Food for Thought: Investigating Wellbeing, Belonging, and Barriers to Community Gardening During the COVID-19 Pandemic

By:

Anila Narayana

Department of Geography

University of Colorado Boulder

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Thesis Advisor

Dr. Azita Ranjbar, Department of Women and Gender Studies

Defense Committee

Dr. Colleen Reid, Department of Geography

Dr. Joe Bryan, Department of Geography

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Introduction

The role of natural and social environments on our health, and health inequalities, has garnered the attention of public health researchers (Marmot, 2005; Mitchell & Popham, 2008). In particular, social determinants of health have emerged as a prominent field of study, defined as the living circumstances that influence people's wellbeing (World Health Organization, n.d.). The power of these determinants becomes apparent when studying how those who live near sources of air pollution are at greater risk for respiratory disease (Esposito et al., 2014), or how poorer access to grocery stores can increase the risk of childhood obesity amongst students (Zeng et al., 2019). Experiencing racial discrimination can harm mental health (Sutter & Perrin, 2016), while those in neighborhoods with lower walkability scores report higher rates of pre-diabetes (Fazli et al., 2020). It is therefore unsurprising that our physical and social environments influence our health outcomes, and contribute significantly to our daily and long-term wellness.

However, our social and natural surroundings are not rigid (Marmot, 2006). Just as our environments may increase disease prevalence, they can also be altered and wielded to support our wellbeing, as exemplified by the impacts of greenspace and urban community gardens (UCGs). This study examines the avenues through which UCGs affect the lives of gardeners, specifically in the Denver Metro Area. I specifically seek to examine questions related to UCG gardeners' motivations and barriers to participation in the era of COVID-19, in an effort to characterize who the primary beneficiaries of UCG membership are, and who is left out of the picture.

What We Know:

While several interpretations of greenspace exist in the literature, a common definition refers to "urban vegetated space," encompassing "parks, gardens, yards, urban forests and urban

farms − usually relating to a vegetated variant of open space" (Taylor & Hochuli, 2017). Though some of these findings may be the result of self-selection regarding who desires to participate at these sites (Barton & Rogerson, 2017), greenspaces are associated with myriad health benefits, including better self-reported health status (de Vries et al., 2003), higher self-esteem (Barton & Rogerson, 2017), and reduced blood pressure (Putrain et al., 2022). These observations are thought to result from the direct and indirect effects of urban greenspace on health and wellbeing, as postulated for different populations, like older adults (Zhou et al., 2020). For example, greenspaces can reduce air pollution and provide stress-reducing surroundings, facilitating improvements in mental health (Chen et al., 2021; Ulrich et al., 1991). Many of these health benefits are also the result of the kinds of activities that communities engage in within greenspaces, as they often encourage exercise (Lee et al., 2015).

In particular, community gardens can bridge the gaps in social determinants of health and foster environments capable of modifying health outcomes (Lampert et al., 2021). These sites are broadly defined as "community-managed open spaces" that "differ from a park or public space where some other entity ultimately decides the purpose of the site and maintains it. Community gardens are where the residents of a community are empowered to design, build, and maintain spaces in the community" (Soil Science Society of America, n.d.). Just as observed in other forms of greenspace, UCGs provide participants with exposure to vegetation, in ways that they may lack access to in urban settings (Ward et al., 2022). A step above the cited benefits of other types of urban greenspace, UCGs can also help diversify diets via the harvest of fresh produce (Guitart et al., 2014). In particular, effects on diet quality and exercise are salient findings in community gardening literature (Gregis et al., 2021). While there is less research on the mental health effects of UCGs in non-patient populations (Lampert et al., 2021), there is some evidence

of the positive role that gardening can play in life satisfaction, stress reduction, and ability to handle adversity (Koay & Dillon, 2020). The kinds of benefits that UCGs impart are especially important in urban contexts, given the negative health and wellbeing outcomes associated with urbanization, from greater exposure to particulate matter exposure (Lu et al., 2021) to reduced greenspace involvement (Barton & Rogerson, 2017).

UCGs have been associated with broader social, economic, and environmental benefits as well. In the wake of COVID-19, many people turned to gardening in search of alternative food sources and social support (Egerer et al., 2022; Music et al., 2021). UCGs and garden allotments were found to foster social capital and cohesion in Melbourne, Australia and amongst refugees (Bishop & Purcell, 2013; 'Yotti' Kingsley & Townsend, 2006), while also growing family bonds in the United Kingdom (Mason & Conneeley, 2012). Community gardens also assisted in the revitalization of Glasgow neighborhoods, driving a sense of place for community members (Cumbers et al., 2018). In Barcelona, UCGs were found to promote social resilience amongst participants, including during periods of duress (Camps-Calvet et al., 2015). Economically, community gardens have often been studied in terms of their contribution to enhanced food security (Carney et al., 2012; Garcia et al., 2018; Krause et al., 2021). In addition to these findings, UCGs advance environmental outcomes as well. Though there are small risks of heavy metal contamination in garden produce (McBride et al., 2014), urban agriculture is predominantly viewed as a way to practice eco-friendly farming (Nowysz et al., 2022), increase local biodiversity (Prudic et al., 2022), and produce cooler microclimates (Anderson & Gough, 2022). As per the concept of social determinants of health, these improvements in social, economic, and environmental conditions can, in turn, further enhance wellbeing (World Health Organization, n.d.).

Though it is widely believed that UCGs can play important roles in improving individual and public health, via the promotion of positive social determinants of health, there is also debate over who is truly able to derive these benefits; some scholars view UCGs as pathways for marginalized communities to reclaim control over their social and natural environments, contributing to food sovereignty, cross-cultural knowledge, and fairer health outcomes (Anderson et al., 2021; Colson-Fearon & Versey, 2022; Shan & Walter, 2015). However, others posit that alternative agriculture sites are primarily accessible to white residents, coded as white spaces, or otherwise isolating to those who require UCGs for food access (Butterfield & Ramírez, 2021; Hoover, 2013; Meenar & Hoover, 2012). In the latter conception, UCGs may exacerbate the social inequality already present in that community. Ultimately, perspectives on how UCGs impact the wider community are likely place-dependent, as the local context of each UCG can inform the role it plays in its surrounding neighborhood. Examining UCGs at the individual and community level is therefore useful when seeking to understand whether they promote more egalitarian communities, or if they foster inequitable social and health outcomes.

This study was undertaken in the Denver Metro Area, made up of seven highly-populated counties in Colorado with a relatively dry, sunny, cold, high-desert climate (Denver Relocation Guide, 2018); as per its classification in Zones 5 and 6 of the Plant Hardiness Zone Map (United States Department of Agriculture, n.d.), UCG participation is generally not a year-round activity in this area, given the relatively shorter growing season compared to warmer and more temperate regions of the United States. As a region, the Denver Metro Area is primarily white, with around one-third of residents identifying as Hispanic, Asian, or Black; just under half of residents have at least graduated from university, and the median age of the area is 36.7 years (Metro Denver EDC, n.d.-a). This study is also set against the backdrop of the COVID-19 pandemic, with data

collection occurring roughly one year after the implementation of stay-at-home mandates in the United States (Moreland, 2020).

The number of studies on UCGs in the Denver area is low, primarily including randomized controlled trials and surveys on produce consumption, weight, and exercise (Litt et al., 2011, 2015, 2017; Villalobos et al., 2019). Only a few peer-reviewed articles focus on the social processes that occur in Denver UCGs specifically, but these do not focus on barriers to UCG participation or occur in the context of COVID-19 (Langegger, 2013; Litt et al., 2011, 2015; Teig et al., 2009), leaving this field a ripe area for further exploration.

Research Questions:

In this work, I seek to contribute to existing knowledge on the role of UCGs, by asking the following three questions:

1. What are gardeners' motivations to participate in UCGs in the Denver Metro Area?
2. Has the role of UCGs in Denver changed during the COVID-19 pandemic?
3. What barriers prevent people from accessing the benefits of UCG engagement and limit their sense of belonging in Denver UCGs?

Conceptually, this study adds to our current knowledge of the mechanisms in which our local environments, including public greenspace, can drive social disparities. Practically, by understanding what barriers limit participation or pose undue burden on current UCG participants, this study can help shed light on ways in which marginalized gardeners may be unable to reap the multidimensional benefits of UCG participation. By understanding why gardeners originally joined their UCG, and what continually motivates them to garden, we can better understand what roles UCGs effectively serve in Denver neighborhoods. This information may help target UCGs as social and public health interventions for those who are more likely to

maintain engagement with these sites and benefit most from participation. Lastly, this study provides a snapshot of the role that UCGs play in Denver neighborhoods, shortly after the emergence of COVID-19, a time of pronounced isolation and social change. Just as many aspects of social institutions have changed in the wake of COVID-19 (Hoofman & Secord, 2021; Pak et al., 2020), characterization of the ways that UCG functions have shifted during this pandemic can provide a clearer depiction of how they can be wielded in the future to support health and wellbeing at individual, community, and societal levels.

Methods

The complex topics of belonging, community, and relationships to self and society that were explored in this study are subject to interpretation; definitions and perceptions of these concepts can vary significantly depending on myriad factors, including upbringing, socioeconomic status, and culture. There also remains a lack of information in the form of personal experiences of UCG participation (Teig et al., 2009), pointing to a need for in-depth accounts that extend beyond the findings that can be extracted from surveys or questionnaires. Given that one goal of this study is to center the perspectives of gardeners facing barriers to participation, using more in-depth data collection methods can more thoroughly capture their experiences. This study thus draws on ethnographic methodologies and qualitative methods, in order to more fully understand the role of UCGs amongst a small group of gardeners in the Denver Metro Area. Institutional Review Board approval for this project was obtained in June 2021, via the University of Colorado Boulder. This study relied on participant observation and semi-structured interviews as methods of data collection. Two UCGs in north and south Denver were selected as primary sites for participant observation, though two other sites were also observed at least once each. I selected the sites based on factors including their closer proximity to public housing infrastructure, lower neighborhood socioeconomic status, greater proportion of racial diversity in the neighborhood, and the UCG's status as publicly available to any community member (as opposed to the private status of some UCGs). In August 2021, an amendment was approved by the Institutional Review Board, primarily to open interviews to active Denver UCG participants over 18 and recruit a wider variety of experts (including those with knowledge of environmental justice, health, and UCGs in general). Interviews occurred

between June 2021 and January 2022, while participant observation occurred between June and August 2021.

Participant observation: While conducting participant observation, I volunteered with general tasks, like weeding, composting, and rebuilding garden boxes. During participant observation, I paid special attention to social dynamics, conversation topics, types of plants being grown, and general behaviors while gardeners were in groups or working solo in the UCG. I also considered characteristics of the physical space in which each UCG was located, as these elements can reflect larger community values and influence social interactions. I conducted participant observation and recorded notes during varied times of day and days of the week, as well as during community volunteer days. By diversifying the times in which I observed UCG members, I could better understand what times and days members visit the UCG, and contextualize social dynamics accordingly.

Interviews: I conducted semi-structured interviews in order to allow for flexibility as subjects discussed unexpected topics. Fifteen UCG gardeners, five garden leaders and administrators, and five experts were interviewed between June 2021 and January 2022, for a total of 25 interview participants in this study. Study subjects were between 18-71 years and participated in seven different Denver UCGs. Gardeners and garden leaders were required to be actively participating in a UCG and live in the Denver Metro Area. Experts were self-identified as those in the fields of urban gardening, community gardening, food insecurity, environmental justice, and food policy. Interviews began with a brief set of open-ended demographic questions (on topics like ethnicity, gender, and education level). All subjects also placed themselves on the MacArthur Scale of Subjective Social Status (Adler et al., 2000), which asked participants to consider education, job status, and social standing to rank where they fall in comparison to others in the United States.

Much like objective social status, higher subjective social status is associated with better health (Singh-Manoux et al., 2005), while this measure also allows for more nuanced interpretations of privilege as it influences general wellbeing (Garza et al., 2017). Gardeners were interviewed on their motivations for UCG participation, how their UCG involvement changed during the COVID-19 pandemic, and how UCGs influenced their sense of community, sense of self, wellbeing, and relationship to food. Garden leaders and administrators were asked to consider these questions as they applied personally and to their larger UCG space, while experts additionally reflected on the wider social implications of UCGs. At the end of each interview, participants were asked to recommend other active Denver UCG participants as part of a snowball sampling recruitment procedure. Other interviewees were recruited via emails to UCG listservs, posters, flyers, and conversation with gardeners. All interviewees received $15 gift cards in compensation.

