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Community gardens support stress coping and health – A comparison of rural and urban perceptions of benefits

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ABSTRACT

Community gardens provide health and stress coping benefits in various geographic settings. However, despite the different structural contexts of rural and urban areas, little work has considered how community garden health benefits may differ in these contrasting settings. We collected and analyzed in-depth interviews ($N = 34$) with mostly White, middle-class rural and urban community garden organizers across the United States to explore understandings of community garden health benefits within these different geographic contexts. Rural participants emphasize the holistic community orientation of their gardens, which were simultaneously embedded in, strengthening, and reliant upon their surrounding communities. In contrast, urban participants emphasize experiences of their gardens as natural spaces and emphasize community gardening as a key driver of interacting with nature. While increases in social connectedness and interactions with nature have been shown to improve health through promoting stress coping, our comparative approach demonstrates the varying impact community gardens can have in rural and urban settings.

Introduction

Community gardens – open spaces managed by local community members who also grow the food and/or flowers produced there (Guitart et al., 2012; Holland 2004; Kingsley, Townsend, and Henderson-Wilson 2009; Pudup 2008) – are located in both urban and rural settings and provide a wide range of health benefits from improved diet (Alaimo et al. 2008; Barnidge et al. 2013; Twiss et al. 2003) and mental health to increased physical activity (Draper and Freedman 2010; Lampert et al. 2021; McCormack et al. 2010; Mundel and Chapman 2010; Twiss et al. 2003). Community gardens improve the health of the communities in which they are located through the sharing of garden produce, improved community visual appeal and walkability, increased open and green space, and opportunities for educational and job-skill improvement within the community (Corrigan 2011; Ferris, Norman, and Sempik 2001; McCormack et al. 2010; Voicu and Been 2008; Wakefield et al. 2007). Community gardens also improve health by acting as a buffer against the negative health impacts of stress (Hawkins et al. 2011, 2013; Van Gundy et al. 2011). Participation often improves stress coping resources like social support (Gerber et al. 2017; McEwen 2006; Thoits 1995), exercise (van den Berg et al. 2010; Hawkins et al. 2013), and connection to nature (Hawkins et al. 2011, 2013).

However, little research investigates how community garden setting may shape variations in specific health benefits and the emphasis placed on those benefits. Research on community garden health benefits has largely focused on gardens in urban areas (Alaimo et al. 2008; Draper and Freedman 2010; Lampert et al. 2021; Litt et al. 2011; McCormack et al. 2010; Mundel and Chapman 2010). Less attention has been given to community gardens located in rural settings, and even less considers comparative differences between rural and urban gardens (Berg et al. 2023; Draper and Freedman 2010). Structural-contextual differences between urban and rural spaces likely impact how community gardens benefit health in each setting. For example, rural residents have limited access to retail food outlets or health facilities like supermarkets and grocery stores, hospitals, and doctors (Bolin et al. 2015; Morris, Neuhauser, and Campbell 1992; Morton and Blanchard 2007; Powell et al. 2007; Ricketts 1999), and amenities like public transportation (Armstrong 2000a). At the same time, urbanization itself limits residents' access to the natural environment (Dallimer et al. 2012), which provides measurable benefits to health through mechanisms like stress reduction and cognitive development (Brown and Grant 2005; Irvine and Warber 2002; McCormick 2017; Mygind et al. 2019; Schutte,

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Torquati, and Beattie 2017; Yang et al. 2019). Food, community, and access to nature are all documented benefits of community gardens; their salience, however, may vary by geographic setting given these unique rural and urban structural contexts.

Much of the literature that does include rural community gardens overlooks structural differences in urban and rural settings and/or lacks comparative consideration of rural and urban gardens (Berg et al. 2023; Chauvenet et al. 2022; Gorton, Bullen, and Mhurchu 2010; Morton et al. 2008; Piaskoski, Reilly, and Gilliland 2020). For example, Armstrong (2000b) compares urban and rural gardens with a small sample in New York, finding that urban gardeners focus more on experiencing nature and rural gardeners focus more on cultural preservation, but they do not consider the role of differing social context of rural and urban setting in shaping these foci. Bussell, Bliesner, and Pezzoli (2017) include rural gardens in their study of the health and economic benefits of community gardens, and Berg and colleagues (2023) demonstrate interest in and effectiveness of community gardens as part of a broader health promotion project in rural Georgia, but neither study includes comparison with urban gardens.

Community gardens promote health in diverse ways for both urban and rural populations. However, given the unique structural-contextual environments of rural and urban settings, there are likely important differences in how urban and rural populations understand and benefit from community garden participation that are not yet well understood in community garden and health research. Understanding how health-promoting benefits differ between urban and rural community gardens is essential for tailoring public health recommendations (i.e. nature-based interventions, gardening programs, etc.) and guiding land-use policies that may support or inhibit garden establishment and development. Given that community garden research has focused primarily on urban settings (Alaimo et al. 2008; Draper and Freedman 2010; Lampert et al. 2021), with only one study comparing the health-promoting benefits reported by rural and urban gardeners (Armstrong 2000b), we ask: How do perceptions of health-promoting community garden resources differ among urban and rural gardeners?

