Urban community garden practices as indicators of community social resilience

By

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Abstract

Resilience is a simple concept — bouncing back after adversity. However, defining resilience, analyzing, and understanding it is far more complex. The COVID-19 pandemic brought unexpected challenges that rippled through the food system, the social system, and the worldwide economy, exposing many vulnerabilities. It has also illuminated areas of resilience, creativity, and strength. Studies indicate that caring for urban green space (urban environmental stewardship) helps mitigate a system shock's social and ecological effects. The work done in an urban community garden is an example of urban environmental stewardship. The benefits of urban environmental stewardship and community gardens overlap as both enhance neighborhoods' social, economic, and ecological value. This mixed-methods study investigated how community gardens, as an example of urban environmental stewardship, contribute to community social resilience, particularly after a system shock. Garden leaders in the Kansas City metropolitan area participated in an online survey, online asynchronous discussion questions, and an online focus group. Discussion questions, text, and focus group transcriptions were inductively and deductively coded. Deductive coding used McMillen et al. (2016) indicators of community social resilience: place attachment, collective identity, social cohesion, social networks, and knowledge exchange and diversification. Inductive coding of the complete data set (all discussion and focus group responses) and within each question was done to look for themes across the data sets. Results show that community garden practices align well with the theoretical framework (McMillen et al., 2016) and illuminate how community gardens contribute to community social resilience. Furthermore, results highlight broader links between community gardens and human well-being.

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Dedication

In Loving Memory of my Papaw, Frank Reaves

-- the reason I am a gardener.

Chapter 1: Background

Community Gardens

History

The term community in community gardening refers to the fact that this approach to gardening involves the convergence of multiple individuals joining together in diverse settings (e.g., schools, neighborhoods, city blocks, faith communities, prisons, nursing homes, and hospitals) to grow, among other things, food (Lawson, 2005). Community gardens in the United States date back to the late 19th century but certainly not as far back as analogous traditions in western Europe (Lawson, 2005; Thorpe et al., 1975). There exists a continuous chain of urban communal garden efforts in the United States. In the 1890s, the trend was vacant-lot cultivation promoted by associations to provide land and assistance to unemployed laborers. At the same time, school gardens were promoted as an interactive teaching venue that correlated with school subjects and taught civics and good work habits (Lawson, 2005). During World War I, millions of Americans planted backyard and community gardens to increase the domestic food supply. During those times, people were encouraged to grow "Victory Gardens" to lessen the strain on the commercial food supply, ensure that everyone had access to nourishment, and provide a morale boost by allowing Americans on the home front to aid the war. Victory Gardens allowed people to feel empowered by their contribution of labor and by growing their food supply (Walter, 2013).

"In response to the early stages of unemployment during the Great Depression of the 1930s, families applied to private, municipal, and state agencies for subsistence garden plots and jobs in cooperative gardens and farms. In 1934, over 23 million households participated in subsistence garden programs, growing produce valued at $36 million for home consumption.

During World War II, households participated in the victory garden campaign to grow food for personal consumption, morale, and recreation. After the war, a few remaining schools and community gardens provided continuity and inspiration for a rebirth in interest in the 1970s" (Lawson, 2005, p. 2). Today, many garden programs exist, including neighborhood gardens, community gardens, children's gardens, school gardens, horticultural therapy gardens, and entrepreneurial job-training gardens (Lawson, 2005). Most grow food, build cooperation, and connect people.

Community garden functions

Traditionally, community gardens function as collaborative projects on divided open spaces, where participants share in the maintenance and products of the garden, including healthful and affordable fresh fruits and vegetables (CDC, 2010). Unlike botanical gardens or city parks typically designed by city infrastructure or municipalities, community-driven organizations commonly build community gardens. These gardens can reflect the wants and needs of their specific area or community more readily (Tidball & Krasny, 2007). "Whether cultivated through a system of individual plots or tended as a whole unit by a group of citizen volunteers, community gardens involve leadership and active participation of area residents to plant and care for these ecological spaces (Tidball & Krasny, 2007, p. 4). Generally, 'community garden' refers to 'open spaces managed and operated by local community members in which food or flowers are cultivated' (Holland, 2004; Kingsley, Townsend, & Henderson-Wilson, 2009; Pudup, 2008). This broad definition of community gardens reflects other studies and captures the variety of community gardens in the literature. Community gardens are similar to but not synonymous with urban agriculture –but differ from backyard gardens that a family

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privately manages. They are a source of low-cost, healthy food in neighborhoods where grocery stores are too few and far between (Martin et al., 2014).

In recent times community gardening has enabled neighborhood networking, improved local environments, established functional and recreational green spaces, aided in harvesting fresh produce, and provided education (Guitart, Pickering, & Byrne, 2012; Kingsley et al., 2009). The therapeutic benefits of community gardening have been documented for a range of people, including refugees (Bishop & Purcell, 2013), people with disabilities (Diamant & Waterhouse, 2010), people with physical or mental health conditions (Pitt, 2014), and people with a life-limiting illness (Marsh et al., 2017).   Community gardeners come of all ages and life positions. The diversity in purpose gives today's community gardens the ability to meet their communities' needs and respond to challenges quickly.

Urban community gardens contribute to the food security of their participants or community, but they also provide places for urban dwellers to build relationships and develop a sense of place (Fawcett et al., 1995). One benefit is that it involves a wide range of groups such as schools, prisons, youth, elderly, hospitals, places of faith, and residents of neighborhoods; bringing together people of diverse ideologies and backgrounds for a common purpose (Pudup, 2008; Teig et al., 2009). Where they host vegetable and fruit production, community gardens can foster food access and healthy eating and physical and mental health, environmental stewardship, and community organizing (Armstrong et al., 2000; Draper & Freedman, 2010; Litt et al., 2011). Community gardening also provides cultural, spiritual, social, and recreational services. The act of growing food has helped some communities maintain cultural connection and continuity (Chan et al., 2015). Several garden studies have found that participating in community gardens has helped build social capital and connectedness, self-efficacy, and civic

engagement (Firth et al., 2011; Hartwig et al., 2016; Litt et al., 2011; Ober Allen et al., 2008)

Biodiversity and ecosystem services

Community gardens contribute to urban ecosystem services in a myriad of ways. These ecosystem functions and services include pollination, soil fertility maintenance, and habitat provision to enhance biological diversity in the community (Calvet, Napoléone, & Salles, 2015). Community gardens contribute to a biologically diverse urban ecosystem and provide valued ecosystem services in food-insecure regions (Clarke & Jenerette, 2015). Gardens also offer much-needed ecosystem services in the urban core. These ecosystem services' benefits involve providing food and health outcomes, increasing climate and water quality, supporting soil health, fostering nutrient cycling, and sustaining biodiversity (Calvet-Mir, Gómez-Baggethun, & Reyes-García, 2012).

Community gardens as Third Places

"Third place" describes neutral public spaces outside of the home (first place) and work/school (second place), such as community gardens, where informal neighborhood interactions occur (Oldenburg & Brissett, 1982). Community gardens have been described as third places in several studies (Firth et al., 2011; Glover, 2004; James et al., 2016; Thorpe et al., 1975; Veen et al., 2014), and conclusions from other studies support this idea (Shimpo et al., 2019). Community gardens, as third places, are dynamic public spaces that make people feel welcome and create possibilities to interact and relax (Veen et al., 2014). Community gardens can serve as spaces to cultivate social support and emotional well-being (Shimpo et al., 2019). Gardeners belong to a community that includes a diverse demographic of race, age, sex, religion, and tradition (Mejia, Bhattacharya, & Miraglia, 2020). Gardens often host community events,

provide safe spaces, and, most importantly, provide an opportunity for people to socialize with each other (Cutter, 2008).

Gardening during crisis times

Community garden participation literature has acknowledged various social, environmental, health, and political motivations. As described above, the popularity of these urban and community gardens ebbs and flows about eras' social and economic climates. During the World Wars and the Great Depression, gardening became much more widespread, from "Victory Gardens" during WWII to the modern environmental movement in the 1970s. The prevalence of community gardens as a strategy for supplementing food costs and cultivating local resilience followed the 2009 recession (Draper & Freedman, 2010). Tidball and Krasny (2014), in their book "Greening in the Red Zone," depict how greening might be helpful after significant disasters. Specifically, they refer to "post-catastrophe, community-based stewardship of nature that serves as a source of socio-ecological resilience" (p. 6). From artificial interventions or natural disasters, green spaces have been part of rebuilding (Godschalk., 2003). Community gardens allow the creation of social ties and create a more incredible feeling of community (Barthel et al., 2015). These connections can help reduce crime, empower residents, and enable residents to feel safe in their neighborhoods. Gardening together also offers opportunities for interconnection and reciprocity (Cinner et al., 2019). Research from Bailey & Kingsley (2020) supports conceptualizations that acknowledge the interconnectedness and exchange of the well-being of people and place at community garden sites, especially during a disaster.

Community gardens' role post-disaster

Studies show that community gardens play critical roles in community recovery following extreme environmental events such as floods and storms. Sims-Muhammad (2012) demonstrated their role in minimizing food insecurity before and after hurricanes in Southern Louisiana. Hou and Grohmann (2018) portray community gardens not necessarily as a direct solution to urban issues but as places where community needs, conflicts, and concerns are addressed and resolved in gardening. Kingsley et al. (2006) see community gardens as places to increase social capital, social support, and social connectedness. Though there has been some literature written on the role of community gardens in contributing to properties of general resilience (Saldivar-Tanaka et al., 2004), significantly less has been written on the role of community gardens in terms of specific resilience to disasters (Tidball, 2010) such as a global pandemic.

Community Gardening as Urban Environmental Stewardship

What is Urban Environmental Stewardship (UES)?

Webster defines stewardship (Stewardship, 2022) as "the careful and responsible management of something entrusted to one's care." The concept of stewardship can be applied to the environment and nature, economics, health, property, information, theology, cultural resources, etc. (Chapin et al., 2009). The practice of stewardship embodies the ethic of responsible planning and management of resources. Rather than hierarchy, there is mutuality built into this idea of stewardship; it is a relationship.

Environmental stewardship is responsible for using and protecting the natural environment through conservation and sustainable practices to enhance ecosystem resilience and human well-being (Chapin et al., 2009). The term environmental stewardship has been used to refer to such diverse actions as creating habitats, replanting trees, limiting harvests, reducing

harmful activities or pollution, creating community gardens, restoring degraded areas, or purchasing more green or sustainable products (McMillen et al., 2016). It is applied to describe strict environmental conservation actions, active restoration activities, and the sustainable use and management of resources. Stewardship actions can also be taken at diverse scales, from local to global efforts and rural and urban contexts (Norton, 2005); stewardship can be applied to local community efforts or international programs. In 2005, the Environmental Protection Association (US) laid out a vision for environmental stewardship, recognizing it "as a means to a more sustainable future."

Citizen-based environmental stewardship is increasingly seen as an innovative and vital approach to improving and conserving urban greenspaces (Romolini, Brinkley, & Wolf, 2012). This concept of citizen-based environmental stewardship was put forth seventy years ago by Aldo Leopold in the Sand County Almanac (Leopold, 1949). He anticipated this need for humans' moral responsibility towards the natural world through his enduring idea, the "Land Ethic." Many of today's modern environmental movements can trace their roots to this piece of literature. Rather than a list of rights and wrongs, the land ethic emphasizes direct contact with the natural world as a critical factor in shaping our ability to extend our ethics beyond our self-interest (Leopold, 1949).

Community garden practices can be classified as urban environmental stewardship; planting a tree, cultivating land, or building a rain garden inside a community space qualifies as reliable resource management and adds to the community (McMillen et al., 2016). Urban gardens are hubs for civic engagement and environmental stewardship in cities (Colding & Barthel, 2013) that inspire civic restoration and community-based green space tending (Connolly, Svendsen, Fisher, & Campbell, 2013; Krasny & Tidball, 2012).

Community-based urban environmental stewardship at community gardens

Researchers are increasingly advocating the importance of exploring locally based urban environmental stewardship organizations (Berdejo-Espinola et al., 2021). They comprise both informal and formal organizations and networks. These groups interact at multiple scales ranging from the household to the neighborhood, metropolitan area, and cross-regional (Svendsen & Campbell, 2011). Studies suggest that examining urban stewardship practices in action, like gardening at a community gardening site, installing butterfly waystations, or planting orchard trees, can help inform how to move forward and strengthen communities (Tidball & Krasny, 2009). Community gardens are distinctive in integrating food production with environmental stewardship ideas and civic engagement (Tidball & Krasny, 2009). These societal microcosms are worth examining to understand better the complex interactions between people, green space, and food—these components, in turn, foster outcomes that build more connected communities and urban areas (Tidball & Krasny, 2009). Literature also notes that community garden practices help create more environmentally responsible behaviors, opportunities for an unstructured time in nature, positive youth development, the understanding of linkages between global and local food security, and the gardening skills themselves (Tidball & Krasny, 2009). The National Forum on Children and Nature recognized community gardening as a best practice for connecting youth with nature (Pudup, 2008).

Community Resilience

Community resilience

Community Resilience is the ability of a community to use its assets to strengthen and improve the community's physical, behavioral, and social health to withstand, adapt to, and recover from adversity (Cagney et al., 2016). Cultivating community resilience has become a

fundamental goal in the face of climate change. As cities continue to grow and grapple with uncertainties and challenges, community resilience has become increasingly favored (Carmin et al., 2012; Leichenko, 2011). Building community resilience requires more than just facing shocks and stressors to the day. Communities must draw on their social, cultural, human, political, natural, and built resources to build more resilient cities that withstand stress (Daniels, 2004; Donoghue & Sturtevant, 2007; Emery & Flora, 2006; Fawcett et al., 1995; Kusel, 2001; Machlis & Force, 1997). Community members must then collectively and strategically engage these resources to respond and adapt to the changes (Berkes and Ross, 2013; Harris et al., 2000; Healy et al., 2003; Smit and Wandel, 2006).

Socio-ecological resilience

Social-ecological resilience is the capacity to adapt or transform in the face of change in social-ecological systems, particularly unexpected changes in ways that continue to support human well-being (Biggs et al., 2011; Chapin et al., 2009). A socio-ecological system includes both societal (human) and ecological (biophysical) components in mutual interaction (Gallopin, 1991). Principle definitions important for understanding socio-ecological resilience fundamentally recognize that people and nature are intricately connected (Cinner and Barnes, 2019). Delving into social-ecological resilience models builds the capacity to learn how to adapt to unexpected change that supports human well-being (Biggs et al., 2011; Chapin et al., 2009). Research indicates that understanding how to incorporate these socio-ecological frameworks from theory into practice is needed (Wilkinson et al., 2012).

Community social resilience

Adger et al. (2006, p. 361), credited with one of the first definitions of social resilience, considered it "the ability of communities to withstand external shocks to their social

infrastructure." Similarly, Turner et al. (2003, p. 440) incorporated the notion of resilience into their 'vulnerability concept': where resilience creates the capacity for collective action in the face of unexpected extreme events. Researchers have developed several factors contributing to community resilience to understand community social resilience more clearly. Several authors, such as Voss and Bornemanns (2011), Lorenz (2013), and Heesen et al. (2014), have suggested that three distinct types of capacities are necessary for understanding the notion of social resilience in its whole meaning. They are labeled as coping abilities, adaptive capabilities, and transformative powers.

Coping capacities, by definition, reduce the adverse impacts in a system after exposure to an extreme event or a chronic natural hazard (Bestelmeyer et al., 2012). Adaptive capacities are individuals' and groups' social and technical skills that respond to environmental and socio-economic changes. Finally, transformative capacities depict creating a fundamentally new system when ecological, economic, or social conditions make the existing system untenable (Folke et al., 2010). While most authors consider social capital an enabling resource for resilience-building, Bohle (2016) has given attention to the dual nature of social networks; sometimes enabling, but sometimes constraining and exclusionary (Keck, & Sakdapolrak, 2013).

Resilience indicator frameworks

With ambiguous definitions and various measurement tools, it is imperative to utilize theoretical frameworks to interpret social resilience practices within the community. Examining existing theoretical frameworks helps build an understanding of the various interactions between individuals, organizations, and the environment. The City Resilience Index provides a comprehensive, technically robust, globally applicable basis for measuring city resilience (ARUP and the Rockefeller Foundation, 2015). It comprises 52 indicators, which are assessed based on

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responses to 156 questions: through a combination of qualitative and quantitative data. The index provides a holistic articulation of city resilience, structured around four dimensions and twelve critical goals for the resilience of our cities (ARUP and the Rockefeller Foundation, 2015). The model has twelve indicators: collective identity and mutual support; social networks and relationships; local identity and culture; minimal human vulnerability; diverse livelihoods; available financial resources; reliable communications; effective leadership; empowered stakeholders; integrated development process; social stability and mobility; and environmental stewardship (ARUP and the Rockefeller Foundation, 2015). These twelve indicators shed light on the building blocks needed to foster and sustain urban resilience.

Berkes and Ross' (2013) work on community resilience framework themes are knowledge, skills and learning, people-place relationships, and social networks by examining two distinct approaches to understanding community resilience: a social-ecological approach and mental health and developmental psychology perspective. Their work includes explicit consideration of people-place relationships and the importance of social education. The book "Principles of Ecosystem Stewardship" (Chapin et al., 2009) shares another framework for managing resources in a world dominated by uncertainty and change. Research relevant to our discussion here describes how acts of urban stewardship, like community gardens practices, might strengthen community social resilience.

The City Resilience Index and the Berkes and Ross framework best relate to our focus on community social resilience in an urban context (McMillen et al., 2016). There are five overlapping indicators pertaining to stewardship between the two frameworks: place attachment, collective identity, social cohesion, social networks, and knowledge exchange and diversity (McMillen et al., 2016). These five themes defined (McMillen et al., 2016) were previously used

to help understand community resilience in a community garden and a living memorial after the 9/11 terrorist attacks and the superstorm Sandy natural disaster. Evaluating the validity of these indicators can inform how to best categorize empirically observable practices in the field. Observing urban stewardship practices, like those found in a community garden, can help understand how urban environmental stewardship contributes to community social resilience.

Greenspace and health

Greenspace is defined as an area of grass, trees, or other vegetation set apart for recreational or aesthetic purposes in an otherwise urban environment (Merriam, 2021). Anecdotally, green spaces are known to have healing and meditative properties. Increasingly, research is empirically explaining this phenomenon. Natural environments offer a high potential for human well-being, restoration, and stress recovery (Haluza et al., 2014). Combining a public health perspective and urban greening practices can also play a role in facilitating desirable outcomes for human health and well-being (Tidball & Krasny, 2014).

Researchers are exploring how neighborhood greenness may affect health behaviors and these outcomes. Greenness promotes physical activity and social contact, decreasing stress, and mitigating air pollution, noise, and heat exposure (James et al., 2016). Health practitioners recommend adopting and implementing green infrastructure and nature-based solutions to create more resilient cities (Miller et al., 2020). Many studies suggest the value and impact of green spaces on urban areas as an effective strategy for enhancing the sustainability and resilience of cities and communities (Meerow et al., 2017). Bohle (2016) discusses prioritizing the relationship between urban land, natural resources, and human health; there is interest in the potential role of the natural environment in impacting human health and well-being. Green

spaces help build an ecological perspective, promote physical activity, encourage psychological well-being, and facilitate urban residents' public health (Taylor et al., 2015).

Food growing at community gardens during COVID-19 and well-being

Home food growing in gardens and allotments has been highlighted as a potential means of providing access to nutritious, healthy food in urban areas during the COVID-19 pandemic (Mead et al., 2021). Existing literature from before the pandemic indicated that home food growing could supplement household food supplies and reduce food insecurity (Algert et al., 2016; Galea et al., 2020; Kortright & Wakefield, 2011). In particular, home food growing has been associated with improved well-being (Dobson et al., 2020; Genter et al., 2015; Soga et al., 2017) and reduced stress (Van Den Berg et al., 2011). In addition to this, engagement in urban food growing (in general) has been associated with mental health benefits (Audate et al., 2019; Kingsley et al., 2009; Lovell et al., 2014). Understanding the impacts of community gardens, especially during extreme shock, may uncover practical ways to encourage and contribute to community social resilience.

Literature Cited

Adger, W. N. (2006). Vulnerability. *Global environmental change*, *16*(3), 268-281.

Algert, S., Diekmann, L., Renvall, M., & Gray, L. (2016). Community and home gardens increase vegetable intake and food security of residents in San Jose, California. *California Agriculture*, *70*(2).

Armstrong, D. (2000). A survey of community gardens in upstate New York: Implications for health promotion and community development. *Health & place*, *6*(4), 319-327.

ARUP and Rockefeller Foundation (2015). City resilience framework. ARUP & Partners Int., https://assets.rockefellerfoundation.org/app/uploads/20150530121930/City-Resilience-Framework1.pdf.

Audate, P. P., Fernandez, M. A., Cloutier, G., & Lebel, A. (2019). Scoping review of the impacts of urban agriculture on the determinants of health. *BMC Public Health*, *19*(1), 1-14.

Barthel, S., Parker, J., & Ernstson, H. (2015). Food and green space in cities: A resilience lens on gardens and urban environmental movements. *Urban studies*, *52*(7), 1321-1338.

Bailey, A., & Kingsley, J. (2020). Connections in the garden: opportunities for wellbeing. *Local Environment*, *25*(11-12), 907-920.

Berdejo-Espinola, V., Suárez-Castro, A. F., Amano, T., Fielding, K. S., Oh, R. R. Y., & Fuller, R. A. (2021). Urban green space use during a time of stress: A case study during the COVID-19 pandemic in Brisbane, Australia. *People and Nature*, *3*(3), 597-609.

Berkes, F., & Ross, H. (2013). Community Resilience: Toward an Integrated Approach. *Society & Natural Resources*, *26*(1), 5–20.

Bestelmeyer, B. T., Duniway, M. C., James, D. K., Burkett, L. M., & Havstad, K. M. (2013). A test of critical thresholds and their indicators in a desertification-prone ecosystem: More resilience than we thought. *Ecology letters*, *16*(3), 339-345.

Biggs, Ferreira, S., Freitag-Ronaldson, S., & Grant-Biggs, R. (2011). Taking stock after a decade: Do the "thresholds of potential concern" concept need a socio-ecological revamp? *Koedoe*, *53*(2), 1–9.

Bishop, R., & Purcell, E. (2013). The Value of an Allotment Group for Refugees. *British Journal of Occupational Therapy*, *76*(6), 264–269.

Bohle. (2016). Handling of human-Geosphere intersections. *Geosciences (Basel)*, *6*(1), 3

Bowler, Diana E., Lisette M. Buyung-Ali, Teri M. Knight, and Andrew S. Pullin. "A Systematic Review of Evidence for the Added Benefits to Health of Exposure to Natural Environments." *BMC Public Health* 10 (August 4, 2010): 456.

Cagney, K. A., Sterrett, D., Benz, J., & Tompson, T. (2016). Social resources and community resilience in the wake of Superstorm Sandy. *PLoS One*, *11*(8), e0160824.

Calvet, C., Napoléone, C., & Salles, J.-M. (2015). The Biodiversity Offsetting Dilemma: Between Economic Rationales and Ecological Dynamics. *Sustainability*, *7*(6), 7357–7378.

Calvet-Mir, Gómez-Baggethun, E., & Reyes-García, V. (2012). Beyond food production: Ecosystem services provided by home gardens. A case study in Vall Fosca, Catalan Pyrenees, Northeastern Spain. *Ecological Economics*, *74*, 153–160.

Camps-Calvet, L., Calvet-Mir, L., Gómez-Baggethun, E., & March, H. (2015). Sowing resilience and contestation in times of crises: The case of urban gardening movements in Barcelona.

Carmin, J., Nadkarni, N., Rhie, C., Sustainability, L. G. for, & Technology, M. I. of. (2012). *Progress and challenges in urban climate adaptation planning: Results of a global survey*.

Centers for Disease Control and Prevention. (2010, June 10). Community Gardens. [Webpage]. Retrieved from https://www.cdc.gov/healthyplaces/healthtopics/healthyfood/community.htm#

Chapin, F. S., Kofinas, G. P., Folke, C., Carpenter, S. R., Olsson, P., Abel, N., ... & Young, O. R. (2009). Resilience-based stewardship: strategies for navigating sustainable pathways in a changing world. In *Principles of ecosystem stewardship* (pp. 319-337). Springer, New York, NY.

Cinner, J. E., & Barnes, M. L. (2019). Social dimensions of resilience in social-ecological systems. *One Earth*, *1*(1), 51-56.

Clarke, L. W., & Jenerette, G. D. (2015). Biodiversity and direct ecosystem service regulation in the community gardens of Los Angeles, CA. *Landscape Ecology, 30*(4), 637-653.

Colding, J., & Barthel, S. (2013). The potential of 'Urban Green Commons' in the resilience building of cities. *Ecological Economics*, *86*, 156–166.

Connolly, J. J., Svendsen, E. S., Fisher, D. R., & Campbell, L. K. (2013). Organizing urban ecosystem services through environmental stewardship governance in New York City. *Landscape and Urban Planning*, *109*(1), 76–84.

Cutter, S. L., Barnes, L., Berry, M., Burton, C., Evans, E., Tate, E., & Webb, J. (2008). A place-based model for understanding community resilience to natural disasters. *Global Environmental Change*, *18*(4), 598–606.

Daniels, J. M. (2004) Assessing socioeconomic resiliency in Washington Counties Gen. Tech. Rep. PNW-GTR-607 Portland OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Diamant, E., & Waterhouse, A. (2010). Gardening and Belonging: Reflections on How Social and Therapeutic Horticulture May Facilitate Health, Wellbeing, and Inclusion. *British Journal of Occupational Therapy*, *73*(2), 84–88.

Dobson, M. C., Reynolds, C., Warren, P. H., & Edmondson, J. L. (2020). My little piece of the planet: the multiplicity of well-being benefits from allotment gardening. *British Food Journal*.

Donoghue , E. , and V. Sturtevant . (2007). Social science constructs in ecosystem assessments: Revisiting community capacity and community resiliency *Society Nat. Resources* 20 (10): 899 – 912.

 Draper, C., & Freedman, D. (2010). Review and Analysis of the Benefits, Purposes, and Motivations Associated with Community Gardening in the United States. *Journal of Community Practice*, *18*(4), 458–492.

Emery, M. and Flora, C. (2006) Spiraling-up: Mapping community transformation with community capitals framework *J. Commun. Dev. Society* 37(1):19 – 35.

Environmental Protection Agency, Environmental Stewardship, Lifespan Technology. (n.d.). [webpage] Retrieved April 13, 2022, from https://www.lifespantechnology.com/environmental-stewardship/

Fawcett , S. B. , A. Paine-Andrews , V. T. Fransisco , J. A. Schultz , K. P. Richter , R. K. Lewis , E. L. Williams , K. J. Harris , J. Y. Berkley , et al. . (1995). Using empowerment theory in collaborative partnerships for community health and development. *Am. J. Community. Psychol.* 23(5): 677.

Firth, C., Maye, D., & Pearson, D. (2011). Developing "community" in community gardens. *Local Environment*, *16*(6), 555-568.