I stored participant observation notes electronically, and conducted interviews virtually, via phone call, or in person; at minimum, I recorded interview audio, but was often able to capture video as well. I thematically analyzed this data via open and axial coding, and when reporting these findings, I use pseudonyms to protect the identities of participants.

Given my own experiences living in the Denver Metro Area for roughly seven years, I applied an interpretivist lens while conducting qualitative analysis, in order to account for the influence of my subjective understandings and perspectives of this region. However, as a non-member at any UCG prior to or after this study, I held relatively few beliefs on the functions of UCGs on social and public health processes before this research. I also used the social ecological model of health to ground my findings. In accordance with the idea of social determinants of health, this model posits that our health and wellbeing is, in part, the product of

environmental, social, personal, and cultural features as they intersect and overlap; this interdisciplinary approach advocates for a mix of personal and population-based health programming, and for multilevel programming that reinforces healthy behaviors and environments in different spheres (Stokols, 1996).

Chapter One: Motivations for Urban Community Gardening

COVID-19 has exposed glaring inequities that disproportionately impact marginalized communities, including barriers to accessing healthy food and social connection (Hwang et al., 2020; Kakaei et al., 2022). Recently, UCGs have become a point of discussion in relation to these barriers (Carney et al., 2012; Wood et al., 2022). This study examined the experiences of urban gardeners in Denver communities during the COVID-19 pandemic, including the role of these gardens on wellbeing via social determinants of health. These findings are informed by the experiences of the 25 UCG participants who completed semi-structured interviews, as well as the Denver UCG gardeners who were studied via participant observation. In this chapter, I examined gardeners' motivations for participating in UCGs, in order to identify the functions that these spaces effectively serve in gardeners' lives. In particular, I expand on the motivations that were intertwined with members' sense of belonging, namely, access to community and cultural preservation. UCGs were also frequently noted as sites to facilitate resource sharing and learning, particularly regarding nature and sustainability, but also on topics of privilege and equity. Key community-building aspects of the UCG experience were forced to cease during COVID-19, but generally, participation was deemed relatively safe, providing a sense of belonging and accomplishment in a time of pronounced uncertainty during the COVID-19 pandemic.

Motivations for UCG Participation

Based on her experiences at several Denver UCGs, Wanda, a low-income UCG administrator in her twenties, suggested that the place in which a UCG is located can inform what the drivers of participation are in that area. In her opinion, certain factors like whether a neighborhood generally has yard access may suggest that UCG gardeners participate for a sense of community, rather than for food or land access. She later proclaimed,

> Finding out [what activates] people, and what interests people, and really, like, ensuring that you're as inclusive as possible to meeting those needs is really important… But when a community garden [is activated]—and by activated I really just mean like when they are meeting those needs, and they are, you know, creating events that bring people together and that meet a wide array of interests and allow for [fun and] allow for experimentation—I think when you have that, it benefits wellbeing so much.

Thus, understanding gardeners' motivations gives us better insight into the resources and characteristics of each community, while also allowing us to better plan future UCGs so that they can serve the needs of these neighborhoods.

In this study, the initial drivers of UCG participation reflect the needs experienced by neighborhoods in the Denver Metro Area. In particular, desire for greater land access was cited amongst study subjects, due to factors like transitory living, apartment-style housing, or lack of backyard space in residential homes. This seems to correspond with the high number of study respondents who noted that increased housing prices in Denver were a large source of personal stress. Additionally, my findings indicate that desire for increased food access was not an especially salient motivator of UCG participation. As this certainly does not negate the importance of food insecurity as a hardship in the Denver Metro Area, it seems that this is not an

issue that UCG participation radically shifted for those interviewed in this study. Instead, UCG members more commonly turned to their garden plots in order to bolster greenspace access, potentially indicating that, in order to garner greater participation at UCG sites and satisfy community needs, future UCGs should be located near apartment-style housing or other regions where greenspace or open space is lacking. One UCG expert who works to increase community access to greenspace noted this as well, believing that the current geographic distribution of UCGs in the Denver Metro Area prevented many without land access from being able to participate. Given that many subjects referenced climate change as a stressor they experienced, it is unsurprising that another prominent motivator of UCG involvement was related to sustainability and desire to nurture connection to the environment. This could potentially indicate that initial UCG participation may be more attractive to those with inclinations towards climate change mitigation.

An unexpectedly low number of respondents cited previous gardening experience as an initiator of their UCG engagement. As many gardeners did not detail a childhood background with gardening, the benefits of participation appeared to be experienced regardless of prior agricultural knowledge. However, this finding should be substantiated with larger surveys of the population, including those who have never engaged with UCGs. Since more of the motivations in this study centered on desire for community and health benefits, rather than previous gardening experience, UCGs in the Denver Metro Area could potentially be wielded more widely as an informal support for those seeking to improve their social and physical environments. In particular, UCG participation seemed to serve the needs of Denver as an area experiencing urban sprawl. The social disconnection that can accompany this urban sprawl and low-density housing has been thought to increase depressive symptoms and loneliness (Miles et

al., 2012; Pohanka & Fitzgerald, 2004), so the presence of UCGs in these areas could help facilitate social solidarity at the local level.

Interviews began with questions related to motivations for subjects' participation in UCG settings. Six key motivations were identified, encompassing both initial and long-term drivers of engagement with UCGs:

1. *Desire for Land Access:* Lacking the ability to garden at home due to insufficient space or no backyard space.
2. *Connection to Nature and Environmental Activism:* Immersing oneself in nature and accessing greenspace, and/or contributing to sustainable causes that improve the environment.
3. *Civic Engagement and Service:* Benefiting the local community, working towards social causes, and improving the lives of others.
4. *Health Benefits:* Exercising, gaining fruit and vegetable access, and improving mental and emotional wellbeing.
5. *Access to Community:* Connecting with other gardeners and those outside the UCG.
6. *Cultural Preservation:* Engaging in cultural practices and traditions, and/or performing activities that grow one's knowledge of their heritage.

Access to community and cultural preservation are discussed in the next section of this chapter, as they are uniquely related to UCG members' sense of belonging.

Desire for Land Access:

I met Sylvia in June 2022 at one of the Denver UCGs I regularly conducted participant observation at. A 26 year old and middle-class woman, Sylvia joined her community garden

during the 2021 growing season. Though she enjoyed gardening in her childhood, she was unable to engage in this during her college years, due to her lack of long-term, permanent housing. Gardening was an activity she strongly desired to return to, and because she lived in an apartment, joining her UCG was the most feasible option for her to do this. Several other gardeners in similar living situations expressed related motivations for participating in their UCG. Several other gardeners in similar living situations expressed related motivations for participating in their UCG. They spoke of UCGs as "the most accessible means… to seek out [land]," suggesting that apartment-style living was not conducive to home gardening.

Even amongst homeowners, desire for land access still served as a motivator for participation amongst interviewees, as exemplified by Maria, a gardener and mother in a rapidly gentrifying area of Denver. She began community gardening because she loved the physical act of working with the land, but primarily because she "did not have land of her own"; essentially, her house did not have the space for a home garden. Kara, another Denver resident who lived and gardened south of Maria, mirrored these sentiments, noting that she was not in a financial position to purchase a house with sufficient land for a home garden. Thus, UCGs were a more financially feasible option for these members to engage in gardening than home gardens were.

Connection to Nature and Environmental Activism:

One particularly salient incentive for UCG engagement was related to participants' desire to experience nature and contribute to sustainable causes. Informed by her career working towards environmental justice and health equity for Latinx communities in Colorado, Elena, a UCG expert, articulated that these gardens could play beneficial roles in slowing climate change. A former full-time farmer in various small-scale agriculture settings, as well as a recipient of higher education in the fields of environmental science and public health, she was particularly

entrenched in issues related to how nature influences wellbeing, specifically via community greenspaces. To her, UCGs served as "a beautiful way of bringing together community… and cleaning up waste sites and unused land in a way that really benefits the environment" in numerous ways. Whether by increasing pollinator presence or helping people reap the benefits of environmental goods, like fruits and vegetables, other administrators and experts echoed how Denver UCGs meaningfully improved the natural environment and people's relationships with it.

Several respondents also discussed the paternal bonds they felt to the plants they grew, maintaining their enthusiasm for gardening. This sense of responsibility to their plants encouraged them to regularly garden and visit their plots throughout the growing season. As two garden administrators, Martina and Lisa, continued their tenure at UCGs, they gained a greater awareness of environmental degradation that motivated them to return. In particular, Martina was a 64 year old who was deeply connected to her community, having established her UCG over 10 years ago. As years went on, she felt a calling to impart sustainable principles to children in the garden, using the UCG as the site to facilitate positive relationships with nature; she would encourage children to "go move the leaves" to see jalapeños growing, or to "hug a tree and listen to that tree," influencing another generation to continue gardening. Thus, gardeners and administrators alike gained a sense of environmental responsibility over time through their UCG membership, inspiring educational and sustainable actions within the space.

Several gardeners and administrators became involved in UCGs with the intention of environmental action from the start. Revisiting Wanda's journey as a UCG administrator, working at a UCG helped her compensate for the areas in her life where she could not act as sustainably. As someone particularly opposed to the use of synthetic pesticides in agriculture, participation in the UCG allowed Patrick, a fellow UCG gardener, to engage in more

environmentally-friendly farming practices. Another younger gardener, Nadia, responded that her inspiration to join a UCG was driven by seeing nature "grow in abundance" in these spaces and her desire to foster communal knowledge on plant care. UCGs were a space where she could engage in a "self-sustaining" way to "[care] for the earth" and "not [do] food production in a way that decimates an ecosystem, just to build a crop." For a few participants, exposure to greenspace and gardening during childhood fostered connections to nature that they hoped to nurture in their adulthood. As such, I found that UCG spaces facilitated environmental awareness and connection, not only as an initial motivator to join a garden, but as one that continued members' desires to return to their UCG.

Civic Engagement and Service:

Across Denver neighborhoods, study subjects reported a desire to join UCGs in order to give back to their neighborhood or fight unfair social systems, framed through the lenses of food justice and community care. Luis, a UCG expert who sought to foster more local and equitable food ecosystems in the Denver area, exemplified this viewpoint. Self-described as Black, Indigenous, and People of Color, or "BIPOC, [an] entrepreneur, and [a] farmer" as well as a "systems-changing agent," Luis sought to create new economic systems that erased social hardship. Though he previously sought to wrestle with social challenges through art, his work in urban agriculture inspired him to use small-scale farming in order to shed light on and actively work against social disparities and community struggles, exemplifying how UCG participation was an act of public service in his eyes. To Luis, farming and small-scale agriculture were cornerstones of community engagement and service.

Another garden administrator similarly reported that working with others at her UCG created a way for her to dismantle structures of disempowerment, something that she could not

do when working alone at a home garden. In particular, she felt that this was exemplified when UCG networks connected low-resourced and high-resourced communities, facilitating the sharing of childcare and food support, amongst other services. Though her efforts shifted to focus more on environmental efforts (as described in the previous section), Martina originally founded her UCG with the pillars of civic engagement and service close to heart. Establishing her UCG following the death of a loved one due to gun violence, she desired to build a safe haven for young people to come and reflect on their actions. Recognizing the role of UCG participation as a "healing" practice in her own life, Martina aspired to provide this experience for inner-city children. In this way, UCG participation was a direct form of service to her own community, grounded in Martina's personal experiences. She maintained that her time in the UCG continued to "[open her] eyes more to things around [her], instead of just being in [her] own little bubble," reflecting how these spaces impart greater social and community awareness. Pia, another UCG administrator and garden leader, mirrored these sentiments, citing the history of the Ku Klux Klan in Denver and her desire to use the UCG as a way to push back against this entrenched racism, ultimately creating a space for those from all ethnicities and backgrounds in her neighborhood.

Interestingly, several participants also discussed how UCGs served their wider communities, including those who did not garden. One gardener, Edward, reflected on how he would transport the excess produce from his UCG to a local church, while another garden leader referenced the crops her UCG grew specifically for non-gardeners to pick and take home. UCGs were also viewed as contributors to larger neighborhood beautification efforts, which served to improve the space for all community residents.

In addition to the topics discussed above, a small number of interviewees maintained that their UCGs improved their awareness of community resources. From participant observation, it was evident that free seedlings, food, and extra supplies were often available to UCG participants, entailing some of the material goods that people could gain from the site. Aside from these material resources, UCGs also facilitated the distribution of social resources; one low-income gardener, Frank, noted that through peers at his UCG,

> I made some friends in the neighborhood that have allowed me [to really] just be more involved in my [neighborhood. I] met people associated with my community association. I met people that are volunteering in different projects. I've been able to find out what's been going on in my neighborhood.

