ROOTED IN WELLBEING

THE BENEFITS OF GARDENING

Mather institute

TABLE OF CONTENTS

INTRODUCTION

Gardening has long been embraced by a wide array of individuals, from celebrities such as Martha Stewart, Oprah Winfrey, and Kylie Jenner, to First Ladies Michelle Obama and Eleanor Roosevelt, to famous artists Leonardo da Vinci and Claude Monet (Bennett, 2019; Chubb, 2020; Namaste, 2022; Smithsonian, 2024). Gardening captivates not only famous figures but also the general public. In fact, today there are an estimated 71.5 million US households that garden (Bigger Garden, 2023).

Gardening is not only about cultivating food; for many, it is a pursuit of creativity and aesthetics, a relaxing hobby, and a meaningful way to connect with nature. An extensive body of research shows that gardening can enhance physical and psychosocial wellness, contributing positively to overall wellbeing (Buck, 2016; Scott et al., 2014). Notably, gardening is one of the most commonly reported types of physical activities among older adults, second only to walking (Ashe et al., 2009). This widespread participation in gardening may play a vital role in older adults' ability to Age Well.

Given the popularity of gardening for older adults and the potential positive impact of gardening on wellbeing, this study had the following three aims:

1. Describe the practices of older gardeners.
2. Explore the benefits of gardening by comparing the physical and psychosocial wellbeing of older gardeners to older non-gardeners.
3. Identify barriers to gardening faced by older adults who do not currently engage in gardening.

ABOUT THE STUDY

A total of 2,025 older adults (ages 55 and better) were recruited via an online research panel to take part in a survey about their behaviors related to gardening and a variety of wellbeing outcomes. Gardeners (n = 1,010) and non-gardeners (n = 1,015) were recruited to be similar in gender, race, age, income, and region. Gardeners included respondents who gardened for at least one hour per week during the times of year when gardening is feasible. Participants were instructed to include both outdoor and indoor gardening (e.g., hydroponic gardening, starting seedlings, etc.) in their responses but not to include caring for their lawn or houseplants. Non-gardeners did not engage in any amount of gardening in a typical week.

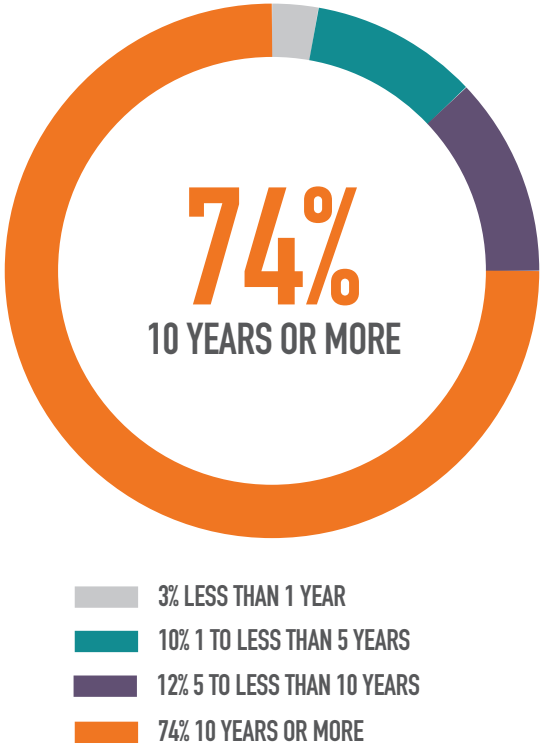
Overall, the sample was 53% female and 72% White/Caucasian, with an average age of 67.4 years. A majority of respondents were retired (58%) and partnered/married (55%). The sample was diverse in terms of education level, region, and income. Detailed demographic characteristics for both gardeners and non-gardeners are available in Appendix A.

UNDERSTANDING THE PREFERENCES AND PRACTICES OF OLDER GARDENERS

On average, gardeners reported spending 4.8 hours per week gardening, and they tended to garden 7.3 months out of the year. Most had devoted years to gardening, with 74% having gardened for a decade or more (see Figure 1).

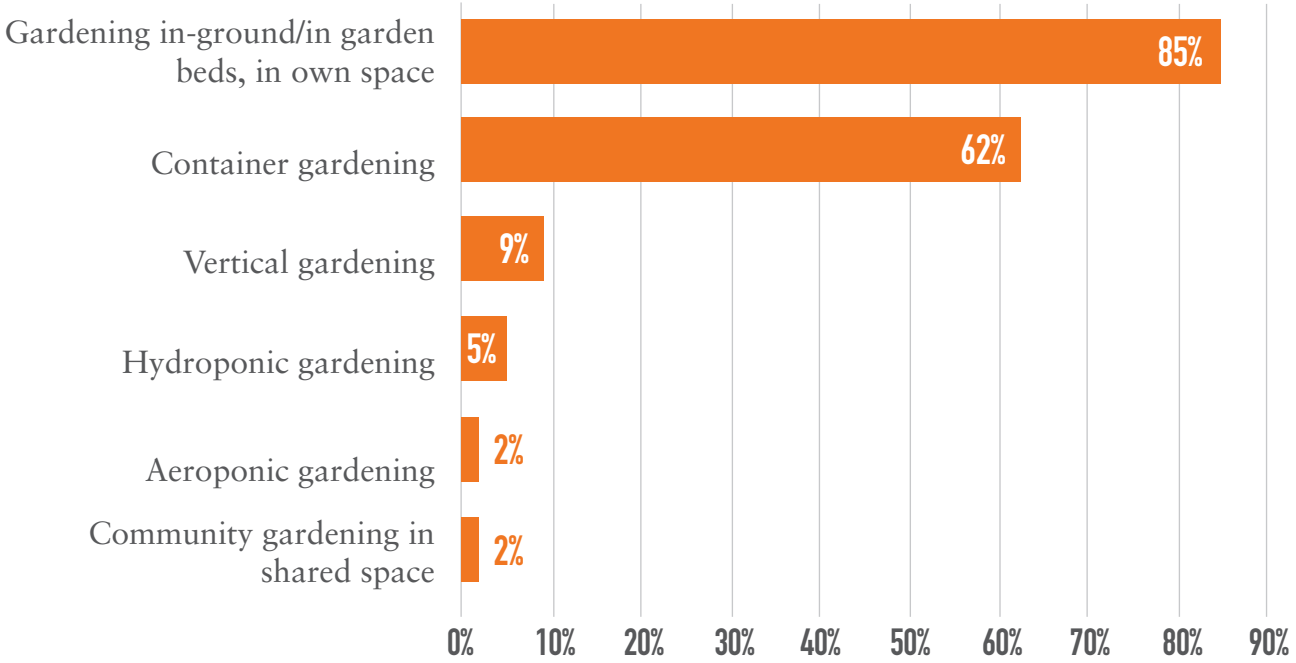
Gardeners were engaging in a diverse array of practices. The most popular was gardening in-ground or in garden beds (85%), followed by container gardening, such as gardening in pots, tubs, or other containers, either indoors or outdoors (62%). While less frequently practiced, vertical gardening, such as growing plants vertically on walls, fences, or other structures (9%); hydroponic gardening, or growing plants in water without soil (5%); and aeroponic gardening, or growing plants without soil and using water to spray the roots (2%) all offer innovative, space-saving alternatives to traditional gardening.