Background

Community and rural health

Community gardens may help mitigate stressors and poor health outcomes experienced by rural populations through access to health promoting resources that may be limited in rural communities, including healthy, affordable foods (Gorton et al. 2010; Morton and Blanchard 2007; Piaskoski et al. 2020; Thompson et al. 2020) and social support (Baernholdt et al. 2012; Gerber et al. 2017; Hawkins et al. 2013; Mangadu et al. 2017; Thoits 1995). Food environments, measured as the availability, accessibility, affordability, acceptability, and accommodation of fresh food in the local environment (Caspi et al. 2012), are often limited in rural spaces (Gorton et al. 2010; Morton and Blanchard 2007; Piaskoski et al. 2020; Thompson et al. 2020). Food may be present in rural environments, but is often expensive, far away from residents' homes, or not fresh (Piaskoski et al. 2020). While rural residents mobilize social and human capital, like food sharing and gardening skills, to prevent this limited food access from manifesting in increased rates of food insecurity as compared to urban residents (Gorton et al. 2010; Piaskoski et al. 2020), poor health outcomes like diabetes and heart disease, linked to a lack of fresh produce, are still a major concern, especially for rural residents of color (Thompson et al. 2020).

Research indicates community gardens are spaces that generate social connection and support (Gerber et al. 2017; Hawkins et al. 2013; van Holstein 2017; Mangadu et al. 2017), facilitating stress coping and subsequent improved health outcomes (Piaskoski et al. 2020; Thoits 1995; Van Gundy et al. 2011).The social benefits individuals gain from participation in community gardens can be understood as forms of social capital, or benefits gained from social networks, including emotional support, such as empathy or care, instrumental support, such as money or labor, or information support, such as useful advice or information (Bourdieu 1985; Ferlander 2007; Portes 1998). In addition to providing health promoting material resources, health advice, and healthcare, social connections with family, friends, co-workers, and community members can buffer the impact of health-harming stress through emotional, instrumental, and informational support (Thoits 1995). An extensive body of research links higher social capital to better health, including reduced mortality, higher self-rated health, and decreased likelihood of chronic illnesses (Ferlander 2007; Kim, Kawachi, and Subramanian 2008; Linde and Egede 2023). Studies indicate involvement in community gardening is linked to higher reported social capital (Gerber et al. 2017; Hawkins et al. 2013; van Holstein 2017; Mangadu et al. 2017). For example, Mangadu and colleagues (2017) found that community gardeners reported feeling more involved in their neighborhood and had made more friends through garden involvement. Among a sample of Nepali Bhutanese refugees, Gerber and colleagues (2017) found self-reported perceived social support was higher among refugees engaged in community gardening compared to those who were not.

Social and community connections represent an especially impactful resource in rural areas. Rural residents, especially older adults, are more prone to social isolation than their urban counterparts (Baernholdt et al. 2012), but also have a greater need for community inclusion and acceptance, given the geographic isolation and inter-dependency of rural communities and small towns (Van Gundy et al. 2011). For rural youth, community attachment is associated with decreased depressive symptoms (Van Gundy et al. 2011). Further, rural residents use social connections and community to resist food insecurity through sharing food and prepared meals with neighbors or throughout the community more broadly (Piaskoski et al. 2020).

The social connections and support that community gardens generate may be especially relevant within a rural context even though their importance has been established in urban settings. Two recent studies of community gardens in the rural Southern U. S. both highlight community integration and community building as key aspects of these resources (Berg et al. 2023; Chauvenet et al. 2022). Community garden integration into rural schools and agricultural education programs was common among rural Georgia community gardens, where rural schools are community gathering places, common employers, and sources of meals for the community (Berg et al. 2023). In rural North Carolina, community gardeners understood community cohesion as a critical aspect of the garden, whether through the garden fostering a sense of community among participants or through the garden bringing together diverse groups from the local community to a shared space (Chauvenet et al. 2022).

Green space and urban health

Community gardeners report feeling more connected to nature through gardening (Hawkins et al. 2013; van Holstein 2017), and connecting with nature has been shown to improve stress coping (Hansmann, Hug, and Seeland, 2007; Keniger et al. 2013). Interacting with nature is associated with improved mood and psychological well-being and reduced aggression (Kuo and Sullivan 2001), anxiety (Chang and Chen 2005; Keniger et al. 2013), and cortisol levels (Van Den Berg and Custers 2011). Experiences of nature, in contrast to urban infrastructure, reduce physical response to stressors and speed recovery times for those stressors (Parsons et al. 1998; Ulrich et al. 1991). In their review of existing experimental literature on the impacts of nature on stress, Mygind and colleagues (2019) find a consistent improvement in heart rate variability from relaxing and walking in natural rather than urban spaces. Green spaces also lessen the impact of stress on the autonomic nervous system and improve concentration and life satisfaction (Irvine and Warber 2002). Cox and colleagues (2017) also find that those who visit green spaces, particularly those with more

vegetation cover, more often and spend more time in them had lower rates of depression and exercised more regularly.