These connections increased Frank's social standing in his community, also allowing him to better understand sources of neighborhood support that he could lean on. By talking with his garden leader and other long-term UCG gardeners, Ken could also network and gain career contacts. As a new gardener who recently moved to Denver and felt less connected to the community, this growth in Ken's social capital was particularly helpful as he sought to shift to a career in the environmental field.

Health Benefits:

A relatively common component of people's desire to join or stay at their UCG revolved around the health benefits that these spaces can impart. Patrick, a low-income, 51 year old gardener who began community gardening that year, noted some of these benefits, believing that "there's nothing like home-grown vegetables." For Patrick, the flavor of the vegetables he personally grew was simply unmatched, and the ability to regulate what his crops were exposed to (including what fertilizers and pesticides), was especially important to him. For gardeners like

Patrick, growing their own produce relayed a greater sense of understanding of the food they consumed, improving their knowledge of their diets and sense of control over their health. Though it was only his first year at his UCG, Patrick was very successful at growing tomatoes in his plot, imparting in him a sense of pride and accomplishment that also bolstered his wellbeing.

Other interviewees mirrored Patrick's beliefs, with one UCG expert, Luis, mentioning that his interest in gardening and food production began because of the mental and physical health conditions he experienced; as he learned about the ways that diet could influence wellbeing, he sought to grow his own food to gain more control over what he ate, in an effort to improve his health. Kate, another UCG administrator who worked at several Denver gardens, built on this driver of participation, discussing that she enrolled her children in UCGs because she experienced this same desire for them to more fully understand what they were consuming.

A number of gardeners highlighted that because of their UCG plots, they ate a more varied diet with a greater diversity of fruits and vegetables, as well as a greater proportion of fruits and vegetables during the growing season. Just one gardener stated, in the UCG, "you can grow a lot of things that you wouldn't be able to get… I grew chard, which I never really grew up having." Thus, Denver UCGs could provide access to new kinds of produce that could not be eaten otherwise, or would not have been. However, amongst the respondents who reported previous or current food insecurity, few considered UCGs as an effective or complete remedy to this issue (in part because UCGs did not address the root cause of food insecurity as poverty). Thus, while UCGs appear to improve gardeners' diets and relationships with food, these were not sufficient to comprehensively resolve food insecurity in the Denver Metro Area.

Aside from food, many found that UCG participation also endowed them the benefits of incidental exercise, in a non-traditional form. The low-intensity cardiovascular exercise they

could engage in at the UCG allowed them to remain active in financially affordable ways (especially in comparison to skiing or other recreational activities popular in Colorado). One UCG member spoke of how she would engage in gardening more often than visiting a gym during the summer, suggesting that it was easier to find motivation to garden than to exercise in more conventional ways. Hank, another gardener at the same UCG as Patrick, added that he would often walk or bike to his garden, illustrating another way in which the UCG experience promoted exercise in his life.

A large number of participants discussed the ways in which UCG participation also helped them cope with the stressors in their lives. Whether COVID-19, climate change, or family issues were on their mind, being in nature temporarily rid them of these worries. According to one administrator, the majority of UCG participants she interacted with had come to their UCG for mental health-related reasons, rather than for food access. Lydia and Jane, a daughter and non-binary parent who identified as "struggling class," exemplified this, stating that, while they originally began home gardening recreationally, UCG engagement was something they intentionally sought as a form of emotional care. When Jane faced significant material and emotional stressors, taking care of their UCG plot was as a way to support their mental health, serving as a "ritual, and something to do that keeps us going, keeps the wheels turning, [and] keeps us getting out of the house." Becoming involved in their UCG therefore served as a pathway to reconcile with their emotions, in a way that they could engage in frequently and regularly. Other interviewees agreed, with multiple gardeners discussing how part of their motivation to join or continue in the UCG was related to the positive effects that participation had on their mental illnesses, including generalized anxiety disorder and major depressive disorder. Subjects also valued the ways in which UCGs provided a change of pace from

competitive workplaces and the hustle and bustle of our daily lives and culture. UCGs gave gardeners an escape from the challenges they faced; especially for stressors that could not be permanently solved, UCGs provided temporary relief.

The role of the UCG as an outdoor activity imparted its own benefits as well. Participants frequently noted that getting fresh air and spending time outdoors augmented their sense of wellbeing. I return to Jane and Lydia, who noted how easy it could be to forget the positive mental health impacts of this time outdoors, in the stress of daily life. Their UCG plot served as a tangible reminder to take care of their own basic needs (i.e., drinking water and spending time in the sun), in the same way that they cared for their seeds. As another gardener reflected, "There's something about working in the earth and getting your hands dirty that feels good. It's difficult to describe." Others expanded on this idea, citing biological pathways through which physically touching dirt and soil could improve mental health (seemingly referencing the *Mycobacterium vaccae* bacteria found in soil, which is thought to increase resilience to stress [Foxx et al., 2021]). Quite commonly, interviewees also discussed the sense of fulfillment they gained when watching a seed grow into a large, thriving plant that could provide sustenance via fruits and vegetables. Lydia (Jane's daughter) tearfully described how observing the growth of these seeds helped her recognize her own ability to grow, change, and evolve, a personal beacon of hope. For Edward, who used to work in a university setting, UCG participation was a stark contrast to his career, both in terms of the kind of tasks he completed, but also in terms of his impact. While he could rarely see the effects of his teaching on student outcomes, he described community gardening as satisfying because he could almost immediately see whether or not he was successful at nurturing that year's plot, growing his sense of accomplishment when this occurred.

As one UCG administrator emphasized, the garden "is more than just the sum of its parts," evidenced by the multiple reasons that respondents referenced while considering initial versus long-term motivations to garden. Across interviews, community interaction became one of the primary reasons that gardeners maintained their membership at their respective UCGs, even if it was not an initial driver of their UCG engagement. Even when solely considering subjects' initial motivations, many cited a combination of factors that led to their involvement. This suggests that perhaps the allure of UCGs is related to the multiplicative benefits they can endow. Rather than exercising at a gym for its physical and mental health benefits, UCGs can provide avenues for participants to do the same, while also engaging in climate action and civic service. Rather than attending a local farmer's market to receive fresh food and reduce their carbon footprint, UCG gardeners can also meet like-minded neighbors and access greenspace. By leaning into the multifaceted roles that UCGs play in participants' lives, and targeting UCGs as public health interventions accordingly, participants can potentially derive greater benefits from their engagement in UCG spaces.

UCGs and Belonging

As mentioned earlier in this chapter, two motivators of UCG engagement were also noted as particularly intertwined in members' sense of belonging, namely, access to community and cultural preservation.

Access to Community:

One of the most commonly referenced motivators of UCG involvement was the desire to find and nurture bonds at the community level. UCGs generally increased social connectedness and belonging amongst gardeners, something that one UCG member, Edward, spoke of. A retired, elderly participant with an advanced degree, Edward spoke of how he began community gardening in Colorado three years prior to our interview. To illustrate how UCG membership facilitated the diversification of his social networks, Edward referenced a working-class, single mother and fellow gardener that he fostered friendship with: "She's someone I probably would have never had a chance to meet [otherwise]… We run in different social circles, yet through the garden we now have common interest and enjoy interacting with one another." Not only did the UCG's diversity of participants provide this avenue to meet those of different socioeconomic backgrounds, but it also seemed that UCGs could foster more consistent, long-lasting relationships with neighbors due to gardeners' regular participation during the growing season.

Several other gardeners referenced the satisfaction they felt while "being out in the sun, sweating together and, like, digging in the dirt and, like, actually doing something that, then months later, you get to consume or get to smell," as Nadia phrased it. These acts allowed respondents to become more involved in their communities by collectively working towards shared goals, which fueled their continued participation. Others noted that UCGs functioned to connect them to their communities, endowing social support that they may not have accessed

otherwise. For Martina, a garden leader in north Denver, this was especially important after the death of her husband:

> I need the garden to help me heal. It's a healing place. If I didn't have the garden, I might be wallowing in self-pity. The garden brings me out to the people. I meet a lot of different people. I meet a lot of young kids that put a smile on my face. When I talk, when other people come here and they remember my husband, it makes me happy.

Thus, the UCG was a conduit for many to create support networks during these times of hardship.

Another garden administrator highlighted how the unique characteristics of UCG communities imparted a certain sense of belonging that she could not necessarily derive from other settings. She noted that UCG networks "outlast a lot of the other ways that we choose to build community… School is amazing and a great place to build community, but eventually you leave. Same with work and career." Because of several commonly shared perspectives amongst UCG members (like environmental appreciation), "you might move, and you might leave that garden, but you can find another garden," allowing members to continue reaping the rewards of participation. This administrator noted the sense of security she felt, knowing that others were committed to the garden and that she could see familiar faces at her UCG. This administrator later noted that UCGs open to specific populations, like refugees, could also provide this sense of belonging for those with similar backgrounds and lived experiences.

Surprisingly, several respondents spoke of the ways in which their UCG involvement also helped them connect with their wider, non-gardening community. Community events, such as corporate volunteerism or concerts in the park, allowed UCG participants to meet others who did not garden, but lived in the neighborhood. These interactions facilitated the development of

UCGs as community hubs, where neighborhood events and activities could be held, feeding members' desires to continue gardening and their sense of connection with the wider neighborhood.

Another way that UCGs fostered belonging and community was via the byproduct of extra harvest in the garden. When this occurred, many members shared their produce with others, both inside and outside the UCG. Gifting their produce to others allowed general gardeners like Nadia and Frank to strengthen their relationships with neighbors, while it helped others "give back" to their friends and community. By quite literally sharing the fruits of their labor, this act of community-building and service helped some gardeners feel more worthy of their space in the UCG.

Cultural Preservation:

I spoke with Maria about her UCG experience in August 2022. A Native American gardener in Denver UCGs since 2007, Maria's desire to participate in her UCG was also grounded in her desire for BIPOC representation in public spaces. Because she wanted her UCG to reflect the ethnic diversity of her community, especially in the context of her neighborhood's gentrification, she felt driven to continue gardening. Over the years, she participated in three different UCGs in the Denver Metro Area. Amongst other Chicano, Latino, Indigenous, and refugee gardeners in this study, UCG participation often began or continued because of its role as a mechanism for cultural preservation as well. This engagement with cultural practices took place in several forms. As Maria discussed, sowing the seeds of culturally-relevant foods and using their plots to grow these crops were key in this endeavor. Other garden leaders like Pia and Wanda reflected on the growth of staple foods for refugees and immigrants in particular, noting

that UCG plots often augmented cultural food security by providing the space to grow native produce that could not be found in local grocery stores.

Occasionally, prayers and dances took place at Maria's UCG as well, marking the sacredness of the site for her. She, amongst other gardeners and UCG experts, found that the physical act of gardening in a community setting could be a spiritual experience, contributing to their sense of belonging via connection to their culture. Elena, a UCG expert who identified as Chicano and Native American, noted that she would talk to her seeds, praying as she sowed them. She felt that her ancestral connection to the land was specifically rooted in her participation at a UCG. As a UCG expert, Luis reflected on his own Mexican heritage as something that amplified the personal importance of food and farming to him, as these accentuated his experience of his culture. As opposed to the capitalist and white supremacist roots of large-scale industrial agriculture, the UCG provided an alternative where participants could gain more knowledge and confidence in their own ethnic identities, via collective gardening practices.

Gentrification

Though it was not included in the original interview script for this study, gentrification arose numerous times during interviews, meriting its own subsection in this chapter. While gentrification often reduced subjects' sense of belonging and the diversity in UCGs, the gardens were also considered as tools to protect against this social phenomenon.

Often, gentrification caused stress for participants, due to the worry that they may lose their UCGs to the development of skyscrapers or apartment complexes. Several members also expressed concerns related to increased property and home prices. Recent changes in UCG makeup were also evident amongst gardeners, often attributed to gentrification; though some

gardeners had mixed opinions on gentrification, they did contend that they saw fewer single mothers, fewer older residents, and BIPOC gardeners in their UCGs, as well as fewer long-term Denver residents and low-income participants as a byproduct of gentrification. One UCG administrator, Wanda, believed that, because long-term UCG participation is associated with homeownership in that neighborhood, gentrification can shift the UCG population through its influence on homeownership, ultimately producing the homogenizing effects that those in this study discussed.