Figure 1. How long have gardeners been gardening?



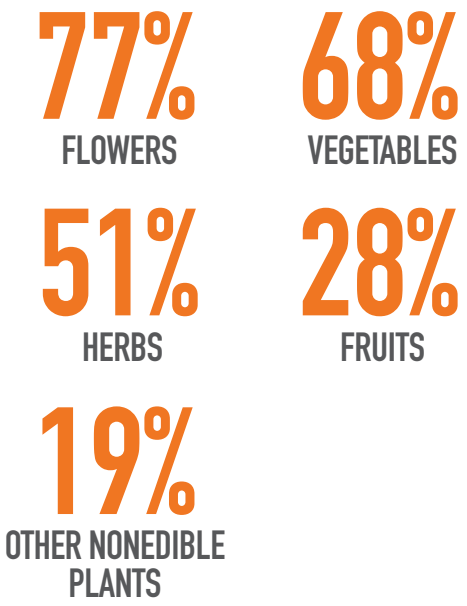
Gardening in a shared community garden space was also less popular (2%), which could be due to general lack of interest, awareness, or availability of local community gardens (see Figure 2).

Figure 2. Types of gardening older adults engaged in within the past year (% selected)



Gardeners were also cultivating a wide selection of plants in their gardens. Flowers were the most commonly grown plants (77%), with vegetables close behind (68%). One-half (51%) of gardeners planted herbs. Fruits (28%) and other nonedible plants (19%) were less common (see Figure 3).

Figure 3. What are older adults growing in their gardens (% selected)?



Gardeners who grew their own fruits, vegetables, and/or herbs estimated saving $36 on their weekly grocery bill in a typical harvest season, which could equate to savings of hundreds or even thousands of dollars per year depending on factors like garden size, types of produce grown, and harvest season length.

Beyond potential economic benefits, approximately 16% of gardeners also reported growing plants or herbs specifically for medicinal or healing purposes. Aloe vera, mint, basil, and rosemary were among respondents' top choices. Aloe vera was most commonly grown to treat sunburns and for other skin care purposes, while mint was most commonly used for nausea or indigestion and for making teas. Respondents indicated they grew basil and rosemary for a variety of healing purposes, including aromatherapy, improving cardiovascular health, reducing nausea, and enhancing memory and mindfulness.

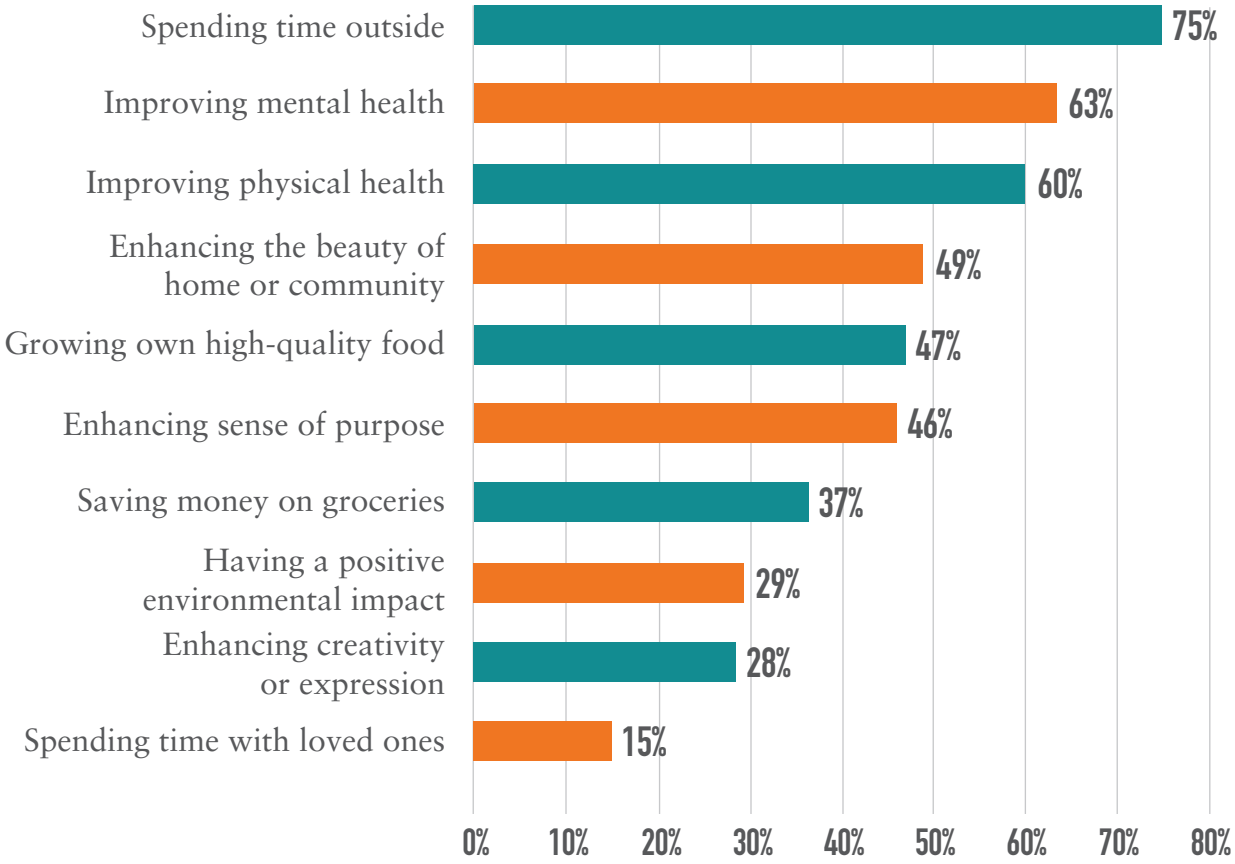
Though many herbs and plants have been previously studied for their medicinal purposes, it's important to research the effectiveness and safety of using any plants before trying them out.

MOTIVATIONS TO GARDEN

What motivates older adults to garden? Three-quarters (75%) of respondents garden to spend time outside, and mental (63%) and physical health (60%) benefits motivate many others (see Figure 4). Enhancing the beauty of the world around them was also important (49%), which aligns with the finding that flowers were the most popular plant grown in respondents' gardens.

Notably, fewer gardeners were motivated by spending time with loved ones (15%), which may indicate that many older adults prefer gardening to be a solitary activity or that others in their households may not share the hobby. Though gardeners were greatly motivated to garden by the perceived health benefits, the next section of this report will explore whether gardening is related to better wellbeing.

