A Pilot Study of the Benefits of Traditional and Mindful Community Gardening For Urban Older Adults' Subjective Well-Being

by

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ABSTRACT

The population of older adults and the percentage of people living in urban areas are both increasing in the U.S. Finding ways to enhance city-dwelling, older adults' social integration, cognitive vitality, and connectedness to nature were conceptualized as critical pathways to maximizing their subjective well-being (SWB) and overall health. Past research has found that gardening is associated with increased social contact and reduced risk of dementia, and that higher levels of social support, cognitive functioning, mindfulness, and connectedness to nature are positively related to various aspects of SWB.

The present study was a pilot study to examine the feasibility of conducting a randomized, controlled trial of community gardening and to provide an initial assessment of a new intervention—"Mindful Community Gardening," or mindfulness training in the context of gardening. In addition, this study examined whether community gardening, with or without mindfulness training, enhanced SWB among older adults and increased social support, attention and mindfulness, and connectedness to nature.

Fifty community-dwelling adults between the ages of 55 and 79 were randomly assigned to one of three groups: Traditional Community Gardening (TCG), Mindful Community Gardening (MCG), or Wait-List Control. The TCG and MCG arms each consisted of two groups of 7 to 10 participants meeting weekly for nine weeks. TCG involved typical gardening activities undertaken collaboratively. MCG involved the same, but with the addition of guided development of non-judgmental, present-focused awareness. There was a

statistically significant increase in different aspects of mindfulness for the TCG and the MCG arms. The interventions did not measurably impact social support, attention, or connectedness to nature in this small, high functioning, pilot sample. Qualitative analysis of interview data from 12 participants in the TCG and MCG groups revealed that both groups helped some participants to better cope with adversity. It was concluded that it is feasible to conduct randomized, controlled trials of community gardening with urban older adults, and considerations for implementing such interventions are delineated.

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The World Federation for Mental Health has adopted the World Health Organization's definition of health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" and states that mental health promotion "aims to foster personal resilience within a supportive community environment" (2008). This indicates that good mental health goes far beyond the absence of a diagnosable disorder. More is needed. We might use Zautra, Hall, and Murray's definition of resilience as the ability to recover quickly from adversity and to sustain one's purpose in life, grow, and thrive (2008). This latter part of the definition in particular speaks to the fact that "everyone has mental health needs, not just those with an illness" (Pretty & Barlett, 2005, p. 315). Treatment of illness is important, then, but equally so are prevention of illness and fostering mental health to enhance well-being.

These are major concerns for all, but especially salient to older adults and to urban-dwellers, given two population trends that have persisted over the past century. First, the number of U.S. adults 65 or older is currently about 39 million, accounting for 13% of the population; the number is expected to increase to 71.5 million by 2030, accounting for 20% of the U.S. population, up from 8% in 1950 (Federal Interagency Forum on Aging-Related Statistics, 2008). Second, the percentage of people in the U.S. living in urban areas is currently about 82% and is expected to increase to 87% by 2030, up from 64% in 1950 (United Nations Secretariat, 2007). In light of these trends, the present study examines whether an urban community gardening intervention with or without mindfulness training enhances well-being among senior citizens and if so, whether this is mediated

through three pathways: attention and mindfulness, social relations, and connectedness to nature.

Older Adults

How do we keep a growing population of older adults resilient—thriving and continuing to achieve, contribute, and grow during the decades that now come after age 55? In *Healthy People 2010* (U.S. Dept. of Health & Human Services, 2000), the Public Health Service called for research into improvement of cognitive, social, and functional health in older adults through activities focused on health promotion and prevention of illness. As cognitive vitality is central to quality of life and survival (Fillit et al., 2002), Infantino (2004) notes that it is essential to identify activities that could delay or prevent the onset of chronic cognitive disorders, including dementia. Participation in mentally stimulating leisure activities may be cognitively protective for older adults (Wilson et al., 2002a; Wilson et al., 2002b; Fabrigoule et al., 1995). Gardening has been identified as one of these activities (Fabrigoule et al., 1995; Katzman, 1995). Additionally, gardening could enhance functional health by providing physical activity and improved nutrition through increased intake of fresh fruits and vegetables, and community gardening might improve social health by offering opportunities for the development of new friendships, social support, and community ties.

Urban Settings and Urban Dwellers

The increase over the past century in the percentage of persons living in urban areas is an abrupt development in human evolution, during the course of

which “we humans have spent 99 percent of our time on earth living in tremendously close contact with forests, grasslands, and other intact ecosystems” (Sullivan, 2005, p. 239). Now, many human environments are disconnected from the natural world. By definition, a city is a setting with less nature than a rural one. Many urban settings are deficient in restorative features (Milligan, Gatrell, & Bingley, 2004). Kaplan (1995b) and Herzog, Maguire, and Nebel (2003) have described in detail four features of restorative settings: being away, compatibility, extent, and fascination. In brief, *being away* refers to settings in which one can get away from the kinds of mental content and concerns on which one typically focuses. *Compatibility* refers to settings that support the unique goals and inclinations of the people who visit them through the kinds of activities encouraged or demanded by the setting. *Extent* refers to settings with sufficient content to engage the mind and support exploration. *Fascination* refers to settings that elicit a moderate level of “quiet” attention without effort—as opposed settings that rivet one’s attention so much that there is little room left for reflection or receptivity to other things—coupled with aesthetic beauty.

Nature photographer Gregory Conniff (2006) asserts that humans need the beauty of nature and that the modern urban world with its strip malls, pavement, billboards, noise pollution, and traffic, is not pretty. He suggests that this leads people either to “fight,” interpreting the environment as an ugly assault and lashing out at others, as exemplified by road rage, or to “flight,” escaping the ugliness via private, controlled environments, from iPods to cars to houses, leading to a sort of blindness, a lost awareness of the effect that the world has on

us. Such disconnection from the natural world and isolation from other people can have adverse effects on mental and physical health.

Various aspects of city life, including overcrowding, noise, pollution, and fear of crime, are associated with mental health detriments such as anxiety, depression, somatic symptoms, aggression, behavior problems in children, and psychiatric symptoms (for a review, see Wandersman & Nation, 1998). Even in the absence of diagnosable disorders, can we consider people to be *healthy* when they are mentally cloudy, error-prone, or exceptionally irritable (Kaplan & Kaplan, 2005)? Such psychosocial sequelae of modern city life pose a public health predicament, the significance of which comes into perspective when we recall the figures on the increasing percentage of people living in urban areas. This suggests a growing need to find ways to offset the mental health detriments of city living and enhance well-being. In the 21st century, this requires new directions, looking beyond the boundaries of single disciplines at the deep roots of problems that lie within systems.

A theoretical perspective that has been offered on this topic is overload and arousal theory, which maintains that the modern world bombards people with noise, movement, and visual complexity, such that the modern environment can overwhelm the senses and lead to damaging levels of psychological and physiological arousal (Ulrich & Parsons, 1992). On the other hand, environments dominated by plants are less complex and have patterns that reduce arousal and therefore, reduce our feelings of stress. Gardening, then, as contact with nature

may be especially important as a potential means of moderating the effects of urban living, balancing an over-stimulating urban environment.

Subjective Well-Being and Quality of Life

At one time considered too unscientific a concept for scholarly research, happiness is now studied as a component of the construct "subjective well-being" (SWB) and the terms have been used interchangeably (Lyubomirsky, 2001). SWB helps describe how a person subjectively experiences life, given whatever objective conditions are present (Okun & Stock, 1987). The construct SWB is commonly conceptualized in a three-part fashion, including 1) perceived life satisfaction, 2) presence of positive affect, and 3) low levels of negative affect (e.g. Diener, 1984; Argyle and Lu, 1990; Diener, 1994; Diener, Suh, Lucas, & Smith, 1999). Applications of structural equation modeling to data on SWB support this conceptual structure (Vitterso & Nilsen, 2002).

Stemming from research examining personal happiness and well-being is the Satisfaction Model of quality of life, in which quality of life is defined as one's satisfaction with aspects of life that one personally finds important (Gladis, Gosch, Dishuk, & Crits-Christoph, 1999). An underlying assumption of the model is that satisfying areas of life compensate for unsatisfying areas (Baker & Intagliata, 1982; Frisch, Cornell, Villanueva, & Retzlaff, 1992). Measures of quality of life informed by the Satisfaction Model thus involve rating one's satisfaction with various life domains, such as physical health, mood, and social relationships.

Pathways to Subjective Well-Being Via Community Gardening

The amount of empirical research that has been conducted on community gardening per se is limited, thus the present study's hypotheses are based on a range of studies related to the association between contact with nature and psychosocial well-being. This includes research on individual gardening, community gardening, and horticultural therapy, which are described below, supplemented by relevant studies of contact with plants via visits to gardens or parks, residential environments, and window views.

Individual gardening, or the cultivation of plants, is engaged in both for practical reasons such as the production of fresh food, and for enjoyment. The gardening research literature covers general populations, as well as specialized groups such as older adults, people with disabilities, and youth. *Community gardening* is a community-based effort to grow vegetables, fruits, herbs, trees, and flowers, either through a system of individual/family plots, or tended as a whole by a group of citizen volunteers. It involves the active participation of city residents to plan and care for these "'socio-ecological spaces' and the associated flora, fauna and structures" (Tidball & Krasny, 2007, pp. 4-5). Community gardens are often created in order to revitalize low-to-moderate income urban neighborhoods (Pottharst, 1995). One reason that people choose to get involved in community gardens is a lack of space available for private gardening (Armstrong, 2000). This is particularly relevant for persons who do not live in private homes, including many senior citizens and urban-dwellers. Other reasons include food production, desire to be outdoors in a safe space, wanting to improve the

neighborhood, wanting to meet other people, and intrinsic enjoyment of gardening.

Horticultural therapy is the application of the activity of gardening (Goodban & Goodban, 1990) in professionally conducted programs of therapy and rehabilitation (Davis, 1998). Davis (1998) describes the development of horticultural therapy, whose history extends back to ancient Egypt, when court physicians prescribed walks in palace gardens for mentally disturbed royalty. In 1798, Dr. Benjamin Rush, considered the Father of American Psychiatry, announced that he had found farm labor to have curative effects on the mentally ill. In 1880, Dr. Thomas Kirkbride, founder of the American Psychiatric Association, described gardening and farming as "one of the best remedies; it is as useful in improving the health of the insane, as in maintaining that of the sane" (qtd. in Davis, 1998, p. 5). For more than a century, horticultural therapy has been used with many populations, including at-risk youth, war veterans, and people with physical disabilities.

Research has been conducted on possible associations between various forms of contact with plants and various aspects of SWB. In a rigorous, retrospective study of 23 matched pairs of patients recovering from surgery with either a view of a deciduous tree or a view of a brick wall from their suburban hospital window, those with the natural view had shorter postoperative stays, used less pain medication, and had less negative affect such as "upset and crying" or "needs much encouragement" (Ulrich, 1984, p. 420). However, there was no significant difference between groups for positive affect. Extending this work on

window views, Kaplan (1993) conducted correlational research with 783 employees, most of whom had desk jobs. She found that workers reported higher job satisfaction when they had a view to the outside, with satisfaction higher for those who could see nature elements. Even in the relatively green context of a rural setting, high levels of "nearby nature"—assessed in terms of the number of live plants indoors, the window view of nature, and the material of the outdoor yard—have been shown to moderate the impact of life stress on the psychological well-being of 337 boys and girls (Wells & Evans, 2003). These findings suggest that contact with nature provides an important buffer of life stress and a potential mechanism of resilience.

The particular effects of gardening on mood have received some empirical assessment. Rachel Kaplan (1973) conducted pioneering research with 96 gardeners on the psychological benefits of community/plot gardening and home gardening. Through interviews and questionnaires, she found that over and above tangible benefits such as cutting food expenses, and primary garden experiences such as a desire to be outside or to see things grow, people rated gardening most highly as a valuable way to spend time, relax, and feel a sense of accomplishment. Additionally, in an experimental design with 107 cardiac rehabilitation inpatients, significant mood improvements were found following a single 60-minute horticultural therapy session that involved a planting activity in a greenhouse, compared to an education control group (Wichrowski, Whiteson, Haas, Mola, & Rey, 2005). This study is limited, however, by its short-term follow-up, and the possibility of selection bias due to a lack of random assignment.