These demographic changes at Denver UCGs also appeared to influence the culture of the garden, as well as whether people felt that they belonged in these spaces. Pedro, a UCG expert and advocate for Latinx empowerment, reflected this point, expressing that the displacement of gardeners led to a loss of culture and history, a phenomenon that he coined as "neo-Denver." One BIPOC gardener confessed that, amidst gentrification, the culture at her UCG changed so dramatically that she would reschedule her visits to the garden to avoid certain gardeners, due to the amplified sense of exclusion she felt in this space; she became so uncomfortable around these new UCG members that she planned to leave the garden after that season, despite the cultural, emotional, and health-related benefits she gained from participation.

Gentrification similarly influenced interactions between UCG members and non-gardeners in the wider community. Despite her status as a community leader and UCG founder, Martina noted that she and her sister, Ximena (who gardened at Martina's UCG), did not "feel like a part of [the neighborhood]," even citing racist and exclusive signs she began to see at local businesses. To Martina, the outside community did not understand the purpose of their UCG in the ways that it once did. As a result, she felt an increased responsibility to push her UCG's message of peace and thoughtful action to the wider community. While balancing this

pressure, Martina simultaneously worried that the outside community reduced her and her sister's identities to being "just garden workers." This was particularly frustrating for her, evident when she stated that,

> We're not. We're preservationists, we're trying to be here for our children, trying to be here for the community, trying to work for the earth, you know, we're trying our hardest to make city people open their eyes, open their eyes to what we're doing and fight for [the planet].

Though it ultimately motivated her increased engagement at her UCG, gentrification isolated her from the community she had dedicated her life to, and the act of gardening exacerbated some of these worries, likely because of the stereotypes she faced as a Native American and Latina woman.

Though this subsection primarily focuses on the role of gentrification on the UCG and its communities, it seemed that the UCG also affected gentrification. In some ways, UCGs appeared to reduce the speed at which gentrification occurred in the Denver Metro Area. Martina was worried about how the UCG could potentially increase surrounding housing prices, but she became particularly invested in maintaining her UCG because she found it increasingly important to keep the spirit of her garden alive. By continuing her UCG, she could help ensure that her neighborhood's history was represented in a physical space, even while the surrounding community was rapidly changing. In her garden, murals painted by "inner-city kids," artwork based in Aztec mythology, tiles completed by victims of neighborhood violence, and cultural events allowed her and her community's heritage to remain visible and gain recognition. Calling upon her experience as a UCG administrator at other Denver gardens, Wanda described another way in which UCGs could potentially serve as a buffer against gentrification; given the benefits

and importance of UCGs, people seemed more opposed to converting these gardens into high-rise building and property that most could not afford to live in. While developers may face relatively little backlash for turning empty lots or abandoned public spaces into apartment buildings, destroying UCGs for this same purpose appeared to be a more difficult proposition to support. By preventing this conversion, more long-term residents of Denver neighborhoods could retain their UCG space and maintain their place in their community.

UCGs as Access Points for Knowledge

Across geographic and demographic lines, subjects asserted that their UCG participation was a key pathway to gain information on topics that they otherwise would not have learned about. As one garden administrator stated, the UCG is "an endless learning platform." Though learning was rarely ever the initial motivator for one's UCG participation, the garden became widely viewed as a space to facilitate the sharing of ideas. As informal hubs for collective and individual learning, UCGs fostered the development and co-creation of knowledge on gardening and food-related topics, but also on fairness, equity, and sustainability.

Gardening and Food Knowledge:

Unsurprisingly, UCGs enabled the sharing and development of knowledge on gardening and food preparation. I revisit Wanda, a young and socially-minded UCG administrator, using one of the stories she shared during our interview to illustrate this point; as one Korean gardener began harvesting the leaves of a squash plant he was growing, other gardeners were confused why he left the squash fruit behind. After they inquired, the gardener explained the widespread use of these squash leaves in Korean cuisine. The other UCG members were able to discuss the utility of the squash fruit with him as well. Thus, all the gardeners involved learned about different ways that they could more fully utilize their harvest, simultaneously deepening cross-cultural knowledge. In the process of making their diets more vegetable-centered, many respondents agreed with Wanda that the UCG permitted them to learn about different crops that could be grown, as well as how to store and preserve their harvest through canning, pickling, and other strategies.

In addition, the UCG served as a platform for experimentation and creativity, where each year, participants could try different gardening strategies that they had learned about online or

from fellow gardeners. Given her intentions to teach students as a UCG leader, Martina desired to use her UCG in order to elevate people's curiosity and knowledge of food production, especially for those who live in the city and rarely see greenspace. Experts and administrators lamented that many "inner-city kids in concrete jungles… [were] never introduced to gardening" and that "a lot of us, like, don't even really know how our food is grown, where our food comes from, [and] what our food looks like" until they began gardening at the UCG.

Gardening in the UCG was often viewed as an activity that any person could become successful at, amplifying the perception of UCGs as spaces for learning. "People aren't born with a green thumb. It's something that's learned through experience, and anybody can start [in a UCG] at any point in their lives, and just try and learn something and improve over time." Pam, another UCG leader, mirrored Martina's sentiments and expressed joy when seeing one child's understanding of nature change over time. "It's so evident that he's learning. You know, he first came in, was, you know, ready to squish any bug that he sees… [Now,] he has learned to identify other things in the garden, other than just what is grown." In particular, Pam felt that this growth in his knowledge was the product of what he learned in the UCG. Another member commented that she gained inspiration on how to improve her UCG while visiting other gardens in Denver, reflecting how this facilitation of learning also crossed neighborhoods.

Fairness and Equity:

While the debate on whether UCGs exacerbate or ameliorate social inequality continues, this study found that UCGs in the Denver Metro Area certainly encouraged discussion and reflection on these issues. Jane and Lydia, two family members who expressed the emotional fulfillment they gained from the garden earlier in this study, used the UCG space in order to facilitate these conversations as they applied at the family and societal level. For Jane, their

nonbinary gender, low-income social status, and chronic illness shaped their view of the neighborhood and Denver profoundly, and the marginalization they faced on account of their identity made it even more important that they communicate these ideas of fairness and equity to their children. In their garden, Jane's family divided their one plot into four portions for each family member, including one for Jane, Lydia's father, Lydia and her brother, and their dog. Lydia's parents discussed with the children that, because their dog did not have opposable thumbs, he would need support from the rest of the family to ensure that he could also have a successful plot in the UCG. This meant that the children could help water and sow seeds, while their dog could use his skills and share the responsibility of digging and breaking up the soil. By utilizing each family member's specific strengths and sharing responsibilities amongst the plots, everyone could reap the benefits of the UCG, regardless of differences in ability. Though certainly not a perfect translation, the UCG was used in this way to share the complex principles of fairness and equity with younger audiences, making these ideas more relatable and tangible.

Other interviewees mentioned how access to UCGs is intricately linked to land, medical, clean air, water, and soil rights; having UCGs "really is like the centerpoint, like pinnacle, of all of those issues, [really in] your face." By facilitating these conversations as they applied in a gardening context, participants could better understand the inequitable distribution of ecosystem services and consider avenues to correct this. Informed by his UCG expertise and systems-level work on changing local food ecosystems, Luis perceived UCGs as sites to conduct on-the-ground research on how to foster justice-based food production. UCGs could model how a neighborhood can break away from the disparities entrenched in the US industrial agricultural system, from unfair wages for farmers to musculoskeletal issues caused by full-time farming amongst laborers. Another UCG expert, Elena, commented that in the UCG, "there's a level also of education—not

only, kind of in the physical but also, like, in the spiritual way—of decolonizing the way that we connect and [grow our] food." In her opinion, reclaiming elements of her own food consumption and production, especially by praying during the stages of plant growth and harvest, helped communicate knowledge on more fair, empowering food systems. In accordance with Elena, Wanda reflected that her time as a UCG administrator reinforced in her that labor distribution must be equitable, rather than equal, given the various motivations, resources, and backgrounds that different gardeners have at her UCG. Thus, UCGs helped shift opinions and grow gardeners' knowledge on alternatives to industrial agriculture and labor systems, both by encouraging reflection on these topics as they applied to gardens, and by exemplifying an alternative to mainstream food systems.

Sustainability and Environmental Knowledge:

Though many participants felt knowledgeable on environmentalism prior to their UCG involvement, respondents frequently noted that they learned more about this topic through the UCG. Administrators and general members alike spoke of new conservation, composting, and mulching strategies that people could learn at the UCG, as well as how they became more familiar with local flora and fauna, like insects and pollinators. Though many of these respondents held longer-term sustainability knowledge prior to joining the UCG, they could explore alternative ways to engage in eco-friendly practices and deepen their understanding of nature through their garden membership.

Like these respondents, gardeners who joined for reasons unrelated to environmental activism became knowledgeable about these issues after participating in the UCG as well. One gardener remarked how members would use what they learned in the UCG in their own homes, reflecting the application of this environmental knowledge in various spaces and contexts.

Several gardeners across UCGs, like Patrick, Jane, and Lydia, commented on their heightened awareness of climate change and environmental degradation, post-UCG involvement. Hank, a gardener with Patrick's UCG, similarly noted that he became more aware of his general surroundings, as he could be "in the moment with the environment" when he was in his UCG.

Martina was a UCG administrator who felt especially motivated to work towards sustainable causes, as she gained environmental consciousness through her UCG. Not only did she access this knowledge via the site, but she then utilized the UCG space to translate this knowledge to those who she gardened with. As Martina acknowledged a fundamental shift in how she viewed the planet, she sought to use the UCG as the vehicle for environmental education (just as Jane and Lydia discussed for fairness and equity). As garden leaders, Pam and Martina remarked on how this education was transformative for children, giving them greater insight into natural processes that could degrade or preserve the earth.

UCGs and COVID-19

Since its emergence, the influence of the COVID-19 pandemic remains in our schools, jobs, and homes (Coker et al., 2023; Martín-Sánchez et al., 2022; Peters et al., 2022). Naturally, COVID-19 has also changed the UCG landscape in the Denver Metro Area, exerting its influence on members' social connections, relationships to food systems, and sense of self and autonomy.

Unsurprisingly, community interactions in UCGs were affected by COVID-19, in the sense that larger community events, potlucks, and social activities were paused during Denver's period of stay-at-home mandates. However, this reduction in social events seemed to extend past these mandates at most UCGs, with a lower (to no) frequency of these events at a number of gardens during the time of my interviews. UCG administrators and members like Wanda, Pia, and Frank commented on how, roughly a year after stay-at-home mandates were instated, they experienced difficulty trying to "get people engaged," found reduced participation during larger community workdays, and didn't "see anybody anymore." Edward agreed, reflecting that, pre-pandemic, he used to see many familiar faces regardless of when he visited his UCG; after the emergence of COVID-19, he often found himself alone or with only a couple other members when he visited his plot. Wanda attributed this to factors like gardener burnout during the pandemic, some members' continued concern about potential COVID-19 infection, and others wanting to spend more time on social and recreational activities outside the UCG.

Despite these reductions in UCG activities, the positive influence of these gardens on people's lives became amplified during the COVID-19 pandemic. Though some UCGs were forced to close during the pandemic, the majority of Denver gardens were able to remain open in reduced capacities, likely because these gardens were generally perceived as safer spaces due to

the ease of facilitating social distancing and their status as an outdoor activity. During a time of relative isolation and pronounced stress, the positive effects of UCG engagement on mental health and wellbeing were accentuated, as Lisa recognized during her time as a UCG administrator. For gardeners like Nadia, Jill, and Kara, COVID-19 provided increased flexibility (likely through work-from-home situations) that "helped [them] clue in, and connect, and really enjoy [the UCG] in a different way" than they had in previous years, igniting their desire and ability to participate in the space. Aligning with the experiences of these three gardeners, others interviewees discussed how members leaned on the continued greenspace access that UCGs provided during COVID-19. Gardening fulfilled members who were "hungry to be social" during this time, while also providing a strong source of emotional support and escapism from stressors that were magnified by the pandemic. Ximena's gardening experience during this time illustrates this, as the UCG helped her fellow gardeners "not have to be cooped up inside of the house." While leading her UCG in North Denver, Martina (Ximena's sister) also observed how the effects of COVID-19 helped her gardeners "slow down" and act more intentionally; she could "tell the difference, if [she] look[ed] at whose garden was whose. [She] could see who comes and sits in their garden and stays and spends time." While she felt like many UCG members did not invest sufficient time caring for their plots, "They did [during] COVID, because they had time," reflecting how shifts to working from home permitted gardeners to more fully appreciate and immerse themselves in the sanctuary that the UCG could serve as.