Figure 4. What motivates older adults to garden? (% selected)



COMPARISON OF WELLBEING FOR GARDENERS AND NON-GARDENERS

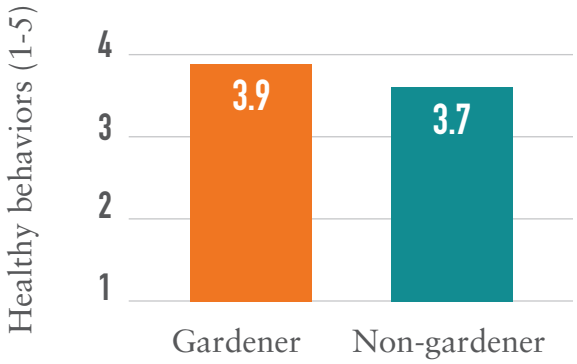
Analyses were conducted to compare older adults who garden and those who don't garden on a variety of wellbeing outcomes. These analyses statistically account for the influence of other variables (e.g., age, gender, income, and self-reported physical health) that are often related to wellbeing. Additional details on study measures are available in Appendix B.

Overall, engaging in gardening was found to be positively related to many aspects of physical and psychosocial wellbeing. However, when interpreting results, it's important to keep in mind that respondents only completed surveys at one point in time, so we can't determine whether gardening caused changes in wellness. It's possible that people who had better wellbeing to begin with were more likely to garden.

PHYSICAL WELL-BEING

Respondents rated how typical it was for them to engage in various healthy behaviors (e.g., exercising, eating a balanced diet, seeing dentists and doctors, getting enough sleep). Gardeners reported engaging in significantly more healthy behaviors on average compared to their non-gardening counterparts (see Figure 5).

Figure 5. Gardeners engaged in more healthy behaviors than non-gardeners



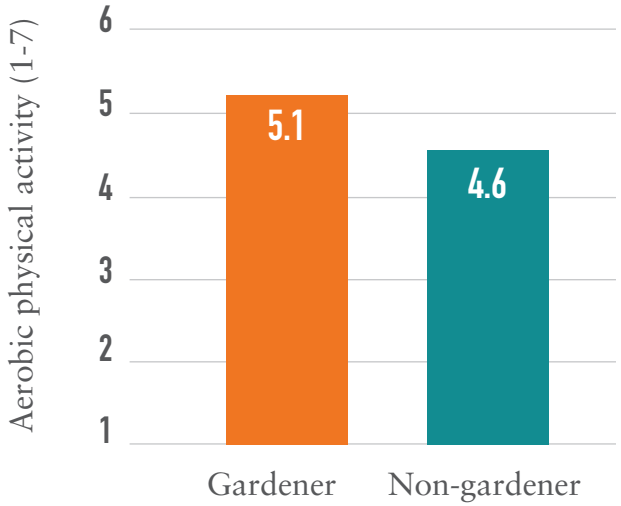
AEROBIC ACTIVITY

On average, gardeners had significantly higher levels of aerobic physical activity compared to non-gardeners (see Figure 6), which is important for many wellbeing outcomes such as cardiovascular health and cognition (Bouaziz et al., 2017).

The CDC recommends that older adults get at least 150 minutes of moderate aerobic physical activity or 75 minutes of vigorous physical activity each week (Centers for Disease Control and Prevention, 2023). However, it's estimated that only 14% of people age 65 and better are meeting federal physical activity guidelines for both aerobic and muscle-strengthening activities (Elgaddal & Kramarow, 2024). Given that gardeners in this study tended to garden nearly five hours per week during a typical gardening season, the potential impact of gardening on health is notable.

With actions like digging, tilling, or weeding that are physically moderate or vigorous yet enjoyable, gardening may be the secret to meeting exercise guidelines for many older adults.

Figure 6. Gardeners (vs. non-gardeners) reported higher levels of aerobic physical activity



STRENGTH AND FLEXIBILITY

A significantly higher proportion of gardeners also engaged in strength and flexibility activities at least once per week (see Table 1). This is particularly notable given that strength and flexibility activities can enhance mental health, reduce bodily pain, and increase longevity (Araújo et al., 2024; Kashi et al., 2022). There were no significant differences between gardeners and non-gardeners in energy levels nor in self-reported dexterity.

Though many gardeners noted doing flexibility exercises once a week or more, fewer were engaging in strength exercises weekly. The CDC recommends older adults engage in at least two days of muscle-strengthening exercises per week (Centers for Disease Control and Prevention, 2023). While many gardeners and non-gardeners were not meeting these guidelines, gardening-related actions such as lifting heavy soil or plants and bending to dig, weed, or harvest may be helping gardeners supplement both strength and flexibility exercises.

Table 1. More gardeners (vs. non-gardeners) reported engagement in strength and flexibility activities.