Folke, C., Carpenter, S. R., Walker, B., Scheffer, M., Chapin, T., & Rockström, J. (2010). Resilience thinking: integrating resilience, adaptability, and transformability. *Ecology and society*, *15*(4).

Gallopín, G. C. (2006). Linkages between vulnerability, resilience, and adaptive capacity. *Global Environmental Change*, *16*(3), 293–303.

Gallopin. G. (1991). Human dimensions of global change - linking the global and the local processes. *International social science journal*, *43*(4), 707–718.

Genter, Roberts, A., Richardson, J., & Sheaff, M. (2015). The contribution of allotment gardening to health and wellbeing: A systematic review of the literature. *British Journal of Occupational Therapy*, *78*(10), 593–605.

"Greenspace." Merriam-Webster.com Dictionary, Merriam-Webster https://www.merriam-webster.com/dictionary/stewardship. Accessed 13 Apr. 2022.

Glover, T., (2004). Social capital in the lived experiences of community gardeners. *Leisure Sciences: An Interdisciplinary Journal*, 26 no. 2, 143–62.

Godschalk, D. R. (2003). Urban hazard mitigation: creating resilient cities. *Natural hazards review*, *4*(3), 136-143.

Guitart, D., Pickering, C., & Byrne, J. (2012). Past results and future directions in urban community gardens research. *Urban forestry & urban greening*, *11*(4), 364-373.

Haluza, D., Schönbauer, R., & Cervinka, R. (2014). Green perspectives for public health: A narrative review on the physiological effects of experiencing outdoor nature. *International journal of environmental research and public health*, *11*(5), 5445-5461.

Harris, C., B. McLaughlin, G. Brown, and Becker, D. (2000). Rural communities in the inland northwest: An assessment of small communities in the interior and upper Columbia River basins. In *Interior Columbia Basin Ecosystem Management Project: Scientific review*, Gn. Tech. Rep. PNW-GTR-477, ed. T. M. Quigley, 120. Portland, OR: Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Hartwig, K. A., & Mason, M. (2016). Community gardens for refugee and immigrant communities as a means of health promotion. *Journal of community health*, *41*(6), 1153-1159.

Healy, K., Hampshire, A., & Ayres, L. (2003, August). Engaging communities for sustainable change: Promoting resilience. In *Integrated Learning Network Consultative Policy Development Conference, Canberra*.

Heesen, J., Lorenz, D. F., Nagenborg, M., Wenzel, B., & Voss, M. (2014). Blind Spots on Achilles' Heel: The Limitations of Vulnerability and Resilience Mapping in Research. *International Journal of Disaster Risk Science*, *5*(1), 74–85.

Holland, L. (2004). Diversity and connections in community gardens: A contribution to local sustainability. *Local Environment*, *9*(3), 285–305.

Hou, J., & Grohmann, D. (2018). Integrating community gardens into urban parks: Lessons in planning, design, and partnership from Seattle. *Urban Forestry & Urban Greening*, *33*, 46–55.

Jacobs, M. (1996). *The Politics of the Real World: meeting the new century*. Earthscan.996.

James, Hart, J. E., Banay, R. F., & Laden, F. (2016). Exposure to greenness and mortality in a nationwide prospective cohort study of women. *Environmental Health Perspectives*, *124*(9), 1344–1352.

Keck, & Sakdapolrak, P. (2013). What is social resilience? Lessons learned and ways forward. *Erdkunde*, *67*(1), 5–19.

Kingsley, J. 'Yotti,' & Townsend, M. (2006). 'Dig In' to Social Capital: Community Gardens as Mechanisms for Growing Urban Social Connectedness. *Urban Policy and Research*, *24*(4), 525–537.

Kingsley, J. Y., Townsend, M., & Henderson-Wilson, C. (2009). Cultivating health and wellbeing: members' perceptions of the health benefits of a Port Melbourne community garden. *Leisure studies*, *28*(2), 207-219.

Kortright, & Wakefield, S. (2011). Edible backyards: a qualitative study of household food growing and its contributions to food security. *Agriculture and Human Values*, *28*(1), 39–53.

Krasny, M. E., & Tidball, K. G. (2012). Civic ecology: A pathway for Earth Stewardship in cities. *Frontiers in Ecology and the Environment*, *10*(5), 267–273.

Kusel, J. (2001). Assessing Well-Being in Forest Dependent Communities. *Journal of Sustainable Forestry*, *13*(1-2), 359–384.Lawson, L. J. (2005). *City Bountiful: A Century of Community Gardening in America*. Univ of California Press.

Lawson, L. (2005). *City Bountiful: A Century of Community Gardening in America*. University of California Press.

Leichenko, R. (2011). Climate change and urban resilience. *Current Opinion in Environmental Sustainability*, *3*(3), 164–168.

Leopold, A., (1949). *A Sand County Almanac and Sketches here and there*. New York : Oxford University Press.

Litt, J. S., Soobader, M.-J., Turbin, M. S., Hale, J. W., Buchenau, M., & Marshall, J. A. (2011). The Influence of Social Involvement, Neighborhood Aesthetics, and Community Garden Participation on Fruit and Vegetable Consumption. *American Journal of Public Health*, *101*(8), 1466–1473.

Lorenz. (2013). The diversity of resilience: contributions from a social science perspective. *Natural Hazards*, *67*(1), 7–24.

Lovell, R., Husk, K., Bethel, A., & Garside, R. (2014). What are the health and well-being impacts of community gardening for adults and children: a mixed method systematic review protocol? *Environmental Evidence*, *3*(1), 1-13.

Machlis ,G.,and Force, J. (1997). The human ecosystem, Part II: Social indicators in ecosystem management. *Society Nat. Resources 10*(4), 347 – 368.

Marsh, P., Gartrell, G., Egg, G., Nolan, A., & Cross, M. (2017). End-of-life care in a community garden: findings from a participatory action research project in regional Australia. *Health & place*, *45*, 110-116.

Martin, K. S., Ghosh, D., Page, M., Wolff, M., McMinimee, K., & Zhang, M. (2014). What role do local grocery stores play in urban food environments? A case study of Hartford-Connecticut. *PloS one*, *9*(4), e94033.

McMillen, H., Campbell, L. K., Svendsen, E. S., & Reynolds, R. (2016). Recognizing stewardship practices as indicators of social resilience: In living memorials and in a community garden. *Sustainability*, *8*(8), 775.

Mead, B. R., Davies, J. A., Falagán, N., Kourmpetli, S., Liu, L., & Hardman, C. A. (2021). Growing your own in times of crisis: The role of home food growing in perceived food insecurity and well-being during the early COVID-19 lockdown. *Emerald Open Research*, *3*, 7.

Meerow, S., & Newell, J. P. (2017). Spatial planning for multifunctional green infrastructure: Growing resilience in Detroit. *Landscape and Urban Planning*, *159*, 62-75.

Mejia, Bhattacharya, M., & Miraglia, J. (2020). Community gardening as a way to build cross-cultural community resilience in intersectionally diverse gardeners: Community-based participatory research and campus-community-partnered proposal. *JMIR Research Protocols*, *9*(10), e21218–e21218.

Miller, S. (2020). Greenspace after a disaster: the need to close the gap with recovery for greater resilience. *Journal of the American Planning Association*, *86*(3), 339-348.Norton. (2005). *Sustainability is a philosophy of adaptive ecosystem management*—University of Chicago Press.

Ober Allen, J., Alaimo, K., Elam, D., & Perry, E. (2008). Growing Vegetables and Values: Benefits of Neighborhood-Based Community Gardens for Youth Development and Nutrition. *Journal of Hunger & Environmental Nutrition*, *3*(4), 418–439.

Oldenburg, R., & Brissett, D. (1982). The Third Place. *Qualitative Sociology*, *5*(4), 265–284.

Pitt, H. (2014). Therapeutic experiences of community gardens: Putting flow in its place. Health & Place, 27, 84–91.

Porter, C. M. (2018). What gardens grow: Outcomes from home and community gardens supported by community-based food justice organizations. *Journal of agriculture, food systems, and community development*, *8*(Suppl 1), 187.

Pudup, M. B. (2008). It takes a garden: Cultivating citizen-subjects in organized garden projects. *Geoforum*, *39*(3), 1228–1240.

Romolini, Brinkley, W., & Wolf, K. L. (2012). What is urban environmental stewardship? constructing a practitioner-derived framework. *USDA Forest Service - Research Note PNW-RN*, *566*, 1–40.

Saldivar-Tanaka, L., & Krasny, M. E. (2004). Culturing community development, neighborhood open space, and civic agriculture: The case of Latino community gardens in New York City. *Agriculture and human values*, *21*(4), 399-412.

Shimpo, N., Wesener, A., & McWilliam, W. (2019). How community gardens may contribute to community resilience following an earthquake. *Urban forestry & urban greening*, *38*, 124-132.

Sims-Muhammad, T. Y. (2012). After the storms: south Louisiana sustainable food system assessment in light of environmental natural disasters hurricanes katrina & Rita. *Int. J. Hum. Soc. Sci*, *2*, 129-135.

Smit, B. and Wandel, J. (2006). Adaptation, adaptive capacity, and vulnerability. *Global Environ. Change* 16 (3): 282 – 292.

Soga, Cox, D. T. C., Yamaura, Y., Gaston, K. J., Kurisu, K., & Hanaki, K. (2017). Health benefits of urban allotment gardening: Improved physical and psychological well-being and social integration. *International Journal of Environmental Research and Public Health*, *14*(1), 71.

"Stewardship." Merriam-Webster.com Dictionary, Merriam-Webster, https://www.merriam-webster.com/dictionary/stewardship. Accessed 13 Apr. 2022.

Svendsen. (2011). Cultivating health and well-being through environmental stewardship. *American Journal of Public Health (1971)*, *101*(11), 2008–2008.

Svendsen, & Campbell, L. K. (2011). Living Memorials: Understanding the Social Meanings of Community-Based Memorials to September 11, 2001.

Taylor, L., & Hochuli, D. F. (2015). Creating better cities: how biodiversity and ecosystem functioning enhance urban residents' wellbeing. *Urban ecosystems*, *18*(3), 747-762.

Teig, E., Amulya, J., Bardwell, L., Buchenau, M., Marshall, J. A., & Litt, J. S. (2009). Collective efficacy in Denver, Colorado: Strengthening neighborhoods and health through community gardens. *Health & place*, *15*(4), 1115-1122.

Thompson, S., & Maginn, P. (2012). Planning Australia: An overview of urban and regional planning.

Thorpe, H. (1975). The homely allotment: from rural dole to urban amenity: a neglected aspect of urban land use. *Geography*, *60*(3), 169-183.

Tidball, K. G., & Krasny, M. E. (2007). From risk to resilience: What role for community greening and civic ecology in cities? In A. E. J. Wals (Ed.), *Social learning towards a sustainable world: Principles, perspectives, and praxis* (pp. 149–164). Wageningen, The Netherlands: Wageningen Academic Publishers.

Tidball, K. G. (2010). Greening in the red zone: Green space and disaster resistance, recovery, and resilience. *Anthropology News*, *51*(7), 10-11.

Tidball, K. and Krasny, M. (2009). "Community Gardens as Contexts for Science, Stewardship, and Civic Action Learning." *Cities and the Environment* 2, no. 1: Article 8-18 pp.

Tidball, K. G., & Krasny, M. E. (Eds.). (2014). *Greening in the red zone: disaster, resilience, and community greening*. Springer Science & Business Media.

Turner, N. J., Davidson-Hunt, I. J., & O'Flaherty, M. (2003). Living on the edge: ecological and cultural edges as sources of diversity for social-ecological resilience. *Human Ecology*, *31*(3), 439-461.

Van Den Berg, A. E., & Custers, M. H. (2011). Gardening promotes neuroendocrine and affective restoration from stress. *Journal of health psychology*, *16*(1), 3-11.

Veen, E. J., Derkzen, P., & Visser, A. J. (2014). Shopping versus growing: food acquisition habits of Dutch urban gardeners. *Food and Foodways*, *22*(4), 268-299.

Voss, J. P., and Bornemann, B. (2011) The politics of reflexive governance: challenges for designing adaptive management and transition management, Ecology and Society, 16, art. 9.

Walter, P. (2013). Theorizing community gardens as pedagogical sites in the food movement. *Environmental Education Research*, *19*(4), 521-539.

Wilkinson, C. (2012). Social-ecological resilience: Insights and issues for planning theory. *Planning theory*, *11*(2), 148-169.

Chapter 2: Urban community gardens as indicators of community social resilience

Introduction

Community gardens are open spaces managed and operated by local community members in which food or other plants are cultivated and where participants share in the maintenance and products of the garden (Guitart et al., 2012; Holland, 2004; Kingsley et al., 2009; Pudup, 2008). Community garden benefits include building community, making fresh food accessible, improving health, increasing urban biodiversity, and contributing to participants' collective efficacy (Guitart et al., 2012; Teig et al., 2009). Community gardens tend to be community-based, collaborative efforts with incredibly diverse visions. Unlike botanical gardens or city parks typically designed by city infrastructure or municipalities, they are commonly built by grassroots organizations and are a source of low-cost, healthy food in neighborhoods where grocery stores are too few and far between (Martin et al., 2014). "Whether cultivated through a system of individual plots or tended as a whole unit by a group of citizen volunteers, community gardens involve leadership and active participation of area residents to plant and care for these ecological spaces" (Tidball & Krasny, 2009, p. 4). Community gardeners come of all ages and life positions. In addition, community gardens can reflect the wants and needs of their specific area or community more readily (Tidball & Krasny, 2009). These shared spaces offer simple solutions to many complex problems facing our cities.

Cultivating community resilience has become a fundamental goal in the face of climate change. As cities continue to grow and grapple with uncertainties and challenges, urban resilience has become increasingly favored (Carmin et al., 2012; Leichenko, 2011). A

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community's resilience will help determine its ability to mobilize successfully and respond to stress, making resilience integral to social sustainability (Beckley, 1995; Doak & Kusel, 1996). Building community resilience requires more than just facing shocks and stressors to the day. It requires communities to have various internal and external resources from which to draw, to respond to change (Kretzmann & McKnight, 1993). They must draw on their social, cultural, human, political, natural, and built resources (Donoghue & Sturtevant, 2007; Emery & Flora, 2006; Kusel, 2001; Machlis & Force, 1997). Community members must then collectively and strategically engage these resources to respond and adapt to the changes (Colussi, 2000; Healy et al., 2003; Smit & Wandel, 2006).

Studies show that community gardens can play critical roles in community recovery following extreme environmental events such as floods and storms (Chan et al., 2015; Shimpo et al., 2019) Sims-Muhammad et al. (2012) demonstrated community gardens' role in minimizing food insecurity before and after hurricanes in Southern Louisiana. Hou, Johnson, and Lawson (2009) portray community gardens not necessarily as a direct solution to urban issues but as places where community needs, conflicts, and concerns are addressed and resolved in gardening. Kingsley et al. (2006) see community gardens as places to increase social capital, social support, and social connectedness. Though there has been some literature written on the role of community gardens in contributing to properties of general resilience (Bendt et al., 2013; Krasny & Tidball, 2012; Okvat et al., 2011; Saldivar-Tanaka et al., 2004), significantly less has been written on the role of community gardens in terms of specific resilience to disasters (Krasny & Tidball, 2012) such as a global pandemic.

McMillen et al. (2016) studied urban environmental stewardship as a strategy for strengthening community social resilience to respond to future disturbances. They used existing

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resilience frameworks (ARUP and the Rockefeller Foundation, 2015; Chapin III et al., 2009) and

community managed-open spaces in the New York City area that had responded to various

chronic presses and acute disturbances, including a hurricane and a terrorist attack, to identify

and characterize the type of grounded, empirically observable stewardship practices that

demonstrate the following indicators of social resilience at the community level: place

attachment, social cohesion, social networks, and knowledge exchange and diversification.

Given that community acts of urban stewardship, like community garden practices, might

strengthen community social resilience, the following research question was derived: Do

community garden practices contribute to community social resilience during a crisis? Thus, this

project aimed to use the five indicators by McMillen et al. (2016) to determine if community

gardens contribute to community social resilience.

Methodology

Study area

The study was conducted in the Kansas City Metropolitan area, shared by two states, with a population of just over half a million. The metropolitan area comprises a fair representation of the demographic, economic, and sociopolitical mix of the United States (Butt et al., 2020). As a midwestern city, Kansas City has strong cultural ties to agriculture and supports urban farming and local food systems (Urban Neighborhood Initiative. Kansas City, 2017). Many organizations in the Kansas City area work to increase food availability by encouraging and supporting urban farms and food-producing gardens. Kansas City, Missouri, is also the only municipality in the region that has adopted an urban agriculture ordinance and boasts many community gardens and urban agriculture endeavors. This zoning benefits the establishment of Urban Agricultural Zones, where growers or vendors in blighted areas are offered tax and water incentives (Kansas City et al., n.d., pp. 74-201). In addition, from 2020-to-2021, Kansas City, MO, became one of the U.S.'s COVID-19 hot spots due to a substantial increase in positive COVID-19 test results (Al-Qadir et al., 2022).   As a hotspot, the pandemic impacted residents' daily lives during the studied timeframe. The COVID-19 pandemic also affected data collection methods, moving from in-person discussion meetings to asynchronous boards and in-person focus groups to an online focus group platform.

Sampling design

In cooperation with the nonprofit Kansas City Community Gardens, an initial list of 50 gardens was identified that met the inclusion criteria of being within the Kansas City Metropolitan area and having a garden leader present at their location for a minimum of five years, including 2020, 2021. Garden leaders were also required to be at least 18 years of age and

able to read and understand English at an 8th-grade level. Next, all gardens identified on this list were sent an email to gauge interest in participating in a study investigating the social impacts of community gardens. Community Gardens that responded via email or phone call (n=37) were then asked if they remained open and gardened during 2020, 2021, which also was an inclusion criterion.   Nineteen gardens chose not to participate, did not respond, or failed to meet inclusion criteria. The remaining eighteen garden leaders were met at their community garden (July 2021) to introduce the project personally and were invited to participate. An email detailing the data collection methods (survey, discussion board, and focus group), the time commitments, and the data collection timeframe of October 2021 was sent to all leaders interested. Eighteen gardens agreed verbally to participate. All leaders that signed an online informed consent were enrolled in the study (n=14) (Fig.1.).

Community garden coordinators or leaders were explicitly targeted to participate in the study because they could offer a comprehensive view of their garden and gardeners' behaviors and actions. In addition, most leaders supplied additional information about the garden (history, guidelines, rules, standard practices, anomalies) to provide a broader perspective on the activities and actions during seasons 2019, 2020, and 2021. Enlisting garden leaders with tenures of at least five years at their location was deemed critical for comparing "normal" time activities to "pandemic time" events and activities.
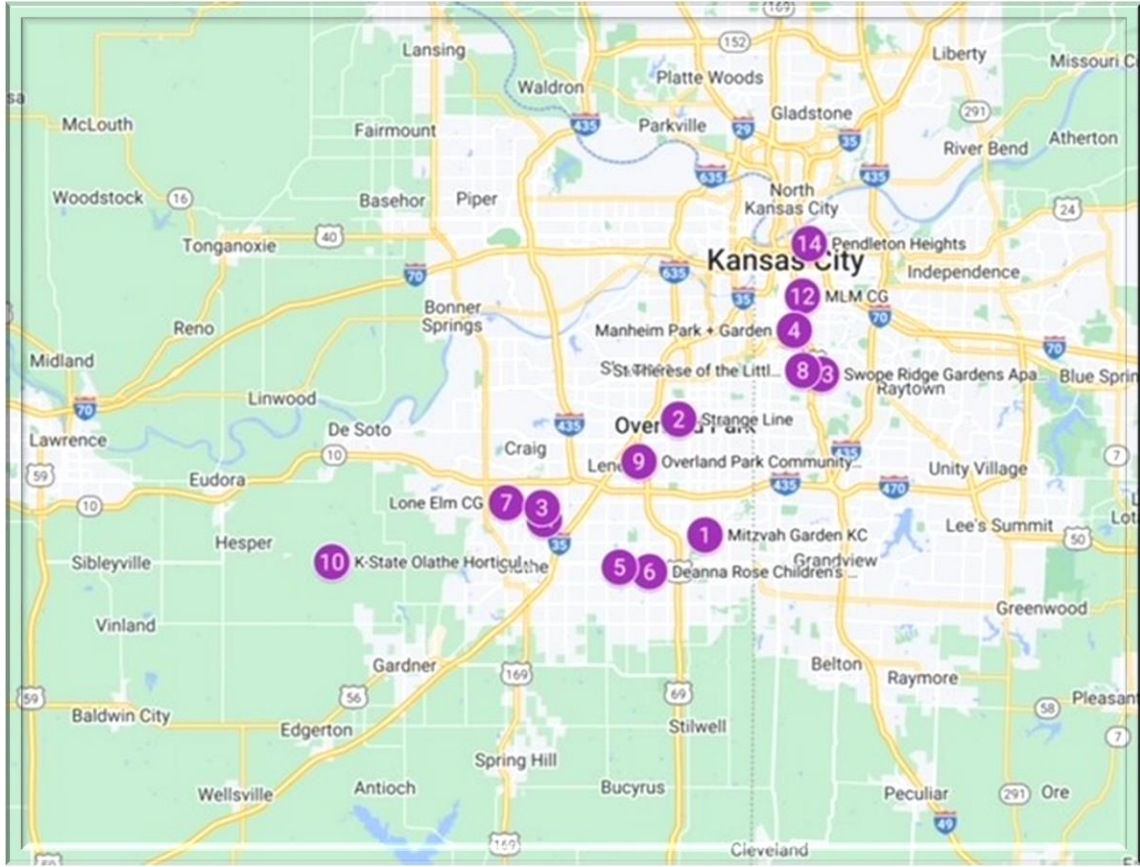
Figure 1. Locations of the community gardens in the Kansas City Metropolitan participating in the study

Mixed methods: survey, discussion board, and focus group

This was a mixed-methods study with three components: an online semi-structured survey, an online asynchronous discussion board, and a series of synchronous online focus groups. The survey instrument, the discussion questions, and the focus group questions were based on McMillen et al. (2016) theoretical framework of community social resilience indicators. The survey (Qualtrics, Provo, UT) consisted of twenty-six questions (Appendix A) that gathered demographic information (Appendix A). An online survey link was emailed to each participant, and the survey was open for one week. All participants completed the survey. After the survey completion, participants were emailed a link to a daily discussion question using an online focus

group discussion board (FocusGroupIt, Rochester, NY). Anonymous participant numbers were automatically assigned to de-identify subjects. Questions were posted each day for five days and open for at least 24 hours to facilitate user participation. Participants took part in the 5-day asynchronous virtual discussion board to answer the daily questions and interact with other participants' responses (Appendix B). Following the 5-day asynchronous discussion board, participants joined in a recorded synchronous online focus group video call (Zoom Video Communications, Inc., San Jose, CA) that was 1.5 hours long to prioritize aspects of community gardening and to provide clarification and insight on the discussion board responses. The fourteen participants were split into two groups based on participants' time preferences of a morning session or evening session. This allowed for smaller group interaction between participants. After the last focus group meeting, the transcripts from the discussion board, the audio, and the video recordings were transcribed manually and then by auto coding software (Google Close Captioning Service, Mountain View, CA). The consequent transcript was then verified manually for accuracy and context to the written transcripts and recorded video sessions.

Coding

Deductive and inductive coding of the complete data set (discussion board and focus group combined) and within each question were done. Deductive coding was done using two sets of codes: 1) the five indicators from (McMillen et al., 2016) (Table 1) and 2) the social, psychological, and physical well-being characteristics (W.H.O., 2021) in the context of a community garden (Figure 2). Inductive coding was completed to look for themes and actions across the data sets.

Deductive coding using indicators of community social resilience

   To test if the community social resilience framework (McMillen et al., 2016) is applicable in understanding community gardens' role in community social resilience, the complete data set (discussion board and focus group responses together) were coded to the five indicators (Table 1) manually and then using artificial intelligence software (QSR International Pty Ltd. (2018) NVivo (Version 12)). Empirically observable practices (examples) from McMillen et al. (2016) were used to facilitate consistent coding across the data set (Table 1). Then, both coding methods were combined into the third compilation by comparing and merging overlapping examples. To further investigate the framework's validity, the same method was used for the responses to each question (Tables 2 and 3). Descriptive statistics for each indicator were done to determine whether each indicator's question successfully elicited relevant responses for the targeted community social resilience indicator to determine if the questions asked were good. Again, both coding methods (manual and NVivo) were combined into the third compilation by comparing and merging overlapping examples.

Table 0.1. Definition of the five indicators used in deductive coding of the respondents' responses

Indicator/Code	Definition	Examples of what to include
Place attachment	the person-to-place bonds that evolve through emotional connection, meaning, and understanding of a specific place and/or features of a place	- Signs of Territory Marking - Place naming - Diversity of place meaning within the group - Strong protection if the site is threatened - Acts of Maintenance - Place of Respite - Place for Contemplation

		• Place to connect with Nature/Earth/Soil
Collective identity	the process of working together in creating and maintaining sites helped to foster and reinforce a sense of shared identity, social cohesion,	• Stewards articulate an identity associated with their site through ritual practices • New Identity emerges following an acute event • Shared group narrative connected to the site • Working together to maintain and develop a shared identity • Building something new together • Shared creation and management of land • Group makes decisions together • Worship/Spiritual Practices • Belonging to a Team/Group
Social cohesion	the strength and number of bonding ties within the group, as well as the degree to which: a group makes decisions together and the degree that individuals engage in acts of reciprocity on and off-site	• Group decides the site • Individuals engage in shared stewardship activities Together • Acts of reciprocity on/off-site • Community based response Growing food for the community
Social networks	a set of relationships that link an individual to other individuals	• Group Expands work beyond the physical boundaries of the site • Group uses existing social networks to disseminate new information • Dominate narrative of group influences policies and programs at larger scales • Interaction from a diverse group • Ripple Effect
Knowledge exchange	promoting the on-site exchange and transmission of diverse kinds of knowledge	• Knowledge and personal experiences are shared in multiple ways within the group

			• Knowledge exchange regarding horticulture, conservation, cuisine, foodways, and lifeways
			• New Knowledge and traditions are adopted and integrated
			• Training next generation/ succession

Inductive coding for community gardening subthemes

To determine the subthemes of community gardening associated with each of McMillen et al. (2016) indicators, inductive open coding of responses coded to each indicator was done. The transcripts were coded according to emerging themes, and then excerpts by code were collated. Examples of emerging themes are safety, growing food, and refuge (Tables 7-14).

Deductive coding for community gardening well-being

The results from the inductive coding indicated support of the many health and well-being benefits of community gardening (Ruck, 2020; Scott et al., 2015; Tracey et al., 2020). Thus, a post-hoc step was added to deductively code the subthemes to the social, psychological, or physical well-being characteristics (WHO, 2022) in the context of a community garden.