The connections with nature generated in community gardens may be especially important in urban settings, which lack green space and subsequent biodiversity from the urbanization process itself (Dallimer et al. 2012). Some scholars of (primarily urban) community gardens argue that their benefits are rooted in and facilitated by engagement with ecological surroundings integral to growing food (Hale et al. 2011; Poulsen, Neff, and Winch 2017). As green spaces, community gardens can benefit physical and mental health by improving healing, heart rate, concentration, stress levels, blood pressure, and mental well-being (Brown and Grant 2005). Lampert and colleagues (2021) frame community gardens as uniquely beneficial to urban residents through increasing access to the natural environment and the related improvements to mental health that accompany this increase in their recent review of quantitative research on community garden health outcomes. Petrovic and colleagues (2019) even find that the food outcome of growing food was not as important as the activity itself in community gardens across Harlem. Engaging in environment-oriented activities within green spaces, like community gardening, has also been shown to bring even greater improvements to health than enjoying a green space without this engagement (Carrus et al. 2015). Further, the perception of increased biodiversity that likely accompanies community gardens, given that each gardener is often choosing different plants to grow, may also increase the health benefits from them as green spaces (Carrus et al. 2015).

Improved access to affordable, high quality, fresh produce likely also promotes health among urban community gardeners, especially those from historically marginalized communities. Some urban residents lack availability, accessibility, affordability, acceptability, and accommodation of fresh food in their local environment (Caspi et al. 2012). Non-White and low-income urban residents are more likely to live in poor local food environments than their more privileged counterparts (Miller, Middendorf, and Wood 2015; Walker, Keane, and Burke 2010). For example, Kwate (2008) argues that the lack of access to fresh food in Black communities within large cities like New York, Chicago, and Boston stems from racial residential segregation. The population, economic, and physical characteristics of segregated communities, as well as social processes like neighborhood stigma, political power, and community strength all shape disproportionate exposure to fast food outlets in Black urban communities (Kwate 2008).

Data and methods

Research design

This qualitative study uses primary semi-structured interview data collected as part of a larger mixed-methods project that was reviewed and approved by the Institutional Review Board at University of California, Merced, and conducted throughout 2016 and 2017 by the first author and a co-PI. The study included a national survey of community garden managers and participants from rural and urban areas across the United States. We partnered with the American Community Garden Association to recruit survey participants and therefore included a wide range of community gardens in our outreach: allotment-style gardens, school gardens, communally-managed gardens, and more (ACGA 2024). We mainly recruited interview participants from a question included at the end of this survey asking respondents to indicate if they would be willing to participate in further research. Because the majority of interview participants identified through this method were from urban or suburban gardens and we were interested in comparing urban and rural community gardening experiences, we targeted rural community gardeners in our later outreach efforts. To do this, we asked specifically for rural community gardeners when recruiting for our last five interviews with survey participants. We also identified five rural community gardens not represented in our survey sample through a combination of internet searches and snowball sampling. We interviewed participant-organizers from four of these five additional rural community gardens. With this sampling method, we ultimately reached saturation in our interviews with each set of gardeners: rural and urban. However, because of our targeted outreach method, rural gardeners may be over-represented among our interview sample as compared to the overall population of community gardeners in the United States.

Interviews were conducted in English and varied in length from thirty to sixty minutes. Interviews were conversational but were steered by a standardized interview guide developed by the first author in consultation with the co-PI on the larger research project. This guide included questions about participants' role in their community garden, their motivations for participating in the garden, what they saw as the main benefits of participating, and what challenges they encountered in their gardens. Interviews also yielded detailed descriptions of the gardens and their connections to local communities. Interviews were recorded and later transcribed. The first author reviewed interview transcriptions in Atlas.ti 9 (ATLAS.ti Scientific Software Development GmbH 2020) using grounded theory analysis: an inductive-deductive process of identifying themes present in our interview data, categorizing these themes, and integrating them within existing theory (Birks and Mills 2015). Throughout this analysis, the first author drafted memos on identified themes related to community gardening benefits and positionalities within local communities as well as comments on specific interviews that were especially characteristic of urban or rural gardens throughout the sample. These memos and comments helped to clarify how these themes inform existing theory on community gardens in rural or urban settings, and were used as reference material as we drafted the results section below. All research participants are referred to using pseudonyms throughout this manuscript to maintain anonymity and protect privacy.