Does activities to increase muscle strength once a week or more

41%	28%
GARDENER	NON-GARDENER

Does activities to improve flexibility once a week or more

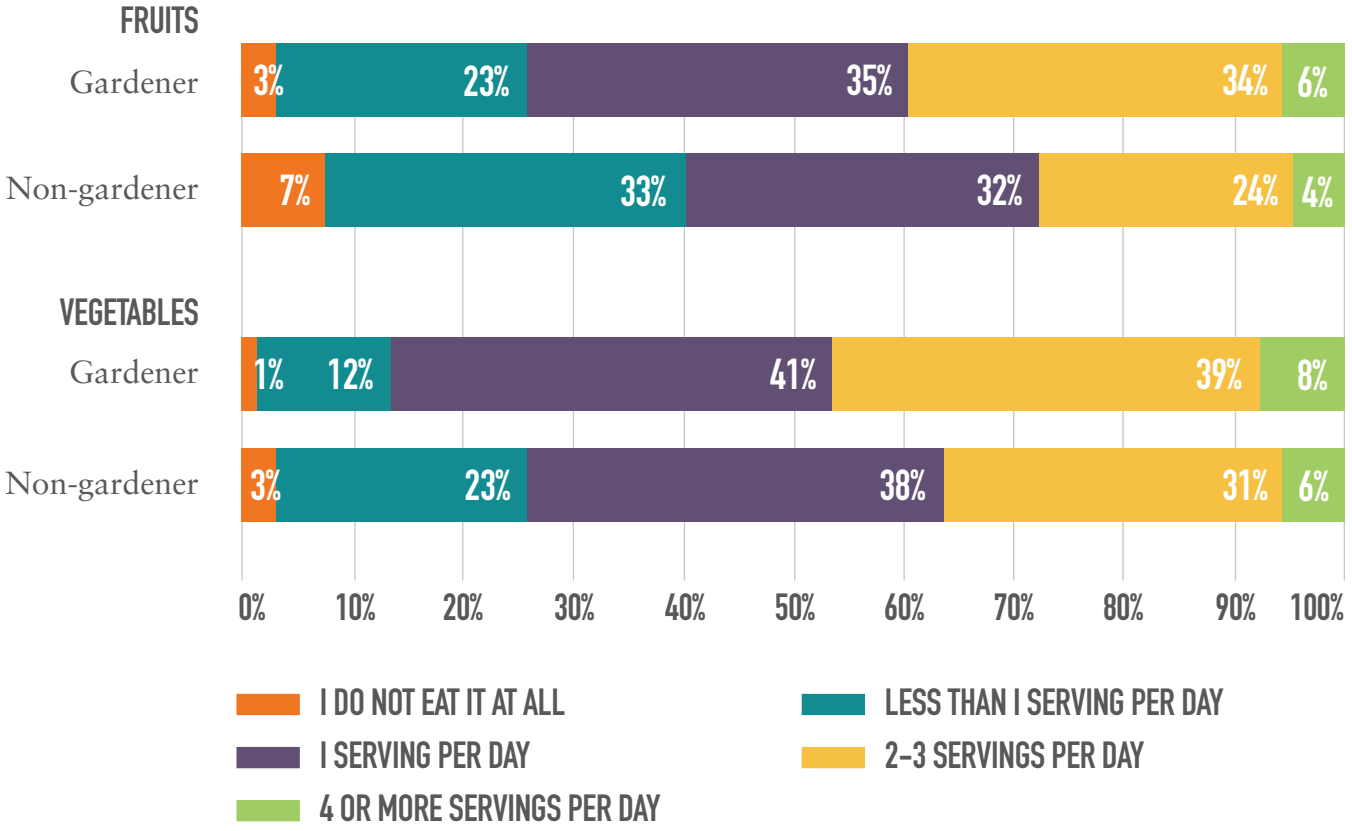
58%	38%
GARDENER	NON-GARDENER

HEALTHY EATING

The nutritional benefits of gardening were also noteworthy. For one, gardeners tended to consume significantly more fruit and vegetables than non-gardeners (see Figure 7). The produce that gardeners are growing themselves may be supplementing their fruit and vegetable consumption during harvest season.

Although nutritional recommendations vary based on factors like age and gender, one study suggests that two servings of fruit and three servings of vegetables per day can help maintain long-term health (Wang et al., 2021). Thus, although gardeners are faring better than non-gardeners in their fruit and vegetable consumption, both groups are largely falling behind when it comes to meeting these guidelines.

Figure 7. Gardeners reported more frequent fruit and vegetable consumption than non-gardeners*



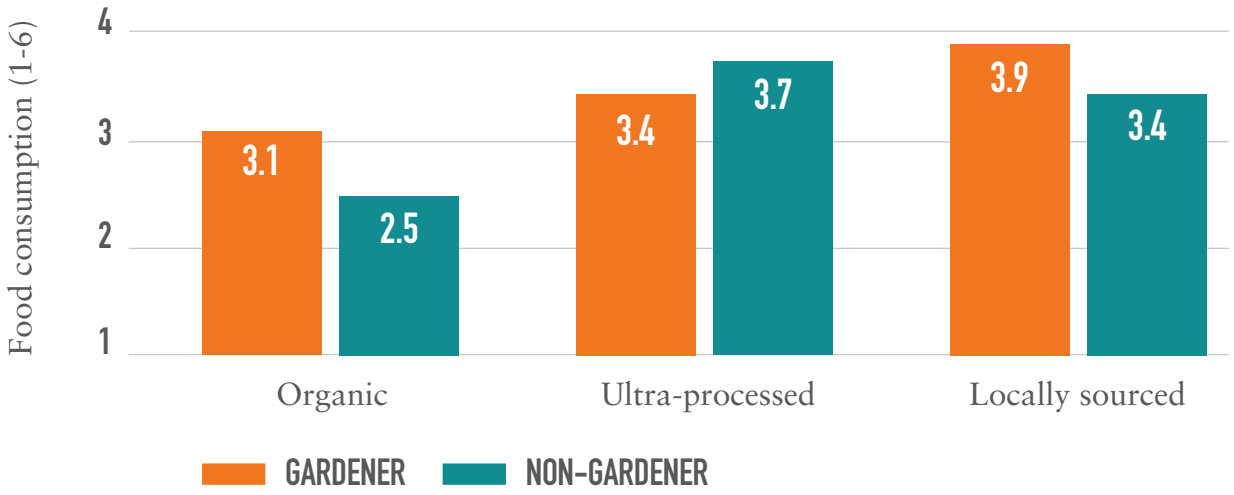
Percentages have been rounded to the nearest number.

Gardeners also engaged in other healthy eating habits more often. Compared to non-gardeners, gardeners reported eating (see Figure 8):

1. More organic foods (i.e., products produced without pesticides, fertilizers, or GMOs (genetically modified organisms)
2. Less ultra-processed foods (i.e., products that have undergone extensive processing such as carbonated soft drinks, packaged snacks, candies, breakfast cereals, and frozen meals)
3. More locally sourced foods (i.e., food that is produced within a relatively close geographic area to you, within less than 400 miles or within your same state)

This could be due in part to many gardeners growing their own produce, which is by nature locally sourced, unprocessed, and most likely organic.

Figure 8. Gardeners reported more organic, less ultra-processed, and more locally sourced food consumption compared to non-gardeners



PSYCHOSOCIAL WELLBEING

Beyond physical wellbeing, gardening was also linked to improved psychosocial outcomes. For instance, gardeners had a stronger sense of purpose, satisfaction with life, and sense of gratitude when compared to non-gardeners (See Table 2). However, there were no differences between gardeners and non-gardeners in levels of stress or self-reported cognitive function.

Unexpectedly, non-gardeners had better mental health compared to gardeners (see Table 2). It's possible that those already with poorer mental health tend to gravitate toward gardening as a self-care endeavor or that non-gardeners are engaging in other activities that are beneficial for their mental health.

Table 2. Gardeners reported greater sense of purpose, satisfaction with life, and sense of gratitude but worse mental health than non-gardeners*

	GARDENER AVERAGE	NON-GARDENER AVERAGE
Sense of purpose (1–5 scale)	3.68	3.54
Satisfaction with life (1–7 scale)	4.69	4.47
Sense of gratitude (1–7 scale)	5.78	5.61
Mental health (1–5 scale)	3.65	3.73

**Note: Light orange shading indicates a significantly better score. Averages adjusted to account for the covariates in the regression analyses.*

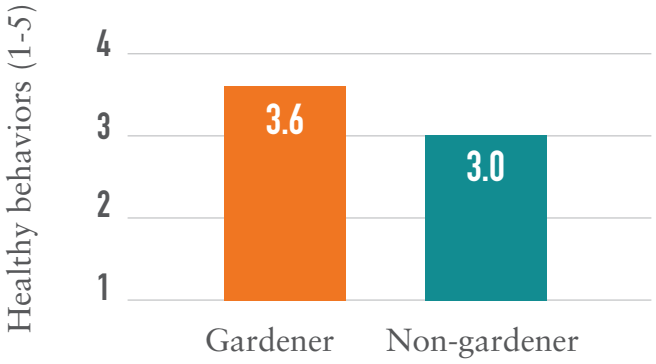
CONNECTION TO NATURE

Another important aspect of psychological wellbeing is a connection to nature, which has been linked to improved cognition and mental health (Barragan-Jason et al., 2022). Connection to nature includes emotions and experiences related to nature as well as a sense that humans are interconnected with other living things (Nisbet & Zelenski, 2013).