Stuart (2005) conducted a program evaluation of California domestic violence shelters' community gardening programs, using surveys and structured interviews with 81 culturally diverse residents, or 5% of the approximately 1,500 program participants. The investigator reported that she was prepared for the possibility that residents' preoccupation with their trauma, their new surroundings, and the search for housing and jobs, would limit the effects they reported from the garden. However, comments indicated that gardening soothed adjustment to the shelter, relieved stress, absorbed negativity, was motivating, provided a peaceful retreat, and engendered hope upon seeing new growth. Data indicated that nurturing plants' growth and producing food also provided empowerment, a connection to ones' own cultural heritage in some cases, and a cross-cultural unifier. A number of other studies have also recorded improvements in affective well-being, psychological symptoms, tension, or distress following a gardening intervention, but did not include a no-treatment control group with which to evaluate the effects of gardening (e.g., Austin, Johnston, & Morgan, 2006; Heliker, Chadwick, & O'Connell, 2000; Milligan, Gatrell, & Bingley, 2004; Richards & Kafami, 1999). In sum, there is some evidence for the effects of gardening activity on SWB, but mechanisms remain to be clarified.

Potential Pathways Linking Gardening to Subjective Well-Being

How might contact with nature via gardening contribute to SWB? Three pathways are proposed that could link community gardening to SWB (see Fig. 1 & Fig. 2): 1) social relations and community integration, 2) attention and

mindfulness, and 3) a sense of connection to nature. Each hypothesized pathway is described below, along with a review of the literature that leads to these hypotheses.

Pathway #1—Social relations and community integration. Although it is possible to keep to oneself within a community garden, it is more likely that participating in a community garden will increase one's interpersonal activity. This could in turn expand one's social network and enhance functional components of social relations—social companionship, feedback that can provide solutions to problems, tangible support, and emotional caring. In the present study, it is hypothesized that socializing and working collaboratively in a community garden will increase social connections, social support, and sense of community integration, and that effects will be more strongly associated with traditional community gardening than with mindful community gardening, which emphasizes focus and relaxation. Enhanced social relations are, in turn, hypothesized to be positively associated with SWB, based on research evidence that social relations are a significant determinant of SWB in adults aged 60 to 75 (McAuley, Blissmer, Marquez, Jerome, Kramer, & Katula, 2000).

An emerging area of interdisciplinary research and theory integrates the ecological and social sciences, along with systems thinking, to help us understand the conditions that create resilience in socio-ecological systems (Tidball & Krasny, 2007). Tidball and Krasny (2007) suggest that community gardens can build resilient neighborhoods and serve as a resource that allows cities, when faced with natural disaster or human-made conflict, to recover quickly and fully.

This is in part through the development of social networks and social relations. The closer and stronger one's tie with someone, the greater the likelihood that they will provide major help in a crisis (Hurlbert, Haines, & Beggs, 2000).

Social networks in the U.S. are shrinking according to a comparison of the 1985 and 2004 General Social Surveys, asking a representative sample of Americans about their close ties with other people (McPherson, Smith-Lovin, & Brashears, 2006). In 1985, the modal respondent had three confidants, whereas the modal respondent in 2004 reported having no one with whom to discuss important matters. In 1985, about 80% of respondents had at least one close friend who was not a relative. In 2004, that figure was less than 60%. In his popular book *Bowling Alone,* Putnam (2000) argues that the fabric of American communities has frayed badly. He notes that this has effects on individuals—e.g., social isolation is as big a risk factor for premature death as smoking—as well as on communities, e.g., the crime rate is higher where people are more socially isolated.

Community gardens bring residents together into a denser network than their urban roles normally allow (Glover, 2003). Research using primarily ethnographic methods with 19 older adults in England found that communal gardening decreased social isolation and aided in the development of social networks, which can act as a buffer to stressors (Milligan, Gatrell, & Bingley, 2004). This study also found that community gardens led to more neighbor-to-neighbor assistance—when one member was ill, injured, or busy, other members would tend their plots. This feature can be especially important for older adults

who want to continue gardening but who acknowledge that some limitations hold them back, resulting in frustration and/or depression (Milligan, Gatrell, & Bingley, 2004).

Bertera (2003) asserts that maintaining social network contacts is an important and challenging factor in successful aging. In regression analyses, she found that after controlling for activities of daily living and sociodemographic factors, gardening was one of three physical activities in community-dwelling older adults positively associated with social contact. This suggests that one way to promote social network contacts may be to reduce barriers to gardening.

Foster (2006) sees community gardens as providing opportunities to build both “bonding” and “bridging” social capital, by enhancing connections with both the residents of one’s own neighborhood and residents of different neighborhoods. Although these assertions remain to be empirically tested, urban community gardens often do bring community members together for the first time (Schrieber, 1998). "Over and over, [community] gardeners [tell] of how gardening and the socializing in the gardens make them feel as though they are a part of the community and a part of the land..." (Schmelzkopf, 1996, p. 373).

The construct *community integration* refers to the extent to which a person feels a sense of belonging to a community, as well as a person’s evaluation of his/her community as positive or negative. The term more commonly used in the literature is social integration, which refers to the self in relation to the social structure (Heidrich, 1993). Social integration was found to contribute to positive affect in community-dwelling elderly women (Adams, 1986). In chronically

disabled, mentally ill adults, a positive relation has been found between community integration and well-being (Kennedy, 1989). In the second half of life, social integration, in addition to social participation and social support, appears to improve health and well-being (Wethington, Moen, Glasgow, & Pillemer, 2000). In summary, social integration directly affects well-being, and although related to social support, is a distinct phenomenon (Thoits, 1992).

Pathway #2—Attention and mindfulness. In the present study, it is hypothesized that enhanced attention and mindfulness will be more associated with mindful community gardening than traditional community gardening. Long-studied within psychology, attention is commonly seen as a multifactorial set of processes, but "consensus has not been reached on the exact meaning of various terms for component processes, and some terms refer to overlapping or synonymous processes" (Strauss, Sherman, & Spreen, 2006, p. 546). William James distinguished attention as "a condition which has a real opposite in the confused, dazed, scatterbrained state which in French is called distraction" (1890, p. 404). Extending James's early work on voluntary and involuntary attention (1892), Stephen Kaplan (1995a) directed attention and fascination. Directed attention takes effort, is subject to voluntary control, and is susceptible to fatigue. It is employed to screen out distractions in order to get something done. By contrast, fascination is relatively effortless and resistant to fatigue, and it might take effort to turn one's attention away from something fascinating. Enjoyable tasks elicit this type of attention. Kaplan and Kaplan (1989) posit that prolonged use of directed attention results in mental fatigue, characterized by difficulty with

concentration and irritability, and that settings that elicit fascination allow directed attention to rest, thereby relieving mental fatigue and enhancing effective functioning. This theoretical model is known as Attention Restoration Theory (ART). ART further posits that many natural environments have the restorative features needed to enhance attention.

A review of 16 studies on ART found persistent, positive results using diverse methodologies and examining varied types of contact with nature, providing robust support for the restorative effects of nature on attention and effectiveness (Kuo, 2001). This was true despite the fact that many studies had small sample sizes, with nine to twenty participants per cell. Additionally, many had weak manipulations, with five studies involving not a truly natural setting, but rather pictures of nature, views of nature, or interior plants, and only five studies exposed participants for longer than 30 minutes to a truly natural setting. Moreover, lack of experimental control due to a field design led to low power in ten of these studies, with high within-condition variability. As Kuo (2001) observes, all of these factors should weaken the capacity to detect effects of nature, because according to the principles for calculating power (Howell, 1982), studies with high within-condition variability and low sample size will only reliably find effects if the effect size is large. However, exposure to nature has been consistently and positively linked to outcomes on standard neuropsychological measures of attention, performance on "real-world" cognitive tasks such as proofreading, and self-report measures of attention and effectiveness.

Kuo utilized ART as a conceptual framework in her hypothesis-driven, cross-sectional study (2001) of 145 inner-city public housing residents. Living in greener surroundings, with pockets of trees and grass as opposed to pure concrete or asphalt, was associated with improved attention as assessed by a Digits Span Backwards test, in which participants hear a series of numbers and must repeat these numbers back in reverse order, with the series becomingly increasingly longer. This is a measure of directed attention, specifically involving concentration and working memory. Kuo found that improved attention was in turn associated with more effective management of major life issues. This ability to manage major life issues is critical to resilience. The effect of green surroundings on the management of major issues was fully mediated through attention.

A wide body of literature suggests that the central construct measured by working memory (WM) span tasks is the ability to control attention and thought (Conway, Kane, Bunting, Hambrick, Wilhelm, & Engle, 2005). This critical ability is implicated in many activities that could affect life satisfaction. Performance on WM span tasks correlates with a wide range of higher level cognitive tasks, such as bridge-playing and writing, as well as lower level attention and perception tasks, with those low on WM making more errors on a Stroop task and demonstrating difficulty resisting the attention capture of an exogenous cue in the antisaccade task (Conway, Kane, Bunting, Hambrick, Wilhelm, & Engle, 2005).

Conway, Kane, Bunting, Hambrick, Wilhelm, and Engle (2005) note that research in many branches of psychology implicates WM as a central psychological construct (e.g. Unsworth, Heitz, & Engle, 2005). For example, clinical psychologists have found that WM is related to depression (Arnett et al., 1999) and the ability to deal with life event stress (Klein & Boals, 2001). Developmental research suggests that declines in WM as a result of aging are central to general cognitive-aging effects (Hasher & Zacks, 1988). Neuropsychological researchers find that deficits in WM may be a marker of early onset of Alzheimer's disease (Rosen, Bergeson, Putnam, Harwell, & Sunderland, 2002). As "a multicomponent system responsible for active maintenance of information in the face of ongoing processing and/or distraction" (Conway, Kane, Bunting, Hambrick, Wilhelm, & Engle, 2005, p. 770), WM is a solid measure of attentional capacity.

ART has provided a theoretical foundation in studies of the effect of green environments on childrens' attentional capacity. In a longitudinal study of 17 low-income, urban children before and after residential relocation from "substandard" housing to new single-family homes, Wells (2000) examined the effects of the *greenness* of the residential environment (amount of greenery seen from windows, and whether the yard was grass, dirt, or concrete) on attention. Although there was no significant correlation in the cross-sectional data between greenness and attention either premove or postmove, those who moved to homes that *improved* the most in terms of greenness showed the greatest increases in attention (Wells, 2000). Regression analyses demonstrated that the change in the

greenness of the home environment accounted for 20% of the variance in postmove attention, beyond the 50% of the variance explained by premove attentional capacity; furthermore, the potential confound of overall change in housing quality was not a significant predictor of attention. Additionally, a nationwide survey of 452 children diagnosed with attention-deficit/hyperactivity disorder found that conducting common after-school activities in "mostly natural" outdoor settings such as parks, farms, or green backyards, as opposed to built outdoor settings, such as parking lots, downtown areas, or neighborhood spaces without much greenery, was associated with reduced symptoms (Kuo & Taylor, 2004). This finding held when controlling for a wide range of individual characteristics, residential differences, and illness severity.

In an older adult population, a positive association has been found between gardening and cognitive vitality. A prospective, longitudinal, observational study of risk of dementia in 2,040 people aged 65 or older who were followed for three years showed that gardening was associated with a 50% lower risk of dementia after adjusting for age, baseline cognitive performance, physical capability, and occupational activities (Fabrigoule, Letenneur, Dartigues, Zarrouk, Commenges, & Barberger-Gateau, 1995). The investigators suggest that this might be because gardening is a cognitively engaging task that requires attentional control and that the effects could be partly mediated through improved attention. Similarly, daily gardening predicted a 36% lower risk of dementia in a longitudinal cohort study of 2,805 community-dwelling people aged 60 or older, initially free of cognitive impairment, who were followed for 16 years (Simons,

Simons, McCallum, & Friedlander, 2006). The authors note that it might be the physical, leisure, or mental activity of gardening, or some combination thereof, that is protective against the onset of dementia.