All together, we reached saturation with 34 interviews with community gardeners throughout the United States who participated in an allotment-style garden (nearly all our interviewees), a communally-managed garden, a school garden, or a church garden; all gardens were focused on growing food and/or flowers. Seventeen interviewees were from urban community gardens in Midwestern states (Illinois and Kansas), Western states (Arizona, California, Oregon, and Washington), Northeastern states (Connecticut, New Jersey, and Pennsylvania), and the Southern state of Texas. Eleven interviewees were from rural community gardens in Western states (California, Colorado, and Washington), Northeastern states (Maine, Massachusetts, and Vermont), and the Southern state of North Carolina (Table 1). We allowed participants to self-identify their garden's urban, rural, mixed, or suburban status as much as possible. When clarifying our position for participants, we defined rural as "small towns, villages, or other non-urban areas with few residents, non-concentrated populations, or little non-residential land use" based on U.S. Census classifications of rural and urban (Census Bureau 2020).

Nearly all our interview participants took on some kind of organizational role in their gardens (88 %) in addition to their own gardening activities (Table 1). The most common organizational role was as a garden manager, but some interviewees were staff at non-profit or government organizations that supported their gardens. Our interview participants were also mostly White (88 %), middle-class (44 % had a graduate or professional degree; median household income was $82,500), older (average age of 54) women (79 %), a much less diverse population than the country overall (Table 1). This homogeneity was consistent across rural and urban gardeners we interviewed, despite the increased homogeneity of many rural U.S. contexts (Brown and Schafft 2011). While this allowed us to isolate geographic context in our exploration of differences between urban and rural gardeners, it also limits the generalizability of this study, which we discuss more in our conclusion.

Table 1
Interview Sample Demographics.

Interview Participants					U.S.[1]
Measure	**Response**		**Count**	**Rate**	**Rate**
Gender ($N = 34$)	Male		7	20.6 %	49.2 %
	Female		27	79.4 %	50.8 %
Education ($N = 25$)[2]	High school graduate		2	8.0 %	27.2 %
	Some college		2	8.0 %	20.6 %
	B.A./4 year degree		10	40.0 %	19.3 %
	Graduate or Professional Degree		11	44.0 %	11.9 %
Race/Ethnicity ($N = 25$)[3]	Non-Hispanic White		22	88.0 %	61.1 %
	African American		1	4.0 %	12.7 %
	Mixed-Race		2	8.0 %	3.2 %
Location ($N = 34$)	Urban[4]		17	50.0 %	
	Rural[5]		11	32.4 %	
	Mixed and/or Suburban[6]		6	17.7 %	
Participation ($N = 34$)	Organizer Only		1	2.9 %	
	Organizer Participant		30	88.2 %	
	Participant Only		3	8.8 %	
Measure	**Range**	**Mean**	**Median**	**SD**	**Median**
Age ($N = 25$)	26 - 78	54.4	57	13.98	37.9
Income ($N = 25$)	$40,000 - $500,000	$103,500	$82,500	$88,087	57,617

[1] Source: United States Census American Community Survey 1-year estimates for 2016, the year in which our data collection began.

[2] Interviews were followed up with an email inquiry about interviewees' race, income, education, and age. Nine interview participants did not respond to this email request, making the sample size for these measures 25 instead of 34.

[3] We only report here on racial groups that at least one of our interview respondents identified with.

[4] Four urban gardeners were from California, three were from Washington state, two were from New Jersey, two were from Texas, and one was from each of the following states: Arizona, Connecticut, Illinois, Kansas, Oregon, and Pennsylvania.

[5] Three rural gardeners were from North Carolina, two were from California, two were from Massachusetts, and one was from each of the following states: Colorado, Maine, Vermont, and Washington.

[6] One mixed/suburban gardener declined to share their location, while one was from each of the following states: Georgia, Maine, Massachusetts, North Carolina, and Pennsylvania.

Results

On balance, gardeners and organizers highlighted a broad range of community gardening benefits, including food production, gardening knowledge, exercise, and satisfaction. These benefits were common to urban and rural gardens and often matched the needs of an individual gardener. For example, both urban and rural participants talked about building advanced gardening skills and knowledge and growing food in the garden as benefits. At the same time, we find some patterns that reveal meaningful differences in how urban and rural community gardens provide benefits associated with stress-coping and overall health. Rural community gardens were simultaneously embedded in, strengthening, and relying upon their surrounding communities – a phenomenon we refer to as *holistic community orientation*. While building relationships and interacting with fellow gardeners was mentioned by both urban and rural gardeners, urban gardeners rarely discussed connections to or integration with the local community. At the same time, urban community gardeners emphasized benefits of accessing and interacting with nature, which were rarely explicitly acknowledged by their rural counterparts.

Rural community orientation

Participants of rural gardens emphasized a more *holistic community orientation*, where their gardens were reliant on their communities both for development and tenure. Rural community gardeners described community members supporting the garden, even when they were not participants. At the same time, the benefits of the garden were often described as supporting the broader community, not just garden participants. These gardens also relied on local organizations and businesses for their creation and upkeep, and broader community participation for garden tenure. Community was even important for the act of gardening; participants learned from one another through observing successes and failures in neighboring plots and related conversations with fellow gardeners.