Coding Examples:

Social Well-being :
- being able to interact with a range of people and having a sense of belonging
- having respect, empathy, and tolerance for other people
- being able to manage emotions to suit the situation
- being aware of rights and responsibilities

Physical Well-being:
- enjoying being physically active
- having good balance, coordination and agility in everyday tasks as well as sport
- having the strength, stamina and suppleness required for daily life, work and play
- having fewer illnesses, diseases and injuries

Psychological Well-being :
- having self-esteem and self-respect
- being able to recognize and express feelings
- being able to manage emotions to suit the situation
- recognizing and managing the factors that affect emotions
- feeling positive about life (which includes feeling useful and being optimistic about the future)

Figure 2. Components of human health and well-being by the World Health Organization

Data Visualization Methods

Based on the descriptive statistics of the five community social resilience indicators coded responses, data visualizations were created using business intelligence software (Microsoft Power Bi (2022)(v.2.103.661.0), Redmond, WA).   Using a chord diagram, a graphical method of displaying the interrelationship between data in a matrix, figures were created to help conceptualize the relationships between study themes and human health and well-being. Indicators were graphically weighted to the percentage of coded responses to each community social resilience indicator, theme, or subtheme. Human health and well-being links were

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connected via definitions outlined by the World Health Organization (2022) (Figure 2).

Table 0.2. The validity test of each discussion question coded to a specifically targeted community resilience indicator the by the percentage of total responses coded to that indicator

Question and targeted indicator	Place Attachment	Collective Identity	Social Cohesion	Social Networks	Knowledge Exchange and Diversity
Place Attachment: The global pandemic impacted our daily lives. How did your garden pivot during this period, and are there ways to strengthen your garden?	50%	10%	24%	13%	3%
Collective Identity: How does working in the garden give garden members an identity within the garden? Did you see changes during the pandemic?	8%	62%	19%	3%	8%
Social Cohesion: Community Gardens often introduce people that might never have crossed paths otherwise. Can you describe people or other gardeners that have positively impacted one another inside or outside the garden?	6%	17%	44%	11%	22%
Social Networks: Describe how working with groups or partners outside of your community garden has helped your group meet needs in your community or neighborhood?	6%	2%	2%	73%	17%
Knowledge Exchange and Diversity: Community	5%	10%	0%	5%	80%

Gardens can be hubs for information between gardeners and the community. How do you view this knowledge exchange, and why does it affect it?				

Table 0.3. The validity test of each focus group question coded targeted to a specific community social resilience indicator by the percentage of total responses coded to that indicator

Focus Group Question and targeted indicator	Place Attachment	Collective Identity	Social Cohesion	Social Networks	Knowledge Exchange and Diversity
Place Attachment: **Why did it matter to you to stay open during 2020 & 2021?**	48%	16%	28%	4%	4%
Collective Identity: **Can you describe ways the garden could be used as a Safe Place during the pandemic?**	32%	27%	27%	14%	0%
Social Networks: **How would your community partners describe your garden to other community members?**	3%	14%	21%	28%	34%
Social Cohesion: **What role did your garden play in the larger community during the pandemic?**	11%	27%	8%	27%	27%

Results and Discussion

Garden leader participants

Results of the online survey provided demographic information on the community gardens and garden leaders. Gardens were located in two Kansas City Metropolitan area counties: Jackson County, Missouri (57%) and Johnson County, Kansas (43%) (Table 4). All gardens were in operation for a minimum of 5 years as per the inclusion requirement, with 71% of participating gardens being managed for over ten years (Table 5). All participating garden leaders had at least five years' experience at their location. Many garden leaders (43%) led their gardens for more than ten years.

Table 0.4. Participating community garden locations by U.S. zip code

Participating community garden location by US zip code	Number of participating gardens in that zip code	City, State	County
64109	1	Kansas City, Mo	Jackson County
64110	1	Kansas City, Mo	Jackson County
64124	3	Kansas City, Mo	Jackson County
64130	3	Kansas City, Mo	Jackson County
66061	3	Olathe, KS	Johnson County
66209	1	Leawood, KS	Johnson County
66214	1	Overland Park, KS	Johnson County
66221	1	Overland Park, KS	Johnson County

Table 0.5. Community garden age and years the garden leader managed the garden

Community Garden Participating Gardens	Five years of less	5-9 years	Ten years or more
Community Garden Age	7%	21%	71%

Leaders number of years managing their community garden	28%	29%	43%

Additionally, community garden leaders in this study self-reported an average of twenty-five years of gardening experience per individual leader via the online survey. Primarily our respondents identified as female (86%) and had gardened in the Kansas City metropolitan area for a minimum of five years. Most study participants (94%) had an affiliation with a community partner (Figure 4). This affiliation comes in many forms: faith-inspired partnership (41%), with a city or municipality (18%), a neighborhood association (12%), or a combination of partners (23%). Before becoming a community garden leader, most survey respondents described being community or farm taught (80%), with only one respondent with a formal horticulture degree.

COMMUNITY GARDEN AFFILIATION

- Faith-Inspired Partnership
- Municipal or City Partnership
- Neighborhood Partnership
- Combination of Partners
- No Partner
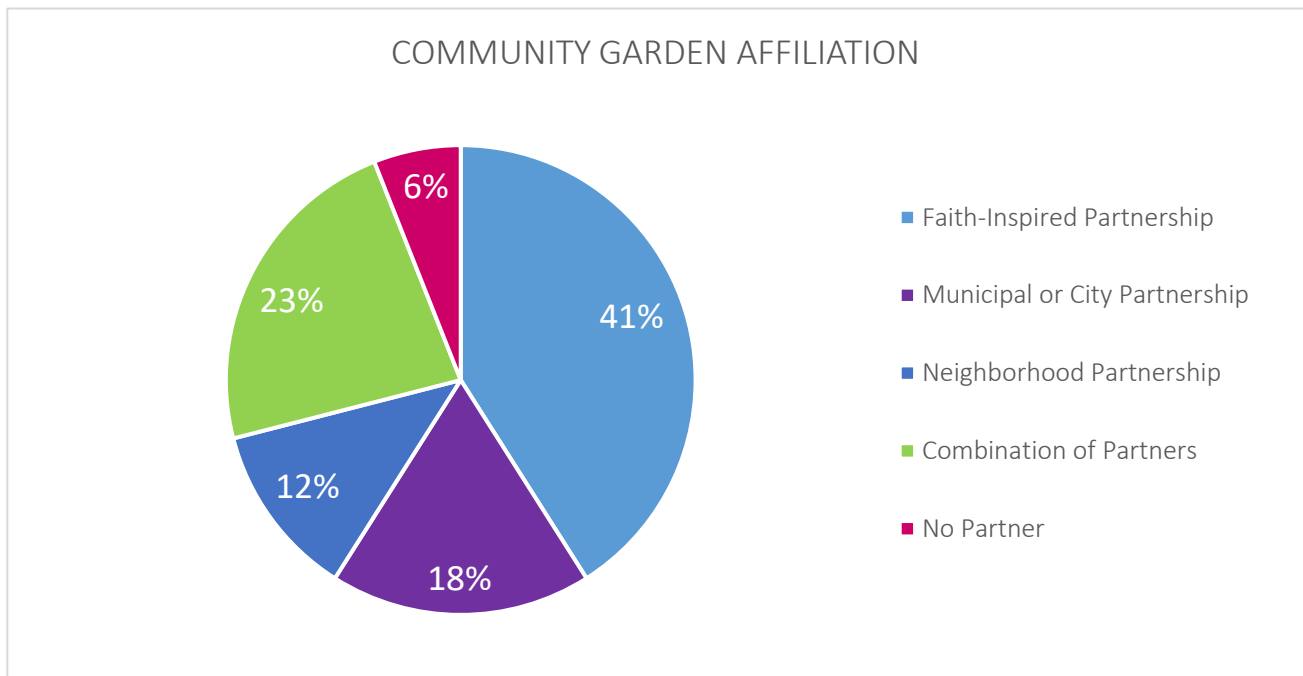
Figure 3. Percent of participating community gardens affiliation with community partners

Community social resilience framework

  Results show that the community social resilience framework (McMillen et al., 2016) is applicable in understanding community gardens' role in community social resilience. When considering all coded responses (discussion board and focus group together) by indicator, the indicators were distributed evenly across the community social resilience framework: place attachment (19%), collective identity (20%), social cohesion (16%), social networks (26%), and knowledge exchange and diversity (19%) (Figure 4). Thus, our questions elicited responses that can be explained through the community social resilience indicators. When considering the coded responses from the discussion board and from the focus group, each discussion and focus group question yielded the highest percent response that correlated with the targeted question indicator (Tables 2 and 3). This also provides evidence of validity in capturing detailed responses that provide meaningful insight for each indicator.
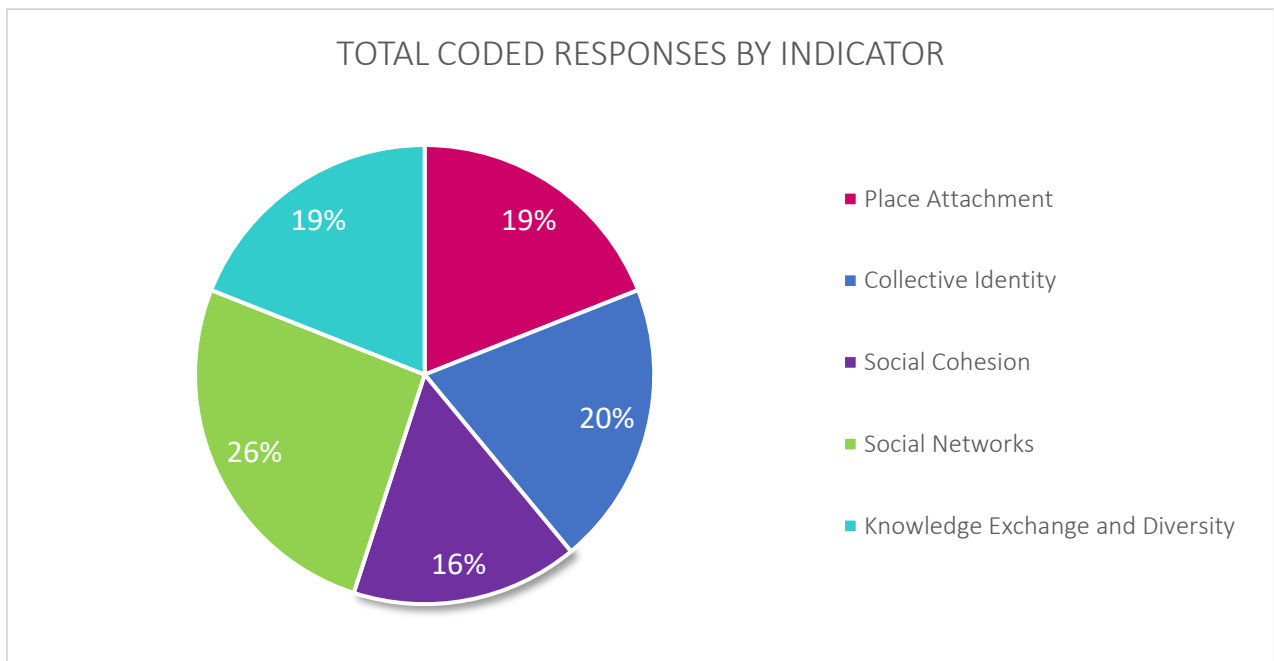
Figure 4. Percentage of coded responses by indicator for the complete data set

Asynchronous discussion board responses

Each discussion question was focused on a particular indicator (Table 2). Fifty percent (50%) of coded responses to the question for place attachment were responses about place attachment. Sixty-two percent (62%) of coded responses to the question for collective identity were about collective identity and teamwork. The social cohesion question examined how individuals impact each other or the community, and forty-four percent (44%) of responses discussed social cohesion. The social networks question describing groups or partners that help your garden was significant in that seventy-three (73%) of responses were coded to social networks. The knowledge exchange question also had an overwhelming response in one category, with eighty percent (80%) of responses referencing knowledge exchange. In each case, our targeted aim was realized. Participants' responses provided ample data to account for and describe observable practices with our questions that targeting each indicator.

Online focus group responses

Furthermore, follow-up focus group questions successfully gleaned information that strengthened the collected data set. Each focus group session question elucidates additional details on the indicators and provides depth to the discussion responses (Table 3). The initial question described how gardens' pivoting and remaining open during the pandemic concentrated on place attachment and collective identity. Forty-eight percent (48%) of coded responses discussed place attachment, with sixteen (16%) responses relating to collective identity concepts. The second question described ways the garden could be used as a safe place during the pandemic. Results were coded evenly across indicators of place attachment (32%), collective identity (27%), and social cohesion (27%), which were the main targets. The next focus group question focused primarily on social networks, and results were concentrated on knowledge

exchange (34%) and social networks (27%). The final question focused on drawing additional information on social cohesion. Results were distributed between social cohesion (27%), social networks (27%), and knowledge exchange (27%) responses equally.

Indicators

Results from the inductive coding for community gardening subthemes provided 3-5 subthemes for each indicator. These subthemes provide insights into the actions and activities of a community garden within each of the indicators.

Place attachment

The first discussion board question focused on how community gardens pivoted during the pandemic. Spending time outdoors and in nature (29%) and providing a place for safe physical exercise (28%) were dominant themes during seasons 2020 and 2021 (Table 6.). Likewise, providing a physical location for refuge and reflection (18%) was a significant theme, with many leaders expressing that their gardeners visited their plots more frequently with "midday breaks."

Table 6. Discussion Board Place Attachment subthemes

Discussion Board -Place Attachment Subthemes	Percent of Place Attachment Responses coded to subtheme
A place to be in nature	29%
Connection to soil	11%
Refuge/respite/stress relief	18%
A place to grow food	14%
A place for safe physical activity	28%

One participant said, *"...many decided they could take a break in the middle of the day and get fresh air and sunshine ...and have a break from the screen time many had. The plot*

owners came out to get away from the stresses of the pandemic." In addition, several respondents spoke to the ability of "staying open" and being "essential" (14%) during the pandemic as food-producing entities. These results highlight ways that community gardens functioned during the pandemic and viewed the garden as a safe place. One respondent summed it this way*," It was a trusted community of people and a safe environment to share concerns and worries about what was going on in the world, all while digging in the dirt and getting fresh air*." The final theme in describing the discussion question responses regarding place attachment was providing a physical connection to the earth/soil (11%).

Additionally, in the focus group data, community gardens were frequently expressed as a place of refuge and reflection (41%) (Table 7). Many respondents discussed how gardeners purposely visited the garden for this specific purpose during the pandemic. Leaders also explained how their gardens were used as a shared space to grow food for the community (27%) and as a safe place for physical activity (23%). In addition, several leaders mentioned that the garden became an exceptionally safe location for the senior community (9%), stating, *"...I have a lot of retirees, so I think it was really important for them to have that safe space during the pandemic*."

Table 7. Focus Group Place Attachment Subthemes

Focus Group - Place Attachment Subthemes	Percent of Place Attachment Responses coded to subtheme
Physically safe place	23%
Seniors	9%
Purpose/growing food for community	27%
Refuge/sense of place	41%

Using a place-based example of the Kansas City Metropolitan, our findings assert that place attachment undergirds most community gardening practices and thus helps build community social resilience by providing a physical, social, and psychological refuge for garden participants (Figure 5).   In addition to growing food, the results suggest that community gardens contribute to the local community's social resilience by providing a place for physical activity, a place for refuge and reflection, a place to enjoy time outdoors, and a place to connect with the soil/earth. Communities with a "diversity of place meanings" and multiple kinds of attachment to place may be more resilient and adaptable to social change (Stedman, 1999, p. 769).

With much of the world socially distancing during the "pandemic lockdown," safe physical spaces to assemble were limited.   In addition to growing food, these established gardens were able to quickly pivot into action and fill in gaps for their participants and the community at large. One respondent said," *…we could provide a safe outdoor space…neighbors started using a part of our garden for a weekly art market. The pandemic made our garden stronger by showing how important green space and a sense of community really are to our neighbors*."
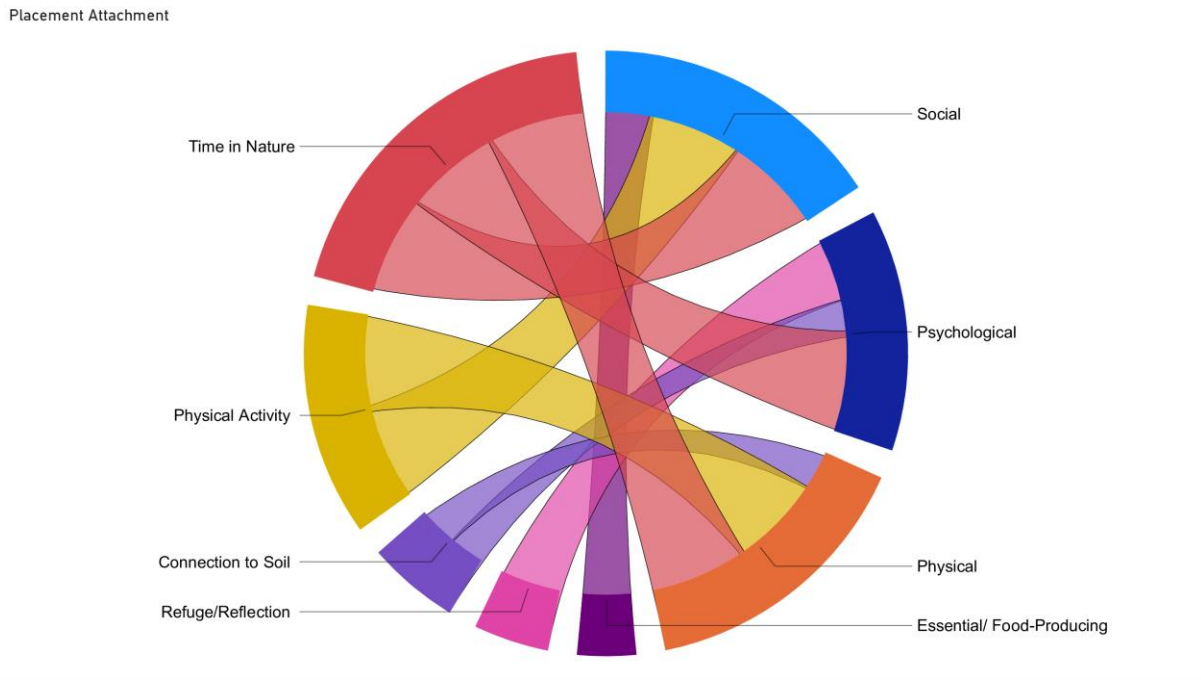
Figure 5. Connections between place attachment themes- time in nature, physical activity, connection to the soil, refuge/reflection to themes of well-being--social, psychological, physical

Collective identity

The second discussion board question focused on gardener collective identity during the pandemic with emergent themes of being "essential" and producing food (33%), giving gardeners a purpose during the pandemic (26%), providing a community to belong (22%), and being an emotionally safe place (19%) for participants dominated responses (Table 8).

Table 8. Discussion Board -Collective Identity Subthemes

Discussion Board- Collective Identity Subthemes	Percent of Collective Identity Responses coded to subtheme
Essential/food-producing	33%
Purpose	26%
Belonging	22%
Safe place for emotion/ worship practices/friendship	19%

Leaders discussed how the gardeners came together as a team during the pandemic. Much of the collected data centered around their gardens' crisis response and how they transitioned in function and purpose in seasons 2020 and 2021, working together on a mission. One participant said, "*Working in the garden gives volunteers a sense of belonging to a community that shares the same goals and gives them a purpose.*" Much of the discussion focused on food production as that acute response to the pandemic (33%) that brought their garden together cooperatively.   One leader of a senior-led garden at a senior care facility stated, "*During the pandemic, they threw themselves into gardening even more and became a tighter-knit group. Being able to leave a small bag of produce on a neighbor's door became a way to say, "I'm thinking of you…you are not forgotten."* In addition, inner-city gardens reported the community garden brought neighborhood people together to garden and becoming an "urban farming" venue where non-members started planting and growing food outside of the traditional raised bed plots, "*…about 10% of our little neighborhood residents are low income or subsidized housing, and they just started coming…just incredible groups just like urban farming …just people planting in the right of ways…not 4X8 raised beds*".

Collective identity, or seeing as a group, was directly reported by many of the leaders. Providing opportunities for urban dwellers to come together to implement a shared vision indicates a way to utilize community gardens to boost community social resilience (Figure 6). By participating in social activities, like communal gardening, a person can develop a sense of belonging and an identity that goes beyond the person. The reported results suggest that being part of a community garden during a crisis benefited participants' well-being by helping them feel connected to a group and serving a greater purpose of feeding the community. Leaders spoke about how the "threat" of the pandemic helped facilitate cohesion within their groups; everyone could see the bigger picture. In addition, leaders communicated how having a shared purpose of growing community food helped their gardeners feel more connected to each other and the broader community. Because it bridges individual and collective identity processes, the stronger the group identification, the more shared beliefs and fate are incorporated into the individual's social identity, and the more people are prepared to act on behalf of the group (Stekelenburg et al., 2013). Communal gardening can help facilitate this process by being a physical and social community focal point bringing people and purpose together.

Other leaders spoke about how gardeners became emotionally closer during the pandemic, utilizing members as support networks. The pandemic provided opportunities for their teams to work more closely together. One leader that manages a donation garden/soup kitchen said, "…*it's like belonging to a team.*" The group interactions built collective fortitude and strength that these gardens and communities will be able to access down the road. One leader stated, *"…we had a united front...one mission…to grow food together… and we still have a strength there (today)*." This is often a goal in urban development – to empower individuals

and capitalize on the group strength of working together. The results show ways these practices in urban community gardens can boost this capability (Figure 6).
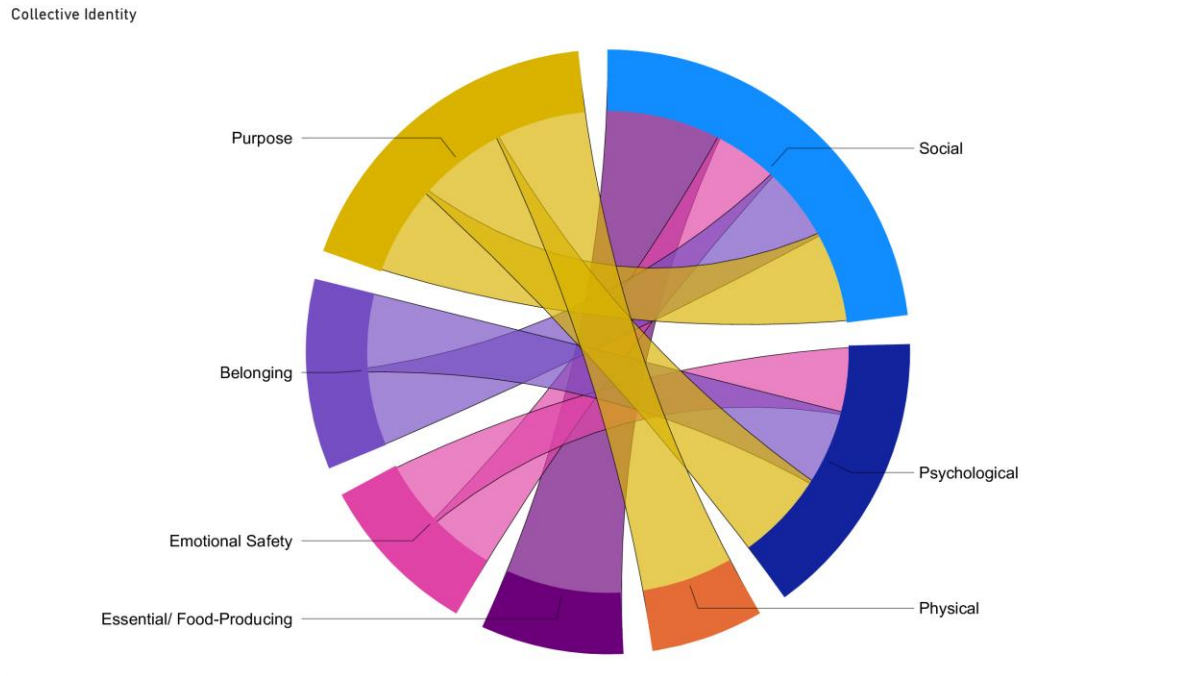
Figure 6. The connection between collective identity themes--purpose, belonging, emotional safety, to themes of well-being--social, psychological, physical

Social cohesion

Discussion question three asked the garden leaders how gardeners have impacted one another within the garden. Themes of gardens being hubs of friendship, fellowship, and connection (42%), reciprocity (33%), and growing food (25%) within the community predominated (Table 9).

Table 7. Discussion Board Social Cohesion subthemes

Discussion Board- Social cohesion subthemes	Percent of Social cohesion responses coded to subtheme
Fellowship/friendship/connection	42%
Reciprocity (food/goods/services)	33%
Crisis response - growing food	25%

One leader recounted that one of their avid gardeners became seriously ill and eventually could not garden. This participant said, "*I have witnessed gardeners working together in the garden and becoming good friends. They check on one another…one gardener comes to mind who was a bright and happy person that everyone liked to talk to…who came down with Lou Gehrig's disease…our gardeners maintained her gardens when she could not get out and do this anymore. It is a good memory to have been able to help this person out.*"   Another leader explained that they wanted to grow more sweet potatoes for area food banks but lacked the dedicated space for such activities. Still, their gardeners worked together to make that happen. The shared purpose of growing food for the community "*During the pandemic, we put in beds out of our desire to plant more food, and we did it through a grant awarded in mid-April, and our volunteer crew came in and built this field and planted sweet potatoes by the end of June this year.*"   Others pointed out that growing food for the community solidified their gardeners as a group by saying, "*Our volunteers worked harder, I believe, to produce foods in their gardens for food pantries and soup kitchens.*"   Other respondents spoke about how their garden expanded its functions to the broader community during 2020, stating, *"…suddenly, artists that were used to having gallery spaces…they did not have them anymore… so during 2020 groups*

organized and we had artists setting up in the garden, and soon we have thousands of people coming on Sundays and food trucks parked outside of our garden…it became a new way of engagement with the community."

Additionally, data from the focus groups had related results as the discussion probes represented indicators of place attachment and collective identity together. Leaders remarked that the garden functioned in many ways, from weddings and celebrations to faith and worship practices to community food production and safety. Predominately mentioned were themes of the garden being an emotionally safe space (33%), a community gathering space (28%), a community gathering location (28%), a physically safe place (17%), and a place to visit with a trusted friend (the leaders) (11%) (Table 8).