Additionally, in a descriptive, qualitative study of five older, white, community-dwelling, female leisure gardeners, Infantino (2004) used a phenomenological methodology to investigate the role of gardening as cognitively protective. Participant narratives indicated that gardening stimulated their cognitive and sensory processes. Sensory stimulation has been associated with improved cognitive functioning, as well as enhanced perceptions of life satisfaction (Burgess, 1990). Although the study sample was small and homogenous, the results suggest that gardening could support healthy aging by keeping people not only physically but mentally active. To more fully understand the cognitively protective effects of gardening, experimental research is needed in older adult populations.

Related to attention is mindfulness, or "paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally" (Kabat-Zinn, 1994, p. 4). Paying attention in this way is associated with improvements in many disorders, including anxiety (Miller, Fletcher, & Kabat-Zinn, 1995), depression (Teasdale, Segal, Williams, Ridgeway, Soulsby, & Lau, 2000), and chronic pain (Kabat-Zinn, Lipworth, Burney, & Sellers, 1987). Although a growing body of evidence indicates that mindfulness meditation enhances attention (Bishop et al., 2004), little research has been conducted on which component processes of attention are affected. However, in pioneering research

into the effects of mindfulness training on specific aspects of attention, Jha, Krompinger, and Baime (2007) reported that beginning mindfulness students taking an introductory course improved after 8 weeks on orienting attention, which this writer finds analogous to directed attention, while advanced mindfulness practitioners improved after a 1-month retreat on alerting attention, which is akin to fascination. In this way, mindfulness practice has been shown to involve both directed attention and fascination. See Table 1 for a summary of the ways that directed attention and fascination have been conceptualized by several fields of study.

This investigator theorized that both gardening and mindfulness training involve directed attention and fascination, and therefore gardening could contribute to greater mindfulness, which has in turn been linked to increases in SWB (Kabat-Zinn, 1990; Brown & Ryan, 2003). In the present study, this hypothesis was tested by using two measures of mindfulness that include items analogous to directed attention and fascination. Two caveats should be mentioned. First, it is possible that because community gardening involves working with others, and potential distractions from other people or interruptions for conversation, it might enhance directed attention less than individual gardening. At the same time, it is possible that such distractions would create more opportunities for re-focusing, thereby augmenting attentional capacity to a greater extent than if there were no distractions. Second, mindfulness involves not only paying attention, on purpose, in the present moment, but also doing so without judgment. Although gardening does not clearly lead to being non-judgmental,

gardening still could contribute to mindfulness. These uncertainties are empirical questions. My working hypothesis is that mindful gardening will contribute more to attention (working memory) and mindfulness than will traditional gardening because it will provide more rest for directed attention. To date, no empirical study has been conducted to explore an association between gardening and mindfulness.

Pathway #3—Connectedness to nature. Ecopsychologists and ecologists have written for decades about the importance of feeling connected to nature (Leopold, 1949; Roszak, Gomes, & Kanner, 1995; Berry, 1997; Pretty, 2002). In the present study, it is hypothesized that an enhanced sense of connectedness to nature will result from both traditional and mindful community gardening, and contribute to SWB (see Fig. 2). This hypothesis stems from the biophilia hypothesis, presented by Edward O. Wilson (1984). It suggests that human connection with nature may be not only for "material and physical sustenance" but may also be "the expression of a biological need, one that is integral to the human species' development and essential in physical and mental growth" (Kellert, 1993, p. 20). Although still a hypothesis in need of systematic inquiry, the provocative theoretical implication is that there is a human need to connect with the natural environment. This theoretical need might be threatened by the amount of time we spend within buildings, estimated by Evans and McCoy (1998) as 90% of our lives.

Connectedness to nature has recently been operationalized as a trait-like feeling of emotional connection to the natural world, and a valid, reliable scale

has been developed to measure this (Mayer & Frantz, 2004). In five studies testing the connected to nature scale (CNS), data from two community and three college samples supported ecopsychologists' assertions that connectedness to nature is an important predictor of SWB (Mayer & Frantz, 2004). In one sub-study with 135 respondents ranging in age from 14 to 89 years, the CNS correlated positively with life satisfaction, one component of SWB. Mayer & Frantz (2004) point out that the magnitude of the correlation between connectedness to nature and SWB (r = .20) is similar to that of three variables more traditionally associated with SWB: marriage (r = .14, reported by Haring-Hidore, Stock, Okun, & Witter, 1985), education (r = .13, reported by Witter, Okun, Stock & Haring, 1984), and income within countries (r = .17, reported by Haring, Okun, & Stock, 1984). Nevertheless, they call for clarification in future research as to whether there is a causal path between connectedness to nature and SWB, and they recommend that researchers evaluate whether interventions aimed at increasing contact with nature actually increase the sense of feeling connected to nature. The present study responds to these calls to action.

As the mindful community gardening intervention will prompt people to pay attention to their surroundings and heighten awareness of the connections among life forms, it is anticipated that it will contribute more to connectedness with nature than traditional community gardening. Mindful gardening as crafted by this writer includes a focus on what Berry (1988) calls "an Earth community." This moves away from an anthropocentric viewpoint and entails redefinition of "community" to include other species and the earth itself. The Earth community

can be seen concretely in the garden, where one learns for example that earthworm castings nourish the soil that grows food for human consumption. In the compost pile, one sees animal manure, dead twigs and leaves, and food scraps transformed into soil that grows corn, sunflowers, and apple trees. This makes it readily apparent how each element in the natural system—human, tree, flower, insect, vegetable, animal, etc.—connects to each other. In this way, gardening with awareness could contribute to a sense of one's place in the larger cycles of life, nature, and food, thereby enhancing sense of connection and meaning, and contributing to greater SWB.

Summary

In summary, there are viable, testable pathways linking community gardening to SWB, potentially mediated by social relations, social support, and community integration; attention and mindfulness; and connectedness to nature. These pathways are likely not totally independent but overlap and contribute to one another.

Limitations in Existing Literature

The studies reviewed suggest a positive relation between community gardening and individual and community well-being. However, the existing literature on community gardening has a number of limitations. First, the volume of literature on community gardening per se is relatively small. This is a gap that needs to be filled. Second, most of the psychosocial research is correlational in nature. Although informative, this hinders the conclusions that can be drawn about cause and effect. Third, the experimental literature sometimes contains

methodological flaws, such as a lack of a control group, which also limits the conclusions that can be drawn. Fourth, theory-testing has been deficient, and few explanations of the mechanisms underlying the observed associations have been offered. Many researchers have chosen to make predictions and report results about the psychosocial benefits of gardening without testing or discussing possible explanatory mechanisms. These limitations provide a rich opportunity to develop better methods of inquiry and deepen understanding in this field of study. Community gardening research is needed to identify processes that could further the well-being and resilience of older adults, urban-dwellers, and the larger Earth community.

Feasibility of a Randomized, Controlled Trial

To date, this investigator has not found a randomized, controlled trial (RCT) of urban community gardening (UCG). Most UCGs are not amenable to RCTs as they typically begin within a neighborhood, with people setting them up and starting gardening prior to any research evaluation. In the proposed study, the garden itself exists, but only two people regularly volunteer there. Thus it provides an opportunity for a quasi-UCG trial—"quasi" in that it is not taking place in the typical fashion in which a community garden starts. However, as an early research attempt, it is a close proxy for a real-life UCG.

It is plausible to imagine that people would be attracted to urban community gardening. People report gardening for many reasons, including tangible benefits, such as cutting their food expenses; interest in gardening as a valuable way to spend time, relax, and feel a sense of accomplishment; and

primary garden experiences, such as a desire to be outside or to see things grow (Kaplan, 1973). With growing urbanization, there has been an increased trend towards seeking out encounters with the natural environment, or "the green experience," (Kaplan, 1978). This need not be dramatic—everyday outdoor environments, from a tree to a small piece of open land, have been found to be enjoyable (Kaplan, Kaplan, & Wendt, 1972).

In addition, more and more reports of the benefits of gardening are appearing in the popular press, and hence in public consciousness. For example, in Phoenix, Arizona, the fifth-largest city in the U.S., an article in a major local newspaper noted that gardening is a form of moderate exercise that burns calories and reported on the use of horticultural therapy to reduce stress, ease pain, and lower blood pressure (Painter, 2007, April 18). The Association for the Advancement of Retired People (AARP)'s September-October 2008 magazine featured an article called "Zen and the Art of Garden Maintenance," which specifically addressed the benefits of mindful approaches to gardening.

In studying the psychological benefits associated with nature experiences, Rachel Kaplan (1973) notes that gardening confers several advantages. First, in gardening, nature is not a background that could be ignored by participants, but rather is an essential component of the experience. Second, gardening is not a casual or chance experience with nature, but rather is a purposeful activity that requires a commitment and ongoing contact. Third, due to the frequency of contact with nature, gardening offers a nature experience that's more accessible to research study, especially longitudinal study.

Summary of Study Hypotheses

See Figures 1 and 2 for illustrations of the following study hypotheses.

1. Traditional community gardening will be positively associated with increases in SWB, compared to a wait-list control group.

2. Traditional community gardening will be positively associated with increases in the hypothesized mediating variables of social relations, social support, and community integration, moreso than will mindful community gardening, compared to a wait-list control group.

3. Social relations, social support, and community integration will all be positively associated with SWB.

4. Mindful community gardening will be positively associated with increases in SWB, compared to a wait-list control group.

5. Mindful community gardening will be positively associated with increases in the hypothesized mediating variables of attention (working memory) and mindfulness, moreso than will traditional community gardening, compared to a wait-list control group.

6. Attention (working memory) and mindfulness will both be positively associated with SWB.

7. Mindful community gardening will be positively associated with increases in the hypothesized mediating variable of connectedness to nature, moreso than will traditional community gardening, compared to a wait-list control group.

8. Connectedness to nature will be positively associated with SWB.

METHOD

This pilot study of urban community gardening interventions for older adults was carried out at Arizona State University (ASU) and a community garden in Tempe, AZ between January 2009 and July 2009. It was approved by the university's Institutional Review Board. The flow of the participants through this randomized, controlled, study is shown in Figure 3. After providing informed consent and completing baseline assessments, participants were randomly assigned to one of three groups: Mindful Community Gardening, Traditional Community Gardening, or Wait-List Control Group.

To be eligible for the study, adults had to be (1) between the ages of 55 and 79, (2) able to transport themselves to the garden for the intervention, (3) willing to participate in all aspects of the study and make the necessary time commitment, and (4) in good physical health, as assessed by the Physical Functioning subscale of The Short-Form-36 Health Survey, described below. The following exclusion criteria were applied: 1) inability to give their full name, address, and telephone number, as a marker for cognitive impairment serious enough to inhibit participation, 2) advance knowledge of having to miss more than two sessions, and 3) unreadiness for physical activity, determined by the presence of an uncontrolled, serious health condition as assessed by the Revised Physical Activity Readiness Questionnaire described below, and unwillingness or inability to obtain a doctor's written clearance for participation.

Participants and Procedure

Recruitment. Recruitment efforts concentrated on a geographic area within 5 miles of the garden. Participants were recruited through the following methods: 1) advertisements in the Tempe Republic insert to the Arizona Republic, the Wrangler News, and HealthWatch (for ASU employees), 2) email announcements to Tempe neighborhood associations, 3) flyers posted at 55+ communities, libraries, churches, supermarkets, and apartment and condominium complexes, 4) community gardening talks given by the main investigator at Tempe senior centers, including the Pyle Center, the Westside Community Center (also known as the Cahill Senior Center), the North Tempe Senior Center, the Escalante Center, and other programs that attract older people, including Tempe Connections at the Tempe Public Library and a storytelling night focused on nature at Community Christian Church in Tempe. Recruitment and screening took place from mid-January to late February 2009.

Screening. Approximately 100 persons were screened via telephone by either the main investigator (HAO) or a trained research assistant (RA). If a caller fulfilled the inclusion criteria and did not meet any of the exclusion criteria, the study was explained in detail by orally reviewing the consent form. Interested persons then ranked their preferred days of the week for participating in a community gardening group, were scheduled for a baseline assessment, and were sent a consent form to read prior to baseline testing. Screening calls took approximately thirty minutes to complete.