Rural gardens were often well-integrated into the community and had aims to benefit the entire community, even when established in a specific subset of that community. For example, John helped start a community garden at a high school in his local rural area. The express purpose of the gardens was to build farming and business skills among the town's youth and the program was integrated with the school's Future Farmers of America group. The garden was mostly managed and cared for by high school students, but community members unaffiliated with the school were also invited to care for plots within the garden and participate in community work days. While this garden was explicitly an investment in the students, it also had a *holistic community orientation*. For example, John explained that organizers got the garden exempt from a local ban on raising chickens so that students could build skills that would connect them to a common local industry: poultry production. Rather than being solely for the benefit of the students, the goal was also to "tie us to our high school students" and keep them in the area and building the local economy through farming. Interestingly, John tied this community orientation directly to solving the uniquely rural problem of young people moving to urban areas with more education and employment opportunities:

> *You had this effort that tied citizens in the community to the young people in the community, so when they go away to school, if they go away to school, that they then end up with the chance to come back to their community. You know, you lose your young people. You lose the ones that are going to get married, raise kids, and grow your community. Like a lot of rural towns, we haven't lost population, but it's been a struggle.*

This community orientation came up repeatedly in the conversation with John, who also more directly stated:

> *The idea was that we would like to create a place where we get more integrated with the community, with the high school.*

He went on to compare the community garden to local football games in rural areas, where there's a sense of community built around them and, as he put it, "People even that don't have kids in high school go to the football game." John also saw this community-integration as uniquely rural:

> *well that's part of what I consider the advantages of rural life, is that you can have a part of the community and take part in it.*

He described community as an asset of rural life that, he went on to say, could be shared with urban neighborhoods through community gardens. Throughout the interview, John expressed his interest in sharing his approach to community gardening with others, particularly his community's approach to framing their community garden as an economic development asset that provided training that could keep young people in the rural area and ultimately benefit their local economy. To John, community was highly valued in his rural area and the community garden was both embedded in and strengthening that community.

Nancy, who manages a rural community garden she described as focused on the broader community, provides another example of *holistic community orientation*. She explains the importance of the community garden in her town as giving them a sense of pride in their town.

> *I think the garden has given people in [our town] a sense that, "Oh, this is what we do, as [our town]. We support this, this is something we're proud of."*

Nancy followed this explanation by discussing (for several minutes) various community organizations, projects, and grants the garden has been connected to. For this garden as well, community embeddedness was directly linked to community strength and cohesion. Similarly, Marg, who helped manage her community garden in a rural area with lots of seniors and families with children, explained one benefit of the garden as having "children come to the garden and pick up some gardening skills" from local seniors. Here, community integration allowed participants to build social ties throughout the community and gardening skills among younger generations.

Beverly also portrays this community orientation in describing the community garden she manages in the center of a small village in what she described as a "very, very rural" area. The property itself has a long history of being a community gathering spot, even though it had been privately owned for some time.

> *It's 15 acres, and it's a property that has a lot of history as a granite working site. It also has a lot of history of use by the town, so that even though up until we owned it, it was privately owned; it was really just used by everybody because for a lot of reasons, it just had a history as a sort of gathering spot. There's a spring festival that happens there every year, and farmers' market. … [T]he community gardens got moved onto the property after we bought it in 2008, and we were able to buy it with a conservation easement put on it so that it would … always be a property that's open to the public. … So much of it was trying to figure out a way that this property could continue to be a community gathering property*.

The land itself was already embedded within the social structures of this rural town, and Beverly described the steps her organization took to ensure it remains open to the public as a community garden. While Beverly also mentioned the garden's intent to reach the residents of the low-income housing immediately surrounding the garden, this focus did not come at the expense of maintaining the garden as a space for the entire community.

Like many of the rural gardens our participants described, Beverly's garden was also integrated with local schools, farmers markets, and other programs. This garden also had a community orchard and was connected to local bike paths and trails frequented by community members, representing another way this garden was structurally embedded in the community geographically surrounding it. Similarly, Lucie, president of her rural community garden, noted that the founders of her garden were well-integrated within the local community; she describes them as "very involved in practically every other committee in town." Lucie goes on to explain that the space itself is central to her rural community as well, being adjacent to "the community field where people play soccer." She discussed this community integration in response to a question about participant recruitment; this community integration kept local interest in this rural community garden strong.

Along with supporting local community, rural gardens also relied heavily on local community ties for fundraising and participation, both important for garden tenure. For example, when asked about resources, Sarah, who helped start and now manages a newer community garden in a rural area, describes a variety of local organizations and businesses that invested small amounts into helping start the garden:

> *[W]e have a local community foundation who gave us $3000. I heard about a local company who does community grants, and reached out to them, they gave us $700. Like I mentioned, we went and presented at the Rotary club, and they agreed to give us $1000, and then we went around to all our local businesses in our area and got several monetary donations from them, like local hardware stores and stuff like that … And then we had a lot of $100 and $50 donations. We ended up raising somewhere between $8000 and $9000 for our supplies, which isn't a huge amount, but it was basically what we needed.*

The support from several local entities combined to provide the resources needed to start the garden, demonstrating a connectedness between the community garden and the local community. This reliance on small chunks of funding from local groups and businesses demonstrates how community gardens are embedded in their local communities, offering a space to connect gardeners with the broader community, facilitating social support.