Another administrator discussed how, because of the radical shifts in people's lives during COVID-19, many community members lost the very things that drove their sense of identity, like their jobs. During a time when one could struggle with finding a sense of self, seeing the progress of one's garden plot in the UCG provided an alternate path to instill a sense

of accomplishment and pride amongst members. Witnessing the success of a garden plot could serve as a small substitute to grow self-esteem when the pandemic shifted many previously assumed guarantees to uncertainties. Thus, during the social and emotional hardships of the COVID-19 pandemic, UCGs served as a valuable informal support amongst gardeners, augmenting their social connection to the community, bolstering sense of identity, and allowing UCG members to step away from the heightened stressors they experienced.

Gardeners' relationships to food systems were also affected by COVID-19, helping UCG members imagine a different future of food production and consumption. In particular, one silver lining of COVID-19 was that it facilitated "more of a[n] opportunity and awareness" for people in urban areas to participate in farming, ushering in new possibilities for locally-based agriculture, as interviewees shared. When COVID-19 exposed the uncertainties and frailties of US industrial agriculture systems via the breakdown of supply chains, UCG participation allowed members to "take control over the means of [food] production," acting as a means of self-sufficiency, "resilience, and food procurement." Gardeners' confidence that they could successfully grow their own produce in the UCG imparted a sense of autonomy and assurance regarding their ability to access food, especially in the midst of climate change, COVID-19, and other crises that could break our conventional food production and distribution systems. As one UCG leader, Pam, put it, people gained a "more comfortable understanding of growing food, rather than just purchasing food." Perhaps, this increase in gardeners' perceptions of UCGs as a viable, secure method of food production could usher in more local and equitable food systems, helping us shift away from industrial agriculture as a society. Pia, one UCG expert, also discussed how she saw greater collaboration between food banks and community gardens during

the COVID-19 pandemic, which she saw as a torch, lighting the way for new partnerships and institutional models to address Denver's food insecurity amongst the wider community.

Chapter Two: Limitations to UCGs and Barriers to Participation

As this study and others have demonstrated, UCGs have clearly gained attention as sites for public health, climate action, and food sovereignty (Colson-Fearon & Versey, 2022; Guerreiro et al., 2021; Okvat & Zautra, 2011). However, alternative food movements are experienced differently by those of different demographic backgrounds (Alkon & Agyeman, 2011; Guthman, 2008), and UCGs are unequally distributed throughout cities (Asl & Azadgar, 2022; Ding et al., 2022). This chapter aims to understand the factors that contribute to belonging and exclusion in UCGs, as a vital step to ensure that all populations can reap the health benefits of garden participation. Data collected via ethnographic methods, including participant observation and semi-structured interviews of UCG members, were thematically analyzed, and via intersectional analysis, this chapter investigated the limitations of UCGs in Denver, Colorado, as well as common deterrents that diminished the UCG experience. A number of participants discussed the ways in which their UCGs fell short of expectations or did not satisfy their needs, while barriers to UCG participation included those that were physical (e.g., fences and inaccessible UCG design) and social (e.g., conflict and the culture of the UCG). This study especially sought to voice the perspectives of marginalized communities in Denver UCGs (along the lines of race, class, and geographic location).

Social Barriers and Exclusion in UCGs

One unfortunately common concern that several UCG participants shared was their fear that they did not meet the expectations of others at their site. Maria, Jane, and Lydia, three gardeners who fell outside the cultural mainstream of white, wealthy gardeners, shared this worry. Their anxieties stemmed from a sense of shame that their plot "looked the worst," causing them to feel guilty that they were taking away a spot from someone else who could be in the UCG instead. Regrettably, the UCG environment made some gardeners feel that they needed to perform at a higher level than they were able to, enhancing their feelings of unworthiness.

Several other social barriers and contributors to exclusion were related to stigmas and preconceived notions of who belongs in UCGs and conflict in the UCG. These are each explored below.

Stigmas and Preconceived Notions of Who Belongs in UCGs:

It was clear that members understood the stereotypes of who UCGs are built for, and thus, who they are not built for. Several commented that UCGs are often seen as a hobby for the upper middle class or the "elite." Two administrators and experts, Lyle and Wanda, felt that these perceptions could limit participation amongst those who fall outside this demographic, by making them feel as though they cannot claim these spaces as their own. Due to their lower socioeconomic statuses, Jane and Lydia experienced the isolating effects of these preconceived notions. Despite their strong belief that they needed a UCG plot and were "good gardeners," and even if other UCG members were pleasant towards them, they experienced a sense of estrangement in the garden that stemmed from their lower class background in comparison to those around them. In other words, "in a garden, you can't hide those things [inequities amongst gardeners related to differences in income and ability,]" as they are exposed and manifest in how

a UCG plot appears or during physically demanding tasks. Another UCG stereotype that Wanda observed was that UCGs are built for white gardeners. The popularity of this sentiment was something she felt she could not escape, and found to be grounded in the history of "wild spaces [and] nature in the United States, [being] a white-dominated space," referencing the exclusion of BIPOC people in environmental movements and greenspace (Rudd et al., 2021). To counter this, she was motivated to build systems "exposing people and connecting people to diversity within the gardens," though this was only slowly gaining traction in the area. As a Native American gardener, Maria was subjected to the negative effects of this stereotype, and she ultimately felt that the garden was not a space that she could claim as her own, as Lyle and Wanda predicted. These experiences highlight just how pervasive these societal preconceptions can be; even when UCG members are amicable, societal beliefs of who is "supposed" to participate in UCGs can still limit belonging and engagement at these sites.

Given the harm that marginalized UCG members face due to social norms alone, it is no surprise that stigmas expressed more overtly by UCG members can also contribute to exclusion in the garden. During my interview with one gardener, Jill, she disclosed a brain injury that she suffered at 13, as well as her chronic illness. Jill described how this affected her ability to learn, necessitating more hands-on, kinesthetic assistance in order to garden most effectively. Unfortunately, she also recounted that many UCG members "write me off as dense," and that "a lot of people don't want to do that [help her learn in a hands-on manner]." Because the UCG was one of her primary sources of social interaction, these kinds of experiences hurt her more at the UCG than at other settings. Jill's experience illustrates how stigmas unrelated to gardening can also manifest in the UCG, just as they can outside these spaces. When UCGs are important

elements of one's identity or lifestyle, these stigmas can be particularly harmful and contribute to the lack of inclusion that some may feel in these settings.

UCG Conflict:

Conflict in the UCG was a particularly salient deterrent noted in this study. For UCG administrators, the different priorities of UCG members could be particularly tricky to navigate, as one gardener's choice could affect many others in the garden as well. What people viewed as the "right way to garden" varied tremendously, leading to social tension. For example, certain gardeners expressed opposition to variety and fluid structures in the garden, wanting "rows of plants" and "uniform," or cookie cutter, plots. Lyle, a UCG expert in Denver, expressed discomfort with this, as he desired for gardens to mirror nature, remaining less rigidly arranged. The pushback he received from those wanting more homogenous and structured gardens left Lyle feeling unheard, diminishing his UCG experience. Wanda reflected that this experience was something she commonly saw while managing UCGs, stating how,

> The [UCG] leaders are the main stewards of that community, and if they are stewarding it in a way that doesn't align with a lot of what I find to be beautiful in nature, um, doesn't, you know, allow for that messiness, and doesn't value the margins, doesn't value diversity, and doesn't allow for open, fluid thinking… the more that they cultivate it to be misaligned, in my opinion, then, the worse it is on our mental health. And I mean, that fractals out into every, every way that we organize and group and gather together.

Thus, this kind of conflict, and lack of willingness for UCG members to step away from hierarchy and inflexibility, worsened others' experiences, making it more difficult for all members to co-create the kind of space they wanted their UCG to be.

Another source of conflict stemmed from disagreements between UCG leaders and general gardeners. In her time as a UCG administrator, Lisa commented that at certain UCGs, "sometimes people holding the power, so like if they're in a leadership position, they think that their voice maybe should matter more." This could reduce the harmony of the UCG and negatively affect social dynamics by constraining and undermining general gardeners without leadership positions. Some UCG leaders may face the stress of trying to encourage certain actions or activities in UCG, when they may not necessarily be what general members are seeking. Thus, different motivations to join the UCG, as well as misunderstandings about why members join their UCG, can cause unnecessary tension and anxiety.

Jane and Jill also discussed some of the policies from leadership and administration that contributed to their sense of exclusion from the UCG, from the lens of their chronic illnesses. At their UCGs, each member was required to fulfill a quota of hours spent on community tasks (like weeding general spaces and other physically demanding activities). Given their medical conditions, completing these hours often became difficult, and they faced inflexibility from UCG leadership when they inquired about alternatives to support the garden. Ultimately, this made both members feel that their UCGs did not meaningfully account for differences in gardeners' privilege. Jill eventually left her original UCG in search of others that would be more understanding of her capacity, even though her prior garden was closer to her home. Jane also lamented that there were no clear ways for UCG members to self-identify as low-income or potentially having greater need for the UCG space. This spoke to their wish that UCG organizations better accommodated those with the least access to and greatest need for UCGs, something which Jane did not feel was prioritized during the time of this study.

Aside from conflicts amongst those in the UCG, conflicts also arose between UCG members and non-members. Vandalism and theft that occurred in the UCG, including stolen tools and graffiti, reflected discord on how the UCG connects to the community at large. Many UCG members understood these acts as disrespect, but one administrator posited that members may forget that,

> Gardens are, you know, seen as a refuge and sanctuary, for all kinds of people. You know, people who are experiencing homelessness now have access to water. They have access to land they may not be kicked off of if they sleep there overnight.

However, UCG participants explained the emotional toll of having food stolen from their plots, especially when they relied on their crops to supplement their diet and faced financial insecurity. One of these members was Jill, who felt that the burden of theft on UCG members was not understood by those who stole produce. To avoid misunderstandings, Wanda recommended greater recognition of the UCG as shared spaces in nature, and shared spaces for the wider community. Having other accommodations, like baskets where gardeners could donate excess produce for the wider community, could reduce some of these conflicts as well.

Physical Barriers

The physical barriers to participation and belonging that UCG participants noted were wide in range. One commonly cited deterrent was the use of fences surrounding UCGs. Several gardeners felt that these fences drove a wedge between them and members of the community, and made the garden less accessible to the outside neighborhood, including those with great need for the resources that UCGs could provide, like food and water. Lyle, a UCG expert, also noted his wish that more benches and other amenities would be installed, so that UCGs could be more welcoming and integrate people into nature more organically. Another barrier was the cost of participation at UCGs. Prices to gain UCG plots could "sometimes be hundreds of dollars, so the vegetables aren't always worth it if people need multiple plots," as stated by one gardener. For those of lower socioeconomic status, participation in a UCG could therefore come at the expense of other basic necessities. One other impediment that manifested for gardeners was related to UCG design, as physically accessible amenities (like raised beds or wider walkways) were not always present. This could pose burdens for current UCG members with disabilities, or more elderly gardeners.

Mishaps at the UCG seemed to affect Jane and Lydia more negatively than they impacted other participants, as a byproduct of their working class background. The duo described how, for the first part of their gardening season, water from their UCG's hose would not flow out properly. Other gardeners "were all bringing jars or jugs of water" to the UCG via their cars, but since Jane and Lydia did not own personal transportation and had to walk to the garden, "[they] just couldn't do that." For them, carrying water across to the UCG would come at the cost of other daily activities. As Jane expressed,

> For us to go hand water would mean, you know, are we–am I going to be able to cook dinner? Are we going to be able to do self-care? Basics, you know, showering or getting our laundry done, walking the dog. Things that are lower on the hierarchy of needs, beyond hand watering my garden to say 'it looks good.' That's a real privilege.

Ultimately, this inability to bring water to their UCG plot translated to a less successful garden during the first part of the growing season, heightening their sense of unworthiness. In this way, physical barriers manifested in emotional discontentment and exclusion, especially amongst low-income gardeners.

Even if UCGs were well-resourced, Lyle emphasized his concern that "the way society is structured, that, often, community gardens don't have necessarily the support they need in communities that need it the most," advocating that they be placed closer to those who lack land access or otherwise need the benefits that UCG participation can endow.

Insufficient Resources for UCG Leadership and Maintenance

Many UCG participants reported that they were provided with insufficient resources for gardening, while also expressing issues with UCG leadership. Due to waitlists at many gardens, a large number of potential UCG participants could not access plots. For those who were able to receive a plot for the season, Lyle noted that, in his experience, guidance and communication from leadership could be lacking at UCGs, serving as a barrier for those with limited prior knowledge on how to garden. Although Nadia (another UCG member) did have prior experience gardening prior to her participation, she explained how the lack of resources at her garden meant that she and other gardeners had to fundraise for equipment. Though in some ways, this task helped drive a sense of belonging and community, the lack of these materials and time spent fundraising did detract from the time and energy they could spend gardening at the UCG. As a UCG administrator, one of Wanda's personal goals was to foster greater communication between high-resource and low-resource UCGs, but due to the lack of capacity at the UCG organization she worked at, she felt that this kind of change could not be achieved. Perhaps, with greater institutionalization of UCGs into government infrastructure and public-private management structures (rather than the reliance on UCG nonprofits in Denver), ideas like Wanda's could be implemented in the city.