Informed consent and baseline data collection. Fifty-three individuals consented to participate and completed baseline assessments (see Figure 3). Sixteen baseline assessment sessions of approximately 2.5 hours each were conducted by the main investigator and an RA at Tempe St. Luke's Medical Office Building for groups of two to five participants. The consent form (Appendix A) was reviewed and any questions were answered before participants filled out questionnaires that assessed demographics, current gardening and meditation activity, depression, physical health, mindfulness, social relations, connectedness with nature, and subjective well-being. Measures are described below. Additionally, as a Nutrition corollary to the present study in collaboration with ASU Assistant Professor of Nutrition Christopher Wharton, Ph.D., participants' attitudes toward and consumption of fresh fruits and vegetables, local foods, and organic foods were assessed via questionnaire.

Participants were individually escorted to a private room for tests of working memory (described below), followed by height and weight measurements and follow-up questions about current gardening and meditation activity, if any, and, if necessary, depressive symptoms. Subsequently, the RA reviewed detailed written instructions with participants on how to fill out a 1-week food diary at home (as part of the Nutrition corollary to the present study). Participant preferences for day of the week for gardening were then verified or modified as needed. Finally, the RA led a walking tour to the garden, several blocks away. Baseline data collection took place in February 2009. Following baseline data collection and prior to randomization, three individuals withdrew

from the study; two did not give reasons and one noted that she realized she would be physically unable to participate. Their baseline data were shredded.

Randomization. Although the sample size (n = 50) for this pilot study fell short of the goal of 90 participants—chosen to allow for a .8 or greater probability of rejection of the null hypothesis regarding Pre-Post differences between treatment groups for medium effect sizes (Cohen, 1988)—it was deemed necessary to randomize and begin the nine-week groups in early March due to impending heat, the anticipated exodus from the Phoenix metro area of many study participants in May, and the risk of losing participants if the start of groups were to be delayed until the fall. In weighing these risks against the loss of power associated with having fewer participants in each cell, a possible design modification of reducing from three levels of the manipulated variable to two was considered. The main investigator, with the committee's support, chose to maintain the original research design with three groups, based on a two-fold rationale. First, from a theoretical perspective, comparison of the three conditions was considered to be vital because mindful gardening as a way to teach mindfulness had never been studied, and there had not been any randomized, controlled trials of traditional gardening. It was decided that it would therefore be worthwhile to explore the pattern of results, which even if not statistically significant, could be examined further in a future larger and better-funded study if moving in the expected direction. Second, based on a review of Cohen (1988), for any given effect size (small, medium, or large), having two conditions with 25

participants per condition would have little effect on power versus having three conditions with 15 to 20 per condition.

A design with unequal sample sizes was then chosen. The rationale was to reduce the standard deviations for the two intervention group means that were expected to be most alike, while increasing the standard deviation about the mean for the control group, which was expected to be most different from the other two. Hence, of the 50 participants in the study, 20 were to be randomly assigned to each of the intervention conditions and 10 to the control group.

Participants were randomly assigned to groups in the following manner. Rankings of their preferred days of the week for gardening were taken into consideration to select the four most popular days for groups (Monday, Tuesday, Thursday, Saturday). Twelve or thirteen participants were assigned to these four days based on preference. Then, for each day of the week, two or three participants were randomly selected to enter the control group. The nine control group members were advised that they had been randomly chosen for a community gardening group to begin in May. They were reminded that they would complete a second set of questionnaires in April and then would have the option of beginning a gardening group in May and participating in that group for as many weeks as they chose, or if they preferred, not participating in the groups at that time. The remaining participants constituted the intervention participants. Finally, Tuesdays and Thursdays were randomly selected for the Traditional Community Gardening intervention, and Mondays and Saturdays were randomly selected for the Mindful Community Gardening intervention.

Following random assignment to a day of the week, but prior to the first group, seven of the 41 intervention participants chose not to begin groups due to a change in schedule or health issues. Group assignment did not appear to be systematically linked to not participating in groups, as evidenced by the fact that at that point, they did not know whether they were in Mindful or Traditional Community Gardening, and the seven individuals were distributed among three of the four group days: Tuesday (n = 3), Thursday, (n = 1), and Saturday (n = 3). Due to concerns about control group attrition, they were invited to complete follow-up data collection in April and then decide if they would like to participate in a gardening group beginning in May. All agreed, and in this way, they were placed in the control group by non-random assignment. This resulted in the following numbers of participants in each group: Monday Mindful Community Gardening (n = 10), Saturday Mindful Community Gardening (n = 7), Tuesday Traditional Community Gardening (n = 8), Thursday Traditional Community Gardening (n = 9), Wait-List Control Group (n = 16). Later analyses showed that the non-randomly assigned control participants were similar to other participants except for lower ratings of connectedness to nature. The lack of random assignment of some control group participants was addressed by conducting analyses involving group comparisons in two ways: first, including these individuals, and second, excluding them.

Intervention. This study involved two intervention groups—Mindful Community Gardening (MCG) and Traditional Community Gardening (TCG). The interventions followed a parallel format, described here and in Table 2. All

intervention groups took place at "Highest Heaven Garden" in Tempe. Participants came to the garden on the same day of the week, for 2.5 hours during the afternoon, once weekly for nine weeks in March and April 2009. Also present were the garden coordinator, Bob Friend, and an RA. The main investigator was present at all sessions of the MCG groups, and approximately five of nine sessions of the TCG groups. Participant attendance was recorded with arrival and departure times; in this way, total time spent in the garden was tracked as "Dose."

TCG involved approximately 1.5 hours of gardening. The remaining hour was allotted for checking in with one another and with the garden coordinator, organizing work, snack breaks, socializing, and a Question & Answer closing activity (Q&A). This would be similar to a "real-word" community garden, with the exception of the Q&A, which would probably take place in a less structured way, but was included to more closely approximate the MCG group. Gardening activities varied and are described in Table 2. Each participant's level of physical ability was respected. Adaptive devices, e.g., kneeling benches and extended-reach garden tools, were purchased to make the process easier. Rather than having individual plots as occurs in some community gardens, in which each person tends their own piece of land, everyone worked together to grow the produce for the overall garden. The garden coordinator oversaw what participants could harvest and bring home. The remainder of the produce was sold locally, with proceeds going back to the garden for its ongoing sustenance, e.g., purchasing garden supplies. Participants' interactions were minimally directed. Although this

community gardening experience was not a class, there was some didactic information shared by the garden coordinator as a matter of course.

MCG is an approach to teaching mindfulness, designed by this researcher, based on the practices of Zen monk and author Thich Nhat Hanh. It involves "paying attention in a particular way—on purpose, in the present moment, and without judgment" (Kabat-Zinn, 1994, p. 4) in the context of an organic garden. Participants engaged in the same kinds of activities as in the TCG group, but were guided to do so in a different way. Mindful gardeners were encouraged to notice the texture of the soil in their hands, the smell of the plants, and the sounds of birds and the neighborhood. They were guided to develop awareness of their surroundings, then of their own physical sensations, and later to develop awareness of their breathing, and then their thoughts. This approach differs from traditional gardening, which may be carried out while conversing about politics, or ruminating over an interpersonal conflict, or working to the point of weariness. The intervention was designed to harness and expand upon the purported benefits of community gardening. Gardeners were gently coached to be fully present in their gardening, walking, and eating while in Highest Heaven. Each week, extended periods of mindful breathing were added to the experience, and new aspects of mindfulness were introduced: walking, eating, and conversing. This was not instead of, but in addition to, the activities conducted in the TCG group. An outline of the activities for each week appears in Table 2. As in the TCG group, during the 2.5 hours in the garden, approximately 1.5 hours were planned for gardening. However, this proved difficult because of the time needed to

review, learn, and discuss mindfulness practices, thus about 1 hour was devoted to gardening. The remaining time was allotted for instruction in mindfulness, checking in with one another, snack breaks, and a closing activity that involved noticing and sharing observations and questions. This time structure mirrored that in the TCG group. Participants were also asked to keep up their mindfulness practice at home through gardening, walking, eating, or sitting meditation, and to keep a log of these activities from Week 5 to Week 9.

Attrition. An examination of attrition revealed differences between groups. An "attriter" was defined as an intervention participant who missed four or more of the nine group sessions, including the last session, or a control group participant who did not complete follow-up data collection. Attriters accounted for 5.9% of the TCG arm (1 participant) and 29.4% of the MCG arm (5 participants). The reasons for dropping out were illness (TCG participant), moving out of town (MCG participant), dislike of the mindfulness component of MCG (two MCG participants), and unknown (two MCG participants who appeared to enjoy mindfulness during the groups that they attended). Including attriters, participants in the TCG arm attended an average of 7.35 sessions, spending 18.9 hours in the garden over the course of the groups, while participants in the MCG arm attended an average of 6.77 sessions, spending 17.22 hours in the garden. Five of the six intervention group attriters returned for follow-up data collection. In the WL control group, 31.3% (5 participants) did not return for follow-up. Four of the five control group members who were lost to follow-up had been randomly assigned

to the control group. In total, 88% of the sample of 50 participants completed follow-up testing.

Follow-up data collection. Fourteen follow-up data collection sessions of approximately one hour each were conducted by an RA at Tempe St. Luke's Medical Office Building for groups of one to four participants. These testing sessions paralleled baseline data collection in that participants completed the same assessments. However, to reduce social desirability effects, the main investigator was not present. Instead, two trained graduate students blind to group assignment conducted the tests of attention (working memory) and provided clinical follow-up of participants' depressive symptom reports as needed. The majority of follow-up data collection sessions took place from late April to late May of 2009, with several sessions in June and July 2009 for those who had been unable to attend earlier. Attriters were contacted by telephone and mail and asked to return follow-up questionnaires by mail.

Garden open to wait-list control participants. In early May, five control group participants wishing to participate in the garden began to do so for as many weeks as they wished. The number of sessions for control participants ranged from one to three, with most participants curtailing their participation due to the heat and/or travel plans. The garden coordinator and an RA were present during these sessions. Intervention group participants were also invited to continue volunteering in the garden; none of them chose to do so, but many expressed a desire to return to the garden to volunteer during cooler weather in the fall. To the

knowledge of this investigator, that did not occur but several continued coming to the garden to buy vegetables or to drop off kitchen scraps for the compost pile.

Participant gathering. In April 2010, approximately one year after their active involvement in the study, participants were invited to return to the garden for a potluck where they would learn and discuss the results of the study. Sixteen participants attended, distributed as follows: Monday MCG (3), Saturday MCG (2), Tuesday TCG (4), Thursday TCG (4), and the control group (3). Six others indicated that they would like to attend but could not due to work, travel plans, family responsibilities, illness, or in one case, having moved out of town. No data were collected on this event, but the consensus of project staff in attendance was that it was appreciated by the participants and that the 9-week community gardening research study experience had had a lasting impact on them.

Quantitative Measures

The quantitative measures fell into four categories: 1) screening tools, 2) demographic and other background variables, 3) primary outcome measures (SWB), and 4) hypothesized mediators. First, the screening tools included self-reported physical functioning; physical activity readiness; and eligibility questions that reflected inclusion/exclusion criteria for age, availability, and transportation. Second, the demographic and other background variables included age, gender, race, education, ethnicity, marital status, employment status, self-rated health, body mass index, weekly hours of gardening and meditation, and depression. Third, primary outcome measures assessed the central dependent variable of SWB, including positive and negative affect, quality of life, and vitality. Fourth,

hypothesized mediators of the relation between gardening and SWB were attention (working memory), mindfulness, social relations, social support, community integration, and connectedness to nature. Measures of these constructs were selected based on reliability, validity, sensitivity to change, and relative brevity, as each was part of a larger battery of assessments. The measures are described below, and the actual items are given in Appendices B through L.