Urban access to nature

Urban gardeners often focused on their gardens as providing space for them to spend time in nature and enjoy its visual aesthetic. Ashley participated as a gardener in two separate community gardens in the large city where she lives and works. Demonstrating her interest in accessing gardening space, she proudly referred to her plots as her gardening empire because, as she put it, "I live in a second story apartment, but I have 200 square feet that I garden." Her focus throughout our interview was largely on the natural environment and her interactions with it. She was even very strategic about maximizing her growing capacity within the space she had. She had two plots, each at a separate garden with different landscape features that allowed her to grow more types of plants. One of these gardens was on the roof of a parking garage, which came with the convenience of ample sunlight as well as drip irrigation, which no other gardens across the city had; however, she chose that garden because of its short waitlist rather than amenities or location. She strategized about where to plant which crops as well:

> *I put all my tomatoes on top of the rooftop in that garden because it does great with tomatoes. 'Cause it gets consistent watering and it gets the most sun. … Then, at the other garden, it's not quite as sunny. I'm in the least sunny part of the garden, so I tend to do a lot of beets and kale and lettuces and green beans and stuff that can tolerate a little bit cooler weather*.

Other urban gardeners saw community gardening as integral to increased interaction with and experience of nature. Janice, who described herself as "not a natural city person, but I've adapted well," had a background in horticulture and had been coordinating her urban community garden for over ten years. She described the garden as giving people a reason to be outside in a broader social environment with increased technological integration through things like smartphones.

> *I think most people see the inadequacy of all that, an Amazon and Facebook world. … [But] it's still that sort of, I have to have an appointment to go outside. I have to have a reason to go outside. So the garden gives you a reason to go outside and dig in the dirt. Because if you were just going to go walk in the park and try and enjoy being outside, I think a lot of us aren't prepared to do that; to just walk and enjoy being in nature, in a city park. You've got to get out there and be doing something…*

Janice went on to say that without having something specific to do outside "I end up standing still, looking at my phone." For her, one important benefit of the garden was interrupting non-nature-oriented habits to focus on and interact with nature through "digging in the dirt" in the garden. Janice describes her community garden as integral to participants engaging in activities that existing research has demonstrated the stress reduction benefits of: engaging with nature.

Fred, a long-time gardener and city-dweller who had managed his urban community garden for about six years, tied experiencing and interacting with nature in the garden, especially in the urban context, directly to health, with a particular emphasis on stress reduction.

> *Another thing that you get, even at your home garden but you get more so in a community garden, is the health aspect as far as I'm concerned. First of all, you're turning soil, you're active, you're busy, you're not thinking of the hectic life we live, and the traffic, and the garbage that we all get inundated with. You're just thinking about planting something and making it grow, and then walking around the garden, admiring all the other people's endeavors. In that you get a health benefit. There's some tranquility that comes along with it.*

For Fred, the health benefits stemmed from both the act of gardening and interacting with nature, but also from the tranquility he found in observing the garden plots of others, especially in contrast to a more stressful environment of traffic and "the hectic life we live." While he also had a home garden, he identified these health benefits as more substantial in a community setting. Fred indicates that community gardens may stand out in urban settings as especially important green spaces for overall health.

Urban gardeners also highlighted the aesthetics of their gardens as important benefits. For example, Evelyn described the beauty of her urban community garden, and the pride it brought her to foster this beauty, as one of the main benefits of her organizing work.

> *…there's a lot of beauty in the garden. And I get a lot of people "Oh, I drive by that place and it looks really good" and there's a lot of kudos that have come through that. And that's just very rewarding because that's like, "Wow, I was behind that." Or, "I'm a big part of that."*

Evelyn helped start her urban community garden, now managed in partnership with the local parks department, and takes pride in community members enjoying how the garden looks. Similarly, Dorothy noted that "We have people who come regularly through to take pictures of plants" in the urban community garden she participates in and helps organize some food donations from. Urban community garden aesthetics were described as valuable to garden participants and the surrounding community alike.

For the urban gardeners we talked to, the focus on interacting with nature in urban community gardens was rooted in accessing nature itself, rather than growing food for consumption. For example, Ashley's stated benefits that she got from the garden did not include food, but focused on experiencing nature, both in terms of participation and aesthetics:

> *Having an excuse to be outside, learning about gardening, both of the gardens are really cool looking.*

These stated benefits were consistent with her gardening decisions. While Ashley was strategic about the vegetables she planted in each of her two gardens, much of what she grew was flowers for her own enjoyment. She also focused on the aesthetic benefits of the produce that she grew, sometimes even refraining from picking it. She identified the benefit from all that strategic work she put in to growing the right produce in the right areas not as supplementing her diet, but as the experience of having a full garden.