Gardeners not only had a significantly greater connection to nature but also spent significantly more time outdoors. They spent an average of 11 hours outdoors in a typical week when weather allowed compared to non-gardeners' 7 hours (see Figure 9).

These findings align with the fact that most gardening takes place outside and also correspond with the number one motivator for gardening among older adults: spending time outside.

Figure 9. Connection to nature was stronger for gardeners than non-gardeners

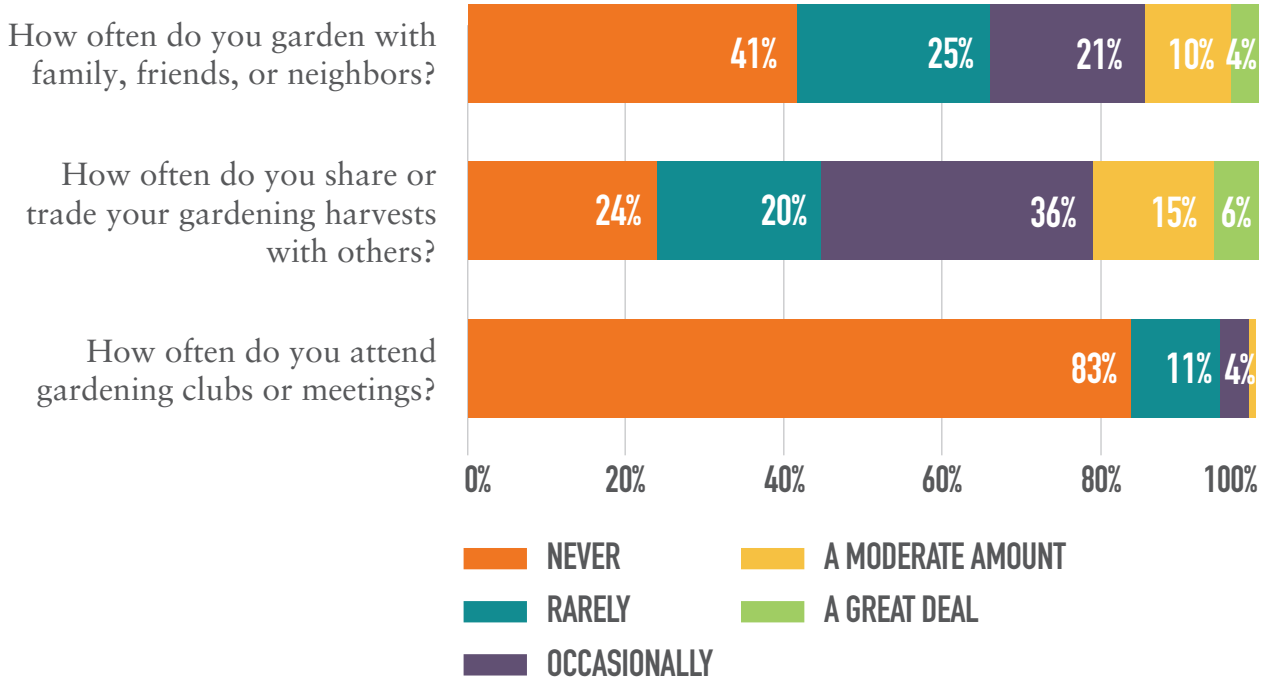


SOCIAL WELLNESS

While past research has demonstrated that gardening can play a role in older adults' social wellness, the present study found no significant difference in loneliness between gardeners and non-gardeners (Scott et al., 2020). Relatedly, gardeners did not often engage in many social aspects of gardening.

The most common gardening-related social behavior was sharing or trading their harvests with others, with 57% of gardeners doing so occasionally or more often (see Figure 10). Gardening with family, friends, or neighbors was less common, with only 35% of gardeners doing so occasionally or more often. Most gardeners (94%) reported never or rarely attending gardening clubs or meetings.

Figure 10. Gardening-related social behaviors



In terms of social media use, the majority of gardeners (61%) stated they do not use social media for gardening purposes; however, some reported using social media to seek advice or learn about gardening (31%), share updates with others about their gardens (11%), and participate in online gardening groups/communities (6%). The most common social or internet-based platforms used by older adult gardeners are highlighted below.:

Less commonly used platforms included TikTok (4%), Reddit (3%), X/Twitter (2%), and Snapchat (1%). Though social media is relatively underutilized by older gardeners, it's notable that nearly 40% were using social media for gardening-related purposes. Thus, although gardening did not relate to reduced loneliness in this study, some gardeners do use gardening to connect with others both in person and online.