Table 8. Focus Group -Place Attachment and Collective Identity subthemes

Focus Group- Place Attachment and Collective Identity Subthemes	Percent of place attachment and collective identity responses coded to subtheme
Emotionally safe space	33%
Community gathering location (weddings/bonfire/faith practices, older kids, art)	28%
Physically safe place	17%
Growing food for community	11%
Leaders as a trusted friend	11%

One respondent encapsulated these themes stating, *"Gardens tend to be a place of sharing…veggies, time, and knowledge. They also share their fears, stress, uncertainty, sadness, and frustrations, as well as celebration and victories, and happiness. Those who listen share their input, insights, prayers, opinions, a shoulder to lean on, a high five, or an air-hug. The garden is viewed as a safe place for all these emotions to be worked through and processed."*

As McMillen et al. (2016) state, "Social cohesion can be understood by considering the strength and number of bonding ties within the group as well as the degree to which: a group makes decisions together about the site and its use; individuals engage in shared stewardship activities together, and individuals engage in acts of reciprocity on and off-site (p. 19). In 2020 and 2021, most leaders' garden communities came together to grow food for community food banks. They exhibited community social resilience capacities by being a unified community that pivoted to growing food for the greater good, exhibiting substantial social capital between members. Some participants shared that a positive outcome of the situation boosted their self-efficacy and described enhanced actions as a group. Community garden leaders reported their gardeners from diverse income levels, cultural backgrounds, and ideologies from the data. This diversity can be used as a strength in solving complex problems. Building social cohesion amongst diverse communities and promoting the inclusion of marginalized and vulnerable groups is essential for development interventions in diverse, dynamic, and dense urban environments (World Vision, n.d.).

Furthermore, Schiefer and van der Noll's (2017) definition of social cohesion emphasize the orientation toward the common good as a crucial element of social cohesion. During 2020 and 2021, social cohesion was in action more significantly at these community gardens. The community gardens members recognized a community need and took action to meet those needs by increasing their food production for the greater Kansas City community. To accomplish this readily and successfully requires an elevated level of group social cohesion. This dynamic response also benefited the greater Kansas City community through enhanced intersections of

themes of relationships, reciprocity, and the shared purpose of growing food, building adaptive

capacity for the community, and promoting overall well-being (Figure 7).
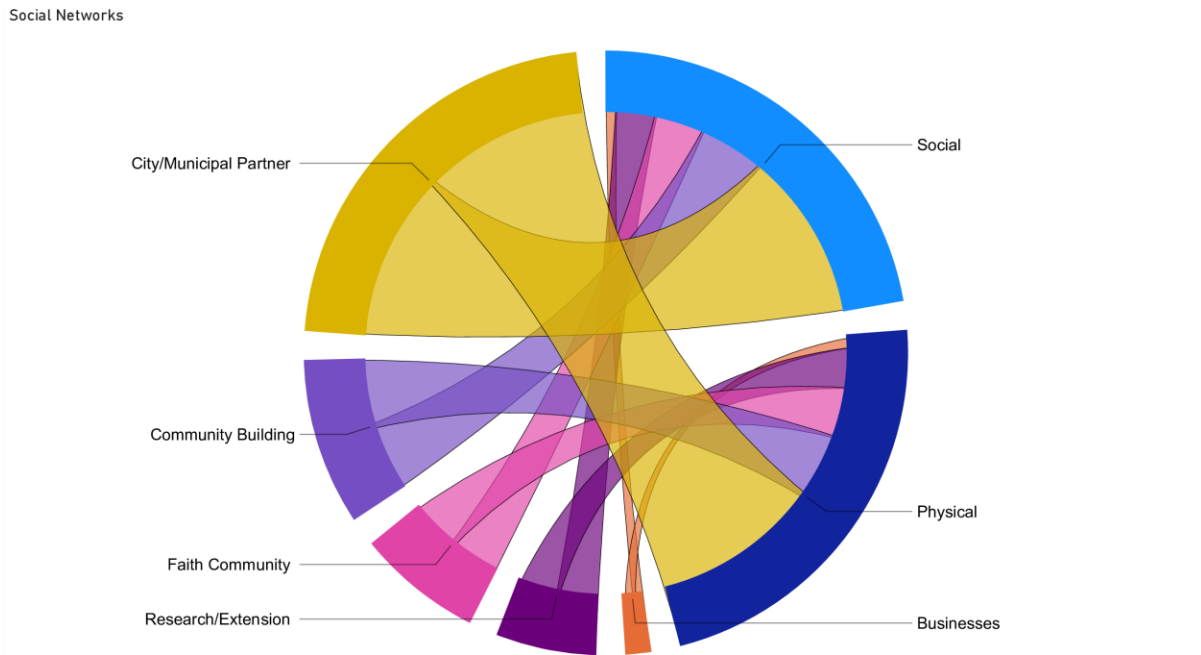
Figure 7. Connections between social cohesion themes--relationships, reciprocity, shared
purpose to well-being themes of social, psychological, physical

Social networks

Sixty-nine percent (69%) of survey respondents stated that their gardeners help each

other inside and outside the garden. Discussion board responses focused on building

relationships and partnerships that connected their garden to the larger community. Strong ties

with cities or municipalities (50%), community partners (20%), faith partners (15%), research

and extension (12%), and businesses (3%) (Table 9).

Table 9. Discussion board - Social network subthemes

Discussion Board - Social network identity subthemes	Percent of social network responses coded to subtheme
City/municipal partner	50%
Community (KCCG, Cultivate, GG, Scouts)	20%
Faith community	15%
Research/Extension	12%
Businesses	3%

Direct connection with a municipal partner (50%) was linked to many participant responses regarding contributing to operating costs, "…*such as assistance from the city has been extremely valuable and allows us to have some reserve money.*" Leaders also described their relationships with partners "…*as the lifeblood of our organization*." While one leader remarked, *"Perhaps most importantly, we appreciate the growing number of volunteers who come to help from boy/girl scout troops, NHS clubs, youth groups, synagogues, churches, interfaith groups, neighborhood associations, and many more."* While others focused on ways, these community relationships helped build infrastructure, capital improvements, and community knowledge.

Likewise, focus group responses spoke to how social networks built a more connected neighborhood (75%) and how their social networks benefited food distribution sites during the pandemic (25%) (Table 10).

Table 10. Focus Group Social Networks subthemes

Focus Group - Social Networks Subthemes	Percent of social network responses coded to subtheme
Connected neighborhood (moms/kids, foot traffic, faith group)	75%
Food banks	25%

One leader expressed it this way*: " I feel that all of these relationships create deeper connection in a community and a sense of neighborhood, community pride, and a sense of purpose."* Others shared that the social networks within the garden also helped disseminate information, especially during the early pandemic and with acquiring new food bank recipients to receive the donated food.

The results suggest that community social resilience is enhanced through the power of social networks and the connectedness therein (Figure 8). Social networks are a critical strategy for grassroots community organizing and how actors construct spaces to defend their interests (Cox et al., 1998). Social networks are noted as a vital building block in the health of community gardens (Fawcett et al., 1995).   Across many fields and disciplines, researchers are uncovering the powerful connections between social networks and social capital (Corvo & De Caro, 2019). Social capital is an intangible asset fostered through civic engagement and correlated to increased quality of life (Putnam, 1993). The results show garden leaders consider their relationships with municipalities, community partners, faith communities, research, and extension as critical to their success, saying, "…*without their assistance, we would not be in existence."*

Furthermore, the results show how they utilized and, in some cases, expanded their networks of people, business, and community partners during a global pandemic.   Results point

to how partners, whether formal or informal, assist in tangible ways and facilitate the flow of information and research-based best practices (Figure 8.).
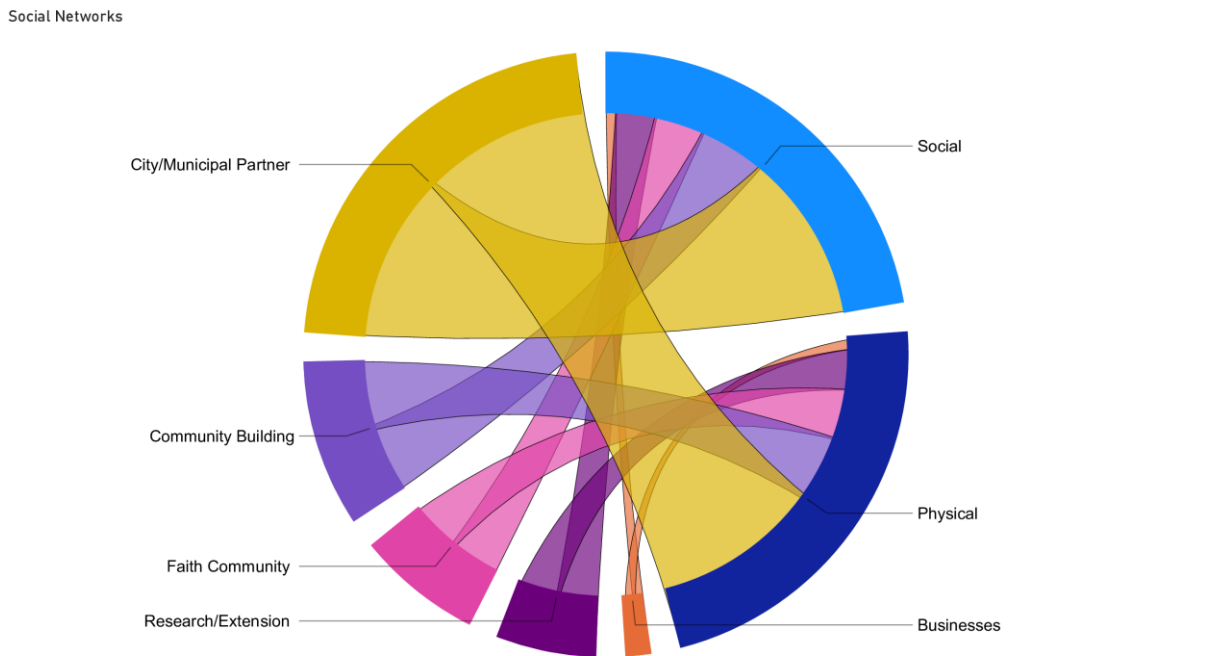
Figure 8. Connections between social networks' themes of city partners, community partners, faith partners, and research and extension partners by themes of well-being-- social, and physical

Good relationships with both Kansas City Community Gardens (non-profit) and Research and Extension (Kansas State/Missouri) were highlighted in the results; they helped many gardens during this period.   One leader stated, "*We remain extraordinarily grateful to Kansas City Community Gardens and The Giving Grove and extension for their ongoing support.*" This highlights the importance of how information, practices, and assistance flow through to and from a community partner, especially during a crisis. In addition, robust social networks provide physical, psychological, and social infrastructures that help access community needs and solve neighborhood problems. Likewise, our results suggest that community gardens can be used to

bridge community relationships, interconnect social circles, and facilitate community social resilience through the power of trusted relationships. One leader stated, "*It (the garden) helps bridge the social distance that often occurs in suburbia where neighbors often remain strangers.*"

Knowledge exchange and diversity

Eighty percent of the survey respondents (80%) reported having some gardening experience before becoming a leader. Many emphasized in the survey that disseminating research-based information was important to them (Appendix A). The final discussion question discussed ways the garden provides educational opportunities and connections. Leaders reported the garden as a place to provide hands-on activities and teaching opportunities (37%), a place to garner interest in gardening (26%), and a place to engage volunteers and the public (22%) (Table 11)

Table 11. Discussion Board Knowledge Exchange and Diversity subthemes

Discussion board - Knowledge Exchange and Diversity subtheme	Percent of knowledge exchange and diversity coded to subtheme
Teaching space/ hands-on activities	37%
Growing gardeners/ interest	26%
Engaging volunteers/public	22%
Build Skills/Self-confidence in gardening	26%

It is a place to build self-confidence and gardening skills (26%). One respondent stated, "*…knowledge exchange is critical for expanding the number of people who are growing their own food. We get a lot of school groups and scout troops, and I look at this exchange as planting a seed that might grow more gardeners in the future.*" Others described the garden as making for an ideal place to demonstrate best practices, educate, and inspire simultaneously. *"In*

addition to the self-confidence and empowerment they feel, the experiences gained culminate into something that is tangible to everyone. A tomato they pick, a bean they can eat, a flower they can enjoy." Participants also highlighted that knowledge exchange happens at many levels, including with other community garden leaders, personal education, and county extension resources. Some shared that their local extension office was crucial to learning and demonstrating best practices. *"Extension provides knowledge that helps us continue to grow and pass along this knowledge to our gardeners."*

No specific focus group question was focused on knowledge exchange and diversity as primary data (discussion board) was sufficient.

Inherently community gardens are sites for learning about gardening and horticultural practices (Pudup, 2008). Community gardens naturally promote the exchange and the transmission of diverse knowledge and promote community social resilience. Gardening together also offers opportunities for interconnection and reciprocity (Ong et al., 2019). Community gardens bring together various groups of people with varying skills and abilities. "Exchanging knowledge within the group itself can expand the group's understanding of its purpose and relationship to other people, events, and issues, thereby creating a stronger and more solid bridge to other groups and issues" (McMillen et al., 2016, p. 19).

Results show that many of these gardens incorporate research-based practices; no-till systems, permaculture, hügelkultur, apiary systems, and monarch waystations are demystified through a hand-on, interactive modeling approach. One leader summed it as, *"…knowledge exchange is a perk of being a part of a community gardening…important for those new to gardening or are recent arrivals"*.

Building on intergeneration and cultural knowledge is an indirect way of building resilience (McMillen et al., 2016). Eighty percent of the study's leaders reported having rural or farming backgrounds. Being part of an urban community garden allowed their "farm" knowledge to expand to a more urban audience. In addition, as several leaders reported, members with multicultural experiences provided opportunities to bring understanding around their knowledge and experiences around food to share with their existing groups. This knowledge exchange benefits both sharer and the listener. In the book "For Space," Massey and Massey (2005, p. 151) stated, "…the chance of space may set us down next to the unexpected neighbor' presents a beautiful way knowledge is shared and observed." Leaders explained how the sharing of culture has led to friendships, which led to enhanced community connectedness.

From a wellness perspective, community gardens provide an intersection of traditions, foodways, and horticulture knowledge with research-based practices together in an interactive way. Furthermore, the data suggest that these spaces educate the garden participants and many community volunteers that interact with these sites. One leader shared it this way, "…*our two prongs of backyard gardening are to teach the community, help them with their backyards, and teach and educate young people."* This helps the knowledge exchange to travel to another level outside the garden. From an urban planning perspective, places that facilitate the exchange of knowledge and the dissemination of cultural contributions build social sustainability, enhance social-ecological resilience in those agroecosystems., develop teamwork, and promote engagement with other stakeholders (Figure 9).
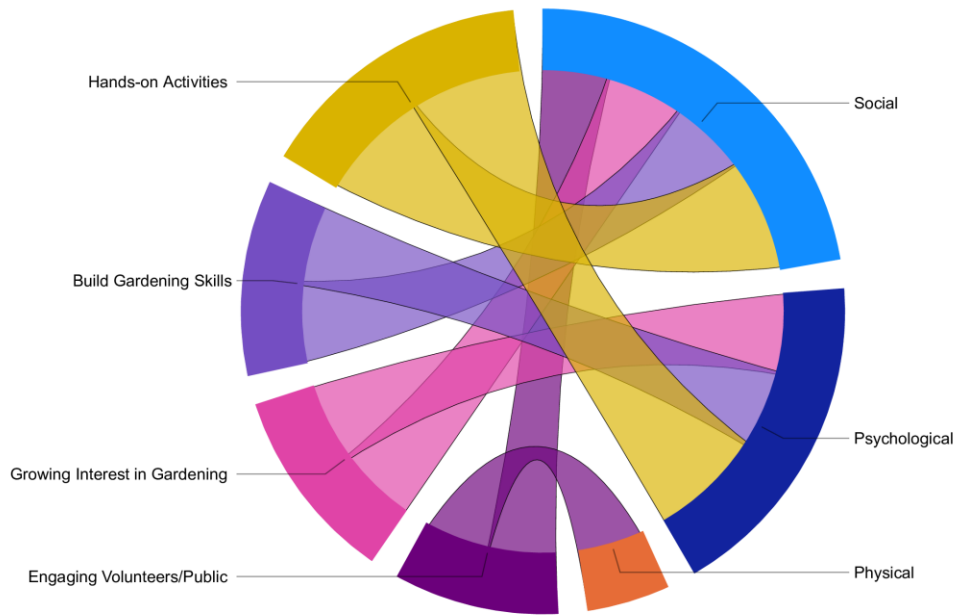
Figure 9. Connections between knowledge exchange themes--hands-on activities, building gardening skills, growing interest in gardening, engaging volunteers, and the public to themes of well-being--social, psychological, and physical

Themes and well-being

Well-being is a multidimensional construct becoming a popular measure for health promoters, government agencies, and academics as an indicator of societal health and happiness (World Health Organization, n.d.). Well-being is vital to consider in community gardens because while well-being may not be the intended end goal, many of the outcomes of community garden participation positively influence physical, psychological, and social well-being. These results align with the reported benefits of community gardening: to consume fresh foods, social cohesion such as community building and culture exchange, improved health among members, and making or saving money by eating from the garden or selling the produce (Guitart et al., 2012). Other less common but still important motivations included: educating, enhancing cultural practices, accessing land, enjoying nature, environmental sustainability, and enhancing spiritual practice (Guitart et al., 2012). Beyond issues of food access, community gardens build social ties, share skills and expertise, create environments to learn about nature and culture, and illustrate proactive measures to improve our physical and mental well-being (Ohmer et al., 2009).

The results indicated practical ways community gardens foster well-being by analyzing subthemes. While developing themes was not this research's goal, they were illuminated through the theoretical framework's lens. They provided practical ways to build community social resilience through community garden practices. What may be of importance here is not merely the themes themselves but understanding the interconnections and intersections between the themes; connections that benefit individuals, neighborhoods, and communities collectively and positively impact community resilience and well-being.

Theme - time in nature/outdoors

Based on our results, time in nature and the outdoors was particularly important to participants. Many respondents discussed feeling locked in their homes and "*glued to screens*." One of the respondents commented that the community garden, especially in urban areas, functions as an *"oasis in the city"* as one of the respondents commented. Results suggest that studying community gardens as both "green infrastructure" and as an "interconnected network of green space that conserves natural ecosystem values and function and provides associated benefits to human populations" (Benedict & McMahon, 2002, pp. 5–6), therein lies an opportunity to provide a double dividend, supporting both human health and resilience (Bunch et al., 2011). Lawson (2005) reported that time spent visiting greenspaces is related to better subjective wellbeing. Other studies have linked this time in nature as a pathway to promote human health and well-being (Kuo et al., 2015; Puskás, Abunnasr, & Naalbandian, 2021). From an urban planning perspective, the findings highlight the importance of having dedicated spaces for urban community gardening and functioning "garden communities" well-established before disaster strikes. These community gardens were well-positioned to be "ready to respond" to an acute crisis—a sure sign of a developed sense of place, solid collective identity and social cohesion, and robust social networks.

Theme - physical activity

During seasons 2020 and 2021, the results also indicate that the physical garden spaces of community gardens were a primary source of physical activity for many participants (28%, Table 6). With many communal sites like gyms, clubs, and recreation sites closed, participants and the outside community realized the garden could provide this benefit. One leader stated, *"…there*

appeared a strong interest in staying active and involved, so we had about twice as many people

coming out to work and volunteer as during a normal year pre-pandemic." Studies indicate that

physical activity is linked to human well-being as a determinate of health. "Biologically

conditioned, the need for action has been minimized by the ever-increasing pace of life. As

a result, it may lead to physical and mental health loss. Active recreation is an excellent source of

activity and satisfaction" ((Wojciechowska, Sokolnicka, & Liberska, 2014)). Other leaders

described that many gardeners "…*decided they could take a break in the middle of the day to*

come out get fresh air and sunshine before going back to work from home… owners that had

young children also used the garden area for them to come out and have a break from the screen

time many had…the plot owners came out to get away from the stresses of the pandemic and get

exercise." The results align with this sentiment; the garden became a safe place to stay

physically active, especially for seniors and vulnerable community members; "…*this allowed*

people who were shut inside their house living, working, and 'Zooming' to actually get outside in

the sun, have good physical activity, and, most importantly, be together with other people in a

safe and enjoyable way."

Theme - essential/food production

A clear indicator of place attachment is "strong protection if the site is threatened"

(McMillen et al.,2016). As many places were ordered closed by the federal and local

governments in response to COVID-19, community gardens were classified as "essential"

because they were producing food, thus allowing them to stay open. The gardens' physical

spaces became more critical to participants' daily lives. Increased food production was one of

the outcomes for these sites. One leader stated, *"I felt like we needed to stay open because we*

supply a lot of food …that is given to shelters, food pantries, and soup kitchens." Another

mentioned, "*the emphasis was… we need to do more… we need to give more to the pantry because people are probably hungry*." Being a food producer "opened the door" to even more place-based connections and a more significant response for participants and the community. Some scholars assert that community gardens also benefit participants (Anderson, Maher, & Wright, 2018). One leader explained, "*As the end of the season approached in 2020, I had several volunteers request that we continue to work throughout the winter on garden projects on nicer days. I think this was a result of the Pandemic but also a desire to have contact with this garden community.*" The results of this study highlight ways the community is strengthened by having volunteers and gardens that help the greater good.

Theme - refuge and reflection

Leaders expressed participants increasingly used the community garden as a place of refuge and reflection during the pandemic. With increased time in the gardens, participants began visiting the garden specifically as a place for stress relief. In the context of the COVID-19 pandemic, it appears likely that there will be substantial increases in anxiety and depression, substance use, stress, and loneliness (Galea et al., 2020). One leader expressed, "*Many used it as horticultural therapy dealing with the stresses, trials, and tribulations as the pandemic ebbed and flowed. We had people using our benches and reflection area to chat with friends while social distancing outside. We have a lot of open space that lends itself to being a place to walk around, look at growing vegetables, fruit, and flowers and not feel enclosed, which many mentioned. Appreciation for our space to get away and do something productive has increased*." Finding physical places to rest, reflect, and get a sense of emotional safety benefits urban dwellers and builds community social resilience by providing a tangible place to seek rest (Lee, Jordan, & Horsley, 2015). Researchers link having safe places to process emotion and find

respite helpful to reducing 'pandemic anxiety' as a method of "psychological first aid" (Zhang et al., 2019). Helping people manage their experiences and feelings associated with natural disasters is often strongly associated with reducing psychological distress (Chan et al., 2015; Haider et al., 2020). This stress-reduction suggests that community gardens are utilized as a place of respite and reflection and, to a greater extent, during an acute event benefiting mind, body, and spirit.

Theme – a physical connection to soil/earth

There is often a disconnect in communicating links between soil and human health as our society has become more urban (Knight et al., 2010). Scientists have made meaningful connections between earth and human health, with many authors publishing in this area (Pepper, 2013; Wall et al., 2015; von Anderson et al., 2018). Soils comprise a dynamic reservoir of biodiversity within which the interactions between microbes, animals, and plants provide many benefits for human well-being; not only includes disease control influencing the quantity and quality of the food we eat, but the air also we breathe and the water we drink (Wall et al., 2015) The results suggest that a direct connection to the soil may contribute to building place attachment and thus community social resilience. Examining the effects, these community gardens inextricably value this physical connection to the earth. One leader said, "… *(the garden) allowed people to be grounded…have contact with the earth*." This direct contact with the soil allows participants to experience something unique to gardening. Physical soil contact has physical and psychological benefits (Smith, 2016) and gives participants a tangible place to care for the earth. In 1949, Aldo Leopold described his vision of a land ethic where the relationships between people and land are intertwined (Leopold, 1949). Caring for people cannot be separated from consideration for the land. Through community gardening, an 'ethos of care

for the world' is reinforced by building resilience through direct care and physical connection to the soil. Community gardens provide a way for urbanites to have a physical connection to the soil in an accessible, community-driven, and low-cost manner.

Theme –purpose

During the early days of the COVID-19 pandemic, many businesses and entities were required to close for health reasons; entities deemed "essential" services were allowed to remain open. Food-producing entities, like community gardens, were able to open and work within local restrictions. This allowed community gardens to continue to be a place to grow food for individual participants. Still, many of the garden leaders reported pivoting to contributing to community food insecurity by maximizing their food production for food banks. By growing food for the community, many leaders reported that this mission gave their gardeners a purpose and increased their motivation to participate in gardening in 2020, 2021. From a social cohesion perspective, this was about the group coming together, addressing a need, and acting. One leader referred to it as "…*growing together for a purpose*." Respondents mentioned that this purpose of serving the community boosted internal and external relationships.

Social cohesion has been described as "the glue that binds society together, promoting harmony, a sense of community, and commitment to fostering the common good" (Haider et al., 2020). Examining gardens during a crisis makes it easier to see this dynamic in action.   As the results suggest, having a new identity emerge after an acute event strongly indicates community social resilience capabilities. These community gardens pivoted in a community-enriching way (McMillen et al., 2016).

Theme - belonging

Ideas of belongingness are linked to mental, physical, and psychological well-being (Kusel, 2001). Lack of belongingness may trigger stress, poor decision-making, anxiety, and depression (Verhagen, Lodder, & Baumeister, 2018). During the pandemic, community garden leaders saw increased participants connecting deeper, stating, *"...more meaningful interactions with each other and the conversations were not just trivial banter*." With many social opportunities limited by the pandemic, results show community gardens as a meaningful place to connect with others. The relationships were expressed between participants and even one garden leader to garden leader. One stated, *"...I have connected with a couple of other leaders, and we talk and get together to "compare notes" and ...discuss how things are affecting us."* Another highlighted, *"...the garden was an essential respite to volunteers and staff as a therapeutic space for a sense of community and belongingness while we were all limited in our social opportunities."* Urban community gardens provide locations for people to be within a connected community and feel valued through positive connections. Research findings support conceptualizations that acknowledge the interconnectedness and exchange between people and place at community garden sites (Beckley, 1995), indicating a solid community social resilience capacity that benefits personal well-being.

Theme - emotional safety

During adversity and with many traditional avenues of psychological release diminished, finding ways and places to express emotion can be difficult. Leaders reported that many gardeners used the community garden as a place of emotional safety. One shared, *"...I would say that it was a place where people could come and vent like it was safe for them, maybe they had a spouse working from home, and it was too much...they would come out, and they got away where they could vent about it and talk to me... I did a lot of listening*." Embedded leaders took

on the role of a trusted friend and provided a safe emotional location for that to occur. This suggests that community gardens build trust between individuals and as a place where emotional safety can be sought.   From a resilience perspective, community gardens can contribute to community social resilience by providing participants emotional protection. The value of emotional security is difficult to quantify but finding ways and environments to build safety in urban areas through community gardening contributes to overall mental health and well-being (Veen, 2020).

Theme – relationships

Leaders reported increased participation among gardeners during the pandemic. Many stated that social groups were changed while many gardeners worked from home; afternoon participants were now intermingling with the morning crowd, preschoolers with seniors. The community garden was a focal point of interaction as people had more time to garden and a less restrictive schedule. Others shared how bonds were created among their faith-inspired gardeners; one shared, "… *(this was) particularly important when in-person worship services were canceled out of concern for the safety of congregants, particularly the elderly. That made working together, talking, learning, and praying with others safely in the garden all the more important*."