> *I do not want to pick the food because it looks so good and I just don't want to make bare spots in my garden. I've been working so hard to fill it out, so I'm really guilty of leaving some stuff and it probably goes bad. Probably 15 % of my food goes bad because I just can't bring myself to take it out of the garden.*

Similarly, Alice, who grew up on a farm and helped start and manage a community garden at a church in her local urban area, notes that food consumption is not really what she gets from gardening, describing it rather as a hobby or lifestyle.

> *It's kind of a hobby, and… lifestyle kind of thing. But it's not really for food consumption.*

While food was being grown, improved diet was not the mechanism through which these urban gardeners found health benefits. These examples demonstrate the privileged status of the urban community gardeners we talked to because they were not concerned with the contribution of their garden participation to meeting their basic needs. However, these examples demonstrate that urban community gardens benefit health beyond their contributions to meeting basic food needs through fostering engagement with nature.

Discussion

Our findings indicate that while urban and rural gardeners share some common benefits, such as food production, gardening knowledge, and personal satisfaction, rural gardeners uniquely emphasized their gardens' embeddedness in their community—both strengthening the community and relying on the community for support—what we call *holistic community orientation.* In contrast, urban gardeners uniquely emphasize gardens as a space to connect with nature. Our findings demonstrate the malleability of community gardens to provide health-promoting benefits a community may lack (i.e. community connection for rural gardeners who may experience isolation and connection to nature for urban gardeners who may lack access to green space).

Our findings are congruent with research which demonstrates that community gardens provide a wide range of benefits, many of which improve health through factors that help mediate the negative health impacts of stress like community building and access to nature (Alaimo et al. 2008; Barnidge et al. 2013; Corrigan 2011; Draper and Freedman 2010; Ferris et al. 2001; McCormack et al. 2010; Twiss et al. 2003). However, much of the literature on community garden benefits focuses on gardens in urban areas, leaving little consideration of rural community gardens or their benefits (Armstrong 2000a; Draper and Freedman 2010). We therefore consider differences by geographic location (rural vs. urban) in how community gardeners articulate the benefits they identify from their participation. Findings indicate both rural- and urban-specific strengths of community gardens in providing benefits that impact health. Rural gardeners understand their gardens as simultaneously embedded in, benefiting, and reliant on their local community. We know from existing research that community engagement is especially important for supporting health in rural settings through stress reduction and access to resources (Baernholdt et al. 2012; Crouch et al. 2020; Piaskoski et al. 2020; Thoits 1995; Van Gundy et al. 2011). At the same time, urban gardeners focused on the increased access to, experience of, and interaction with nature they got from their community garden participation. Similarly, existing research demonstrates the importance of natural spaces for reducing stress and promoting health (Chang and Chen 2005; Hansmann et al. 2007; Keniger et al. 2013; Kuo and Sullivan 2001; Parsons et al. 1998; Ulrich et al. 1991; Van Den Berg and Custers 2011), especially in urban settings where natural environments are systematically lacking (Dallimer et al. 2012). These findings demonstrate the responsiveness of community gardens to the differing needs associated with urban and rural geographic contexts.

This work confirms urban and rural differences in community garden benefits predicted by existing research. The *holistic community orientation* we observed among rural gardeners suggests the potential for gardens to impact rural food insecurity through fresh produce sharing (Berg et al. 2023; Corrigan 2011; McCormack et al. 2010) and further benefit health through increased social connection and social capital that rural residents often lack (Baernholdt et al. 2012; Crouch et al. 2020; Van Gundy et al. 2011). Similarly, urban community gardens' improvement to urban green space represents a meaningful contribution to participant health in an urban landscape where green space is uniquely lacking (Mygind et al. 2019; Parsons et al. 1998; Poulsen et al. 2017; Ulrich et al. 1991). While this green space benefit is consistent with literature on urban community gardens (Hale et al. 2011; Poulsen et al. 2017), our findings suggest that it is a disproportionately urban benefit of community gardens.

The present study adds the concept of *holistic community orientation* to the community gardening literature. Rural community garden participants talked about their gardens as embedded in their local communities and strengthening those same communities, all while their existence relied on financial support from local businesses and participation from community members. Community-centered benefits have been identified in existing research on urban community gardens (Armstrong 2000a; Butterfield and Ramírez 2021; Draper and Freedman 2010). What was unique about the discussion of community among rural

gardeners in this study was its holistic nature. Beyond being spaces where individual gardeners met one another, some rural community gardens served as meeting places also frequented by community members not affiliated with the garden. Some rural community gardeners even understood their gardens as maintaining the future of their rural communities by developing farming skills in the local youth. For rural community gardeners in this study, community gardening wasn't just something they did; their gardens were part of their local community and represented a way for them to engage with their villages, beyond their fellow gardeners. The *holistic community orientation* of community gardens provides participants with multiple pathways to health promoting benefits (Alaimo et al. 2008; Barnidge et al. 2013; Corrigan 2011; Draper and Freedman 2010; Ferris et al. 2001; McCormack et al. 2010; Twiss et al. 2003).