Another negative aspect of the UCG experience was the uneven distribution of duties that gardeners were responsible for; regularly-attending UCG members frequently felt that they could not address all of these responsibilities. Hank, a UCG member in south Denver, expressed the great workload of harvesting fruit, while Jill noted the physical burden associated with strenuous tasks in her garden plot. Hank felt that some of these difficulties were exacerbated because "many times, people start but will disappear fairly quickly," leaving the UCG and not completing

the growing season. Others may "sign up, and maybe do a little gardening, but don't participate in the group gatherings," ultimately increasing the workload for more regular gardeners. Ximena, who participated in a different UCG than Jill and Hank, did not have issues with this uneven distribution at first, but she later admitted the difficulty she faced as one of the more involved gardeners at her site. Wanda also noted that the workload and duties of being a UCG leader were too great for "any one singular person should be the leader of a garden." Due to the enormity of a UCG leader's responsibility, Wanda felt that having multiple people shoulder these responsibilities could decrease burnout, create "checks and balances" in the UCG, and maintain leaders' enthusiasm for the garden.

Other Barriers and UCG Limitations

One additional barrier to UCG participation, and perhaps one of the most frequently mentioned, was the lack of time available for UCG activities. Martina expressed that many of her gardeners were unable to fully participate or invest in her UCG because "Adults are busier, so some of them realize they really don't have that time to take care of a garden." Interviewees similarly noted that the time commitment of maintaining a plot could limit accessibility. For one gardener, Nadia, this was exacerbated by the community hours and plot fees required for entry into her UCG.

Other UCGs have also experienced issues with retention and community participation. There were a number of times during which participation waned, member turnover was high, or gardeners were alone in the garden due to differences in members' schedules. Some of the community-building aspects of the UCG became difficult to maintain because of those challenges, a frustration that Pam expressed as she led her garden. Pia expanded on her wishes as another UCG leader, sharing her desire for greater UCG participation from those in the adjacent affordable housing buildings, suggesting that UCG participation does not necessarily mirror the neighborhood's demographics. Nadia even noted that, though her UCG better represented the diversity of her community, she did not believe this to be true to other Denver UCGs. Addressing these barriers may make UCG involvement more accessible, allowing these spaces to more accurately reflect the diversity of each Denver neighborhood.

These findings suggest that, despite the many benefits of UCG participation in the Denver Metro Area, these benefits are not equally accessible for all. Those who reported social and physical barriers to participation were predominantly from marginalized communities,

meaning that they are most likely to be pushed out of UCG spaces. Thus, these barriers must be addressed to ensure that all groups (especially those with fewer access to social, health, and community resources in the first place) have the means to participate in UCGs.

Several of these barriers can be addressed through changes in UCG culture; despite these challenges and conflicts she described during her time as a UCG administrator, Wanda ultimately maintained that much could be mitigated with these conflicts of human nature, if people acknowledged their UCG's culture and factored this into their solutions. Decentralization of garden leadership and more equitable distribution of responsibilities of community tasks may prevent the sense of burden that some gardeners feel while taking on more than their share of responsibilities. Similarly, normalizing the sharing of responsibilities and tasks in the UCG (like watering plots and weeding) can lessen the workload that each gardener has. For example, if two gardeners shared the responsibility of watering both of their plots, they would both only need to visit the garden every other day, rather than both of them needing to visit every day. Given that time constraints posed a particularly salient challenge for UCG participants, translating the sense of community at UCGs to the distribution of tasks might be an effective way to make these spaces more accessible. Additionally, creating UCGs as a "a community greenspace that people garden [collectively]" rather than structured plots for each gardener, may also contribute to a greater sense of community and belonging by facilitating the greater sharing of land and garden resources.

Additionally, this study suggests that the experiences of UCG participants are intertwined with the larger social processes and social privilege that influence the lives of these gardeners. Gentrification is one illustration of this, as discussed in Chapter One; though UCGs seemed to serve as somewhat of a buffer against the exclusionary impacts of gentrification, it was clear that

this social process had driven many gardeners' feelings of isolation in the space. Thus, UCGs could not entirely eliminate the effects of gentrification in Denver, reflecting the ways that this practice has ostracized many low-income and BIPOC residents in general. Similarly, gardeners with disabilities, chronic illnesses, low-income backgrounds, and BIPOC identities were often the ones who reported facing barriers to participation, just as these populations face greater barriers outside the UCG as well. Though UCGs have a great potential to improve measures of inclusion, community cohesion, and wellbeing, unless these spaces are crafted with the needs of these groups in mind, they may continue perpetuating disparities and inequities.

Though some of these barriers require cultural shifts, a great number of challenges that UCGs faced were also related to insufficient funding for these spaces. Raised beds were suggested by participants to increase the accessibility of UCGs (as they could reduce bodily strain associated with bending over to tend to plots for older gardeners and ease the process of participation for those in wheelchairs). However, raised beds cost significantly more than on-the-ground plots, and gardens may not have the financial means to install sufficient numbers of these beds. Additionally, many gardeners expressed their disapproval of plot fees and applications needed for entry, both because they served as a barrier to participation that limited UCG diversity, but also because they limited the sense of belonging and inclusion that they sought from the UCG. Having additional funding and city support would reduce the necessity of these plot fees to support the maintenance of the UCG. Greater government support at the city and state level could also improve the distribution and greater number of UCGs (so that they are not located inaccessibly from those who seek their benefits). This change in priorities would advance UCG experts' visions of a more sustainable, equitable food landscape; specifically, Elena and Luis advocated for the greater institutionalization of UCGs into the fabric of each

community, so that a UCG is present "everywhere where food justice is achieved." Greater financial and institutional support could even assist with the time-based barriers that gardeners and UCG administrators face; if UCG leaders could be provided jobs, rather than lead on a volunteer basis, the UCG could receive more regular maintenance, and the responsibility of community tasks on general UCG participants could be reduced.

Ultimately, UCG administrators must remain cognizant of the barriers to belonging and participation that gardeners (especially those from marginalized communities) may face, in order to help foster more equitable spaces. Especially in the case of social barriers or ones related to garden culture, they must actively work towards building more inclusive gardens so that all may access the educational and wellness benefits that come from UCG involvement. Many of the barriers described in this chapter can be resolved with community input, whether it be through providing childcare so that gardeners with children can still visit the UCG, or advocating for raised beds and inclusive garden technologies. Engaging those who face these barriers in the garden's decision-making processes is one particularly powerful way to foster procedural justice, dispeling stigmas about who UCGs are for (and who they are not for), while creating more easily accessible UCGs.

Conclusion

Revisiting the original aims of this thesis, I sought to characterize the motivations for and barriers to UCG participation, after the emergence of the COVID-19 pandemic; these questions were studied with the goal of understanding these factors to empower more equitable public health outcomes, as well as inclusive social and natural environments, amongst Denver Metro Area residents.

This study finds a stark tension between the ways that UCGs in the Denver Metro Area can promote belonging and wellbeing, while also enforcing social inequality via their limitations and barriers. UCGs served some of the Denver community's social, cultural, and economic needs, filling in gaps in their access to resources that they may not have accessed otherwise; this is reflected by participants' initial and sustained reasons for gardening, including lack of land access, desire for social connection and capital, engagement in cultural preservation, and desire to connect with nature. The knowledge that UCG participants gained on fairness and equity, as well as the ways UCG involvement was perceived as civic engagement, reinforce this idea as well. Despite these findings, gardeners from marginalized backgrounds (like Jane and Jill, who experienced chronic illness) reported numerous ostracizing factors present in UCGs, causing guilt and isolation for these participants. Barriers to UCG participation included those that were physical (e.g., fences and inaccessible UCG design) and social (e.g., conflict and the culture of the UCG), amongst others. My findings include similar barriers as those noted by Kingsley et al. in 2009, like time constraints and living far from a UCG. I build on Diaz et al.'s work on this topic (2018), through in-depth, first-hand accounts of the social barriers that UCG members face, including more detailed descriptions of barriers in these spaces.

Of note, UCGs served as access points for cultural, social, and practical knowledge for gardeners. By characterizing the ways that UCGs foster learning and serve as access points for knowledge, we can begin to integrate UCGs into the ways we improve social determinants of health, not only through social contexts and built environments, but also through education. As a social determinant of health, education is often viewed through the indicators of high school graduation rates, math and reading proficiency, and early childhood education (United States Department of Health and Human Services, n.d.). However, outside of school-based measures, there exist many other avenues to increase one's knowledge in ways that support their wellbeing, including improvements in health literacy, knowledge, and behaviors (Braveman et al., 2011). This is where UCGs can factor into the equation. By increasing knowledge of community resources and food production, UCGs can promote healthier living via health knowledge and behaviors. As discussed by Zahur et al., empowerment is another key goal of education in the classroom (2002). I found that access to knowledge in the UCG served a similar purpose, especially for those with different ethnic identities, who sought to use the garden space to learn and practice traditional agriculture; engaging in the UCG grounded their sense of cultural identity and promoted their connection to their ancestral lands, as exemplified by Luis and Elena, both of whom discussed their cultural ties to gardening in this study. Via the diversity of UCG participants' experiences, the UCG also served to grow cross-cultural knowledge, through the sharing of gardening practices and food preparation. The transmission of knowledge on community resources and social networks were viewed as particularly beneficial in the context of the Denver Metro Area, which some participants noted to be like an "enclave," where people felt unknowledgeable about other parts of their city, including social services and organizations that were just blocks away.

Lastly, these findings are important to understand in the context of COVID-19. Simultaneously, the social components of UCG participation became less frequent, but also more important to gardeners' wellbeing. In Denver UCGs, the reduced frequency of social activities has generally persisted in gardens like the ones led by Pia and Lyric, even one year after stay-at-home mandates were implemented in the US. However, the greater reliance that Denver community members had on their UCGs for social support, autonomy, and stress reduction mirrors the historical to present-day use of community gardens during times of crisis (Egerer et al., 2022; Music et al., 2021). Thus, even as UCGs have not returned to their original status post-COVID-19's emergence (and even if they never do), these spaces can still serve key roles in public health promotion. In fact, COVID-19 has opened doors for gardeners to gain greater autonomy over their health via the reclamation of food production, given the ways that UCGs permitted members to grow produce on their own terms, without limitations of industrial agriculture.

Recommendations

Based on the findings of this study, I pose several recommendations for the Denver Metro Area's engagement with UCGs:

- Private institutions and government organizations should dedicate greater financial and labor resources to UCG spaces. Most UCGs involved in this study are maintained through nonprofit organizations, and allocating outside organizational resources to Denver UCGs aligns with calls for public-private governance structures and multiple groups working together to run greenspaces (Dushkova & Haase, 2020; Maćkiewicz & Asuero, 2021). The provision of these additional resources and support can help reduce barriers to engagement and prevent stress amongst volunteer garden leaders.
- Greater attention to neighborhood characteristics is critical when deciding where future UCGs should be located; multiple subjects reported their sentiments that UCGs were established without sufficient attention towards the local characteristics of the community, or otherwise located inconveniently (creating burdens when participating in UCGs). During a time of reduced public park and greenspace supply (Perkins, 2010), it is prudent that UCGs are made available to those who otherwise lack greenspace access, safe and walkable public space, and fresh food.
- Those who feel relatively isolated from their immediate and wider communities can consider UCG participation as a salient way to improve social capital and improve sense of place in the Denver Metro Area. As my findings suggest, UCGs can serve as pathways to belonging, despite their exclusionary elements. Groups like senior citizens, in particular, may benefit from the cumulative benefits of community interaction, connection to nature, and improvements in health.

Limitations and Future Directions

As an interview-based, qualitative study of UCGs in the Denver Metro Area, this study is successful in creating an in-depth illustration of concepts related to belonging, motivations for UCG engagement, and barriers to UCG participation. In this work, interview recruitment involved a mix of strategies, including online outreach, conversations with gardeners following participants observation, and snowball sampling. The latter approach may limit the representativeness of the interview population, providing a non-random sample of Denver UCG participants (Raina, 2015). In general, increasing the number of study subjects may better capture the UCG experience in this region. Additionally, all UCGs involved in this study were all publicly available without formal restrictions to entry. However, there are also several private UCGs in the Denver Metro Area that this study did not engage with (Denver Urban Gardens, n.d.). These UCGs are catered to specific populations, like refugees. In these spaces, social dynamics may differ or actively dismantle social hierarchies in ways that were not observed in the public UCGs involved in this study.