Theme – reciprocity/ sharing

While most social endeavors had nearly come to a standstill during the pandemic, the community garden provided a place to share. Leaders reported increased participation that led to much sharing of food, culture, stories, and interaction between gardeners. Our leaders state that the community garden cultivates reciprocity between members and the broader community. One said, *"Instead of our annual produce sale, we decided to reach out to people we wouldn't*

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normally distribute to with "Vegetable Blessing Bags." This was at the peak of our harvest, so it wasn't taking away from our regular donation outlets--We gave out over 100 bags." Others discussed how the community table at the garden served as a physical place to build community through sharing, "*a lot more of them sharing… what worked for you what didn't work just…reaching out…coming from rural communities where you know that was the mindset of helping each other out lending a helping hand and you we see a lot of that in the garden, but I think we maybe saw a little bit more than we had in past years.*" Social support has been conceptualized as the beneficial interpersonal transactions that protect people from adverse effects of stressful occurrences (Cohen et al., 1984). In social psychology, reciprocity is a social norm of responding to a positive action with another positive action, rewarding kind actions (Molm, 2010). As a social construct, reciprocity means that people are frequently much nicer and more cooperative than predicted by the self-interest model in response to social actions. Reciprocal action in the garden allows people to get things done that they would not be able to do independently. By working together or exchanging services, people can accomplish more than individuals. It also allows for people to connect on a deeper level. One leader described how a new community member "*…invited a small group of us to her daughter's house for dinner. They wanted to give back to us that we have given to her, a garden community, friendship, and love. That night we learned from her daughter that before she started gardening, she was depressed, but since gardening with us, she is very happy and looks forward to coming to the garden with her friends.*"

Theme - growing interest in gardening/skills

Beneficial social networks support positive self-esteem and high self-efficacy through experiences that influence individuals' well-being (Pannebakker, 2018). Alongside the apparent

health benefits, the potential for the community gardens to be transformative at the individual level in developing both skills and knowledge "grows gardeners" for a future generation is immeasurable. With urbanization, fewer people grow up on farms or have direct gardening experience. Community gardens function as places to gain practical knowledge and expertise.

One characteristic of place attachment is a plan for succession of the site to the next generation (McMillen et al., 2016). Acknowledging this informational succession is how community garden practices contribute to resilience at the community level. Leaders mentioned how many more people were discovering growing plants during the pandemic, and the community garden became a way to learn how to develop and nurture those plants. One leader stated, "*In the gardens, we can point things out that may make something easier to understand since the plant is right there in front of us. I think it is critical to promote interest in gardening to share our passion with those of the public that come through our gardens*." Providing urbanites opportunities to build their horticultural knowledge and practical garden skills ensures the transfer of hand-on or modeled learning, often considered "fragile knowledge," that would be otherwise lost without these interactions. This idea further underscores the values of associative life and learning from one another that are often lost due to urbanization.

Theme - engaging the public and volunteers.

Previous scholarship has shown a positive relationship between volunteering and improved mental and physical well-being measures (Kusel, 2001). Urban community gardens allow people to share expertise, make friends, trade skills, and boost relationships. They also became hubs for growing and assembling volunteer groups. In addition to benefitting the community, volunteering is also assumed to help the volunteer (Carlton et al., 2015). During the pandemic, leaders reported increases in internal and external volunteer groups. One leader said,

"… (I) *think we saw a lot more people coming to the garden groups of people… I don't know*

exactly how they found out about us, these youth groups, but they did, and it is great to see them

coming around and getting involved, and they love it!" The results suggest that these volunteers,

who were already actively volunteering in the community, can mobilize, access, and triage ways

to help the local community, especially during a crisis time. Having safe places to assemble is

critical. One leader stated, " *…gardening during this time did seem to have the effect that people*

didn't take for granted that they would be able to be involved … we had a strong core of

gardeners that continued. Working through this challenge made us appreciate both being able to

volunteer and our fellow friends we have made as we have worked together over the years." Just

as place attachment undergirds most community garden practices; the results suggest that

volunteers are integral and essential for success—the great connectors of a resilient community.

Conclusion

Invisible to the naked eye, mycorrhizal fungal networks' role in a forest system cannot be understated and are a critical part of the natural systemic health of a forest. Mycorrhizal action is one of nature's invaluable tools, ensuring overall system resilience and fortitude. Community gardening can be similar; many practices and processes occur but are not easily detected. Research indicates that greenspace and connections to the outdoors, like those found in a community garden, support urban community resilience, especially during times of stress and uncertainty like a global pandemic (Robinson et al., 2021; Solnit, 2010). Far less scholarship has focused on community gardens' contribution to community social resilience. Through a theoretical framework lens (McMillen et al., 2016), this research revealed practices, processes, and creative innovations within community gardens that foster community social resilience and help build inner fortitude within communities. The theoretical framework illuminated practices that promote community social resilience by examining place attachment, collective identity, social cohesion, social networks, and knowledge exchange within urban community gardens. Furthermore, several themes were identified using this construct that demonstrates the connectedness between the indicators in understanding how community gardens can contribute to community social resilience and benefit human health and well-being. Results show community gardens play a role in addressing the effects of the pandemic, serving as a space that contributes to community food security and as a source of physical, social, and emotional well-being for community residents during this time of crisis.

Literature Cited

Al-Qadir, Bani Yaghoub, M., Wu, S., Balakumar, S., & Francisco, A. (2022). Prospective Spatial-Temporal Clusters of COVID-19 in Local Communities: Case Study of Kansas City, Missouri, United States. *Epidemiology and Infection*, 1–24.

Anderson, C., Maher, J., & Wright, H. (2018). Building sustainable university-based community gardens: Volunteer perceptions of enablers and barriers to engagement and benefits from volunteering in the moving feast. *Cogent Social Sciences, 4*(1).

Armstrong, Donna. (2000). A Survey of Community Gardens in Upstate New York: Implications for Health Promotion and Community Development. *Health & Place* 6, no. 4 (December 1, 2000): 319–27.

ARUP and the Rockefeller Foundation (2015). "United Kingdom : Pioneering New City Resilience Index Launched by Arup and Rockefeller Foundation." *MENA Report*, https://assets.rockefellerfoundation.org/app/uploads/20150530121930/City-Resilience-Framework1.pdf. (May 19, 2015).

Barthel, S. and Colding, J. (2013) Civic Greening and Environmental Learning in Public-Access Community Gardens in Berlin. *Landscape and Urban Planning*, Special Issue: Urban Ecosystem Services, 109, no. 1 (January 1, 2013): 18–30.

Beckley, T. (1995). Community stability and the relationship between economic and social well-being in forest-dependent communities. *Society Nat. Resources* 8 (3): 261 – 266.

Benedict, M. A., & McMahon, E. T. (2002). Green infrastructure: smart conservation for the 21st century. *Renewable Resources Journal*, *20*(3), 12-17.

Bendt, P., Barthel, S., & Colding, J. (2013). Civic greening and environmental learning in public-access community gardens in Berlin. *Landscape and Urban Planning*, *109*(1), 18–30.

Berkes, F., & Ross, H. (2013). Community Resilience: Toward an Integrated Approach. *Society & Natural Resources*, *26*(1), 5–20.

Bunch, Morrison, K. E., Parkes, M. W., & Venema, H. D. (2011). Promoting Health and Well-Being by Managing for Social–Ecological Resilience: the Potential of Integrating Ecohealth and Water Resources Management Approaches. *Ecology and Society*, *16*(1), 6–.

Butt, A. A., Kartha, A. B., Masoodi, N. A., Azad, A. M., Asaad, N. A., Alhomsi, M. U., Saleh, H. A. H., Bertollini, R., & Abou-Samra, A.-B. (2020). Hospital admission rates, length of stay, and in-hospital mortality for common acute care conditions in COVID-19 vs. Pre-COVID-19 era. *Public Health*, *189*, 6–11.

Camps-Calvet, L., Calvet-Mir, L., Gómez-Baggethun, E., & March, H. (2015). Sowing resilience and contestation in times of crises: The case of urban gardening movements in Barcelona.

Carlton, Sally. (2015). Connecting, Belonging: Volunteering, Wellbeing, and Leadership among Refugee Youth. *International Journal of Disaster Risk Reduction* 13 (September 1, 2015): 342–49.

Carmin, J., Nadkarni, N., Christopher, R. (2012). Local Governments for Sustainability, and Massachusetts Institute of Technology. Progress and challenges in urban climate adaptation planning: results of a global survey.

Centers for Disease Control and Prevention. (2017). Social determinants of health. Retrieved from https://www-cdc-gov.er.lib.k-state.edu/socialdeterminants/index.htm

Centers for Disease Control and Prevention. (2010, June 10). Community Gardens. [Webpage]. Retrieved from https://www.cdc.gov/healthyplaces/healthtopics/healthyfood/community.htm#

Centers for Disease Control and Prevention. (2022). COVID-19: people with certain medical conditions. Atlanta, GA: US Department of Health and Human Services.

Chan, J., DuBois.B., and Tidball, K. (2015). Refuges of Local Resilience: Community Gardens in Post-Sandy New York City. *Urban Forestry & Urban Greening* 14, no. 3 (January 1, 2015): 625–35.

Chapin, F. S., Chapin, M. C., Chapin, I. I. I., & Chapin, M. C. (2009). *Principles of Ecosystem Stewardship: Resilience-Based Natural Resource Management in a Changing World*. Springer, New York. 319–37. New York, NY: Springer New York, n.d.

Cohen, McGowan, J., Fooskas, S., & Rose, S. (1984). Positive life events, social support, and the relationship between life stress and psychological disorder. *American Journal of Community Psychology*, *12*(5), 567–587.

Colussi, M. M. (2000). *The community resilience manual: A resource for rural recovery and renewal*.

Corvo, & De Caro, W. (2019). Social capital and social networks. *European Journal of Public Health*, *29*(Supplement_4).

Cox, Rosenbluth, F. M., & Thies, M. F. (1998). Mobilization, Social Networks, and Turnout: Evidence from Japan. *World Politics*, *50*(3), 447–474.

Davis, S. (1998). Development of the profession of horticultural therapy. *Horticulture as therapy: Principles and practice*, 3-18.

Doak, & Kusel, J. (1996). Well-being in forest-dependent communities, Part II: A social assessment focus. In *Sierra Nevada Ecosystem Project: Final report to Congress, vol. 2,*

Assessments and scientific basis for management options (pp. 375–402).

Donoghue, & Sturtevant, V. E. (2007). Social Science Constructs in Ecosystem Assessments: Revisiting Community Capacity and Community Resiliency. *Society & Natural Resources*, *20*(10), 899–912.

Draper, C., & Freedman, D. (2010). Review and Analysis of the Benefits, Purposes, and Motivations Associated with Community Gardening in the United States. *Journal of Community Practice*, *18*(4), 458–492.

Emery, M., & Flora, C. (2006). Spiraling-up: Mapping community transformation with community capitals framework: Journal of the community development society. *Community Development, 37*(1), 19-35.

Fawcett , S. B. , A. Paine-Andrews , V. T. Fransisco , J. A. Schultz , K. P. Richter , R. K. Lewis , E. L. Williams , K. J. Harris , J. Y. Berkley , et al. . (1995). Using empowerment theory in collaborative partnerships for community health and development. *Am. J. Community. Psychol.* 23 (5): 677.

Galea, Merchant, R. M., & Lurie, N. (2020). The Mental Health Consequences of COVID-19 and Physical Distancing: The Need for Prevention and Early Intervention. *JAMA Internal Medicine*, *180*(6), 817–818.

Guitart, Pickering, C., & Byrne, J. (2012). Past results and future directions in urban community gardens research. *Urban Forestry & Urban Greening*, *11*(4), 364–373.

Haider, I. I., Tiwana, F., & Tahir, S. M. (2020). Impact of the COVID-19 Pandemic on Adult Mental Health. *Pakistan Journal of Medical Sciences*, *36* (COVID19-S4), S90–S94.

Harris, McLaughlin, B., Brown, G., Becker, D. R., & Quigley, T. M. (2000). Rural communities in the inland northwest: An assessment of small communities in the interior and upper Columbia River basins. In Interior Columbia Basin Ecosystem Management Project scientific assessment /. US Dept of Agriculture, Forest Service, Pacific Northwest Research Station.

Healy, K., Hampshire, A., & Ayres, L. (2003, August). Engaging communities for sustainable change: Promoting resilience. In *Integrated Learning Network Consultative Policy Development Conference, Canberra*.

Holland, L. (2004). Diversity and connections in community gardens: A contribution to local sustainability. *Local Environment*, *9*(3), 285–305.

Hou, Zhang, T., Cai, W., Song, X., Chen, A., Deng, G., & Ni, C. (2020). Social support and mental health among health care workers during Coronavirus Disease 2019 outbreak: A moderated mediation model. *PloS One*, *15*(5), e0233831–e0233831.

Kansas City, MO, Code of Ordinances. (n.d.). American Planning Association. Retrieved April 14, 2022, from https://www.planning.org/knowledgebase/resource/9124445/

Kingsley, J. Y., Townsend, M., & Henderson-Wilson, C. (2009). Cultivating health and wellbeing: members' perceptions of the health benefits of a Port Melbourne community garden. *Leisure studies*, *28*(2), 207-219.

Knight, Lewis, and William Riggs. (2010). Nourishing Urbanism: A Case for a New Urban Paradigm. *International Journal of Agricultural Sustainability* 8, no. 1–2 (February 1, 2010): 116–26.

Koliou, M., van de Lindt, J. W., McAllister, T. P., Ellingwood, B. R., Dillard, M., & Cutler, H. (2020). State of the research in community resilience: Progress and challenges. *Sustainable and resilient infrastructure*, *5*(3), 131-151.

Hou, J. Johnson, J., Lawson, L.(2009). Greening Cities, Growing Communities – Learning from Seattle's Urban Community Gardens. Landscape Architecture Foundation with University of Washington Press, 2009. ISBN 978-0-295-98928-0, 221 pages, € 29,55. *Journal of Landscape Architecture (Wageningen, Netherlands)*, *2010*(9), 86–86.

Krasny, M. E., & Tidball, K. G. (2012). Civic ecology: A pathway for Earth Stewardship in cities. *Frontiers in Ecology and the Environment*, *10*(5), 267–273.

Magis, K. (2010). Community resilience: An indicator of social sustainability. *Society and natural resources*, *23*(5), 401-416.

Kuo, Chang-Fu, Matthew J. Grainge, Weiya Zhang, and Michael Doherty. (2015). Global Epidemiology of Gout: Prevalence, Incidence and Risk Factors. *Nature Reviews Rheumatology* 11, no. 11 (November 2015): 649–62.

Kusel. (2001). Assessing Well-Being in Forest Dependent Communities. Journal of Sustainable Forestry, 13(1-2), 359–384.

Leichenko, R. (2011). Climate change and urban resilience. *Current opinion in environmental sustainability*, *3*(3), 164-168.

Leopold, A., (1949). *A Sand County Almanac and Sketches here and there*. New York : Oxford University Press, 1949.

Martin, K. S., Ghosh, D., Page, M., Wolff, M., McMinimee, K., & Zhang, M. (2014). What role do local grocery stores play in urban food environments? A case study of Hartford-Connecticut. *PloS one*, *9*(4), e94033.

Martin, P. (2017). Community Gardening in Poor Neighborhoods in France: A Way to Re-Think Food Practices? *Appetite* 116 (September 1, 2017): 589–98.

Martin, P., Consalès, J. N., Scheromm, P., Marchand, P., Ghestem, F., & Darmon, N. (2017). Community gardening in poor neighborhoods in France: a way to re-think food practices? *Appetite*, *116*, 589-598.

Massey, D., & Massey, D. B. (2005). *For space*. Sage
.

McMillen, Heather, Lindsay K. Campbell, Erika S. Svendsen, and Renae Reynolds. (2016). Recognizing Stewardship Practices as Indicators of Social Resilience: In Living Memorials and a Community Garden. *Sustainability* 8, no. 8 (August 2016): 775.

Molm. (2010). The Structure of Reciprocity. *Social Psychology Quarterly*, *73*(2), 119–131.

Momtaz, Y. A., Haron, S. A., Ibrahim, R., & Hamid, T. A. (2014). Social embeddedness as a mechanism for linking social cohesion to well-being among older adults: moderating effect of gender. *Clinical interventions in aging*, *9*, 863.

Ohmer, Mary L., Pamela Meadowcroft, Kate Freed, and Ericka Lewis. (2009) Community Gardening and Community Development: Individual, Social and Community Benefits of a Community Conservation Program. *Journal of Community Practice* 17, no. 4 (November 19, 2009): 377–99.

Ong, M., Baker, A., Aguilar, A., & Stanley, M. (2019). The meanings attributed to community gardening: A qualitative study. *Health & Place*, *59*, 102190.

Pannebakker, Noortje M. (2018). Services Use by Children and Parents in Multiproblem Families. *Children and Youth Services Review* 84 (January 1, 2018): 222–28.

Pepper, Ian L. (2013) The Soil Health-Human Health Nexus. *Critical Reviews in Environmental Science and Technology* 43, no. 24 (January 1, 2013): 2617–52.

Pudup, M. B. (2008). It takes a garden: Cultivating citizen-subjects in organized garden projects. *Geoforum*, *39*(3), 1228–1240.

Puskás, N., Abunnasr, Y., & Naalbandian, S. (2021). Assessing deeper levels of participation in nature-based solutions in urban landscapes – A literature review of real-world cases. *Landscape and Urban Planning*, *210*, 104065-.

Putnam, Robert D. (1993). Making democracy work. Civic traditions in modern Italy. Princeton: Princeton University Press.

Robinson, Jake M., Paul Brindley, Ross Cameron, Danielle MacCarthy, and Anna Jorgensen. (2021). Nature's Role in Supporting Health during the COVID-19 Pandemic: A Geospatial and Socioecological Study. *International Journal of Environmental Research and Public Health* 18, no. 5 (January 2021): 2227.

Ruck, K. (2020). The health benefits of community gardening. *Kai Tiaki: Nursing New Zealand, 26*(6), 30-31.

Russell, Allison R., Ama Nyame-Mensah, Arjen de Wit, and Femida Handy. (2018). Volunteering and Wellbeing Among Ageing Adults: A Longitudinal Analysis. *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations* 30, no. 1 (February 1, 2018): 115–28.

Saldivar-Tanaka, Laura, and Marianne E. Krasny. (2004). Culturing Community Development, Neighborhood Open Space, and Civic Agriculture: The Case of Latino Community Gardens in New York City. *Agriculture and Human Values* 21, no. 4 (January 1, 2004): 399–412.

Sansom, & Portney, K. E. (2018). Sustainable cities, policies, and healthy cities. In *Integrating Human Health into Urban and Transport Planning: A Framework* (pp. 31–49).

Schiefer, D., & Van der Noll, J. (2017). The essentials of social cohesion: A literature review. *Social Indicators Research*, *132*(2), 579-603.

Scott, T. L., Masser, B. M., & Pachana, N. A. (2015). Exploring the health and wellbeing benefits of gardening for older adults. *Ageing & Society, 35*(10), 2176-2200.

Shimpo, N., Wesener, A., & McWilliam, W. (2019). How community gardens may contribute to community resilience following an earthquake. *Urban Forestry & Urban Greening*, *38*, 124–132.

Sims-Muhammad, Toni Y. (2012). After the Storms: South Louisiana Sustainable Food System Assessment in Light of Environmental Natural Disasters Hurricanes Katrina & Rita. *International Journal of Humanities and Social Science* 2, no. 3 (2012): 8.

Smit, B., and J. Wandel. (2006). Adaptation, adaptive capacity, and vulnerability. *Global Environ. Change* 16 (3): 282 – 292.

Smith, J. (2016). Nature contact, health, and the built environment. In *Sowing Seeds in the City* (pp. 101-105). Springer, Dordrecht.

Solnit, Rebecca. (2010) *A Paradise Built in Hell: The Extraordinary Communities That Arise in Disaster*. Penguin.

Stedman, R.C. (1999). Sense of place as an indicator of community sustainability. Forestry Chronicle. 75: 765–770.

Stekelenburg, Jacquelien van, and Bert Klandermans. (2013). The Social Psychology of Protest. *Current Sociology* 61, no. 5–6 (September 1, 2013): 886–905.

Teig, E., Amulya, J., Bardwell, L., Buchenau, M., Marshall, J. A., & Litt, J. S. (2009). Collective efficacy in Denver, Colorado: Strengthening neighborhoods and health through

community gardens. *Health & Place*, *15*(4), 1115–1122.

The State of Missouri Kansas City. "Article VI. URBAN AGRICULTURAL ZONE, Chapter 74. KANSAS CITY REDEVELOPMENT ORDINANCE, Code of Ordinances, Kansas City."

Tidball, K. G., & Krasny, M. E. (2009). "Community Gardens as Contexts for Science, Stewardship, and Civic Action Learning." *Cities and the Environment* 2, no. 1 (2009): Article 8-18 pp.

Tidball, K. G., & Krasny, M. E. (2014). Introduction: Greening in the Red Zone. In: Tidball, K., Krasny, M. (eds) Greening in the Red Zone. Springer, Dordrecht.

Tidball, K. G., & Krasny, M. E. (2007). From risk to resilience: What role for community greening and civic ecology in cities? In A. E. J. Wals (Ed.), *Social learning towards a sustainable world: Principles, perspectives, and praxis* (pp. 149–164). Wageningen, The Netherlands: Wageningen Academic Publishers.

Tracey, D., Gray, T., Sweeting, J., Kingsley, J., Bailey, A., & Pettitt, P. (2020). A systematic review protocol to identify the key benefits and associated program characteristics of community gardening for vulnerable populations.

Urban Neighborhood Initiative. *Kansas City* (2017). Purpose Built Communities. Retrieved April 14, 2022, from https://purposebuiltcommunities.org/our-network/kansas-city-urban-neighborhood-initiative/

Veen, E. (2020). Designing Urban Green Space (UGS) to Enhance Health: A Methodology. *International Journal of Environmental Research and Public Health* 17, no. 14 (2020): 5205.

Verhagen, M., Lodder, G. M. A., & Baumeister, R. F. (2018). Unmet belongingness needs but not high belongingness needs alone predict adverse well-being: A response surface modeling approach. *Journal of Personality*, *86*(3), 498–507.

Von Lindern, I. (2016). Estimating Children's Soil/Dust Ingestion Rates through Retrospective Analyses of Blood Lead Biomonitoring from the Bunker Hill Superfund Site in Idaho. *Environmental Health Perspectives* 124, no. 9 (September 2016): 1462–70.

Wall, D.H., Uffe N. Nielsen, and Johan Six. (2015). Soil Biodiversity and Human Health. *Nature* 528, no. 7580 (December 2015): 69–76.

Wojciechowska, L., Sokolnicka, H., & Liberska, H. (2014). Activity was undertaken by persons in late adulthood and their psychological well-being.

World Health Organization. (W.H.O.) Constitution of the World Health Organization. Basic Documents; Forty-Fifth Edition, Supplement. October 2006. https://www.who.int/ Assessed

April 14, 2022.

World Vision. (n.d.) *Social cohesion, what do we know about it?* (n.d.). Retrieved April 14, 2022, from https://www.wvi.org/our-urban-research-learning-initiative/blogpost/social-cohesion-what-do-we-know-about-it.

Zhang, T., Liu, J., & Li, H. (2019). Restorative Effects of Multi-Sensory Perception in Urban Green Space: A Case Study of Urban Park in Guangzhou, China. *International Journal of Environmental Research and Public Health*, *16*(24).

Chapter 3: Conclusion

As a form of urban environmental stewardship, community gardens practices increase the availability of nutritious foods, strengthen community ties, and create biodiversity in the urban core that can facilitate a more sustainable system (Magis, 2010). In addition, urban community gardens function as hubs for civic engagement and environmental stewardship that can inspire civic restoration and community-based green space tending. Historically, urban greenspace has played a vital role in recovery efforts to economic, environmental, and social disturbances (Camps-Calvet et al. 2015). Community gardens have played a critical role in community recovery following extreme ecological events such as floods, storms and hurricanes (Chan et al., 2015; Shimpo et al., 2019) (Sims-Muhammad et al., 2012). In addition, they can function as places to increase social capital, social support, and social connectedness (Hou & Grohmann, 2018) before, during, and after those crises. Though there has been some literature written on the role of community gardens in contributing to properties of general resilience, significantly less has been written on the part of community gardens in terms of specific resilience -- such as a global pandemic (Bendt et al., 2013; Krasny & Tidball, 2012; Okvat et al., 2011; Saldivar-Tanaka et al., 2004).

Through urban environmental stewardship, community gardens can help prepare cities for times of crisis by increasing the resilience of their social-ecological systems (Barthel et al., 2013). As cities continue to grow and grapple with uncertainties and challenges, urban resilience has become increasingly favored (Carmin et al., 2012; Leichenko, 2011). Cultivating community resilience has become a fundamental goal in the face of climate change. A community's resilience will help determine its ability to mobilize successfully and respond to stress, making

resilience integral to social sustainability (Beckley, 1995; Doak & Kusel, 1996). Building

community resilience requires more than just facing shocks and stressors to the day.

This mixed-methods study investigated if the COVID-19 pandemic affected urban

environmental stewardship practices in community gardens. Results show that the community

social resilience framework (McMillen et al., 2016) is applicable in understanding community

gardens' role in community social resilience. Through this theoretical framework lens

(McMillen et al., 2016), this research revealed practices, processes, and creative innovations

within community gardens that foster community social resilience and help build inner fortitude

within communities. By examining place attachment, collective identity, social cohesion, social

networks, and knowledge exchange within urban community gardens, practices were illuminated

that foster community social resilience. Furthermore, using this construct, several themes were

identified that demonstrate the connectedness of the indicators in understanding how community

gardens can contribute to community social resilience. Results show that many community

garden practices, such as spending time outdoors and in nature, providing a place for physical

and emotional safety, and producing food, became more critical in response to the pandemic.

Beyond community garden practices, well-being themes emerged in response to the pandemic,

such as giving gardeners a purpose, providing a community to belong to, and being an

emotionally and physically safe place.

In conclusion, a shock to the system, such as a pandemic, amplifies environmental

stewardship practices of a community garden and the value of community gardens to human

well-being. This study asserts that examining observable practices within a community garden

can demonstrate community resilience at work. Acknowledging the contribution community

gardens make in the urban context helps build an understanding of the social impacts of

community gardens on community social resilience. Furthermore, it is reasonable to propose that other researchers can apply the approach and methods in this study well beyond this context. Future research directions could focus on examining how community gardens build adaptive capacity after an acute event and the long-term effects of a crisis event on the garden. Limitations of this study include exploring only metropolitan area during a specific period with only garden leaders. Further comparative studies and findings from other community gardening projects about community social resilience during this timeframe are needed. In addition, future research could focus on gaining participants' perspectives to achieve a more comprehensive and holistic assessment of garden actions, activities, and behaviors of gardeners during this period. In addition, future studies could include outlining best practices gained during the crisis from community garden leaders and the effect of volunteerism on community social resilience during a crisis. During the COVID-19 pandemic in the Kansas City Metropolitan area, urban community gardening practices provided volunteers with fresh air, physical activity, respite and reflection, and an opportunity to contribute to the larger community in a healthy environment and benefit their health and well-being. As author and poet Wendell Berry proposes in his essay, The Gift of Good Land, "…a garden is a solution that leads to other solutions. It is a part of the limitless pattern of good health and good sense."

Literature Cited

Beckley, T. M. (1995). Community stability and the relationship between economic and social well-being in forest-dependent communities.

