira et al., 2013; Wood et al., 2008).

Food producing landscapes including gardens in urban, suburban or rural settings (e.g., community or allotment gardening) (American Community Gardening Association, 2010), home gardens, and community farms represent model neighborhood environments and behavior settings through which we can explore processes that may be crucial in explaining how affordances of the built environment influence health behaviors and health status in a lasting way. Food producing landscapes, such as gardens, which support micro-social organizations within neighborhoods, may represent an important combination of physical improvements and social engagement to support healthy behaviors and healthy communities (Cattell et al., 2008; Sampson et al., 1997). As a way to dig further into the relationships between built, social, and health

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environments, this research is focused upon understanding connections between ecological, emotional, and social processes, and health, in urban gardens. This is done through investigating the pathways by which gardening influences self-rated health.

1.1. *The benefits of gardening*

The social, emotional, and mental health benefits associated with gardening have been well documented. Kaplan and others pioneered the idea that gardening contributes to mental health among home and community gardeners (Kaplan, 1973). A comprehensive review of the scientific literature on recreational gardening demonstrated that gardening improves mental health status through reduced levels of stress hormones (Brown and Jameton, 2000). Milligan and others have documented therapeutic benefits of communal gardening on allotments among older adults (Milligan et al., 2004). Others have documented the cognitive, social, and community benefits of gardening among school-aged children through changes in children's confidence, self-esteem, attitudes and learning (Bowker and Tearle, 2007).

Moreover, several studies have demonstrated the role of gardens in shaping health behaviors. For example, Park and others showed that gardening was an effective way for adults to meet the national guidelines for moderate to vigorous physical activity (Park et al., 2009). In other studies, urban gardeners reported fruit and vegetable intake levels that met national guidelines for fruit and vegetable consumption (Alaimo et al., 2008; Litt et al., 2011). The increase in fruit and vegetable consumption for all gardeners was almost two times larger than the increase seen across most other published interventions (Ammerman et al., 2002; Thomson and Ravia, 2011).

While there is ample evidence to demonstrate the benefits of gardening, understanding the processes that link garden participation and improvements in health status are not well understood. We posit that gardens impact self-rated health through key ecological, emotional, and social intervening processes, specifically through aesthetics, social involvement, collective efficacy, and neighborhood attachment. Our research draws on multiple theoretical frameworks including ecological system (Bronfenbrenner, 1979; Stokols, 1996), social capital (Carpiano, 2006; Kawachi and Berkman, 2000), social cognitive (Bandura, 1986) theories and the relational nature between people and places (Carolan, 2007; Conradson, 2005; Frumkin, 2005; Gesler, 1992; Hartig et al., 2014; Kaplan and Kaplan, 2005). Together, this multi-theoretical approach recognizes the range of influences on health at intra-personal, interpersonal, cultural, organizational, and environmental levels.

1.2. *Levers of change: aesthetics*

Aesthetic experiences help us understand the relational unfolding between people and places, such as the relationships between nearby nature (e.g., trees, green space) and neighborhood perceptions (e.g., perceived safety) (Kuo and Sullivan, 2001; Kuo et al., 1998) and health outcomes (e.g., obesity) (Pereira et al., 2013). These experiences occur at the individual and collective levels, are multisensory and play a key role in the development of environmental knowledge and in everyday engagement in one's surroundings (Capaldi et al., 2014; Foster, 2009; Hale et al., 2011; Neves, 2009).

Gardens are spaces that foster a sense of beauty among residents and encourage direct engagement in natural and social processes over time. By providing an alternative to city noise, pollution and heat, for example, urban gardens provide hands-on learning about the biophysical system that supports plants, animals and

microorganisms and a range of social and emotional processes associated with growing food in the garden (Hale et al., 2011; Neves, 2009). The tactile experience of gardening helps to embed individuals within these alternative social and natural worlds and, in turn, also helps embody a deeper awareness of others and the local environment (Carolan, 2007, 2011; Conradson, 2005; Milligan et al., 2004).

The garden experience also promotes social and civic learning as gardeners watch each other, ask questions, work together, make decisions, experiment and share results. This is rooted in a shared commitment toward the garden, and this commitment is not static. For example, it is shaped by formal workdays where aesthetics, ethics, and routines are shared, as well as regular garden-related activities and experiences, such as sharing seeds or plant knowledge, all of which are sustained through evolving interpersonal relationships and trust (Glover et al., 2005a; Hale et al., 2011; Teig et al., 2009).

We posit that the aesthetic experiences in community gardens generate meaning that encourages further engagement in garden-specific and neighborhood level activities, ignites strong emotional bonds to place (e.g., neighborhood attachment) (Arnberger and Eder, 2012; Hale et al., 2011) and develops positive social experiences (de Vries et al., 2013; Hale et al., 2011; Maas et al., 2009; Wakefield et al., 2007). Such processes relate to attitudinal and behavioral changes (Alaimo et al., 2008; Carolan, 2007; Hale et al., 2011; Lindstrom et al., 2001; Litt et al., 2011), overall quality of life (Foster, 2009; Hale et al., 2011; Wood et al., 2008), and improvements in health conditions (Cohen et al., 2006; Pereira et al., 2013).

1.3. *Levers of change: social involvement*

Social involvement fosters access to social resources and social learning and helps define and reinforce meaningful social roles (Berkman and Glass, 2000; Hale et al., 2011; Litt et al., 2011). Behavioral settings associated with leisure activities that require active and sustained participation can lead to deeper engagement in civic life (Glover et al., 2005b; Hemingway, 1999). Studies of community gardening show that the process of direct participation and social engagement promotes individual ownership of and commitment to the garden structure, enhances community engagement, and empowers residents to get involved on a variety of civic issues (Alaimo et al., 2010; Delind, 2002; Litt et al., 2011; McIvor and Hale, 2015; Teig et al., 2009; Travaline and Hunold, 2010). Glover and others found that strong social relationships formed within community gardens facilitated social organization and increased community capacity for accessing resources and social learning (Glover et al., 2005a). Such involvement seeds the formation of trust and reciprocity, which are necessary ingredients for collective action and exercising informal social control (Anselin, 1995; Subramanian et al., 2002; Teig et al., 2009).

1.4. *Levers of change: collective efficacy*

Defined by Sampson and others, collective efficacy is "the link between mutual trust and a shared expectations to intervene for the common good of the neighborhood (Sampson and Raudenbush, 1999; Sampson et al., 1997)." Social cohesion and informal social control are the two major tenets of collective efficacy (Sampson et al., 1997). This concept reflects the neighborhood conditions that help actualize social networks to achieve desired outcomes (Rose and Clear, 2001). That is, neighborhood collective efficacy reflects the process by which social resources, such as trust, cohesion, shared norms and values, and informal control, are translated into specific social and health outcomes such as public order,

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