27% FACEBOOK

20% YOUTUBE

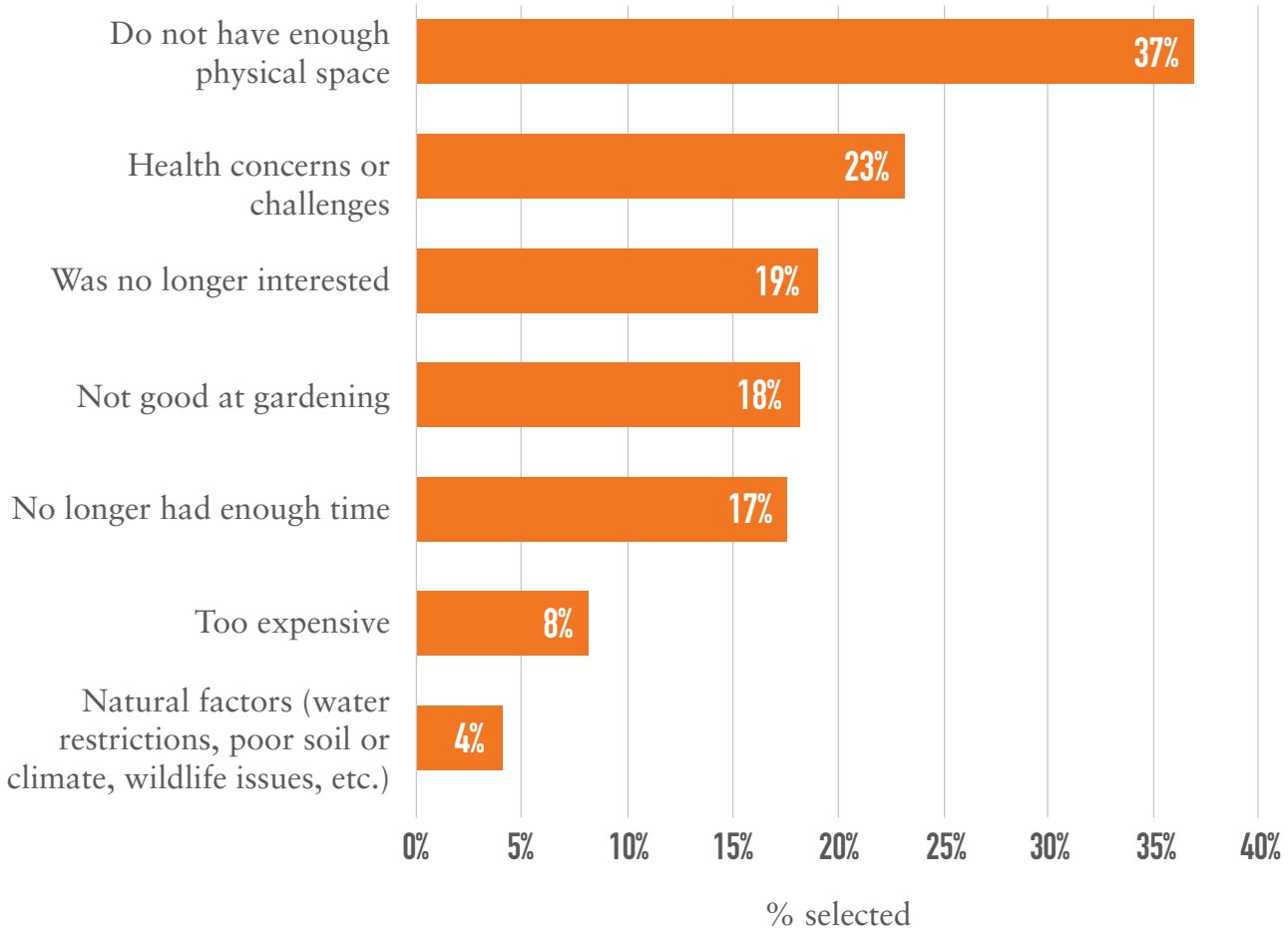
8% PINTEREST

8% INSTAGRAM

BARRIERS TO GARDENING FOR OLDER ADULTS

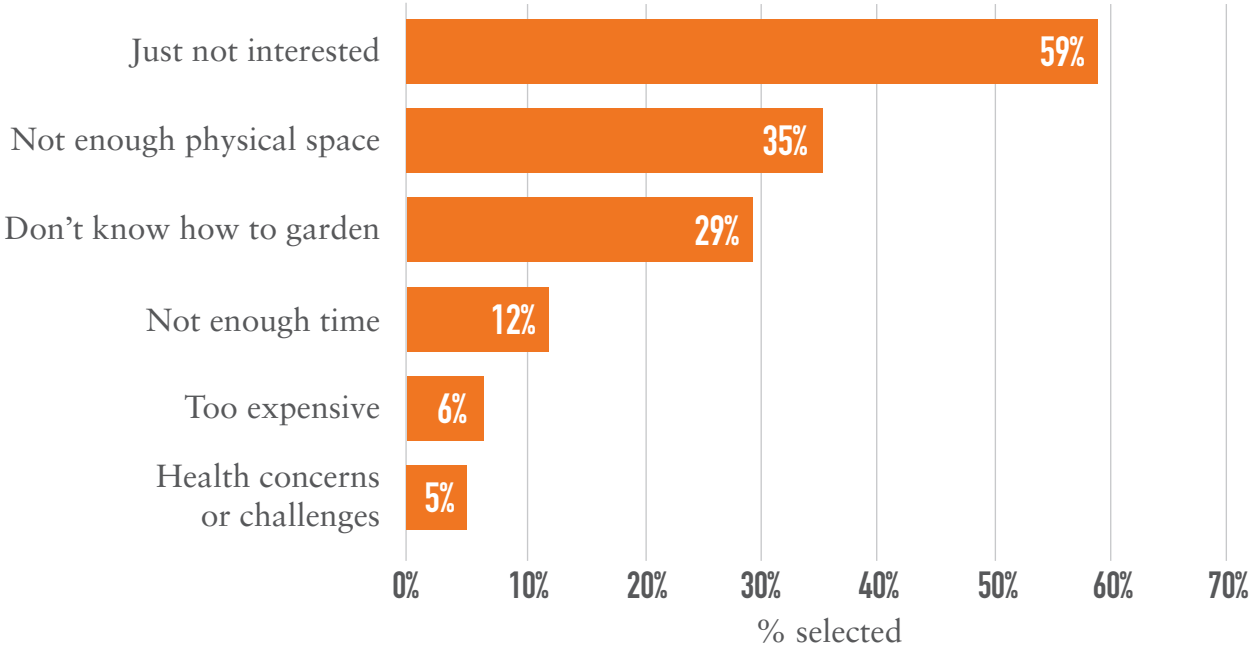
Given these findings suggesting a link between gardening and benefits to older adults' wellbeing, it is vital to understand the reasons why some older adults are not engaging in gardening. Interestingly, 57% of the non-gardeners had gardened in the past, and of those, 60% gardened for five years or more before they stopped. When asked why they stopped gardening, many reported that they did not have enough space (37%), had health concerns or challenges (23%), or were simply no longer interested (19%; see Figure 11).

Figure 11. Reasons that older adults stopped gardening



Meanwhile, 43% of non-gardeners had never gardened in the past. Their top reasons for never venturing into gardening included lack of interest (59%), lack of space (35%), and not knowing how to garden (29%; see Figure 12).

Figure 12. Reasons that older adult participants had never tried gardening



These insights from non-gardeners reveal challenges that must be addressed to encourage more gardening among older adults. Making gardening feel easier and more accessible is important in addressing the common lack of interest or knowledge in gardening.

This may include actions such as supporting beginner community gardens or clubs, sharing local resources, involving family and friends, and having new gardeners start with smaller spaces or hardier plants. Notably, cost was not a substantial barrier for most, indicating that gardening can be an affordable activity for many older adults.

Space constraints were also a major challenge, which may be especially relevant for older adults who live in urban areas (Lin et al., 2025). Even in this study, a higher proportion of non-gardeners lived in urban areas and apartments/condominiums. Fortunately, many fruits, herbs, and vegetables can grow indoors.

Even with limited indoor and outdoor space, hydroponic, aeroponic, and vertical gardening offer innovative alternatives for saving space. If physical space is too limited for even those kinds of gardening, simply walking through a neighbor's garden or a community garden has been shown to provide wellbeing benefits as well (Guo et al., 2024).