Bendt, P., Barthel, S., & Colding, J. (2013). Civic greening and environmental learning in public-access community gardens in Berlin. *Landscape and Urban Planning*, *109*(1), 18–30.

Berry. (1981). *The gift of good land : further essays cultural and agricultural*. North Point Press.

Camps-Calvet, M., Langemeyer, J., Calvet-Mir, L., Gómez-Baggethun, E., & March, H. (2015). Sowing resilience and contestation in times of crises: The case of urban gardening movements in Barcelona.

Carmin, J., Nikhil, N., Christopher, R., (2012) Local Governments for Sustainability, and Massachusetts Institute of Technology. "Progress and challenges in urban climate adaptation planning: results of a global survey,"

Chan, J., DuBois, B., & Tidball, K. G. (2015). Refuges of local resilience: Community gardens in post-Sandy New York City. *Urban Forestry & Urban Greening*, *14*(3), 625-635.

Doak, S. C., & Kusel, J. (1996). Well-being in forest-dependent communities, Part II: A social assessment focus. In *Sierra Nevada ecosystem project: final report to congress* (Vol. 2, No. 13, pp. 375-402). The University of California, Centers for Water and Wildland Resources.

Hou, J., & Grohmann, D. (2018). Integrating community gardens into urban parks: Lessons in planning, design, and partnership from Seattle. *Urban Forestry & Urban Greening*, *33*, 46-55.

Krasny, M. E., & Tidball, K. G. (2012). Civic ecology: A pathway for Earth Stewardship in cities. *Frontiers in Ecology and the Environment*, *10*(5), 267–273.

Leichenko, R. (2011). Climate change and urban resilience. *Current opinion in environmental sustainability*, *3*(3), 164-168.

Magis, K. (2010). Community resilience: An indicator of social sustainability. *Society and natural resources*, *23*(5), 401-416.

McMillen, H., Campbell, L. K., Svendsen, E. S., & Reynolds, R. (2016). Recognizing stewardship practices as indicators of social resilience: In living memorials and in a community garden. *Sustainability*, *8*(8), 775.

Okvat, H. A., & Zautra, A. J. (2011). Community gardening: A parsimonious path to individual, community, and environmental resilience. *American journal of community*

psychology, *47*(3), 374-387.

Saldivar-Tanaka, L., & Krasny, M. E. (2004). Culturing community development, neighborhood open space, and civic agriculture: The case of Latino community gardens in New York City. *Agriculture and human values*, *21*(4), 399-412.

Shimpo, N., Wesener, A., & McWilliam, W. (2019). How community gardens may contribute to community resilience following an earthquake. *Urban forestry & urban greening*, *38*, 124-132.
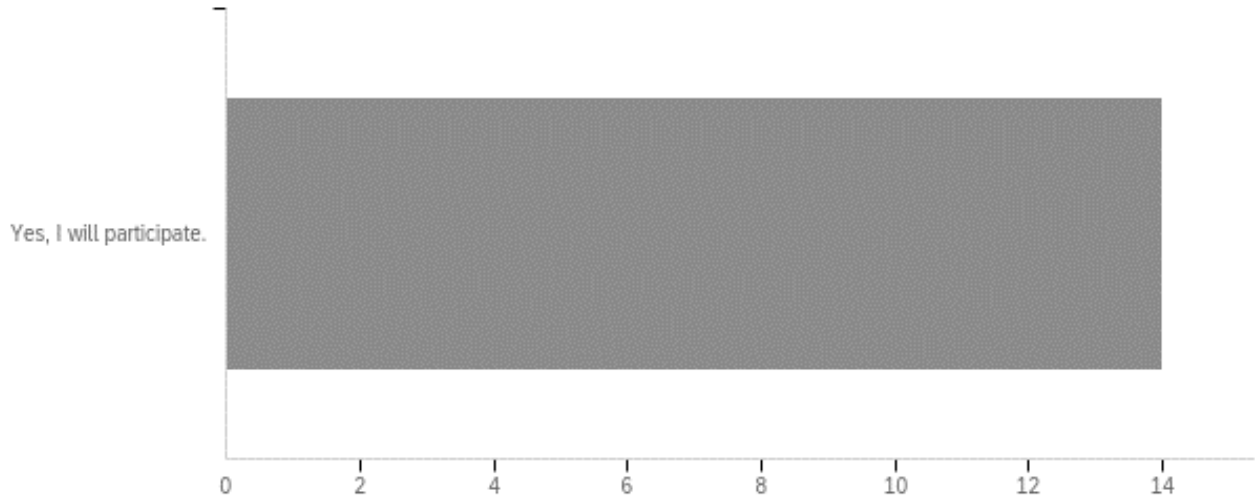
Sims-Muhammad, T. Y. (2012). After the storms: south Louisiana sustainable food system assessment in light of environmental natural disasters hurricanes katrina & Rita. *Int. J. Hum. Soc. Sci*, *2*, 129-135.

Appendix A - Survey Instrument & Survey Results

Survey

*Understanding the Role of Community Gardening in Community Resilience*

Q1 - Understanding the Social Impacts of Community Gardening   Thank you for participating in the Community Gardens Project. The information you provide through an online survey, online discussion boards, and an online focus group discussion will help us better understand the role of community gardens in community resilience.   The following survey will take about 20 minutes and will ask 1) a little bit about your background, and 2) and a little bit about your community garden. Next week you will be asked to respond to a daily question about community gardening for five consecutive days. The study will conclude with a live, virtual 1.5-hour focus group discussion with other community garden leaders. We hope you will benefit from the question and focus group discussions through other community garden leaders' knowledge. Kansas State University is conducting this research. Participation is voluntary, and you may choose not to answer any of the questions. A small stipend will be provided as compensation for your time. You will need to complete a W-9 form before receiving the stipend. All responses or other identifying information will be kept confidential. The 'zoom' focus group discussion will be audio-recorded and transcribed. Subjects will be identified by pseudonym throughout the study. However, given the nature of the 'zoom' focus group discussion, the risk of privacy loss is possible. The aggregated response may be used in publications, presentations, and other materials. All data will be stored on Kansas State University's encrypted server.   If you have any questions about this study, please contact the lead researchers, Ms. Kristin Taylor, kristinhtaylor@ksu.edu, 859.312.2146, or Dr. Candice Shoemaker at cshoemak@ksu.edu, 785.532.1431, 227 Waters Hall, Manhattan, KS 66506.   Institutional Review Board – Human Subjects Chair: Dr. Rick Scheidt, 203 Fairchild, KSU, Manhattan, KS 66506, 785.532.3224, rscheidt@ksu.edu Institutional Review Board approval date: INFORMED CONSENT: By proceeding to the next page, you are consenting to participate and confirming that you are at least 18 years of age.   Institutional Review Board approval date: 10-14-2021   INFORMED CONSENT: By clicking yes and proceeding to the next page, you consent to participate and confirm that you are at least 18 years of age.

Yes, I will participate.

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Understanding the Social Impacts of Community Gardening Thank you for participating in the Community Gardens Project. The information you provide through an online survey, online discussion boards, and an online focus group discussion will help us better understand the role of community gardens in community resilience. The following survey will take about 20 minutes and will ask 1) a little bit about your background, and 2) and a little bit about your community garden. Next week you will be asked to respond to a daily question about community gardening for five consecutive days. The study will conclude with a live, virtual 1.5-hour focus group discussion with other community garden leaders. We hope you will benefit from the question and focus group discussions through other community garden leaders' knowledge. Kansas State University is conducting this research. Participation is voluntary, and you may choose not to answer any of the questions. A small stipend will be provided as compensation for your time. You will need to complete a W-9 form before receiving the stipend. All responses or other identifying information will be kept confidential. The 'zoom' focus group discussion will be audio-recorded and transcribed. Subjects will be identified by pseudonym throughout the study. However, given the nature of the 'zoom'	1.00	1.00	1.00	0.00	0.00	14

focus group discussion, the risk of privacy loss is possible. The aggregated response may be used in publications, presentations, and other materials. All data will be stored on Kansas State University's encrypted server.   If you have any questions about this study, please contact the lead researchers, Ms. Kristin Taylor, kristinhtaylor@ksu.edu, 859.312.2146, or Dr. Candice Shoemakerat cshoemak@ksu.edu, 785.532.1431, 227 Waters Hall, Manhattan, KS 66506. Institutional Review Board – Human Subjects Chair: Dr. Rick Scheidt, 203 Fairchild, KSU, Manhattan, KS 66506, 785.532.3224, rscheidt@ksu.edu Institutional Review Board approval date: INFORMED CONSENT: By proceeding to the next page, you are consenting to participate and confirming that you are at least 18 years of age. Institutional Review Board approval date: 10-14-2021 INFORMED CONSENT: By clicking yes and proceeding to the next page, you consent to participate and confirm that you are at least 18 years of age.

Q1 - How many years has your community garden existed?
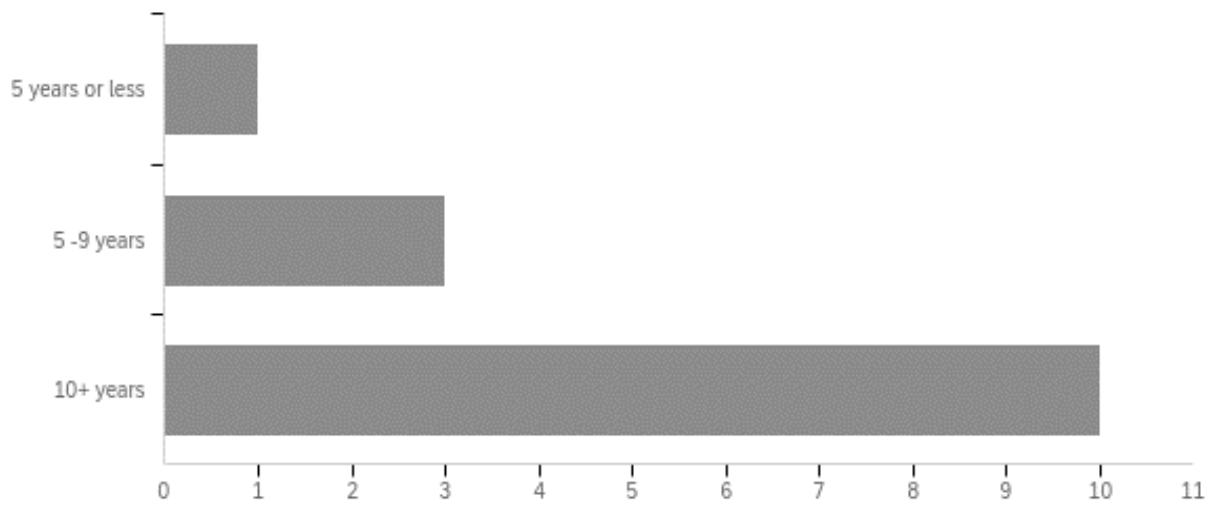
What is the zip code of your community garden?

66209

66061
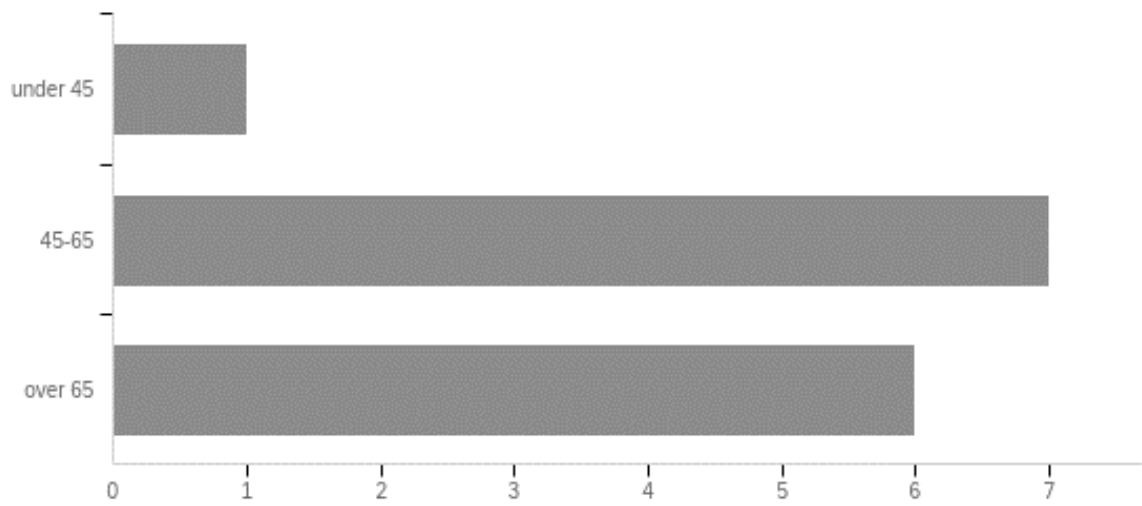
64124

66214

66221

64130

66061
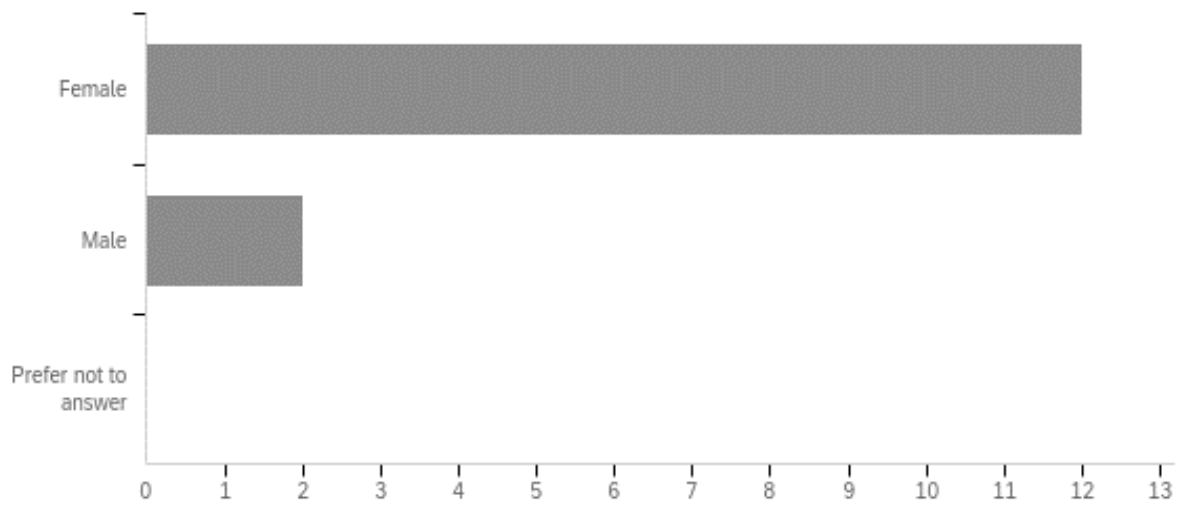
66209

662221

64130

64109

64110

66061

64130

Q4 - What is your age range?

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	What is your age range?	1.00	3.00	2.36	0.61	0.37	14

Q5 - What is your gender?

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	What is your gender?	1.00	2.00	1.14	0.35	0.12	14

What is the zip code of your home?
66226
66061
64124
66212
66221
64154
66061
66209
66221
64114
66215
64110
66061
64114

Q6 - How many years have you been a community garden leader?
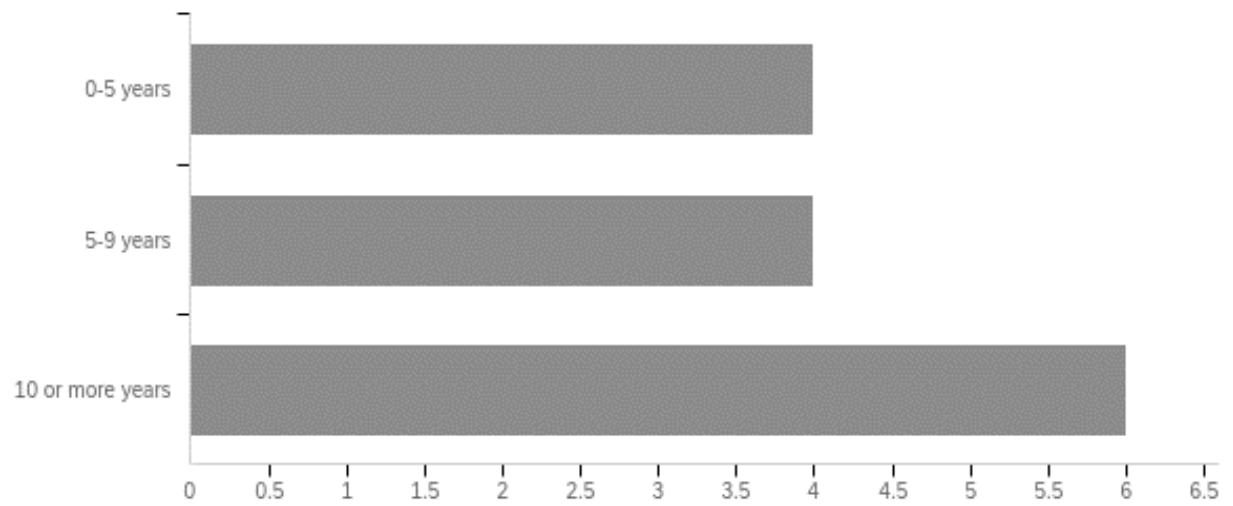
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	How many years have you been a community garden leader?	1.00	3.00	2.14	0.83	0.69	14

How many years have you been gardening?
12 years
About 20, seriously.
10
11
15+
5
30
34
60
10
60
40 plus years
10

Q8 - Does your garden have signage to identify it as a community garden?
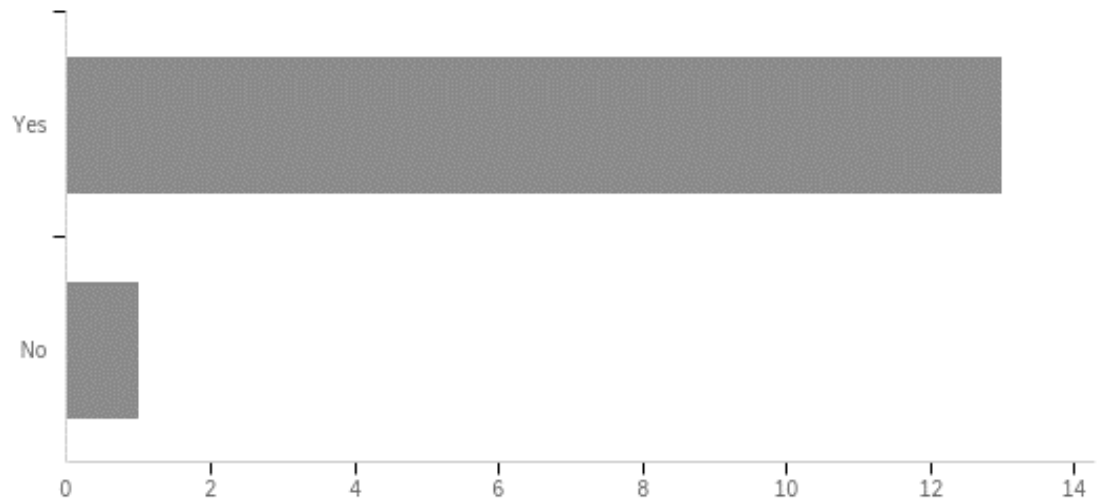
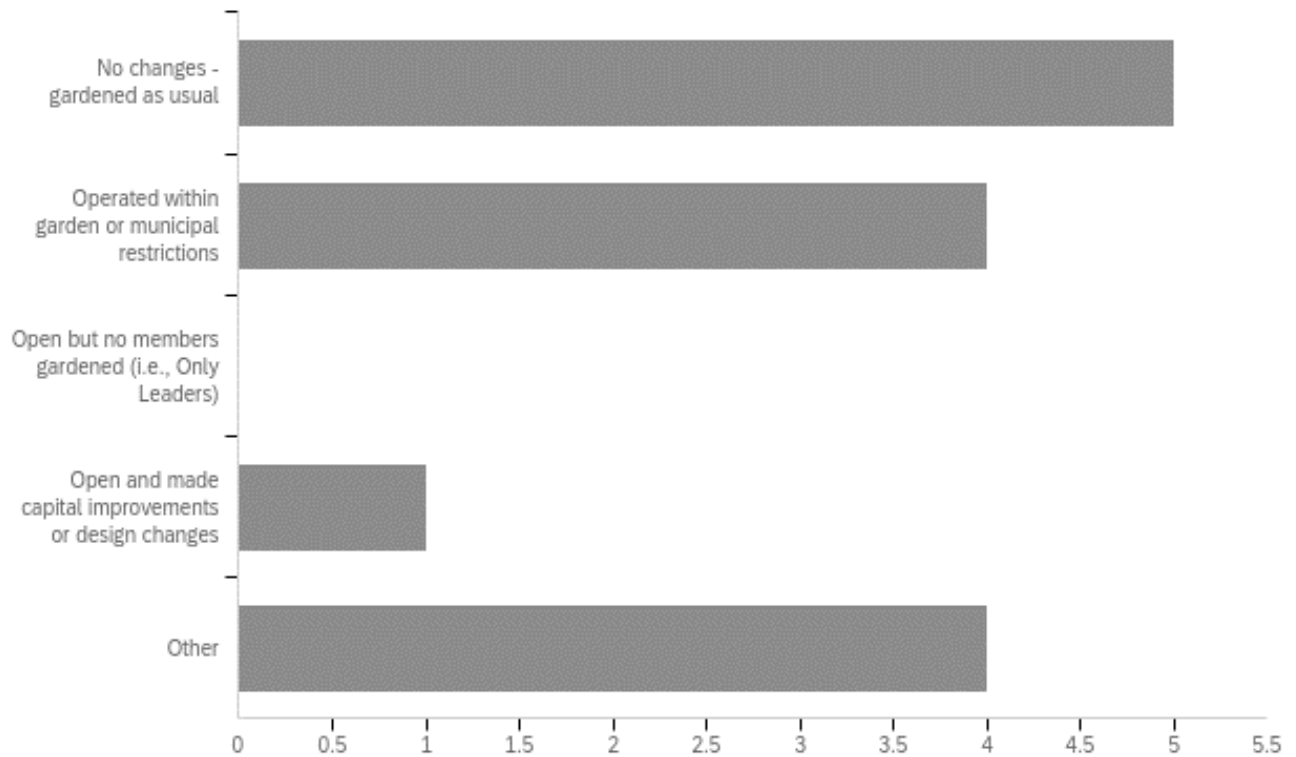| #	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Does your garden have signage to identify it as a community garden?	1.00	2.00	1.07	0.26	0.07	14

Q9 - What does your garden add to the community? Select all that apply.
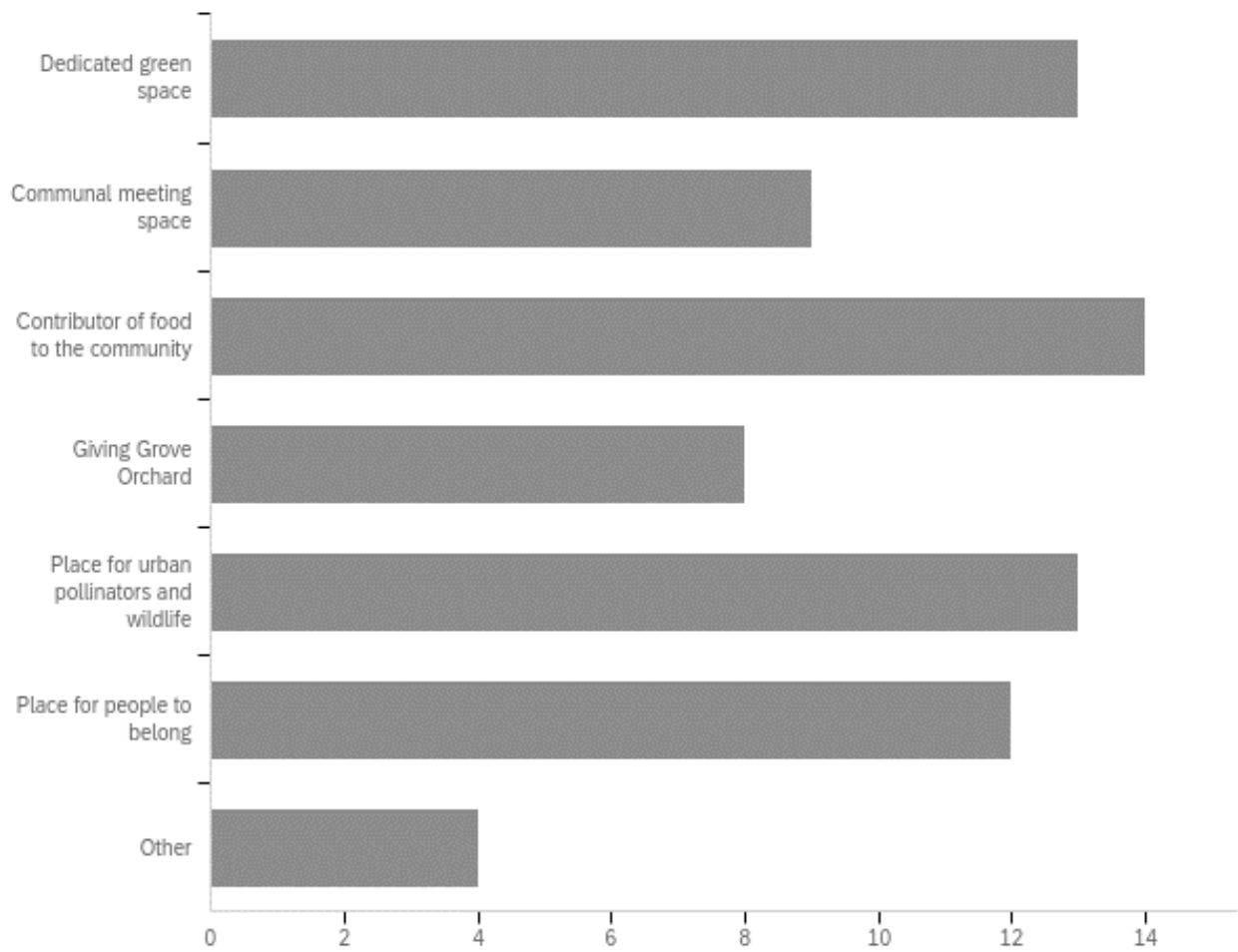
Q10 - Do you have an ongoing plan for your garden?
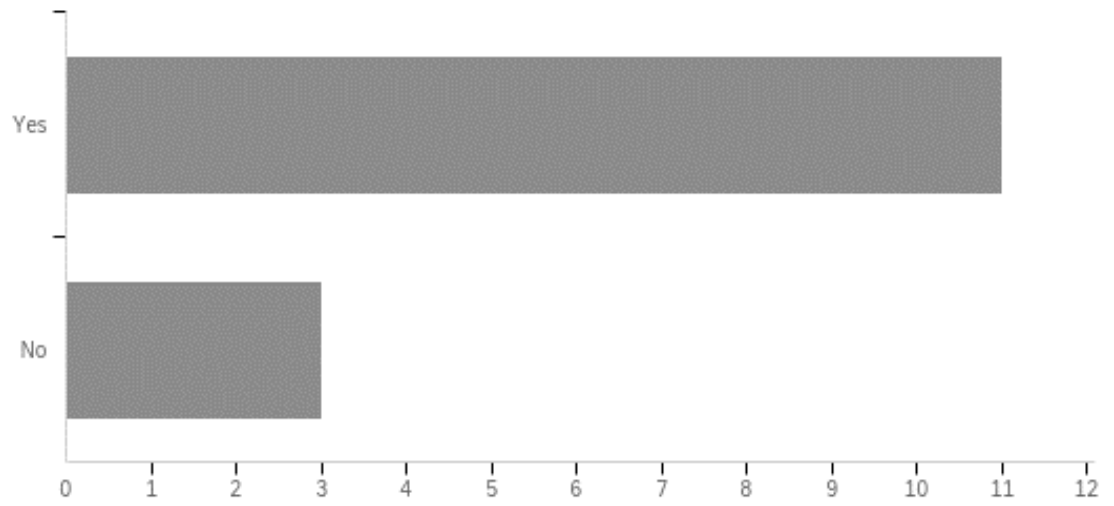
Q11 - How did your garden change during the pandemic? Select all that apply.