Screening Tools

Self-reported physical functioning. Physical functioning was measured using the Physical Functioning subscale of the Medical Outcomes Study (MOS) 36-item Short-Form Health Survey (Ware & Sherbourne, 1992). This 10-item measure asks respondents to rate how much their health limits them in a variety of activities, such as "bending, kneeling, or stooping," "walking one block," and "bathing or dressing yourself." All the responses are rated based on a 3-point scale, where "1" indicates "*Yes, limited a lot*," "2" indicates "*Yes, limited a little*," and "3" indicates "*No, not at all limited*." Items appear in Appendix B. Validity, internal consistency, and test-retest reliability have been reported to be 0.39 to 0.85, and 0.60 to 0.90, respectively (Ware & Sherbourne, 1992). Norms are available for various age groups, including age 75 and over (Ware, Snow, Kosinski & Gandek, 1993). Participants were deemed ineligible to participate if they responded "1" to any item *other than* the following: (a) Vigorous activities, (d) Climbing several flights of stairs, or (g) Walking more than a mile.

Physical activity readiness. Physical activity readiness clearance was measured using the Revised Physical Activity Readiness Questionnaire (rPARQ).

This is an 11-item, pre-exercise screening tool that assesses whether people are ready to become more active immediately or whether they should check with their doctor. Respondents answer "yes" or "no" to questions such as "Do you feel pain in your chest when you do physical activity?" and "Do you lose your balance because of dizziness or do you ever lose consciousness?" If a respondent answers "yes," then additional follow-up questions ask whether the condition is well-controlled by medication, whether the medication has changed in the past 3 months (an indicator that the condition might not be well-controlled), and whether the respondent's doctor has ever said not to engage in physical activity because of this. If prospective study participants had a serious condition that was not well-controlled, they were deemed ineligible for the study unless they obtained a waiver from a medical doctor stating that they had no contraindication to participate. Concurrent validity between the rPARQ and the PARQ has been reported, with 87.6% agreement between instruments regarding whether to exclude/include for exercise clearance, but enhanced specificity in the rPARQ to decrease false positive exclusions (Cardinal, Esters & Cardinal, 1996). Items appear in Appendix C.

Demographic and Other Background Variables

Background questionnaire. Participants were asked to fill out a background questionnaire created by the main investigator. First, they rated their overall health on a 5-point scale, where "1" indicates "*Poor*" and "5" indicates "*Excellent."* Then they gave their date of birth (age) and selected from a number of categories to describe their gender, race/ethnicity, marital status, living

situation (e.g., alone, with a spouse, with another adult or adults), highest level of education, and current employment situation (e.g., working for pay, looking for work, retired). Finally, they answered questions regarding how many hours of gardening and meditation they do on a weekly basis, and what kinds of gardening. They also answered "filler" questions about how many hours of physical activity and relaxation they engage in on a weekly basis. Items appear in Appendix D.

Depression. Depression in older adults is often accompanied by memory loss (Kahn, Zarit, Hilbert, & Niederehe, 1975), a symptom seen less frequently in the young, while somatic symptoms such as sleep disturbance that are keys to depression in younger people are less useful in older adults because they are common even in the absence of depression (Yesavage et al., 1983). Given such special considerations in the assessment of depression in older adults, depressive symptoms were measured using the Geriatric Depression Scale—Short Form (GDS-SF; Yesavage et al., 1983), a 15-item measure. Items appear in Appendix E. Correlations with other measures of depression range from 0.69 to 0.83, demonstrating evidence of validity; internal consistency is high, with a reported alpha coefficient of 0.94; and test-retest reliability has been reported as 0.85 (Yesavage et al., 1983). For this sample, Cronbach's alpha was acceptable at 0.73.

Body mass index. Body mass index (BMI) is a measure of health based on height and weight. Study participants' heights and weights were measured by a trained RA. BMI was subsequently calculated using the World Health Organization's formula, i.e., the individual's body weight in pounds multiplied by 703, then divided by the square of his or her height in inches.

Subjective Well-Being Measures

Positive and negative affect. As a component of SWB, positive and negative affect were measured by the Positive and Negative Affect Scales (PANAS; Watson & Pennebaker, 1989). The PANAS is a 20-item self-report measure that assesses two primary dimensions of mood, positive affect (PA) and negative affect (NA). Each item is rated to the extent that the respondent has experienced that mood state during the previous 4 weeks on a 5-point scale ranging from "1" or "*None of the time*" to "5" or "*All of the time.*" The PA scale reflects mood states such as "enthusiastic," "active," and "alert," while the NA scale reflects mood states such as "distressed," "irritable," and "afraid." Items appear in Appendix F. The PANAS has demonstrated high internal consistency in previous research with a Cronbach's alpha of 0.84 to 0.90 as well as test-retest reliability ranging from 0.42 to 0.72 within an 8-week retest interval (Watson & Pennebaker, 1989). For this sample, Cronbach's alpha was 0.88 for PA and 0.90 for NA.

Quality of life. Quality of life was measured using the Quality of Life, Enjoyment, and Satisfaction Questionnaire Short Form (Q-LES-Q-SF; Endicott, Nee, Harrison, & Blumenthal, 1993). This is a 16-item self-report containing 14 items about satisfaction in a variety of domains such as "mood," "social relationships," and "leisure time activities," plus two items measuring satisfaction with medication and overall life satisfaction. All items are rated on a 5-point scale of level of satisfaction over the past week, where "1" indicates "*Very Poor*" and "5" indicates "*Very Good*." Items appear in Appendix G. The Q-LES-Q is a valid

measure of quality of life in depressed outpatients, as demonstrated by correlations with other measures (depression, illness severity) but a level of shared variance suggesting it is not redundant (Endicott, Nee, Harrison, & Blumenthal, 1993). Internal consistency and test-retest reliability are reported to be 0.90 and 0.74 to 0.86, respectively (Endicott, Nee, Harrison, & Blumenthal, 1993; Schechter, Endicott, & Nee, 2007). For this sample, Cronbach's alpha was 0.88.

Vitality. Vitality has been described as a positive and restorative state that is associated with energy, enthusiasm, and physical and psychological well-being (Rozanski & Kubzansky, 2005; Ryan & Frederick, 1997). In a review of several studies, subjective vitality was seen as a reflection of well-being; for example, it was positively related to positive affect and negatively related to depression, anxiety, negative affect, and somatic distress (Ryan & Frederick, 1997). Resilient individuals are able to maintain their vitality in the face of chronic stress, illness, or psychological distress (Rozanski & Kubzansky, 2005; Ryan & Frederick, 1997). Vitality was measured with a subscale of the MOS 36-item Short-Form Health Survey (Ware & Sherbourne, 1992). Each item is rated to the extent that the respondent has felt that way during the previous 4 weeks on a 6-point scale ranging from 1 or "*All of the time*" to 6 or "*None of the time*." Items appear in Appendix H. For this sample, Cronbach's alpha was 0.90.

Hypothesized Mediators

Attention. Attention was assessed with Digit Span Backward, a test of working memory that tests "how many bits of information a person can attend to

at once and repeat in reverse order" (Lezak, 2004, p. 358). It has been used in both the clinical measurement of attention (e.g., Lezak, 2004) and in past research on attention restoration theory (e.g., Kuo, 2001). Digit Span Forward and Backward is a standardized sub-test of the Wechsler Adult Intelligence Scale. To administer these tests, the examiner reads aloud a series of digits (e.g., "2 ... 5 ... 1"). For Digits Forward, participants are asked to repeat back the series. For Digits Backward, they are asked to repeat back the series in reverse order (e.g., "1 ... 5 ... 2"). Series of increasing length are administered beginning with two digits and continuing to a maximum of eight digits. If a respondent fails a series of a given length, a second series of equal length is administered. Testing is discontinued when a participant scores 0 on both trials of the same length. Digit Span Forward was administered to help prepare participants for Digit Span Backward, which was the only part of the test utilized in the analyses because it measures WM. Items appear in Appendix I. WM span tasks show convergent, discriminant, and predictive validity and successfully predict complex cognition (Conway, Kane, Bunting, Hambrick, Wilhelm, & Engle, 2005). Internal consistency and test-retest reliability are reported to be 0.70 to 0.90, and 0.70 to 0.80, respectively (Conway, Kane, Bunting, Hambrick, Wilhelm, & Engle, 2005).

Mindfulness. Mindfulness was measured using both the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) and the Observe subscale of the Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004). Items for both scales appear in Appendix J. Item in both of these scales are

viewed by this investigator as tapping into the directed attention and fascination aspects of mindfulness and of gardening.

The MAAS is a 15-item measure that asks participants to what extent they are attentive to and aware of what is occurring in the present (e.g., "I tend to walk quickly to get where I'm going without paying attention to what I experience along the way"). Due to the phrasing of the items, the scale has been described as more of a measure of mind*less*ness, i.e., the absence of mindfulness. All items are rated on a 6-point Likert scale ranging from 1 or "*Almost always*" to 6 or "*Almost never*," so that higher scores reflect greater mindfulness. Convergent and discriminant validity have been reported, and internal consistency in a U.S.-wide sample of 239 adults age 18 to 77 was very good with a Cronbach's alpha of 0.87 (Brown & Ryan, 2003). Test-retest reliability has been reported as 0.81 (Brown & Ryan, 2003), and scores have increased with mindfulness intervention (Nyklicek & Kuijpers, 2008). For this sample, Cronbach's alpha was 0.82.

The Observe subscale of the KIMS consists of 12 items that ask participants about the extent to which they observe whatever happens in the present moment (e.g., "I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow"). All items are rated on a 5-point scale, ranging from 1 or "*Never or rarely true*" to 5 or "*Almost always or always true.*" Content validity has been reported, and internal consistency in a sample of 205 undergraduates was very good with a Cronbach's alpha of 0.91 (Baer, Smith, & Allen, 2004). Test-retest reliability has been reported after two

weeks as 0.65 (Ibid), and scores have increased with mindfulness intervention (Nyklicek & Kuijpers, 2008). For this sample, Cronbach's alpha was 0.86.

Social relationships, social support, and community integration. Several aspects of social relations were measured. All items appear in Appendix K. First, social relationships were assessed with four questions regarding the number of close friends and relatives one has, as well as whether the respondent had made any new friends during the past two months, and if so, how they met. These items were generated for the present study based on questions in past research into the association between greenspace and social ties.

Second, social support was measured using a subset of six items from the 20-item MOS Social Support Survey (Sherbourne & Stewart, 1991). This measure asks respondents how often various kinds of support (emotional, instrumental, companionship) would be available to them if needed, with items such as "someone to have a good time with" and "someone who understands your problems." Responses are rated on a 5-point scale, from 1 or "*None of the time*" to 5 or "*All of the time*." Convergent and discriminant validity has been reported, and internal consistency is excellent with a Cronbach's alpha of 0.97 and a one-year test-retest reliability of 0.78 (Sherbourne & Stewart, 1991). The six items selected reflect two subscales of Social Support—Positive Social Interaction and Emotional/Information Support—that were considered to be most sensitive to the interventions in the present study. For this sample, Cronbach's alpha was 0.93.

Third, Community Integration was assessed using six items from the Study of Midlife Development in the U.S. (MIDUS) that ask how strongly

participants agree or disagree with statements such as “I don't feel I belong to anything I'd call a community” and “I have nothing important to contribute to society.” Items are rated on a 7-point scale ranging from 1 or “*Agree strongly*” to 7 or “*Disagree strongly*.” In previous research, a 4-item subset of this measure had moderate internal consistency with a coefficient alpha of .72 (Okvat, Davis & Okun, unpublished). For this sample, Cronbach’s alpha was 0.78.

Sense of connection with nature. This was assessed using the Connectedness to Nature Scale (CNS; Mayer & Frantz, 2004), a 14-item measure that asks participants how much they agree with a series of statements such as “I think of the natural world as a community to which I belong” and “I often feel part of the web of life.” Items are rated on a 5-point scale ranging from 1 or “*Strongly disagree*” to 5 or “*Strongly agree.*” The CNS has good convergent validity with related variables and is uncorrelated with potential confounds (verbal ability, social desirability); internal consistency has been reported to be 0.79 to 0.84; and test-retest reliability has been reported as 0.82 (Mayer & Frantz, 2004). Items appear in Appendix L. For this sample, Cronbach’s alpha was 0.85.