Though I aimed to voice the perspectives of marginalized UCG gardeners, certain underrepresented perspectives were not fully represented in this work, due to the limitations of recruitment. While the proportion of interviewees of Hispanic and Native American origin closely mirrors or outnumbers the percentage of this population in the Denver Metro Area (Metro Denver EDC, n.d.-b), other communities of color are relatively underrepresented in this study. Language barriers also limited the participation of non-English speaking gardeners who derived benefits from UCG membership. Thus, this study may be effective in examining a more mainstream perspective on Denver UCGs, and may be somewhat limited in its exploration of certain marginalized gardeners' viewpoints.

Additionally, this study drew upon qualitative analysis in order to examine the experiences of Denver UCG members, with nuances that are otherwise difficult to capture in short questionnaires or surveys. In order to engage in triangulation, using GIS methods and quantitative approaches can confirm the findings of this study. For example, mapping UCG demographics in the Denver Metro Area, and comparing these to surrounding neighborhood demographics, may help elicit a stronger understanding of which populations most frequently engage in UCGs; utilizing quantitative measures of belonging, or even asking participants to rate their motivations to garden on a numeric scale, can further validate this study's findings. Thus, diversifying data gathering and analysis represents one future direction for this field.

Similarly, conducting longitudinal data collection can help us understand how the role of UCGs will evolve in the Denver Metro Area, both from the outset of COVID-19 and in the presence of gentrification. This kind of work would answer questions on whether UCGs will be forever changed by this pandemic, or if they eventually return to their previous form. Given the continued influence of gentrification (Cole et al., 2021), future research should also consider this phenomenon, further characterizing its layered relationship with UCGs (including how UCGs may accelerate or decelerate gentrification, and how gentrification affects the UCG experience). Lastly, while this study captured the perspectives of UCG members, targeting UCGs as a social and public health intervention also warrants exploration of nonmembers' perceptions. Understanding the beliefs that non-gardeners hold regarding UCGs, and why they have not participated in these spaces, can help us determine what level of community-wide engagement is realistic in community gardens.

As we seek to foster a public health response that accounts for the complex ways our social and environmental circumstances dictate our health, UCGs can serve as an enjoyable and

environmentally sustainable option to do just that. We must ensure that UCG spaces, like all other interventions, are made with the needs of all populations in mind, actively considering underrepresented and underserved populations at each step. Only then can we bring forth truly equitable and inclusive health outcomes at the community level.

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References

Adler, N. E., Epel, E. S., Castellazzo, G., & Ickovics, J. R. (2000). Relationship of subjective and objective social status with psychological and physiological functioning: Preliminary data in healthy, White women. *Health Psychology*, *19*(6), 586–592. https://doi.org/10.1037/0278-6133.19.6.586

Alkon, A. H., & Agyeman, J. (2011). The Food Movement as Polyculture. In R. Gottlieb & N. Cohen (Eds.), *Cultivating Food Justice: Race, Class, and Sustainability*. MIT Press.

Anderson, V., & Gough, W. A. (2022). Nature-based cooling potential: A multi-type green infrastructure evaluation in Toronto, Ontario, Canada. *International Journal of Biometeorology*, *66*(2), 397–410. https://doi.org/10.1007/s00484-021-02100-5

Anderson, V., Gough, W. A., & Agic, B. (2021). Nature-Based Equity: An Assessment of the Public Health Impacts of Green Infrastructure in Ontario Canada. *International Journal of Environmental Research and Public Health*, *18*(11), 5763. https://doi.org/10.3390/ijerph18115763

Asl, S. R., & Azadgar, A. (2022). The spatial distribution of urban community gardens and their associated socio-economic status in Tehran, Iran. *Frontiers in Sustainable Food Systems*, *6*. https://www.frontiersin.org/articles/10.3389/fsufs.2022.949075

Barton, J., & Rogerson, M. (2017). The importance of greenspace for mental health. *BJPsych International*, *14*(4), 79–81.

Bishop, R., & Purcell, E. (2013). The value of an allotment group for refugees. *British Journal of Occupational Therapy*, *76*(6), 264–270. https://doi.org/10.4276/030802213X13706169932824

Braveman, P., Egerter, S., & Williams, D. R. (2011). The Social Determinants of Health: Coming

of Age. *Annual Review of Public Health*, *32*(1), 381–398. https://doi.org/10.1146/annurev-publhealth-031210-101218

Butterfield, K. L., & Ramírez, A. S. (2021). Framing Food Access: Do Community Gardens Inadvertently Reproduce Inequality? *Health Education & Behavior: The Official Publication of the Society for Public Health Education*, *48*(2), 160–168. https://doi.org/10.1177/1090198120950617

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. *Partecipazione e Conflitto*, *8*(2), 417–442. https://doi.org/10.1285/i20356609v8i2p417

Carney, P. A., Hamada, J. L., Rdesinski, R., Sprager, L., Nichols, K. R., Liu, B. Y., Pelayo, J., Sanchez, M. A., & Shannon, J. (2012). Impact of a Community Gardening Project on Vegetable Intake, Food Security and Family Relationships: A Community-based Participatory Research Study. *Journal of Community Health*, *37*(4), 874–881. https://doi.org/10.1007/s10900-011-9522-z

Chen, K., Zhang, T., Liu, F., Zhang, Y., & Song, Y. (2021). How Does Urban Green Space Impact Residents' Mental Health: A Literature Review of Mediators. *International Journal of Environmental Research and Public Health*, *18*(22), 11746. https://doi.org/10.3390/ijerph182211746

Coker, T. R., Cheng, T. L., & Ybarra, M. (2023). Addressing the Long-term Effects of the COVID-19 Pandemic on Children and Families: A Report From the National Academies of Sciences, Engineering, and Medicine. *JAMA*. https://doi.org/10.1001/jama.2023.4371

Cole, H. V. S., Mehdipanah, R., Gullón, P., & Triguero-Mas, M. (2021). Breaking Down and

Building Up: Gentrification, Its drivers, and Urban Health Inequality. *Current Environmental Health Reports*, *8*(2), 157–166. https://doi.org/10.1007/s40572-021-00309-5

Colson-Fearon, B., & Versey, H. S. (2022). Urban Agriculture as a Means to Food Sovereignty? A Case Study of Baltimore City Residents. *International Journal of Environmental Research and Public Health*, *19*(19), 12752. https://doi.org/10.3390/ijerph191912752

Cumbers, A., Shaw, D., Crossan, J., & McMaster, R. (2018). The Work of Community Gardens: Reclaiming Place for Community in the City. *Work, Employment and Society*, *32*(1), 133–149. https://doi.org/10.1177/0950017017695042

de Vries, S., Verheij, R. A., Groenewegen, P. P., & Spreeuwenberg, P. (2003). Natural Environments—Healthy Environments? An Exploratory Analysis of the Relationship between Greenspace and Health. *Environment and Planning A: Economy and Space*, *35*(10), 1717–1731. https://doi.org/10.1068/a35111

Denver Relocation Guide. (2018, December 17). *Denver, Colorado*. Denver Relocation Guide. https://denverrelocationguide.com/denver-colorado/

Denver Urban Gardens. (n.d.). *Join a Community Garden*. Denver Urban Gardens. Retrieved March 20, 2023, from https://dug.org/gardens/

Diaz, J. M., Webb, S. T., Warner, L. A., & Monaghan, P. (2018). Barriers to community garden success: Demonstrating framework for expert consensus to inform policy and practice. *Urban Forestry & Urban Greening*, *31*, 197–203. https://doi.org/10.1016/j.ufug.2018.02.014

Ding, X., Zhao, Z., Zheng, J., Yue, X., Jin, H., & Zhang, Y. (2022). Community Gardens in China: Spatial distribution, patterns, perceived benefits and barriers. *Sustainable Cities*

and Society, *84*, 103991. https://doi.org/10.1016/j.scs.2022.103991

Dushkova, D., & Haase, D. (2020). Not Simply Green: Nature-Based Solutions as a Concept and Practical Approach for Sustainability Studies and Planning Agendas in Cities. *Land*, *9*(1), Article 1. https://doi.org/10.3390/land9010019

Egerer, M., Lin, B., Kingsley, J., Marsh, P., Diekmann, L., & Ossola, A. (2022). Gardening can relieve human stress and boost nature connection during the COVID-19 pandemic. *Urban Forestry & Urban Greening*, *68*, 127483. https://doi.org/10.1016/j.ufug.2022.127483

Esposito, S., Galeone, C., Lelii, M., Longhi, B., Ascolese, B., Senatore, L., Prada, E., Montinaro, V., Malerba, S., Patria, M. F., & Principi, N. (2014). Impact of air pollution on respiratory diseases in children with recurrent wheezing or asthma. *BMC Pulmonary Medicine*, *14*, 130. https://doi.org/10.1186/1471-2466-14-130

Fazli, G. S., Moineddin, R., Chu, A., Bierman, A. S., & Booth, G. L. (2020). Neighborhood walkability and pre-diabetes incidence in a multiethnic population. *BMJ Open Diabetes Research & Care*, *8*(1), e000908. https://doi.org/10.1136/bmjdrc-2019-000908

Garcia, M. T., Ribeiro, S. M., Germani, A. C. C. G., & Bógus, C. M. (2018). The impact of urban gardens on adequate and healthy food: A systematic review. *Public Health Nutrition*, *21*(2), 416–425. https://doi.org/10.1017/S1368980017002944

Garza, J. R., Glenn, B. A., Mistry, R. S., Ponce, N. A., & Zimmerman, F. J. (2017). Subjective Social Status and Self-Reported Health Among US-born and Immigrant Latinos. *Journal of Immigrant and Minority Health*, *19*(1), 108–119. https://doi.org/10.1007/s10903-016-0346-x

Gregis, A., Ghisalberti, C., Sciascia, S., Sottile, F., & Peano, C. (2021). Community Garden Initiatives Addressing Health and Well-Being Outcomes: A Systematic Review of

Infodemiology Aspects, Outcomes, and Target Populations. *International Journal of Environmental Research and Public Health*, *18*(4), 1943. https://doi.org/10.3390/ijerph18041943

Guerreiro, H., Fernandes, T., & da Câmara, M. B. (2021). Can urban gardens improve food security, health, well-being and financial sustainability of households? *Annals of Medicine*, *53*(Suppl 1), S104–S105. https://doi.org/10.1080/07853890.2021.1896077

Guitart, D. A., Pickering, C. M., & Byrne, J. A. (2014). Color me healthy: Food diversity in school community gardens in two rapidly urbanising Australian cities. *Health & Place*, *26*, 110–117. https://doi.org/10.1016/j.healthplace.2013.12.014

Guthman, J. (2008). "If They Only Knew": Color Blindness and Universalism in California Alternative Food Institutions. *The Professional Geographer*, *60*(3), 387–397. https://doi.org/10.1080/00330120802013679

Hoofman, J., & Secord, E. (2021). The Effect of COVID-19 on Education. *Pediatric Clinics of North America*, *68*(5), 1071–1079. https://doi.org/10.1016/j.pcl.2021.05.009

Hoover, B. (2013). White Spaces in Black and Latino Places: Urban Agriculture and Food Sovereignty. *Journal of Agriculture, Food Systems, and Community Development*, *3*(4), Article 4. https://doi.org/10.5304/jafscd.2013.034.014

Hwang, T.-J., Rabheru, K., Peisah, C., Reichman, W., & Ikeda, M. (2020). Loneliness and social isolation during the COVID-19 pandemic. *International Psychogeriatrics*, 1–4. https://doi.org/10.1017/S1041610220000988

Kakaei, H., Nourmoradi, H., Bakhtiyari, S., Jalilian, M., & Mirzaei, A. (2022). Effect of COVID-19 on food security, hunger, and food crisis. *COVID-19 and the Sustainable Development Goals*, 3–29. https://doi.org/10.1016/B978-0-323-91307-2.00005-5

Kingsley, J. ‘Yotti,’ 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. https://doi.org/10.1080/02614360902769894

Koay, W. I., & Dillon, D. (2020). Community Gardening: Stress, Well-Being, and Resilience Potentials. *International Journal of Environmental Research and Public Health*, *17*(18), 6740. https://doi.org/10.3390/ijerph17186740