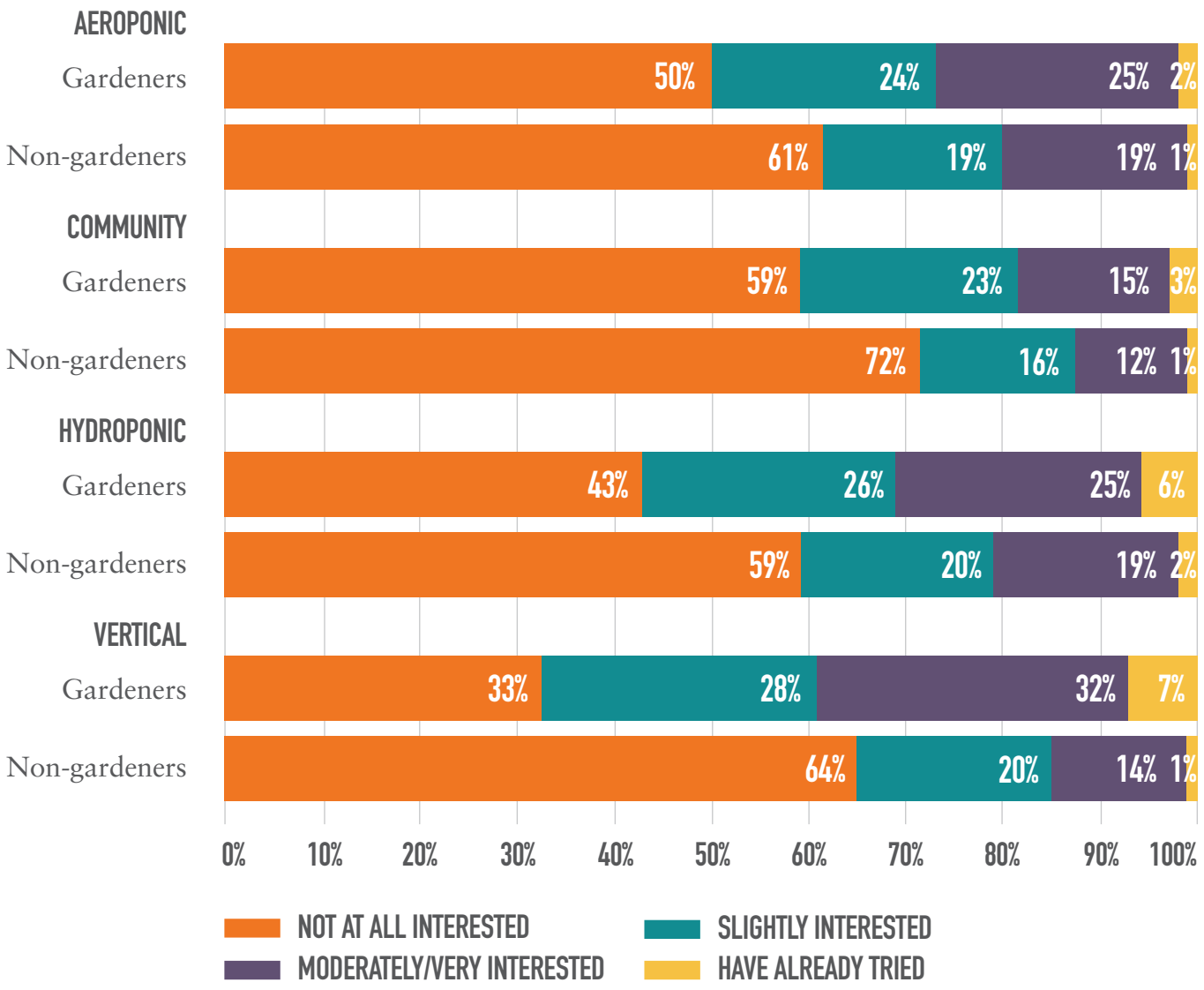
Health-related challenges were also a top barrier to continued gardening. Gardening may be difficult for some older adults with health concerns, as it can lead to physical strains from activities such as bending and lifting (Park & Shoemaker, 2009).

However, adaptations and different gardening techniques may mitigate these issues. For instance, a study of Australian older adult gardeners found that nearly 53% of the gardeners had adjusted their gardening activities as they've aged, including engaging in more frequent but shorter gardening sessions and modifying tools and gardening spaces (Scott et al., 2014). Modifications could include things like raised garden beds, ergonomic tools, and irrigation systems to reduce watering burden.

For those facing more substantial health challenges, less intensive forms of gardening, such as hydroponic or aeroponic gardening, could be viable alternatives.

Many older adults in this study were at least slightly interested in different forms of nontraditional gardening. Though gardeners tended to be more interested in each form, some non-gardeners expressed interest in trying them (see Figure 13). Overall, respondents were more interested in trying vertical, hydroponic, and aeroponic gardening and were less interested in trying community gardening.

Figure 13. How interested are you in trying each of the following forms of gardening?



KEY TAKEAWAYS AND OPPORTUNITIES

Gardening is good for us! This study provides evidence for specific ways gardening benefits older adults' physical and psychosocial wellbeing. One unexpected but striking finding was how much physical activity gardeners get. These findings suggest not only that gardening is great exercise but also that many older adult gardeners far exceed exercise guidelines (averaging almost five hours of gardening per week), and the great majority maintain it over decades! This raises the question, is gardening the secret to long-term exercise?

The study also sheds light on the gardening practices of older adults and the barriers that keep them from gardening. However, with a little effort, barriers may be transformed into opportunities.

BARRIER: Not enough space

OPPORTUNITY: Introduce older adults to aeroponic, hydroponic, or container gardens, all of which can be done inexpensively and with minimal space. Connect older adults with opportunities for community gardening.

BARRIER: Health-related limitations

OPPORTUNITY: The gardens noted above may be a good option for those with health limitations as well, as they are easy to use and don't require bending or crouching. For community gardening, modified tools and accessible gardening spaces may help address limitations.

BARRIER: Limited social benefits from gardening

OPPORTUNITY: Some older adults may prefer gardening as a solo activity. For others, community gardening spaces and workshops, gardening "buddy" programs, harvest swaps, and online gardening groups could provide opportunities for connection.

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APPENDIX A – RESPONDENT DEMOGRAPHIC INFORMATION

	Gardeners *N* = 1,010	Non-gardeners *N* = 1,015
Gender		
Male	473 (47%)	475 (47%)
Female	533 (53%)	536 (53%)
Non-binary/Other gender	4 (<1%)	4 (<1%)
Race/Ethnicity		
White/Caucasian (non-Hispanic)	745 (74%)	723 (71%)
Black/African American (non-Hispanic)	95 (9%)	108 (11%)
Asian (non-Hispanic)	59 (6%)	56 (6%)
Other (non-Hispanic)	23 (2%)	19 (2%)
Hispanic/Latino/a (all races)	88 (9%)	109 (11%)
Age	**Avg. = 67.5 yrs.**	**Avg. = 67.4 yrs.**
55 to 64	368 (36%)	403 (40%)
65 to 74	470 (47%)	397 (39%)
75 and better	172 (17%)	215 (21%)
Household Income		
Less than $50,000	335 (33%)	447 (44%)
$50,000 to less than $100,000	400 (40%)	339 (33%)
$100,000 to less than $150,000	173 (17%)	136 (13%)
$150,000 or more	102 (10%)	93 (9%)
Marital Status		
Never married	124 (12%)	194 (19%)
Partnered/Married	618 (61%)	489 (48%)
Separated/Divorced	152 (15%)	213 (21%)
Widowed	116 (11%)	119 (12%)
Education Level		
Did not complete high school	11 (1%)	15 (1%)
High school graduate/GED	283 (28%)	325 (32%)
Associate's degree	225 (22%)	230 (23%)
Bachelor's degree	303 (30%)	278 (27%)
Master's degree	150 (15%)	131 (13%)
Doctorate/professional degree	38 (4%)	36 (4%)