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	How did your garden change during the pandemic? Select all that apply. - Selected Choice	1.00	5.00	2.64	1.67	2.80	14

| #	Answer	%	Count
1	No changes - gardened as usual	35.71%	5
2	Operated within the garden or municipal restrictions	28.57%	4
3	Open, but no members gardened (i.e., Only Leaders)	0.00%	0
4	Open and make capital improvements or design changes	7.14%	1
5	Other	28.57%	4
	Total	100%	14

Q12 - Do you have garden members that take care of communal spaces?
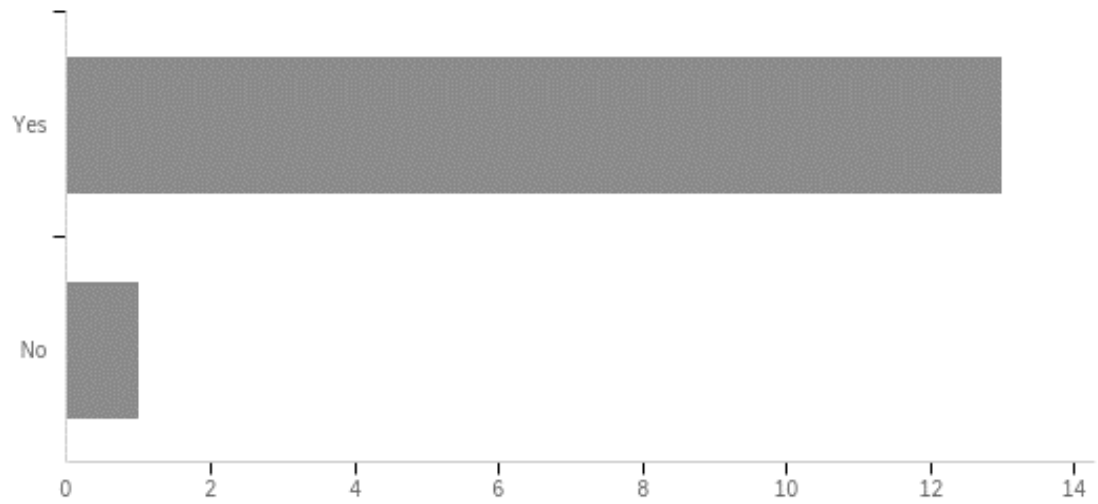
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Do you have garden members that take care of communal spaces?	1.00	2.00	1.07	0.26	0.07	14

Q13 - Please indicate how much you agree with the following statement from strongly disagree to agree strongly.

Your community garden gives members a sense of belonging to a community.
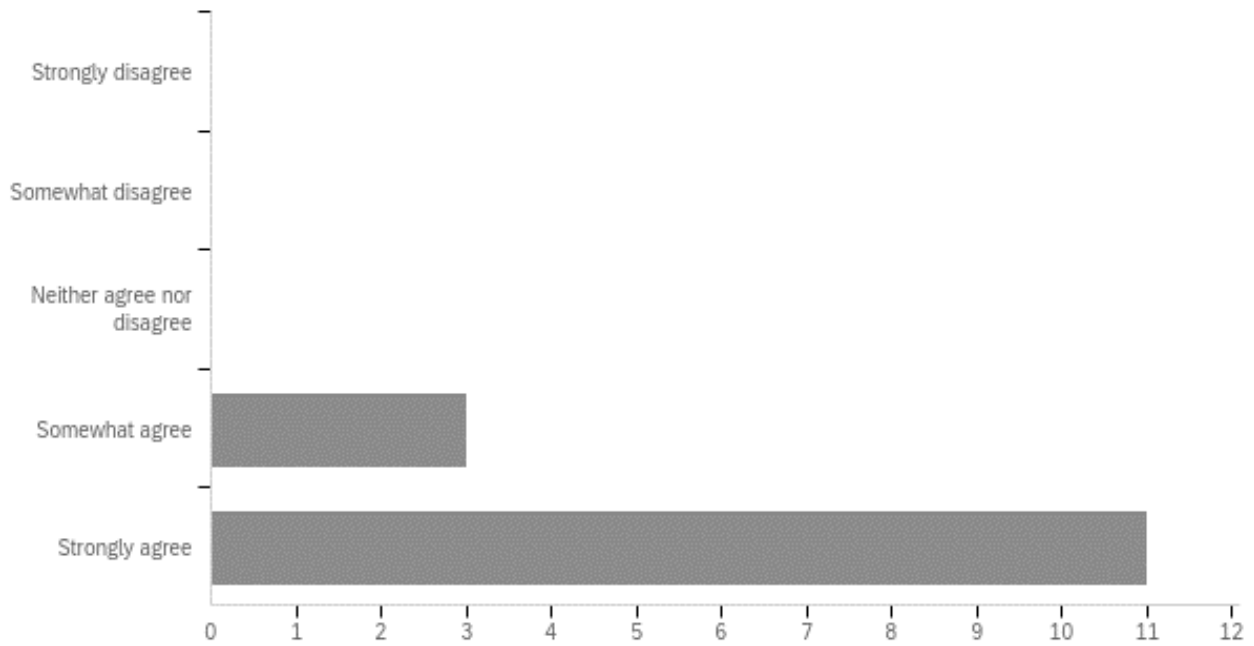
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Please indicate how much you agree with the following statement from strongly disagree to agree strongly. Your community garden gives members a sense of belonging to a community.	4.00	5.00	4.79	0.41	0.17	14

| #	Answer	%	Count
1	Strongly disagree	0.00%	0
2	Somewhat disagree	0.00%	0
3	Neither agree nor disagree	0.00%	0
4	Somewhat agree	21.43%	3
5	Strongly agree	78.57%	11
	Total	100%	14

Q14 - How do you think community gardening gives your members a sense of belonging to a community?

How do you think community gardening gives your members a sense of belonging to a community?

No Data due to widget error- Qualtrics

Q15 - Would community members describe your garden as any of the following? Select all that apply.

| #	Answer	%	Count
1	Community green space	15.87%	10
2	Community meeting place	9.52%	6
3	A place to grow food	20.63%	13
4	A place to build relationships	15.87%	10
5	A place to help others	17.46%	11
6	A place to contribute to the community in a meaningful way	20.63%	13
	Total	100%	63
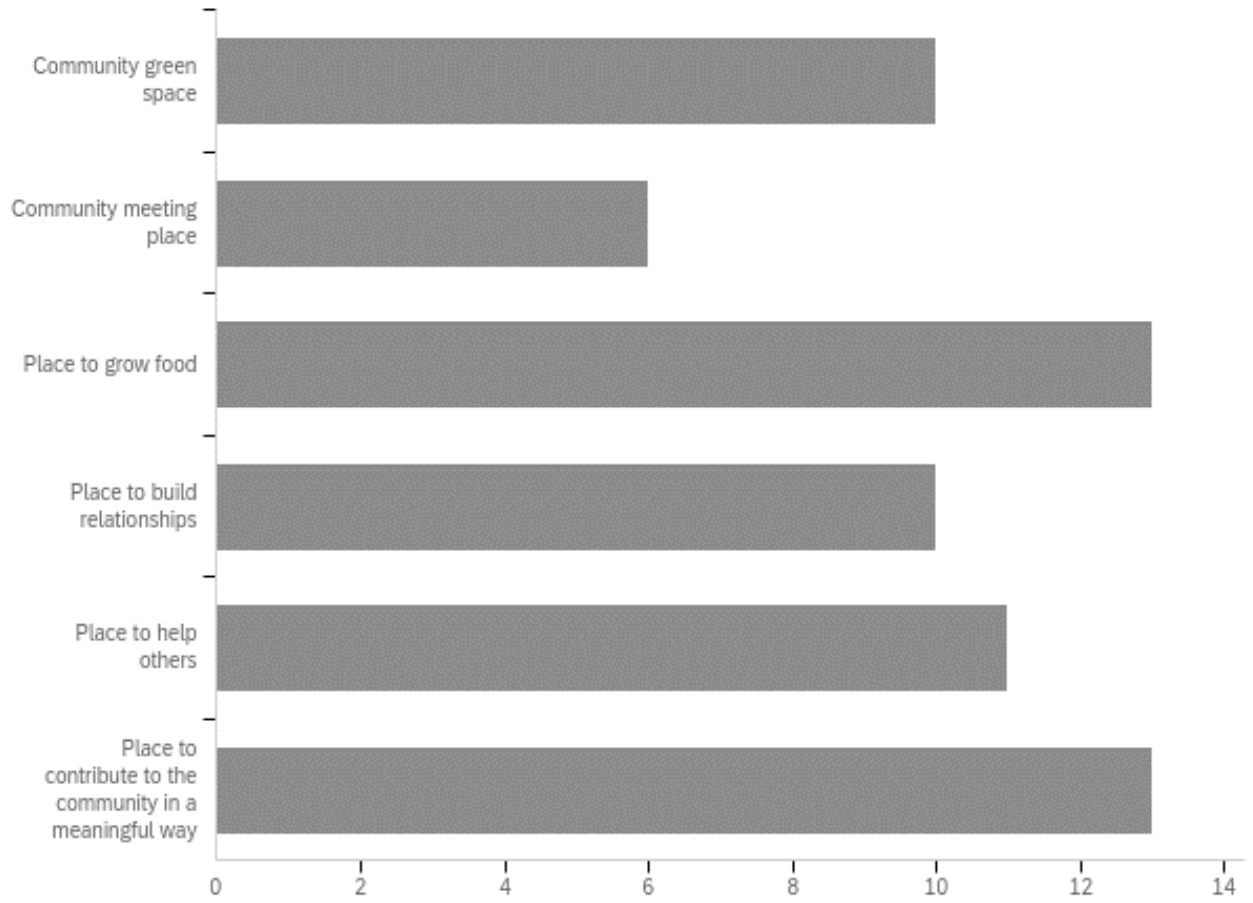
Q16 - How are decisions made regarding the management of your garden? Select one.
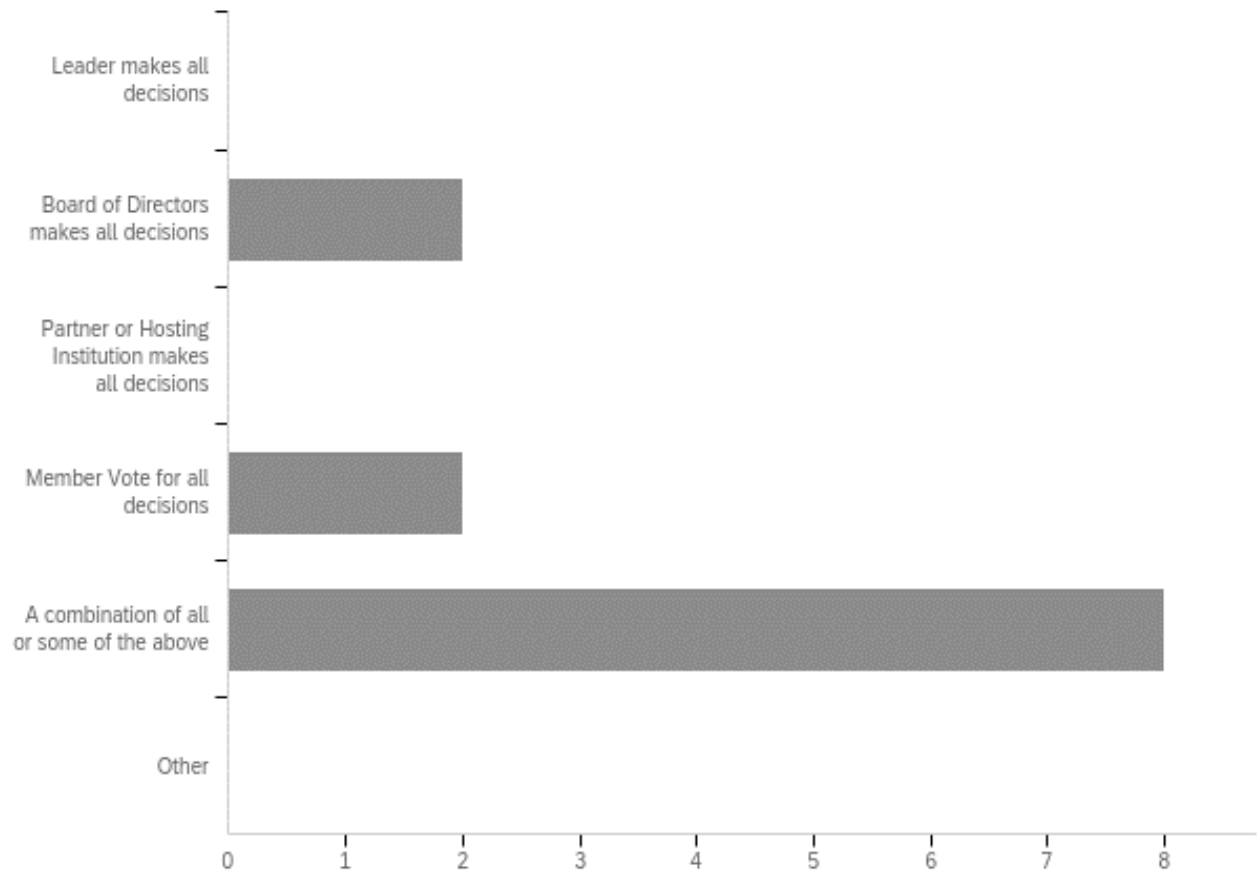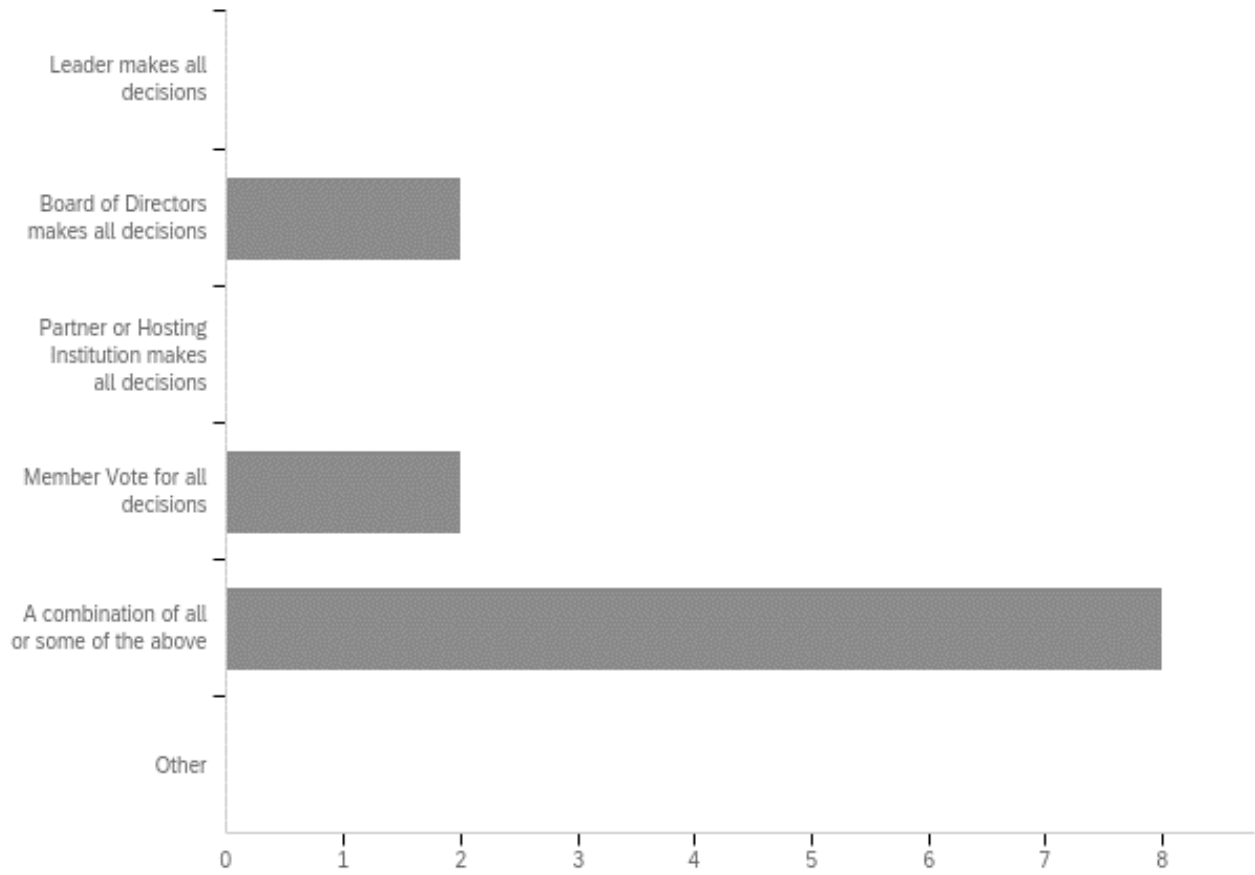
Q17 - Please indicate how much you agree with the following statement from strongly disagree to agree strongly.

You and the garden members have built meaningful relationships within your garden through working together.
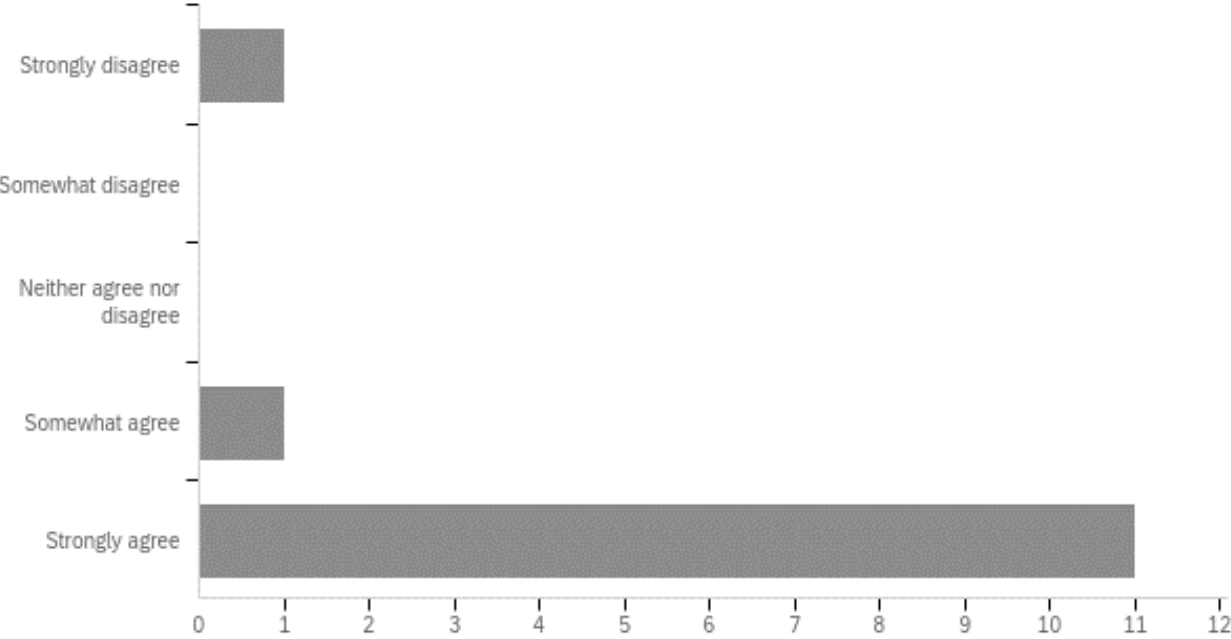
How do you think gardening together for a common goal (like donating food) can help members feel more connected to each other and their community, especially during the pandemic?

Yes, I do.

The ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮ saw an increase in interest and new gardeners. Many people were working from home, so they had more time when not commuting, and I think they wanted the human interaction. The lending library really brought people in and opened more conversations for donating food as well.

It provides a mechanism to give back or help those that are in need. The act of gardening is very therapeutic & the interactions that occur in the garden are typically very positive.

I have a lot of recently retired folks who volunteer that came originally looking for a purpose and place to serve. They found that plus made connections with others who are serving a found a loving community and a place to serve that it meaningful in a safe outdoor environment. I also think we all have a heart for the mission of providing fresh vegetables to those who need it in our community.

The garden members are all seniors who were quite socially isolated during the pandemic. The garden gave them a reason to be outside and a purpose. It gave them a safe way to socialize from a distance.

During a period of enhanced isolation, the garden provided a space for community members to come together safely. It provided opportunities for them to feel empowered to do something for others when their normal activities for community involvement and/or service were curtailed.

Working outside has allowed social distancing and interacting which had become otherwise difficult to do. The work being done to feed those in need made it even more satisfying and enriching.

Because we were prevented from doing so many things, we were used to doing we appreciated even more being able to grow our garden. That common interest and desire to pursue something we had done in the past gave us an even stronger bond together.

The gardeners give a part of their produce to the church's food pantry, so hopefully they find meaning in this action.

We had a safe outdoor space to be in and could keep social distance and enjoy each other's company
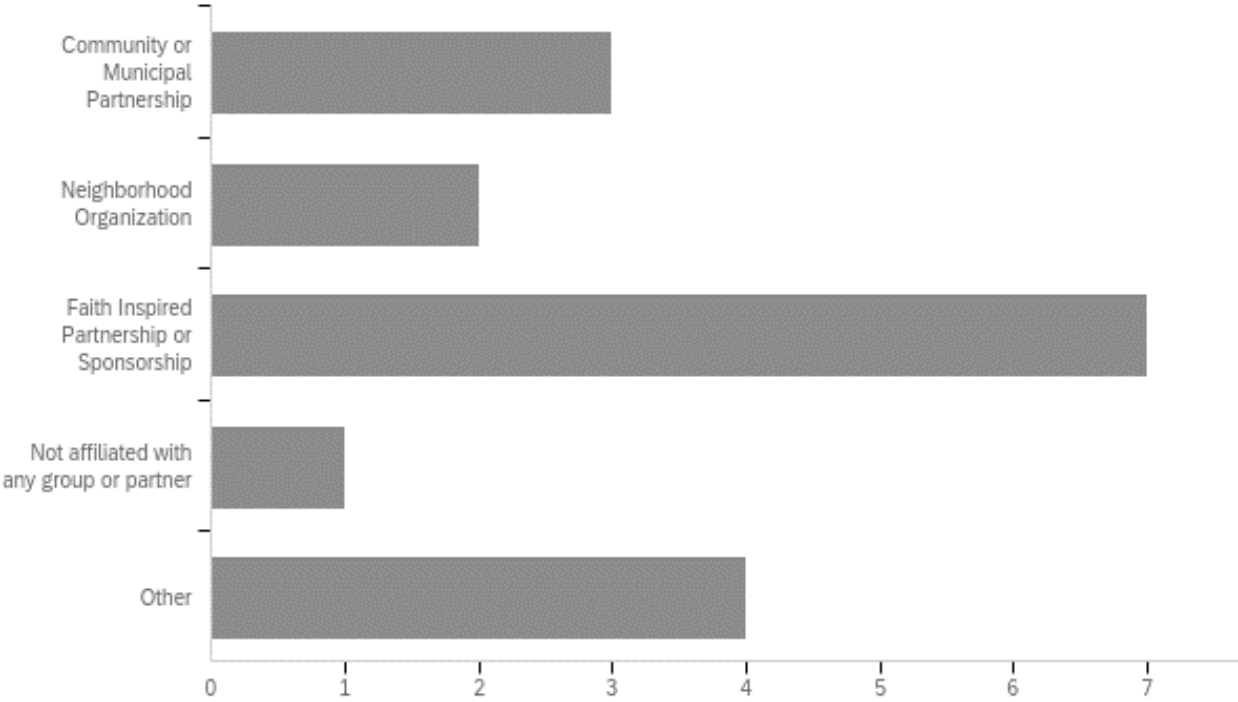
Most definitely.

Each gardener gives a portion of their produce to our church food pantry. It's a way to help those in need.

Q19 - Do members help each other out even outside the garden?

| #	Answer	%	Count
1	Yes	69.23%	9
2	No	0.00%	0
3	Don't know	30.77%	4
	Total	100%	13

Q20 - Is your garden a part of a larger organization? Select all that apply.