More broadly, our findings suggest community gardens are community health resources with the responsive capacity to meet the needs of their constituents in different social contexts. The participatory nature and communal structure of community gardens may position them to represent their participants especially well. The *holistic community orientation* of gardens in rural areas where social connectedness is often simultaneously limited and linked to accessing other resources (Baernholdt et al. 2012; Crouch et al. 2020; Van Gundy et al. 2011), may result from garden organizers and participants instilling their values within their garden's structure, making it more community-oriented and more strongly embedded in the local community. In other words, the strong need for community in rural areas may be shaping the focus of rural gardens towards proving this need. Similarly, the focus on interactions with nature among community gardeners in urban areas where green space and access to nature is limited by the urbanization process itself (Mygind et al. 2019; Parsons et al. 1998; Poulsen et al. 2017; Ulrich et al. 1991) demonstrates the responsive capacity of urban community gardens to meet the specific needs participants in this context.

Our study advances research on social capital, health, and community gardens by presenting the concept of *holistic community orientation* and demonstrating its importance to rural gardeners. Research indicates that both urban and rural community gardeners report increased social capital from garden participation (Gerber et al. 2017; Hawkins et al. 2013; van Holstein 2017; Mangadu et al. 2017), yet no research to date has compared how social capital indicators vary by urban and rural gardeners. Guiding future research, we theorize that rural gardens with *holistic community orientation* provide health-promoting social capital including emotional, instrumental, and informational support (Bourdieu 1985; Ferlander 2007; Portes 1998). Increased access to social capital is especially important to rural gardeners who may experience more health-harming social isolation than urban gardeners (Baernholdt et al. 2012; Van Gundy et al. 2011), and future research should investigate the connection between *holistic community orientation* among rural gardeners, forms of social capital, and health outcomes.

Conclusion

Our study addresses a gap in the community garden and health literature by comparing gardener reported health-promoting resources in urban and rural gardens. This paper extends research on the health benefits of community gardens by demonstrating the health-promoting capacity of these spaces and comparing rural and urban experiences of participation benefits. The community garden benefits highlighted by our research participants – *holistic community orientation* in rural settings and interaction with nature in urban settings – each promote health through supporting the capacity to cope with stress (van den Berg et al. 2010; Gerber et al. 2017; Hawkins et al. 2011, 2013; McEwen 2006; Thoits 1995), while *holistic community orientation* may further promote health in rural communities through increased social capital such as emotional support, instrumental support, and informational support (Ferlander 2007). Our comparison between rural and urban setting demonstrates the responsiveness of community gardens to the unique needs of each of these populations and suggests the broader ability of community gardens to support health in a wide range of communities.

Limitations/future work

One important limitation to this work is the demographic homogeneity of our interview respondents, most of whom were White, middle-class, older women. Future work should strive to make similar comparisons in rural/urban understandings of community garden benefits using a more diverse sample of gardeners. More privileged community gardeners, like those we spoke to, may participate more out of preference than need; a more diverse sample would likely include gardeners participating out of need. Given the challenges to maintaining health and food access disproportionately felt among non-White and working-class residents of both urban and rural areas, these gardeners are likely more focused on food access and may not discuss the holistic participation benefits we heard about. However, the community and nature related benefits outlined here likely also help reduce stress among less privileged rural and urban gardeners in addition to benefits more impactful in meeting basic needs. We would also like to see future work take a more precise approach to measuring health and wellness outcomes of community gardening. While this study is limited to considering perceived participation outcomes, future work including quantitative measures of health and wellness factors before, during, and after community garden participation would be particularly insightful, especially if paired with qualitative analysis of how race, class, and geographic context may intersect to shape those outcomes.

Significance

Our findings underscore the importance of recognizing how health-related benefits of community gardens are shaped by local context. Differentiating the roles that gardens play in urban versus rural settings can inform more effective place-based public health strategies. For example, in rural communities, community gardening may be recommended to help reduce social isolation. Meanwhile, in urban communities, community gardening may be recommended as a stress-relief strategy in areas lacking access to green spaces. Though the reported health-promoting benefits vary by context, our findings underscore the benefits of community gardening regardless of context, emphasizing the necessity of land-use and zoning policies that enable the establishment and sustainability of community gardens in both rural and urban communities.

Ethics statement

The authors have not identified any potential conflicts of interest, financial or otherwise. The article is not currently published or under consideration or review elsewhere. All authors participated in the work and have seen and approved this final manuscript. Research was conducted with review and approval from the University of California, Merced, Institutional Review Board.

CRediT authorship contribution statement

Katie L. Butterfield: Writing – review & editing, Writing – original draft, Validation, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Kathryn P. Daniels:** Writing – review & editing, Writing – original draft, Validation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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