Qualitative Methods

The purpose of the qualitative component of the study was to bring to light any issues or phenomena that might not have been detected by the quantitative methods, and to obtain deeper information from participants on a variety of questions, especially how they cope with challenges and stressors. Three methods were used to gather qualitative data for the present study. First, at each intervention group session, behavioral observations were made and recorded by a

research assistant (RA) and subsequently supplemented by the main investigator. The RA focused on documenting what actually occurred in the group in terms of the facilitators' comments and group activities, in order to maintain intervention fidelity across groups; participants comments that "stood out" in some way related to the constructs under investigation, e.g., suggestions for group to get together outside of the garden; overall level of conversation and participation, both of the group as a whole and individual participants; particular verbal or non-verbal expressions of positive and negative affect; tangible contributions of group members to one another (e.g., bringing handouts on gardening for others); participant comments on mindfulness practice; and the degree to which conversations were focused on the present experience or on outside topics or future or past activities. As she/he was naturally interacting on a limited basis with participants and monitoring activity, it was possible to keep the recorded observations unobtrusive. This process resulted in 36 field notes (9 sessions x 4 groups) of approximately two pages each.

Second, at the end of the follow-up data collection session, all intervention participants received a questionnaire with six open-ended questions. This allowed them to convey their opinions about the groups in their own words. Of the 34 intervention participants, 30 (88.2%) responded to the open-ended questions. Items appear in Appendix M.

Third, in July 2009, approximately 2.5 months after the last intervention group, individual interviews of approximately one hour were conducted with twelve intervention group participants. Three individuals were interviewed from

each of the two TCG groups and each of the two MCG groups, resulting in interviews with six TCG participants and six MCG participants. Interviewees were selected based on completion of groups and purposive sampling, such that those who had been quieter in groups were invited first. All participants invited for an interview indicated that they would be willing to attend, but in some cases were unavailable due to travel plans or other responsibilities, in which case another participant from the same group was selected. Interviews were conducted at the ASU Clinical Psychology Center in a comfortable therapy room containing two armchairs. All interviews were conducted by the main investigator and were audiotaped with interviewees' informed consent. Interviews were semi-structured, posing the same key questions to all interviewees, regardless of group assignment. The interviewer then tailored follow-up questions to interviewees' statements. Questions assessed participants' experiences with contact with nature and meditation, recent challenges and stressors, ways of handling these stressors, and sense of place in the natural world. The interview guide appears in Appendix N.

Analytic Strategy

Quantitative data analyses. Quantitative statistical analyses were conducted using SPSS statistical software Version 17.0.1 and Mplus, a statistical modeling program with special features for handling missing data. Frequencies for all study variables in the data set were examined for errors in data entry or scoring, and corrected if indicated. Items were recoded as needed to compute scale scores. Scales were then analyzed for reliability by calculating inter-item

correlations for the scale items and examining the resultant Cronbach's alpha scores.

Next, descriptive statistics were calculated for all variables. Two measures of hypothesized mediators did not function as expected and thus were dropped from subsequent analyses. These were Community Integration, which was rated extremely highly (M = 6.12 on a scale of 1 to 7), a "ceiling" effect that would make it difficult to detect improvements on this measure in this sample, and Social Relationships, where participants' definitions of "close friends" appeared to differ wildly from one another and from the researchers' conceptualization. For example, some individuals listed that they had 10 or 12 close friends but "can not remember their names" or listed only 3 names, while another participated listed that she had 45 close friends but did not give any first names as requested and probing suggested that most were acquaintances.

Correlations were run to assess the relation of demographic and other background variables to SWB measures and to the hypothesized mediators. Correlations were also run to test the relations among the various background variables, SWB measures, and hypothesized mediators. Chi-square tests and one-way ANOVAs were used to compare the three groups at baseline on demographic and other background variables, as well as on SWB and the hypothesized mediators.

In this quasi-experimental pilot study, the main question was whether community gardening enhances SWB, and if so, whether attention and mindfulness, social support, or a sense of connection to nature mediate the

observed associations between community gardening and SWB, as described in Figures 1 and 2.

To test my main hypotheses, I used regression analysis, a general system for examining the relation of a number of independent variables to a single dependent variable. Regression analyses were planned following the four steps detailed by Baron and Kenny (1986) for testing mediation. First, the regression equations test that there is a significant relationship between predictors and outcomes. In this study, each of the four measures of SWB—positive affect, negative affect, quality of life, and vitality—was regressed separately on each of the three group comparisons of interest, MCG vs. TCG, MCG vs. WL, and TCG vs. WL. Second, the regression equations test whether the predictors are related to the hypothesized mediators. In this study, each of the five mediators—attention/working memory, mindfulness as measured by the KIMS, mindfulness as measured by the MAAS, social support, and connectedness to nature—was regressed separately on each of the three group comparisons to examine these proposed pathways in the model. Third, the regression equations test whether the hypothesized mediators are related to the outcomes. Fourth, the regression equations test whether each hypothesized mediator completely mediates the relationship between predictor and outcome, by establishing that the effect of predictor on outcome controlling for the mediator is zero. In the present study, as the first two steps of testing for mediation were not met, Steps 3 and 4 were not tested.

Sixty-three regression models were tested in all. These included nine dependent variables and seven predictors. The nine dependent variables for the regression models were the four SWB measures at follow-up (Positive Affect, Negative Affect, Quality of Life, and Vitality) and the five hypothesized mediators at follow-up (Attention, Mindfulness—KIMS, Mindfulness—MAAS, Social Support, and Connectedness to Nature). The seven predictors for the regression models were the three a priori contrasts, or group comparisons of interest (MCG vs. TCG, MCG vs. WL, TCG vs. WL), one post-hoc comparison of the interaction between dose and intervention groups (MCG vs. TCG x Dose), and three post-hoc comparisons of the interaction between baseline negative affect (BNA) and the three group comparisons (MCG vs. TCG x BNA, MCG vs. WL x BNA, TCG vs. WL x BNA). The interaction with dose was tested as a post-hoc analysis to account for differences in attrition between the intervention groups (recall that all but one attriter returned for follow-up testing) and individual variations in group attendance. The interaction with baseline negative affect was tested as a post-hoc analysis because several intervention participants reported in interviews that they had been depressed upon entering the study and had greatly benefitted from the groups. In all 63 regression models, baseline scores on the criterion variable were added into the regression equation to control for the influence of individual differences in the criterion variable prior to the intervention. Type 1 error inflation was controlled by always including in the regression equations all of the variables that went into the interactions. All of the interaction terms were constructed with centered variables. The grouping

variables (e.g., MCG vs. TCG) were centered by using contrast coding, with the first group in the contrast coded as +.5 and the second group in the contrast coded as -.5.

Missing data in the regression models were handled using maximum likelihood estimation in Mplus. I chose maximum likelihood estimation because it yields unbiased parameter estimates when data are missing at random and increases power for analyses when data are missing completely at random (Enders, 2010). These advantages in accuracy and power make maximum likelihood estimation preferable to traditional missing data handling methods (Schafer & Graham, 2002). Mplus was used for the regression analyses because, unlike many other data analysis programs, Mplus does not automatically exclude cases with missingness on the predictors. Rather, the model can be specified in Mplus to treat each predictor as the only indicator of a latent variable and uses each latent variable as a predictor of the outcome. This allows cases with incomplete predictors to be included in the model without changing the interpretation of the estimates. The total number of observations used and the number of incomplete observations used are included in the table for each regression analysis.

Qualitative data analyses. First, behavioral observation data were reviewed informally on a weekly basis through discussion at a weekly research meeting. Then, after the end of the nine weeks of groups, the behavioral observation field notes were typed, and a form was developed to quantify some of the data. However, as this was a post-hoc form, it became clear that the

observations had not been systematic enough across RAs to quantify the data. Instead, the most common themes that stood out were summarized.

Second, intervention participants' responses to the open-ended questions at the spring follow-up were compiled by an RA, and then content analysis was used question-by-question to group the responses into the main themes. To ensure that the main themes were consistent with the views of more than one or two people, any theme that was identified by at least three of 30 respondents (10%), were included.

Third, between September 2009 and April 2010, audiotapes of the individual interviews were transcribed by RAs, then checked for quality by the main investigator, producing twelve transcripts averaging 25 pages each. Between April and June 2010, the transcripts were analyzed by the main investigator and three RAs using meaning condensation procedures (Kvale & Brinkmann, 2009). This involved first reading the entire transcript to get a sense of the whole. Second, the researchers worked together to identify natural "meaning units" within the text, as expressed by the interviewees. Third, the researchers restated as simply as possible the central theme of each natural meaning unit, drawing on each interviewee's viewpoint as we understood it. In this way, long statements were rephrased into short phrases to capture the main sense of what was said. Fourth, the researchers openly and rigorously discussed the meaning units in terms of the research questions to ensure that the generated themes were consistent with the views of more than one person, and not simply a reflection of the main investigator's subjective interpretation. In this manner, the main themes

across interviews were explicated, yielding a twelve-page list of qualitative data analysis codes containing eighteen central themes and numerous sub-themes (see Appendix O). Finally, three essential, non-redundant themes from the twelve interviews were more extensively interpreted, subject to theoretical analyses focused on those theories that form the substrate of the present study, and tied together with the descriptive statements found in the Results section.

RESULTS

Sample Description

A description of the sample's demographic and background characteristics is presented in Table 3. Fifty individuals ranging in age from 55 to 79 (M = 63.42, SD = 5.67) participated in this study. Eight-four percent were female, and 86% were White (not Hispanic or Latino). Overall, the sample was highly educated, with 66% of participants having a Bachelor's degree or a higher level of education. Approximately half of the sample was married. Forty-six percent of participants were retired, while 40% were employed for pay. The mean level of self-rated health, with an actual range from 1 to 5, was a 3.76 (SD = 0.87), falling between "good" and "very good." Participants' mean Body Mass Index was 28.33 (SD = 7.24), indicating that the average participant was overweight. In addition, baseline levels of depression were very low—the mean number of depression symptoms endorsed was 1.18 out of 15 (SD = 1.79). As a result, depression was not included in subsequent analyses.

More than half of the sample self-identified as active gardeners (57%), with a mean of 1.54 hours spent gardening each week (SD = 1.93). No one was

already involved in a community garden. With 71% of the sample reporting no regular meditation practice, weekly hours of meditation was highly positively skewed (skewness = 3.25). The 29% of the sample who self-identified as active meditation practitioners reported a mean of less than one hour spent in meditation each week (*SD* = 1.80). These individuals filled out a checklist regarding the types of meditation in which they were active, which revealed that 12% of the overall sample reported at baseline that they practiced mindfulness.

Baseline Levels of Subjective Well-Being

The means, standard deviations, ranges, skewness, kurtosis, and reliability for the four SWB scales at baseline are presented in Table 4. The variables were all approximately normally distributed. The sample reported frequent positive affect, with a mean of 37.41 indicating that positive feelings were experienced between some and most of the time. Correspondingly, negative feelings were reported as infrequent, with the mean of 17.96 indicating that negative emotions were experienced between none and little of the time. On the Q-LES-Q, the participants' mean rating was 64.89, indicating an overall level of satisfaction between good and very good. Vitality also was fairly high, with a mean of 4.52 indicating that the sample felt a sense of vitality between a good bit of the time and most of the time.

Baseline Levels of Hypothesized Mediators

The means, standard deviations, ranges, skewness, kurtosis, and reliability for the two mindfulness scales, attention (working memory) test, three measures of social relations, and connectedness to nature scale at baseline are presented in

Table 5. The variables were all approximately normally distributed, with the exception of number of close friends, which was highly positively skewed (4.91) and kurtotic (29.41). To correct this violation of normality, the item was Windsorized by eliminating the highest outlier score, reducing both the skewness (1.14) and kurtosis (1.12) to acceptable levels. As explained above, the Community Integration and Social Relations measures did not function as expected and thus were dropped from subsequent analyses. The remainder of the hypothesized mediators are described next.