Q21 - Listed below are organizations that community gardens often partner with. For 2019, 2020, and 2021, please indicate the organizations you worked with to help you achieve your mission. Select all that apply.
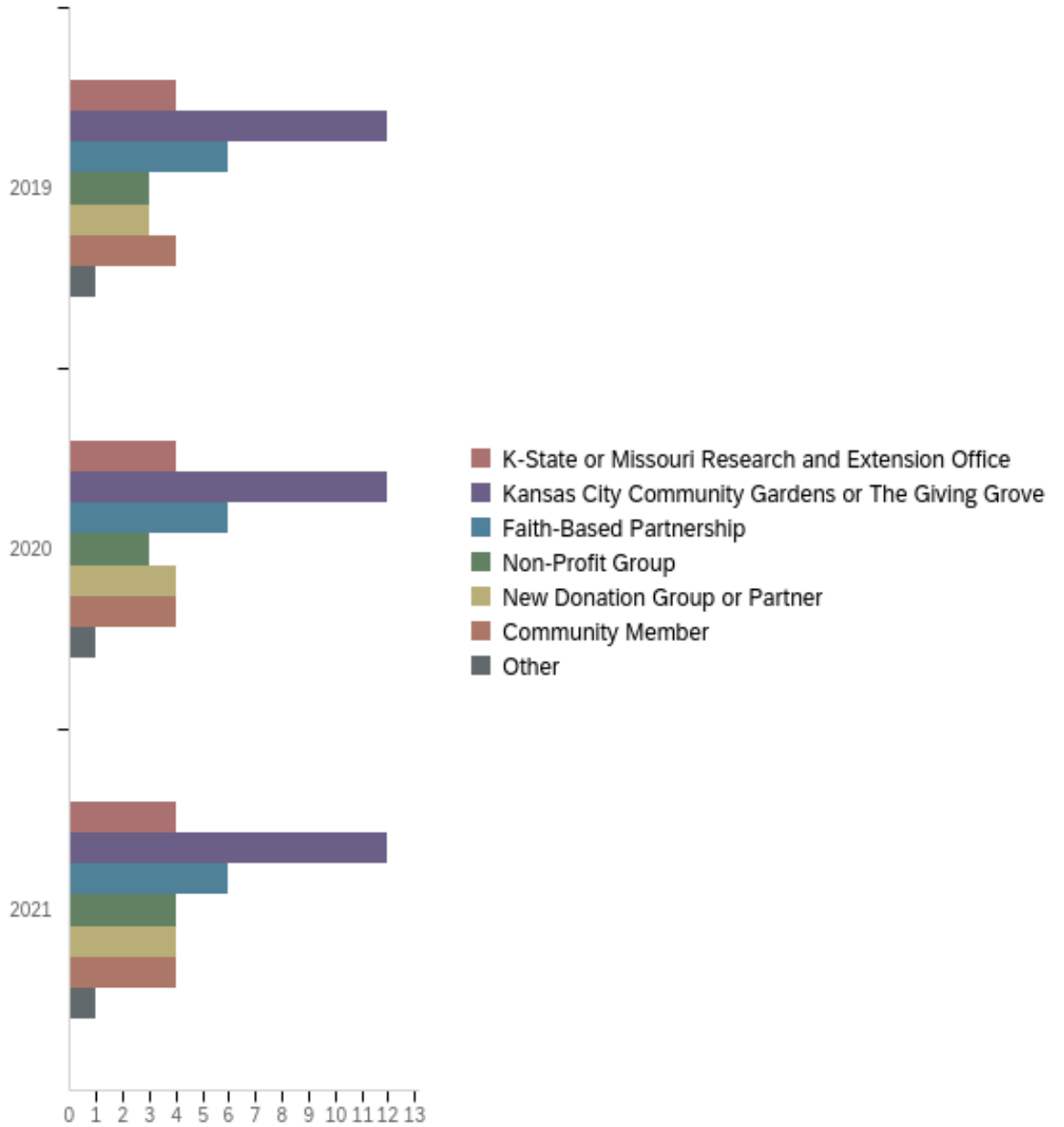
Q22 - Do you change what you grow or how you do things based on member feedback year-to-year?
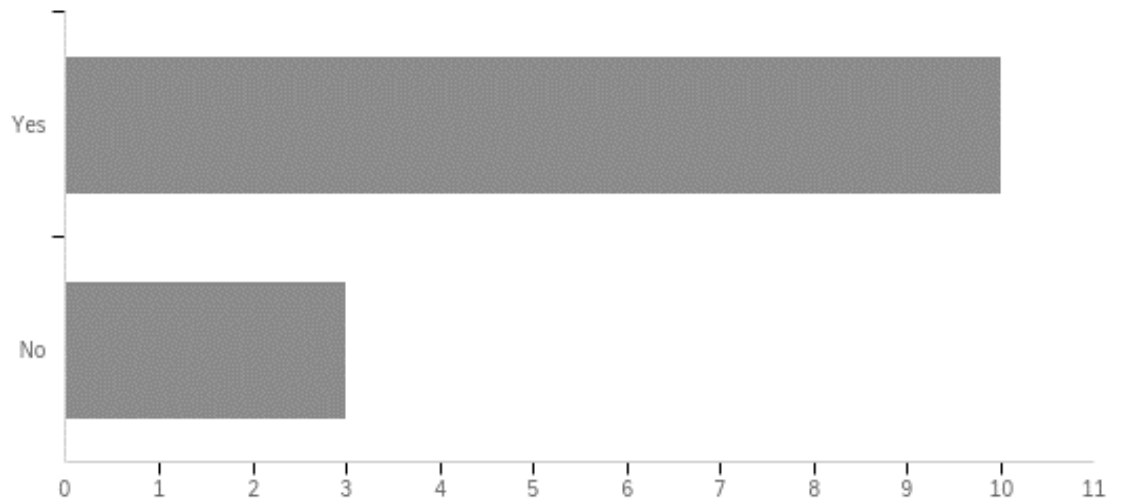
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Do you change what you grow or how you do things based on member feedback year-to-year?	1.00	2.00	1.23	0.42	0.18	13

Q23 - How does your Garden disseminate information to members? Select all that apply.

Legend:
- Memo Board/ Community Board
- Social Media
- Email
- Phone
- Other
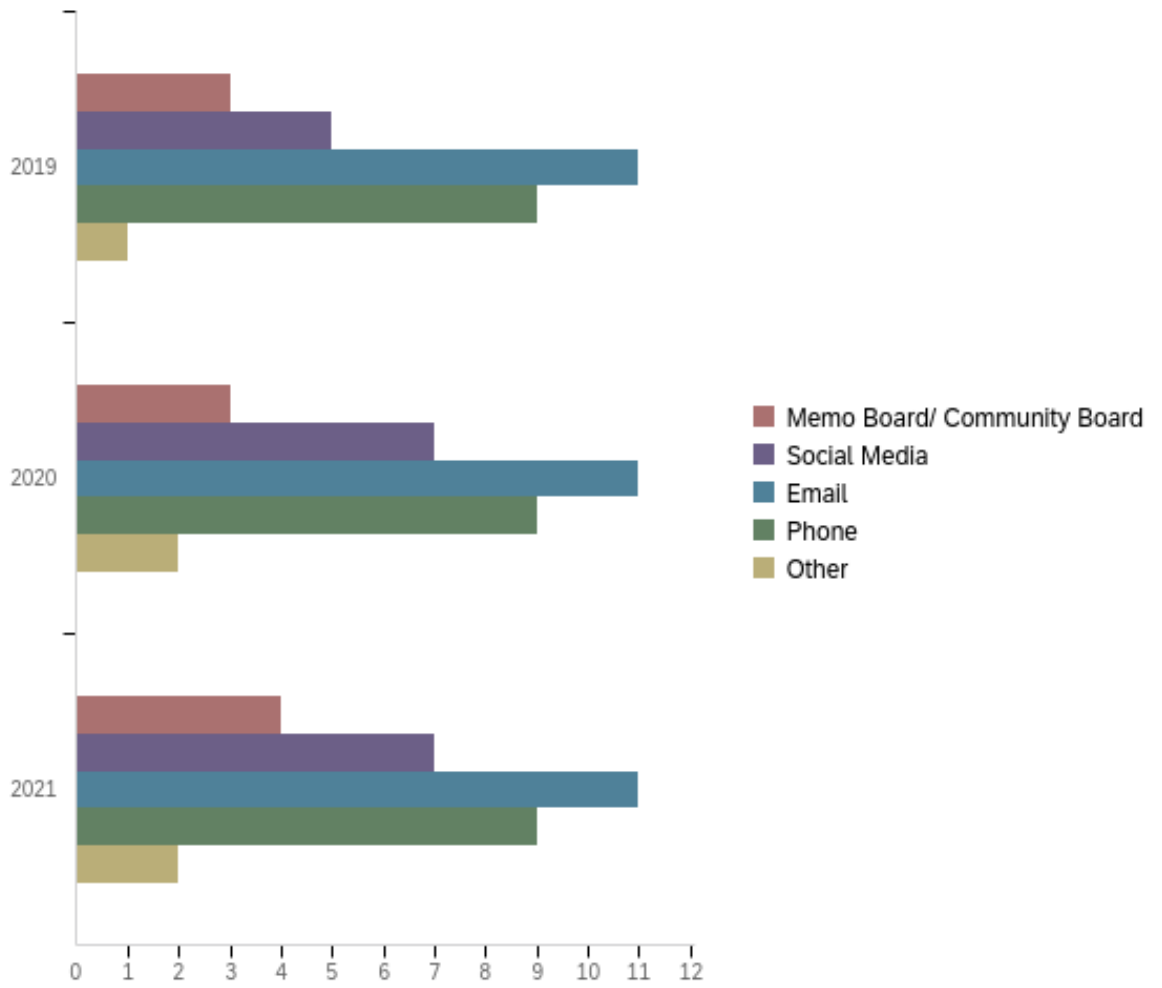
Q24 - Do you offer any educational training or information sharing for your gardeners?
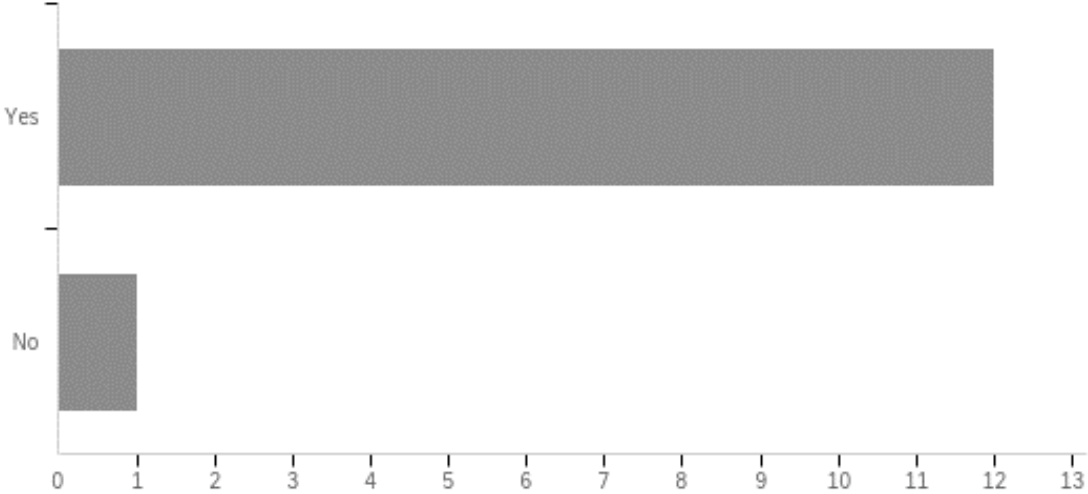
Q25 - What resources do you use for gardening information? Select all that apply.

#	Answer	%	Count
1	Extension Office or Extension Website	15.22%	7
2	K-State or other University Website	13.04%	6
3	YouTube or Social Media	4.35%	2
4	Extension Master Gardeners/Hotline	8.70%	4
5	Other Community Garden Leaders	15.22%	7
6	Gardener Friends	23.91%	11
7	Local Library	0.00%	0
8	Books and Magazines	8.70%	4
9	Other	10.87%	5
	Total	100%	46
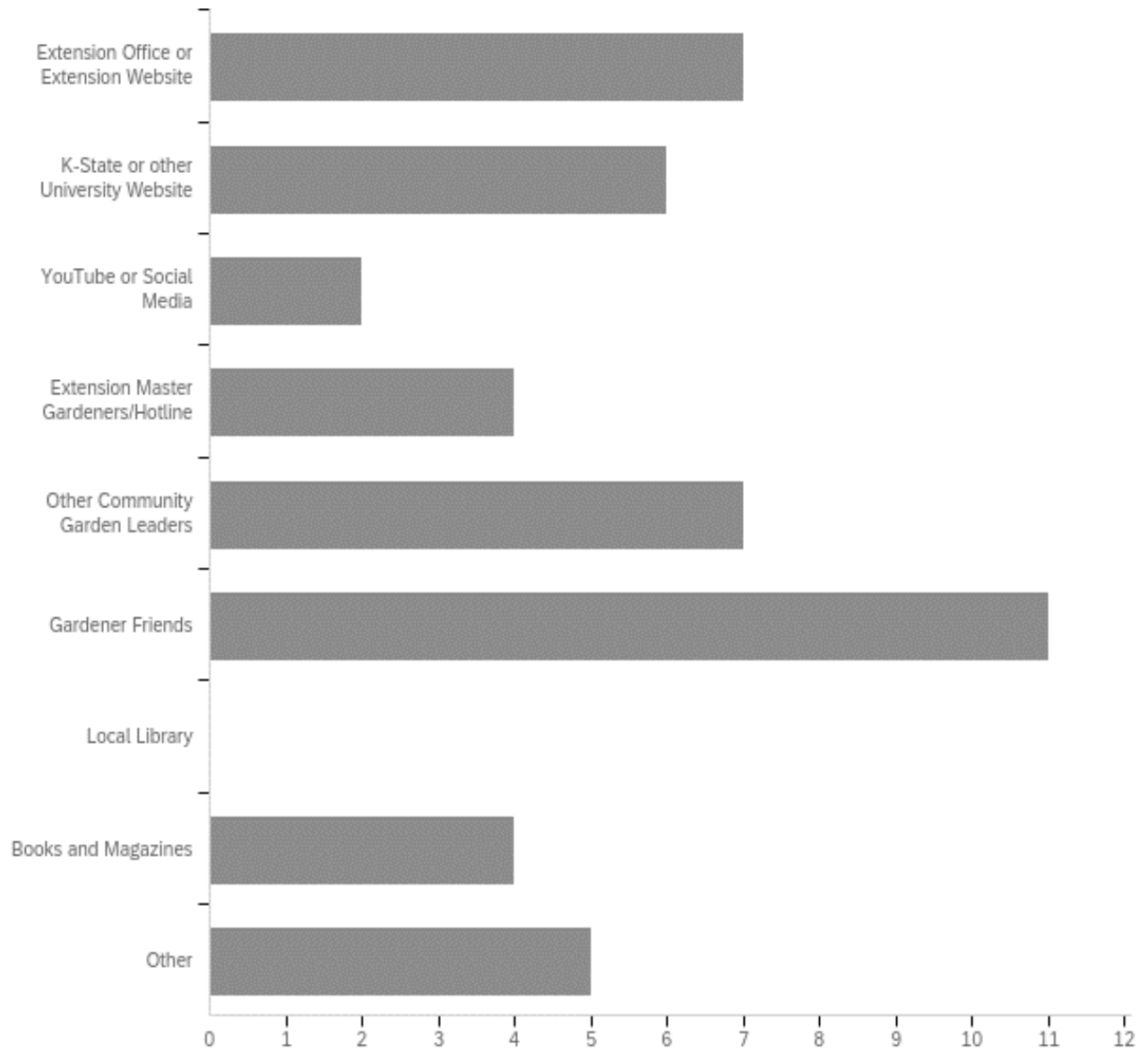
Q26 - Were you a gardener before becoming a community garden leader? Select all that apply.
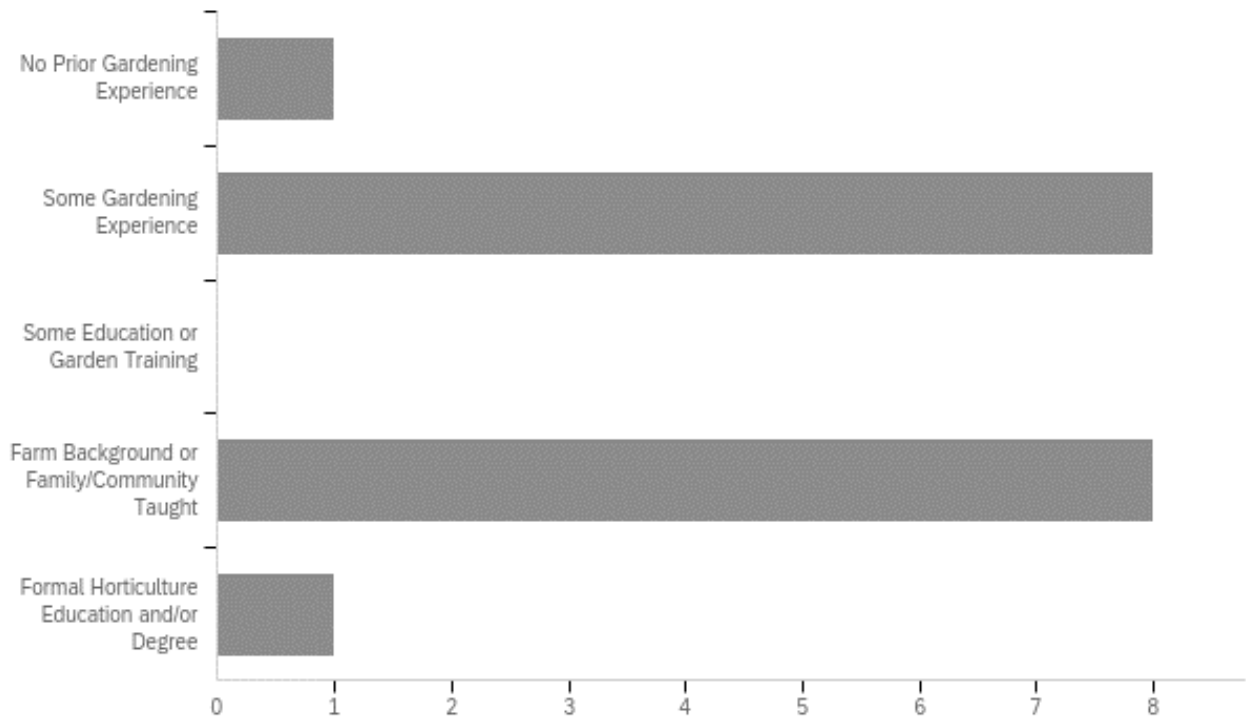
Appendix B - Discussion Questions

Social Resilience Indicator	Topic Led-in/Day	Daily Question
Place Attachment	Today, we are focusing on the community…	The global pandemic impacted our daily lives. How did your garden pivot during this period, and are there ways it made your garden stronger?
Signs of territory & place naming		
Diversity of place meaning in group		
Planning ongoing care of the site		
Collective Identity	Today, we focus on how you and your community garden members function as a team…	How does working in the garden give the garden members an identity within the garden? Did you see changes during the pandemic? If so, what were they?
A new identity emerges after a disaster.		
Stewards reinforce identity		
Shared group narrative		
Social Cohesion	Today, we are thinking about relationships **within** the garden…	Community Gardens often introduce people that might have never crossed paths otherwise. Can you describe people or other gardeners that have positively impacted one another inside or outside the garden?
The group makes decisions about the site.		
Individuals engage in shared stewardship activities together.		
Individuals engage in acts of reciprocity on/off-site.		
Social Networks	Today, we are thinking about	Describe how working with groups or partners outside of your community garden has helped your group meet needs in your community or neighborhood?
The group expands its works beyond the physical		

boundaries of the site.	relationships **outside** of the garden…	
Group uses existing social networks to disseminate info.		
Dominate narratives of group influences policy/programs at larger scales		
Knowledge Exchange & Diversity	Today, we are focusing on teaching and learning….	Community Gardens can be hubs for information between gardeners and the community. How do you view this knowledge exchange, and why does it make a difference?
teaching		
Learning/Diversity of thought		

Appendix C - Focus Group Questions

Online Zoom Focus Group Discussion Questions will focus on the five indicators of community resilience as listed below. Additionally, there may be responses from the asynchronous discussion questions that we will probe into to elucidate further how community gardens can contribute to community resilience.

Place Attachment: Why do community gardens matter to you, and did that change during the pandemic?

Collective Identity: How would your gardeners or community partners describe your garden? Did that change any during the pandemic? How can a garden be used as a safe place?

Social Cohesion: What relationships make a difference to you as a community garden leader? Did these relationships help you during the pandemic?

Social Networks: Think about all the partners you work with within the community.   How have these relationships made a difference to your garden? Did any of your partnerships change during the pandemic?

Knowledge Exchange and Diversity: Gardening 'Know How' can be gained from various formal and informal sources. Does educating others in gardening 'pass down' knowledge you gained from family or training? How does that matter to you? Did that change during the pandemic?

Appendix D - Study Volunteer Informed Consent

OCTOBER   2021

Thank you for participating in the Community Gardens Project. The information you provide through an online survey, online discussion boards, and an online focus group discussion will help us better understand the role of community gardens in community resilience. The following survey will take about 20 minutes and will ask 1) a bit about your background and 2) and a bit about your community garden. Next week you will be asked to respond to a daily question about community gardening for five consecutive days. The study will conclude with a live, virtual 1.5-hour focus group discussion with other community garden leaders. We hope you will benefit from the question and focus group discussions through other community garden leaders' knowledge. Kansas State University is conducting this research. Participation is voluntary, and you may choose not to answer any of the questions. All responses or other identifying information will be kept confidential. The 'zoom' focus group discussion will be audio-recorded and transcribed. Subjects will be identified by pseudonym throughout the study. However, given the nature of the 'zoom' focus group discussion, the risk of privacy loss is possible. The aggregated response may be used in publications, presentations, and other materials. All data will be stored on Kansas State University's encrypted server. If you have any questions about this study, please contact the lead researchers, Ms. Kristin Taylor, kristinhtaylor@ksu.edu, 859.312.2146, or Dr. Candice Shoemaker at cshoemak@ksu.edu, 785.532.1431, 227 Waters Hall, Manhattan, KS 66506. Institutional Review Board – Human Subjects Chair: Dr. Rick Scheidt, 203 Fairchild, KSU, Manhattan, KS 66506, 785.532.3224, rscheidt@ksu.edu I

Institutional Review Board approval date: 10-14-2021

Appendix E - Institution Review Board Exemption

KANSAS STATE | University Research
U N I V E R S I T Y | Compliance Office

TO: Candice Shoemaker   Proposal Number: IRB-10840
       Horticulture & Nat Resources
       Manhattan, KS 66506

FROM: Rick Scheidt, Chair
       Committee on Research Involving Human Subjects

DATE: 10/14/2021

RE: Proposal Entitled, "
Operationalizing Urban Stewardship Practices as Indicators of Social Resilience in Kansas City Community
       Gardens."

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State
University has reviewed the proposal identified above and has determined that it is EXEMPT from further
IRB review. This exemption applies only to the proposal - as written – and currently on file with the IRB.
Any change potentially affecting human subjects must be approved by the IRB prior to implementation and
may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the
Federal Policy for the Protection of Human Subjects, **45 CFR §104(d), category:Exempt Category 2
Subsection ii.**

Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that
research is exempt does not imply that investigators have no ethical responsibilities to subjects in such
research; it means only that the regulatory requirements related to IRB review, informed consent, and
assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the
Chair of the Committee on Research Involving Human Subjects, the University Research Compliance
Office, and if the subjects are KSU students, to the Director of the Student Health Center.

Electronically signed by Rick Scheidt on 10/14/2021 2:28 PM ET

Appendix F - Indicators Coding Table

Place Attachment	Collective Identity	Social Cohesion	Social Networks	Knowledge Exchange And Diversity
• Signs of Territory Marking • Place naming • Diversity of place meaning within the group • Strong protection if the site is threatened • Acts of Maintenance • Place of Respite • Place for Contemplation • Place to connect with Nature/Earth/Soil	• Stewards articulate an identity associated with their site through ritual practices • New Identity emerges following an acute event • Shared group narrative connected to the site • Working together to maintain and develop a shared identity • Building something new together • Shared creation and management of land • Group makes decisions together • Worship/Spiritual Practices • Belonging to a Team/Group	• Group decides the site • Individuals engage in shared stewardship activities Together • Acts of reciprocity on/off-site • Community based response • Growing food for the community	• Group Expands work beyond the physical boundaries of the site • Group uses existing social networks to disseminate new information • Dominate narrative of group influences policies and programs at larger scales • Interaction from a diverse group • Ripple Effect	• Knowledge and personal experiences are shared in multiple ways within the group • Knowledge exchange regarding horticulture, conservation, cuisine, foodways, and lifeways • New Knowledge and traditions are adopted and integrated • Training next generation/ succession

PLACE-BASED /LAND-BASED	PEOPLE-BASED	PEOPLE-BASED	PEOPLE-BASED	PEOPLE-BASED

Appendix G - Study Term Definitions and Attributes

Definition of Terms & Attributes

Place Attachment: Place attachment and meaning are the person-to-place bonds that evolve through emotional connection, purpose, and understanding of a specific place and/or features of a place. Land-based.

- Inalhan, G., Yang, E., & Weber, C. (2021). *PLACE ATTACHMENT THEORY* (pp. 181–194). https://doi.org/10.1201/9781003128830-16
- McMillen, H., Campbell, L. K., Svendsen, E. S., & Reynolds, R. (2016). Recognizing Stewardship Practices as Indicators of Social Resilience: In Living Memorials and a Community Garden. *Sustainability*, *8*(8), 775. https://doi.org/10.3390/su8080775

Collective Identity: The process of working together in creating and maintaining sites helped to foster and reinforce a sense of shared identity. (seeing as a group) People-based.

- McMillen, H., Campbell, L. K., Svendsen, E. S., & Reynolds, R. (2016). Recognizing Stewardship Practices as Indicators of Social Resilience: In Living Memorials and in a Community Garden. *Sustainability*, *8*(8), 775. https://doi.org/10.3390/su8080775

Social Cohesion: Social cohesion refers to the strength of relationships and the sense of solidarity among community members.[6] One indicator of social cohesion is the amount of social capital a community has together. People-based

- McMillen, H., Campbell, L. K., Svendsen, E. S., & Reynolds, R. (2016). Recognizing Stewardship Practices as Indicators of Social Resilience: In Living Memorials and in a Community Garden. *Sustainability*, *8*(8), 775. https://doi.org/10.3390/su8080775

Social Networks: A set of relationships that link individuals to other individuals. People-based.

- Boyd, D. M., & Ellison, N. B. (2007). Social Network Sites: Definition, History, and Scholarship. *Journal of Computer-Mediated Communication*, *13*(1), 210–230. https://doi.org/10.1111/j.1083-6101.2007.00393.x
- McMillen, H., Campbell, L. K., Svendsen, E. S., & Reynolds, R. (2016). Recognizing Stewardship Practices as Indicators of Social Resilience: In Living Memorials and in a Community Garden. *Sustainability*, *8*(8), 775. https://doi.org/10.3390/su8080775

Knowledge Exchange and Diversity- sites that promote the exchange and transmission of diverse kinds of knowledge.

- *Knowledge Exchange Processes in Organizations and Policy Arenas: A Narrative Systematic Review of the Literature—CONTANDRIOPOULOS - 2010—The Milbank Quarterly—Wiley Online Library*. (n.d.). Retrieved April 11, 2022, from https://onlinelibrary-wiley-com.er.lib.k-state.edu/doi/full/10.1111/j.1468-0009.2010.00608.x

- McMillen, H., Campbell, L. K., Svendsen, E. S., & Reynolds, R. (2016). Recognizing Stewardship Practices as Indicators of Social Resilience: In Living Memorials and in a Community Garden. *Sustainability*, *8*(8), 775. https://doi.org/10.3390/su8080775

Human Health and Well-being is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. (World Health Organization, 1948)(World Health website, 2021)

Physical well-being is linked to **fitness** – being able to perform effectively the physical tasks involved in life and sport. Being physically healthy includes

enjoying being physically active

- having good balance, coordination, and agility in everyday tasks as well as sport
- having the strength, stamina, and suppleness required for daily life, work, and play
- having fewer illnesses, diseases, and injuries

Psychological well-being is a state of well-being in which an individual realizes their abilities, can cope with the everyday stresses of life, can work productively, and can contribute to them

- having self-esteem and self-respect
- being able to recognize and express feelings
- being able to manage emotions to suit the situation
- recognizing and managing the factors that affect emotions
- feeling optimistic about life (which includes feeling useful and being optimistic about the future)

Social well-being – feeling optimistic about interactions with other people and the wider world. Being socially healthy includes:

- being able to interact with a range of people and having a sense of belonging
- having respect, empathy, and tolerance for other people
- being able to manage emotions to suit the situation