Krause, R. J., Scott, M. E., Sinisterra, O., & Koski, K. G. (2021). Demonstration gardens improve agricultural production, food security and preschool child diets in subsistence farming communities in Panama. *Public Health Nutrition*, *24*(5), 1104–1116. https://doi.org/10.1017/S1368980020002918

Lampert, T., Costa, J., Santos, O., Sousa, J., Ribeiro, T., & Freire, E. (2021). Evidence on the contribution of community gardens to promote physical and mental health and well-being of non-institutionalized individuals: A systematic review. *PLOS ONE*, *16*(8), e0255621. https://doi.org/10.1371/journal.pone.0255621

Langegger, S. (2013). Emergent public space: Sustaining Chicano culture in North Denver. *Cities*, *35*, 26–32. https://doi.org/10.1016/j.cities.2013.04.013

Lee, A. C. K., Jordan, H. C., & Horsley, J. (2015). Value of urban green spaces in promoting healthy living and wellbeing: Prospects for planning. *Risk Management and Healthcare Policy*, *8*, 131–137. https://doi.org/10.2147/RMHP.S61654

Litt, J. S., Lambert, J. R., & Glueck, D. H. (2017). Gardening and age-related weight gain: Results from a cross-sectional survey of Denver residents. *Preventive Medicine Reports*, *8*, 221–225. https://doi.org/10.1016/j.pmedr.2017.10.018

Litt, J. S., Schmiege, S. J., Hale, J. W., Buchenau, M., & Sancar, F. (2015). Exploring ecological,

emotional and social levers of self-rated health for urban gardeners and non-gardeners: A path analysis. *Social Science & Medicine (1982)*, *144*, 1–8. https://doi.org/10.1016/j.socscimed.2015.09.004

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. https://doi.org/10.2105/AJPH.2010.300111

Lu, X., Yuan, D., Chen, Y., & Fung, J. C. H. (2021). Impacts of urbanization and long-term meteorological variations on global PM2.5 and its associated health burden. *Environmental Pollution*, *270*, 116003. https://doi.org/10.1016/j.envpol.2020.116003

Maćkiewicz, B., & Asuero, R. P. (2021). Public versus private: Juxtaposing urban allotment gardens as multifunctional Nature-based Solutions. Insights from Seville. *Urban Forestry & Urban Greening*, *65*, 127309. https://doi.org/10.1016/j.ufug.2021.127309

Marmot, M. (2005). Social determinants of health inequalities. *The Lancet*, *365*(9464), 1099–1104. https://doi.org/10.1016/S0140-6736(05)71146-6

Marmot, M. (2006). Health in an unequal world. *The Lancet*, *368*(9552), 2081–2094. https://doi.org/10.1016/S0140-6736(06)69746-8

Martín-Sánchez, M., Cáceres-Muñoz, J., & Flores-Rodríguez, C. (2022). The Effects of the COVID-19 Pandemic on Educational Communities: Evidence of Early Childhood Education Students. *International Journal of Environmental Research and Public Health*, *19*(8), Article 8. https://doi.org/10.3390/ijerph19084707

Mason, J., & Conneeley, L. (2012). The Meaning of Participation in an Allotment Project for Fathers of Preschool Children. *British Journal of Occupational Therapy*, *75*(5), 230–236.

https://doi.org/10.4276/030802212X13361458480324

McBride, M. B., Shayler, H. A., Spliethoff, H. M., Mitchell, R. G., Marquez-Bravo, L. G., Ferenz, G. S., Russell-Anelli, J. M., Casey, L., & Bachman, S. (2014). Concentrations of lead, cadmium and barium in urban garden-grown vegetables: The impact of soil variables. *Environmental Pollution (Barking, Essex: 1987)*, *194*, 254–261. https://doi.org/10.1016/j.envpol.2014.07.036

Meenar, M., & Hoover, B. (2012). Community Food Security via Urban Agriculture: Understanding People, Place, Economy, and Accessibility from a Food Justice Perspective. *Journal of Agriculture, Food Systems, and Community Development*, 143–160. https://doi.org/10.5304/jafscd.2012.031.013

Metro Denver EDC. (n.d.-a). *Demographics | Metro Denver*. Retrieved March 12, 2023, from https://www.metrodenver.org/regional-data/demographics

Metro Denver EDC. (n.d.-b). *Ethnicity | Metro Denver*. Retrieved March 12, 2023, from https://www.metrodenver.org/regional-data/demographics/ethnicity

Miles, R., Coutts, C., & Mohamadi, A. (2012). Neighborhood Urban Form, Social Environment, and Depression. *Journal of Urban Health : Bulletin of the New York Academy of Medicine*, *89*(1), 1–18. https://doi.org/10.1007/s11524-011-9621-2

Mitchell, R., & Popham, F. (2008). Effect of exposure to natural environment on health inequalities: An observational population study. *Lancet (London, England)*, *372*(9650), 1655–1660. https://doi.org/10.1016/S0140-6736(08)61689-X

Moreland, A. (2020). Timing of State and Territorial COVID-19 Stay-at-Home Orders and Changes in Population Movement—United States, March 1–May 31, 2020. *MMWR. Morbidity and Mortality Weekly Report*, *69*. https://doi.org/10.15585/mmwr.mm6935a2

Music, J., Finch, E., Gone, P., Toze, S., Charlebois, S., & Mullins, L. (2021). Pandemic Victory Gardens: Potential for local land use policies. *Land Use Policy*, *109*, 105600. https://doi.org/10.1016/j.landusepol.2021.105600

Nowysz, A., Mazur, Ł., Vaverková, M. D., Koda, E., & Winkler, J. (2022). Urban Agriculture as an Alternative Source of Food and Water Security in Today's Sustainable Cities. *International Journal of Environmental Research and Public Health*, *19*(23), 15597. https://doi.org/10.3390/ijerph192315597

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. https://doi.org/10.1007/s10464-010-9404-z

Pak, A., Adegboye, O. A., Adekunle, A. I., Rahman, K. M., McBryde, E. S., & Eisen, D. P. (2020). Economic Consequences of the COVID-19 Outbreak: The Need for Epidemic Preparedness. *Frontiers in Public Health*, *8*. https://www.frontiersin.org/articles/10.3389/fpubh.2020.00241

Perkins, H. A. (2010). Green Spaces of Self-Interest Within Shared Urban Governance. *Geography Compass*, *4*(3), 255–268. https://doi.org/10.1111/j.1749-8198.2009.00308.x

Peters, S. E., Dennerlein, J. T., Wagner, G. R., & Sorensen, G. (2022). Work and worker health in the post-pandemic world: A public health perspective. *The Lancet. Public Health*, *7*(2), e188–e194. https://doi.org/10.1016/S2468-2667(21)00259-0

Pohanka, M., & Fitzgerald, S. (2004). Urban Sprawl and You: How Sprawl Adversely Affects Worker Health. *AAOHN Journal*, *52*(6), 242–246. https://doi.org/10.1177/216507990405200605

Prudic, K. L., Cruz, T. M. P., Winzer, J. I. B., Oliver, J. C., Melkonoff, N. A., Verbais, H., &

Hogan, A. (2022). Botanical Gardens Are Local Hotspots for Urban Butterflies in Arid Environments. *Insects*, *13*(10), 865. https://doi.org/10.3390/insects13100865

Putra, I. G. N. E., Astell-Burt, T., & Feng, X. (2022). Perceived green space quality, child biomarkers and health-related outcomes: A longitudinal study. *Environmental Pollution (Barking, Essex: 1987)*, *303*, 119075. https://doi.org/10.1016/j.envpol.2022.119075

Raina, S. K. (2015). Establishing association. *The Indian Journal of Medical Research*, *141*(1), 127.

Rudd, L. F., Allred, S., Bright Ross, J. G., Hare, D., Nkomo, M. N., Shanker, K., Allen, T., Biggs, D., Dickman, A., Dunaway, M., Ghosh, R., González, N. T., Kepe, T., Mbizah, M. M., Middleton, S. L., Oommen, M. A., Paudel, K., Sillero-Zubiri, C., & Dávalos, A. (2021). Overcoming racism in the twin spheres of conservation science and practice. *Proceedings of the Royal Society B: Biological Sciences*, *288*(1962), 20211871. https://doi.org/10.1098/rspb.2021.1871

Shan, H., & Walter, P. (2015). Growing Everyday Multiculturalism: Practice-Based Learning of Chinese Immigrants Through Community Gardens in Canada. *Adult Education Quarterly*, *65*(1), 19–34. https://doi.org/10.1177/0741713614549231

Singh-Manoux, A., Marmot, M. G., & Adler, N. E. (2005). Does subjective social status predict health and change in health status better than objective status? *Psychosomatic Medicine*, *67*(6), 855–861. https://doi.org/10.1097/01.psy.0000188434.52941.a0

Soil Science Society of America. (n.d.). *Community gardens | Soil Science Society of America*. Retrieved March 12, 2023, from https://www.soils.org/about-soils/community-gardens/

Stokols, D. (1996). Translating Social Ecological Theory into Guidelines for Community Health Promotion. *American Journal of Health Promotion*, *10*(4), 282–298.

https://doi.org/10.4278/0890-1171-10.4.282

Sutter, M., & Perrin, P. B. (2016). Discrimination, mental health, and suicidal ideation among LGBTQ people of color. *Journal of Counseling Psychology*, *63*(1), 98–105. https://doi.org/10.1037/cou0000126

Taylor, L., & Hochuli, D. F. (2017). Defining greenspace: Multiple uses across multiple disciplines. *Landscape and Urban Planning*, *158*, 25–38. https://doi.org/10.1016/j.landurbplan.2016.09.024

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. https://doi.org/10.1016/j.healthplace.2009.06.003

Ulrich, R. S., Simons, R. F., Losito, B. D., Fiorito, E., Miles, M. A., & Zelson, M. (1991). Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology*, *11*(3), 201–230. https://doi.org/10.1016/S0272-4944(05)80184-7

United States Department of Agriculture. (n.d.). *Map Downloads*. Retrieved March 12, 2023, from https://planthardiness.ars.usda.gov/pages/map-downloads

United States Department of Health and Human Services. (n.d.). *Education Access and Quality—Healthy People 2030 | health.gov*. Retrieved March 13, 2023, from https://health.gov/healthypeople/objectives-and-data/browse-objectives/education-access-and-quality

Villalobos, A., Alaimo, K., Erickson, C., Harrall, K. K., Glueck, D. H., Buchenau, H., Buchenau, M., Coringrato, E., Decker, E., Fahnestock, L., Hamman, R. F., Hebert, J. R., Hurley, T. G., Leiferman, J. A., Li, K., Quist, P., & Litt, J. S. (2019). CAPS on the move: Crafting

an approach to recruitment for a randomized controlled trial of community gardening. *Contemporary Clinical Trials Communications*, *16*, 100482. https://doi.org/10.1016/j.conctc.2019.100482

Ward, K. S., Truong, S., & Gray, T. (2022). Connecting to nature through community engaged scholarship: Community gardens as sites for collaborative relationships, psychological, and physiological wellbeing. *Frontiers in Psychiatry*, *13*. https://www.frontiersin.org/articles/10.3389/fpsyt.2022.883817

Wood, C. J., Barton, J. L., & Wicks, C. L. (2022). The Impact of Therapeutic Community Gardening on the Wellbeing, Loneliness, and Life Satisfaction of Individuals with Mental Illness. *International Journal of Environmental Research and Public Health*, *19*(20), 13166. https://doi.org/10.3390/ijerph192013166

World Health Organization. (n.d.). *Social determinants of health*. Retrieved March 11, 2023, from https://www.who.int/health-topics/social-determinants-of-health

'Yotti' Kingsley, J., & 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. https://doi.org/10.1080/08111140601035200

Zahur, R., Barton, A. C., & Upadhyay, B. R. (2002). Science education for empowerment and social change: A case study of a teacher educator in urban Pakistan. *International Journal of Science Education*, *24*(9), 899–917. https://doi.org/10.1080/09500690110095302

Zeng, D., Thomsen, M. R., Nayga, R. M., & Bennett, J. L. (2019). Supermarket access and childhood bodyweight: Evidence from store openings and closings. *Economics and Human Biology*, *33*, 78–88. https://doi.org/10.1016/j.ehb.2019.01.004

Zhou, Y., Yuan, Y., Chen, Y., & Lai, S. (2020). Association Pathways Between Neighborhood

Greenspaces and the Physical and Mental Health of Older Adults—A Cross-Sectional Study in Guangzhou, China. *Frontiers in Public Health*, *8*, 551453. https://doi.org/10.3389/fpubh.2020.551453