The sample reported moderate levels of mindfulness, with a mean of 3.72 on the Observe subscale of the Kentucky Inventory of Mindfulness Skills indicating that it was between sometimes and mostly true that participants noticed their own physical and emotional experiences. On the Mindful Attention Awareness Scale, a mean of 4.40 indicated that a *lack* of mindfulness in everyday life was experienced between somewhat and very infrequently. On the attention (working memory) test, participants' mean score was a 7.26, designating that overall working memory was in the high average range. Social support ratings were moderately high, with a mean of 3.90 indicating that the sample felt that various forms of support were available to them between some and most of the time. Finally, the sample reported a fairly high sense of connectedness to nature, with a mean of 3.92 indicating that the sample generally agreed with, rather than disagreed with or felt neutral about, items tapping into feeling connected to the natural world.

Correlations Among Variables

With a sample size of 50 persons, yielding 48 degrees of freedom for the bivariate or Pearson's correlation, and two-tailed tests, a Pearson's *r* of .279 is the critical value required for the correlation to be significant at an alpha level of .05. Comments are made here on correlations greater than or equal to .25 in absolute value. Note that all correlations were two-tailed.

Intercorrelations of demographic and background variables are presented in Table 6. Older individuals were less likely to be married ($r = -.31$, $p < .05$) and less likely to be working for pay ($r = -.32$, $p < .05$). Those with higher levels of education were more likely to be female rather than male participants ($r = -.26$, *ns*) and were less likely to be married ($r = -.27$, *ns*). Number of hours spent in gardening each week was negatively related to working for pay ($r = -.25$, *ns*). Neither gender nor number of hours spent in meditation each week was highly correlated with other demographic or background variables.

Correlations between demographic variables and SWB are presented in Table 7. Age was negatively associated with Negative Affect ($r = -.33$, $p < .05$). Working For Pay was negatively related to two SWB measures, Quality of Life ($r = -.37$, $p < .01$) and Vitality ($r = -.41$, $p < .01$). Self-Rated Health was positively associated with three of the four measures of SWB: Positive Affect ($r = .39$, $p < .01$), Quality of Life ($r = .40$, $p < .01$), and Vitality ($r = .35$, $p < .05$). None of the correlations between SWB and Race, Gender, Education, or Marital Status were notable, with the exception of Marital Status and Vitality, which indicated that these variables were positively, but modestly, related ($r = .25$, *ns*).

Correlations between demographic variables and hypothesized mediators are presented in Table 8. Age was negatively associated with mindfulness as measured by the KIMS Observe scale (r = -.31, p < .05), but positively associated with mindfulness as measured by the MAAS (r = .28, *ns*). This discrepancy reflects past research findings indicating that these two scales tap into distinct dimensions of mindfulness, with the former related to noticing internal and external stimuli and the latter related to acting with awareness, or acting less automatically (Baer, Smith, & Allen, 2004). Self-Rated Health was positively, but modestly related to the KIMS (r = .26, *ns*), but negatively related to the MAAS (r = -.33, p < .05). Again, this indicates that the items on these two measures tap into two distinct aspects of mindfulness. It is possible that the negative correlation between Self-Rated Health and the MAAS indicates that participants in poorer health tend to be more tuned in to their physical sensations, to have more difficulty with concentration and memory, and to be less active and therefore less likely to rush through activities. Attention (working memory) performance on Digit Span Backward was positively associated with both Education and Working For Pay (r = .34 and r = .30, respectively, p's < .05). Being Married was negatively related to mindfulness as measured by the MAAS (r = -.30, p < .05). This could indicate that freedom from a personal commitment to another individual gives people more space to pay attention to their activities. Being Married was also negatively related to Connectedness to Nature (r = -.31, p < .05), which might indicate that married individuals are more attuned to their spousal relationship than to their relationship with the natural world. Neither Race

nor Gender was notably correlated with any of the hypothesized mediators, with the exception of Female Gender and Connectedness to Nature, which showed a negative relationship (r = -.26).

Correlations between baseline levels of gardening activity, meditation activity, and SWB, as well as intercorrelations among SWB variables, are presented in Table 9. The hypothesized relations between gardening and SWB, and between meditation and SWB, were not observed at baseline. The correlations between the four measures of SWB were all statistically significant, ranging from r = -.30 (p < .05) for Negative Affect and Vitality, to r = .66 (p < .01) for Quality of Life and Vitality. Nevertheless, because the SWB measures chosen for this study were conceptually distinct and because this was an exploratory pilot study, the decision was made to proceed with the planned analyses of all four measures of SWB rather than form a composite.

Correlations between baselines levels of gardening activity, meditation activity, and hypothesized mediators, as well as intercorrelations among hypothesized mediators, are presented in Table 10. In general, the variables were not correlated with one another. Only Connectedness to Nature was positively correlated to Weekly Hours of Meditation (r = .33, p < .05) and to mindfulness as measured by the KIMS (r = .30, p < .05).

Correlations between SWB and the hypothesized mediators are presented in Table 11. The hypothesized relation between Social Support and the SWB variables was mostly observed; Social Support correlated in the expected directions with Positive Affect (r = .49, p < .01), Quality of Life (r = .48, p <

.01), and Negative Affect (r = -.26, *ns*), and to a lesser degree with Vitality (r = .21). Additionally, mindfulness as measured by the MAAS correlated negatively and significantly with Negative Affect (r = -.41, $p < .01$), lending some support to the hypothesized relation between mindfulness and SWB. However, correlations between the other measures of SWB and the hypothesized mediators were not significant at baseline.

Comparison of Groups at Baseline

All analyses involving group comparisons were conducted twice, first including all participants (n = 50), and second excluding non-randomly assigned participants (n=43). Table 12 displays a comparison of the two intervention groups and the wait-list control group on demographics and other background variables. With an alpha level of .05, there were no differences between groups on any of these variables. Table 13 displays a comparison of the groups at baseline on SWB, and Table 14 displays a comparison of groups at baseline on the hypothesized mediators. One aspect of SWB and one hypothesized mediator were found to differ significantly between groups at baseline. The TCG group reported higher levels of Quality of Life (mean of 69.43 versus 63.18 in the WL group and 61.94 in the MCG group; $F(2, 47) = 4.47$, $p < .05$). Additionally, the WL group reported lower levels of Connectedness to Nature (3.57 versus 4.04 in the MCG group and 4.13 in the TCG group; $F(2,47) = 6.21$, $p < .01$). Given random assignment, these baseline differences were somewhat unexpected. It was hypothesized that those individuals who were randomly assigned to intervention groups but could not commit to them and thus were placed in the WL group by

non-random assignment, might have been lower on Connectedness to Nature. Indeed, when the ANOVA was re-run with randomly assigned participants only, the difference between groups disappeared. However, the finding that the TCG group was higher on Quality of Life held when the ANOVA was re-run with only randomly assigned participants, $F(2, 40) = 4.96$, $p < .05$. The baseline and follow-up means by group on SWB and on hypothesized mediators appear in Tables 15 and 16.

Hypothesis Testing

As with the analyses above, all multiple regression analyses were conducted twice, first including all participants (n = 50), and second excluding non-randomly assigned participants (n=43). In accordance with methods outlined by Baron and Kenny (1986), the first set of regression equations tested whether there were significant relationships between predictor (group assignment) and final outcome (SWB). In order to do this, each of the four aspects of SWB—Positive Affect, Negative Affect, Quality of Life, and Vitality—was regressed onto seven different predictors— MCG vs. TCG, MCG vs. WL, TCG vs. WL, MCG vs. TCG x Dose, MCG vs. TCG x Baseline Negative Affect, MCG vs. WL x Baseline Negative Affect, TCG vs. WL x Baseline Negative Affect—in respective models. These results are shown in Tables 17-20. In summary, no significant main effects were found between the predictors and SWB, indicating that there was no effect to mediate.

Nevertheless, a second set of regression equations was tested to determine whether the predictors were related to the initially hypothesized mediators. To do

this, each of the five mediators—Social Support, Attention (Working Memory), Mindfulness as measured by the KIMS, Mindfulness as measured by the MAAS, and Connectedness With Nature—was regressed separately onto the seven different predictors. These results are shown in Tables 21-25. In summary, significant relationships were found between certain predictors and Mindfulness as measured by the KIMS (see Table 23) and Mindfulness as measured by the MAAS (see Table 24). These results are described below under *Hypothesis 5*.

Hypothesis 1. Traditional community gardening will be positively associated with increases in SWB, compared to a wait-list control group. Regression analyses indicate that participation in the TCG group did not significantly predict increases in any of the four measures of SWB (β's of .02 to .14 for the full sample). The results of these analyses are presented in Tables 17-20. Thus, Hypothesis 1 was not supported.

Hypothesis 2. Traditional community gardening will be positively associated with increases in the hypothesized mediating variable of social support, moreso than will mindful community gardening, compared to a wait-list control group. Participation in the TCG group did not significantly enhance social support, nor did participation in the MCG group. (See Table 21.) Thus, Hypothesis 2 was not supported.

Hypothesis 3. Social support will be positively associated with SWB. As noted above, regression analyses were not conducted to predict SWB from the hypothesized mediators, as the previous steps in mediational analysis had not been met. Also noted above (*Correlations Among Variables*), the hypothesized

relation between Social Support and the SWB variables was partially observed in baseline correlational analyses. Social Support correlated positively and significantly with Positive Affect (r = .49, p < .01) and Quality of Life (r = .48, p < .01). In addition, Social Support correlated in the expected directions with Vitality (r = .21) and Negative Affect (r = -.26), although these associations did not reach statistical significance. (See Table 11.) Thus, Hypothesis 3 was partially supported.

Hypothesis 4. Mindful community gardening will be positively associated with increases in SWB, compared to a wait-list control group. Regression analyses indicated that participation in the MCG group did not significantly predict increases in any of the four measures of SWB (β's of .03 to .19 for the full sample). The results of these analyses are presented in Tables 17-20. Thus, Hypothesis 4 was not supported.

Hypothesis 5. Mindful community gardening will be positively associated with increases in the hypothesized mediating variables of attention (working memory) and mindfulness, moreso than will traditional community gardening, compared to a wait-list control group. Participation in the MCG group did not significantly enhance attention (working memory), nor did participation in the TCG group (see Table 22). However, the gardening groups did enhance mindfulness in both expected and unexpected ways (see Tables 23-24). As expected, participation in the TCG group was positively associated with mindfulness as measured by the KIMS Observe scale, when compared to the wait-list control group (β = .39, p < .01). Participation in TCG accounted for 14%

of the variance in follow-up scores on the KIMS Observe scale. This effect held when the same regression analysis was run with the smaller dataset including only randomly assigned participants, although it became somewhat weaker ($\beta = .35$, $p < .05$) and TCG then accounted for 11.5% of the variance in the KIMS. Unexpectedly, participation in the MCG group was not positively associated with mindfulness as measured by the KIMS, when compared to the WL group. More surprisingly, participation in TCG enhanced mindfulness as measured by the KIMS moreso than did participation in MCG ($\beta = -.30$, $p < .05$), an effect that again held when the same regression analysis was run with only randomly assigned participants. In both sets of analyses, participation in TCG as compared to MCG accounted for about 8% of the variance in the KIMS Observe scale. These findings might be due to the fact that the mindfulness-explicit component of the study was not well-received by some participants, resulting in decreased attendance (decreased dose) and perhaps resistance to suggestions for enhancing observation in the garden.

Also as expected, greater mindfulness as measured by the MAAS was predicted by participation in the MCG group ($\beta = .25$, $p < .05$), compared to the control group, for the full sample. MCG accounted for 6% of the variance in MAAS follow-up scores. However, this effect diminished to a non-significant level when the same regression analysis was conducted with only randomly assigned participants ($\beta = .14$, *ns*), and the proportion of variance in MAAS follow-up scores accounted for by MCG dropped to 2%. This could be due to the fact that with only randomly assigned participants, the control group *n* drops from

11 to 5, leaving fewer cases to contribute to maximum likelihood estimation. As well, the SE increases from 0.17 to 0.23. Taking the findings on attention and mindfulness altogether, support for Hypothesis 5 was mixed.