There were no significant differences in the gardener and non-gardener samples in region, race/ethnicity, gender, or age. However, gardeners tended to have slightly higher income and education level compared to non-gardeners. These differences in income were statistically accounted for when conducting analyses comparing gardeners and non-gardeners. More gardeners were partnered/married, whereas more non-gardeners were never married or separated/divorced. A higher proportion of non-gardeners resided in urban areas and in buildings with four or more apartments/condominiums, and more gardeners lived in single-family homes.

Continued	Gardeners *N* = 1,010	Non-gardeners *N* = 1,015
Region		
Midwest	200 (20%)	204 (20%)
Northeast	225 (22%)	199 (20%)
Southeast	293 (29%)	304 (30%)
West	292 (29%)	308 (30%)
Employment Status*		
Employed full time	213 (21%)	194 (19%)
Employed part time	116 (11%)	95 (9%)
Unemployed and looking for work	40 (4%)	45 (4%)
Unemployed and not looking for work	13 (1%)	20 (2%)
Student	0 (0%)	3 (<1%)
Retired	576 (57%)	598 (59%)
Homemaker	51 (5%)	36 (4%)
Unpaid caregiver	9 (1%)	4 (<1%)
Unable to work	33 (3%)	54 (5%)
Location		
Rural	253 (25%)	228 (22%)
Suburban	575 (57%)	537 (53%)
Urban	182 (18%)	250 (25%)
Type of residence		
Single-family home	796 (79%)	615 (61%)
Townhouse	75 (7%)	68 (7%)
Building with 3 or fewer apartments/condos	29 (3%)	32 (3%)
Building with 4 or more apartments/condos	71 (7%)	246 (24%)
Mobile home/trailer	32 (3%)	46 (5%)
Other	7 (1%)	8 (1%)

*Respondents could select more than one employment status, so percentages may not total 100%.

APPENDIX B – STUDY MEASURES

PHYSICAL WELLBEING MEASURES

HEALTH BEHAVIORS

14-item measure of various health behaviors on a scale from 1 (Not at all like me) to 5 (Very much like me). Example items include "I exercise to stay healthy" and "I eat a balanced diet" (adapted from Hampson et al., 2017). Responses on each item were averaged together to create an overall health behavior score for each individual.

AEROBIC PHYSICAL ACTIVITY

Respondents indicated whether 7 different statements accurately described their aerobic physical activity levels (1 = Yes, 2 = No; University of Washington Health Promotion Research Center, 2006). The question with the highest score with an affirmative response was chosen, resulting in an aerobic physical activity score ranging from 1 (I rarely or never do any physical activities) to 7 (I do 20 minutes or more a day of vigorous physical activities, 3 or more days a week).

STRENGTH AND FLEXIBILITY ACTIVITIES

Respondents indicated whether they do activities to increase muscle strength once a week or more and whether they do activities to improve flexibility once a week or more (1 = Yes, 2 = No). Examples of strength and flexibility exercises were provided (University of Washington Health Promotion Research Center, 2006).

ENERGY

4-item measure of energy/fatigue (Hays et al., 1993; Ware & Sherbourne, 1992). Respondents indicated how much they have felt full of pep, energized, worn out, and tired during the past four weeks on a scale from 1 (None of the time) to 6 (All of the time). Responses were averaged to create an overall energy-level score for each respondent.

DEXTERITY

Single-item indicator of self-rated dexterity, on a scale from 1 (Poor) to 5 (Excellent).

FRUIT AND VEGETABLE CONSUMPTION

2-item measure of fruit and vegetable consumption (one item for fruits, one item for vegetables) on a scale from 1 (I do not eat it at all) to 6 (6 or more servings per day). Respondents were given specific instructions on what kinds of fruits/vegetables to include for each question and examples of serving sizes (measure adapted from Lara-Breitinger et al., 2023).

ORGANIC, ULTRA-PROCESSED, AND LOCALLY SOURCED FOOD CONSUMPTION

Respondents were asked to report how often they consume each type of food on a scale from 1 (Almost never) to 6 (Almost always), or Don't know/Not sure. Respondents who selected Don't know/Not sure were excluded from analyses of these three items.

PSYCHOSOCIAL WELLBEING MEASURES

PURPOSE

4-item measure of meaning and purpose, including items related to fulfillment and direction in life (PROMIS Short Form v1.0 – Meaning and Purpose 4a; Salsman et al., 2020). Response options ranged from 1 (Not at all) to 5 (Very much), and all items were averaged to create an overall sense of purpose score.

LIFE SATISFACTION

3-item measure of overall life satisfaction, including items such as "The conditions of my life are excellent" (Diener et al., 1985; Kjell & Diener, 2020). Items were scored on a scale from 1 (Strongly disagree) to 7 (Strongly agree) and were averaged to create an overall satisfaction with life score.

GRATITUDE

6-item measure, including items such as "I have so much in life to be thankful for" and "I am grateful to a wide variety of people" (McCullough et al., 2002). Response options ranged from 1 (Strongly disagree) to 7 (Strongly agree), and all items were averaged to calculate a composite gratitude score.

STRESS

4-item measure of perceived stress, including items such as "In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?" (Cohen et al., 1983). Response options ranged from 1 (Never) to 5 (Very often), and all responses were averaged to generate an overall stress score.

COGNITIVE FUNCTION

4-item measure of cognitive function, including items related to memory and cognitive abilities (PROMIS Short Form v2.0 – Cognitive Function 4a; Lai et al., 2014). Response options ranged from 1 (Not at all) to 5 (Very much), and all items were averaged to create an overall cognitive function score.

MENTAL AND PHYSICAL HEALTH

One item for overall self-rated mental health and one item for overall self-rated physical health, both on a scale from 1 (Poor) to 5 (Excellent).

CONNECTION TO NATURE

6-item measure, including items such as "My relationship to nature is an important part of who I am" and "I feel very connected to all living things and the earth" (Nisbet & Zelenski, 2013). Each item was scored on a scale from 1 (Disagree strongly) to 5 (Agree strongly), and items were averaged to create an overall connection to nature score.

LONELINESS

3-item measure of loneliness (Hughes et al., 2004). Respondents reported how often they lack companionship, feel left out, and feel isolated from others on a scale from 1 (Hardly ever) to 3 (Often). All responses were averaged to calculate an overall loneliness score.

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