Hypothesis 6. Attention (working memory) and mindfulness will both be positively associated with SWB. As noted above (*Correlations Among Variables*), the hypothesized relation between Attention (Working Memory) and SWB was not observed in correlational analyses. This could be related to a third variable, Working for Pay. Working for Pay was correlated with improved Attention (r = .30, $p < .05$), but was also strongly correlated negatively with SWB, especially Quality of Life and Vitality (r's = =.37 and -.41, $p < .01$). (See Tables 7-8).

The hypothesized relation between Mindfulness and SWB was partially observed. Mindfulness as measured by the MAAS was correlated negatively and significantly with Negative Affect (r = -.41, $p < .01$), but was not correlated with the three other measures of SWB. Mindfulness as measured by the KIMS was not significantly correlated with any of the four measures of SWB. (See Table 11.) Thus, Hypothesis 6 was mostly unsupported.

Hypothesis 7. Mindful community gardening will be positively associated with increases in the hypothesized mediating variable of connectedness to nature, moreso than will traditional community gardening, compared to a wait-list control group. Participation in the mindful community gardening group did not significantly enhance connectedness to nature, nor did participation in the traditional community gardening group. (See Table 25.) Thus, Hypothesis 7 was not supported.

Hypothesis 8. Connectedness to nature will be positively associated with SWB. As noted above (*Correlations Among Variables*), the hypothesized relation between Connectedness To Nature and SWB was not observed in correlational analyses. (See Table 11.) Thus, Hypothesis 8 was not supported.

Post-Hoc Analyses

The lack of support for most study hypotheses was unexpected. To more deeply explore the findings from the regression analyses, two substantial post-hoc analyses were undertaken. First, based on observations of individual variations in group attendance and differences in attrition between the intervention groups, the interaction between dose and the comparison of MCG and TCG was tested. A significant result emerged for Negative Affect (Table 18), with the interaction accounting for 6% of the variance in follow-up Negative Affect (β = -.26, p < .05). This effect held when the analysis was conducted with the smaller dataset of randomly assigned participants. The plot of the interaction (Figure 4) reveals that dose was a significant predictor of Negative Affect in the TCG group, with those spending more time in the TCG group reporting significantly less Negative Affect at follow-up compared to those spending less time in the TCG group. Dose also emerged as a significant predictor of Quality of Life scores for both MCG and TCG participants (Table 19) in the analysis with all participants (β = .34, p < .01) and the analysis with only randomly assigned participants (β = .38, p < .01).

Second, as a number of MCG and TCG participants reported in interviews that they had been depressed upon entering the study and had greatly benefitted from the groups, a hypothesis emerged that the gardening groups might have been

most helpful to those with higher levels of negative affect at baseline. Since most of the sample reported no depression on the Geriatric Depression Scale, resulting in a highly positively skewed and kurtotic measure, this post-hoc analysis was conducted with the baseline measure of negative affect, for which scores were normally distributed. Significant results emerged for Quality of Life (Table 19). When comparing Quality of Life at follow-up in the two intervention groups, baseline negative affect was a significant predictor for both the MCG and TCG groups ($\beta = .28$, $p < .05$). Given that Negative Affect and Quality of Life were correlated at baseline ($r = -.36$, $p < .05$), this finding is somewhat less compelling. Unexpectedly, the plot of the interaction of Baseline Negative Affect with TCG vs. WL (Figure 5) shows that participants with high levels of negative affect at baseline did not benefit from TCG in terms of quality of life as much as those with low baseline levels of negative affect. Oddly, it also shows that control participants with high levels of negative affect at baseline had higher quality of life at follow-up compared to those with lower levels of negative affect.

Additionally, Baseline Negative Affect emerged as a significant predictor of Attention scores at follow-up for both TCG and WL participants ($\beta = .23$, $p < .05$), and with the smaller dataset of randomly assigned participants only, this effect was even stronger ($\beta = .40$, $p < .01$; Table 18). Baseline Negative Affect was also a significant predictor of Connectedness to Nature at follow-up for all groups (Table 25), although when the analysis was conducted with the smaller dataset of randomly assigned participants, the effect remained significant for only the MCG and TCG groups ($\beta = .35$, $p < .05$). These findings suggest that in some

cases, those with worse affective states upon entering the study were more able to improve on certain outcomes.

Power Analysis

Due to the small sample size, this study had low power, meaning a low probability of detecting a "true" effect even if it exists. Post-hoc power analyses were undertaken to determine how large a sample would be needed to enable accurate, reliable statistical judgments, given the observed effect sizes in this study. G*Power 3.1, a general power analysis program, was used to perform the power analyses for F-tests in linear multiple regression, with alpha level set at .05 and power set at .80. To cover the various permutations in this study, the analyses were conducted with different variations of effect size, ranging from .06 to .14 based on the effect sizes (R^2) associated with statistically significant results in the present study, and with different numbers of predictors, ranging from 2 to 4 based on the main effects and interaction models in the current study. Results appear in Table 26. In summary, the total sample size needed varied from 72, based on a medium effect size of .14 and two predictors, to 204, for a small effect size of .06 and four predictors.

Behavioral Observation Results

After review of behavioral observation data from the gardening groups, two main themes emerged around social interactions. First, those participants who spontaneously brought items to the group to share with other group members seemed to be enjoying and benefitting from the group the most. Examples included garden pots, handouts on gardening, homemade food, produce from their

home gardens, referrals to humane bee removal professionals, and seeds and seedlings.

Second, when participants in the Traditional Community Gardening groups were invited to sit in a circle at the beginning of each group and share a question about gardening or say a word about how they were feeling (an activity selected to parallel to the Mindful Community Gardening groups), they usually chose to disclose personal information about their lives. This suggested that they were not at the group just for gardening, but to develop relationships. They shared stories, were observed manifesting "lots of teamwork, " carpooled to the garden, and made plans to get together outside of the garden.

Open-Ended Questionnaire Results

The results from the analyses of six open-ended questions indicates that both the TCG and the MCG groups were an overall positive experience for the vast majority of the participants. Positive comments were made by 100% of respondents. In response to Question 1, "What did you like most about being in the gardening group?" the following four themes emerged (percentage of respondents citing this theme in parentheses): 1) social connections, including both general comments about meeting new people with similar interests, learning about them, and making new friends (80%), as well as specific comments about the quality of interactions with group members, including laughing, camaraderie, sharing life's ups and downs, and feeling like a part of the group (13%); 2) learning more about gardening (37%); 3) the beauty and peace of the garden setting, and/or primary contact with fresh air, plants, and soil, or specific

gardening activities such as planting or weeding (30%); and 4) learning about mindfulness and different ways to meditate and to relax (17%). These responses suggest that the study hypotheses should have had more support.

In response to Question 2, "What did you dislike or what weaknesses did you see in the group/program that detracted from the experience?," many responded "No answer" or "Can't think of any" (27%). Among others, the following four themes emerged (percentage of respondents citing this theme in parentheses): 1) deficiencies in the organization and productivity of sessions (27%, 2/3 of whom were in TCG groups), including comments such as "not enough gardening work for the number of people in study;" 2) too hot for gardening during the March/April afternoons (17%); 3) hoped to learn more about organic gardening (10%, all of whom were in MCG groups); and 4) distance to restroom/lack of on-site bathroom (10%). The first theme has implications for finding the right-sized group for the size of the garden and reveals that the reduced size of the present study sample relative to the target sample size was a blessing in disguise in that the "carrying capacity" of the garden site for this study would not have accommodated more participants. In addition to these themes, several comments made by no more than one respondent were considered vital feedback for planning future MCG groups. These comments spoke to the importance of more fully explaining the mindfulness focus of the group in advertisements and consent forms to better inform those who are interested in gardening but not meditation, and highlighted the importance of considering replacements for certain terminology and tools that were considered offensive by

one Christian participant because of their Buddhist roots (ringing a bell to begin and end meditations and using the word *"gatha"* in addition to "mindfulness verses"), which was somewhat surprising given past findings that devout Christians had no difficulty with mindfulness training (Smith, 2004).

The responses to Question 3, "What can we improve that might help future gardening groups of this kind?" reflected the main weaknesses identified in Question 2. The following five themes dominated the responses (percentage of respondents citing this theme in parentheses): 1) include more didactic material about organic gardening (33%); 2) organize smaller groups with specific goals/plans for each session (13%, all of whom were in TCG groups); 3) hold groups at a cooler time (10%); 4) rent a port-a-potty for the garden (10%); and 5) provide more explicit information about the 9 weeks of groups, especially whether meditation is or is not included (10%). Several of these themes reflect the widespread conceptualization by participants of the community gardening groups as "classes," a perception that the research team attempted to clarify from the screening process through to the final study interviews, explaining that the groups were not meant to be classes, but rather were designed as hands-on, participatory learning experiences. It is possible that community gardening was such a novel activity that it only fit into the heuristic of group activities being classes.

In response to Question 4, "What did you learn in the gardening group?" most participants (57%) cited specific gardening methods or facts, ranging from how to compost, to organic techniques, to the availability of adaptive gardening tools. Seventeen percent mentioned that they learned what can grow in their local,

hot, arid climate, which was often a surprise to them. About one-half of the MCG respondents mentioned mindfulness-related skills, including mindfulness in tasks of everyday living, being in the moment more often and not as judgmental, and guidelines for aware living. Several respondents (10%) identified collaborative learning experiences, including learning about sharing seeds, plants, and produce; problem-solving; and how to garden with a group.

There were many responses to Question 5, "What other benefits did you get from the gardening group?" The five most common themes (percentage of respondents citing this theme in parentheses) were: 1) social interaction with people one would not otherwise have met and the development of friendships (20%); 2) learning from other gardeners, including sharing gardening ideas, experiences, and information (17%); 3) enjoyment of the garden's tranquility, fresh air, and being outside in nature (13%); 4) free plants to take home (10%); and 5) learning specific gardening methods and seeing effective techniques in action (10%). Other noteworthy benefits cited by just one or two participants each were exercise; relaxation; being provided a structure to allow for the development of new habits, including gardening, meditating, and mindful eating; the importance of taking "self" time for physical, psychological, and spiritual well-being; a "sense of unity;" and "got me out of the house." These results demonstrate that participants gleaned a wide variety of benefits from the groups.

Finally, in response to Question 6, "What do you see as the benefits of gardening with others, if any, over and above the benefits that you might get from gardening alone?" four themes emerged (percentage of respondents citing this

theme in parentheses): 1) social benefits—more fun, you meet new people and make new friends (43%); 2) rich learning experience—exchange knowledge and ideas (30%); 3) shared labor—many hands make gardening easier (17%); and 4) a sense of collaboration, community, and feeling of closeness to others (10%). Two participants did not identify any unique benefits to community gardening. One did not respond to this question; another expressed a preference for gardening alone.

Interview Results

The twelve individual interviews were conducted with 3 participants from the Monday MCG group, 3 from the Saturday MCG group, 3 from the Tuesday TCG group, and 3 from the Thursday TCG group. This included one male and eleven female participants. The 92% female interview sample nearly reflected the 84% female gender of the overall study sample. An additional interview might have been conducted with a male intervention participant, but notably, only one of the four intervention group males completed the study groups.

The individual interviews produced themes similar to those identified in the open-ended questionnaire items, but more data emerged, both in terms of level of detail and in terms of new themes. Although there was by no means complete uniformity in the issues reported across individuals, a number of major themes emerged repeatedly. A full list of themes and sub-themes appears in Appendix O. Three themes were selected for detailed reporting here: (1) Aging, (2) Using the study intervention to cope with difficulties, and (3) Experiences with the mindfulness aspect of the intervention. Each theme and its accompanying sub-themes are explored below, using representative interview passages to reflect the

experiences and views of the participants. Note that there is some overlap among themes. For example, observing the cycles of life in the garden was an important way that MCG participants used the intervention to cope with challenges; this is described under "Using the study intervention to cope with difficulties," but it also fits with the theme, "Experiences with the mindfulness aspect of the intervention."

Aging

Inspiration. Interactions with other older adults had effects beyond the benefits of socialization and forming friendships. One participant who had been depressed and looking dimly at her own aging process, was inspired by the level of engagement and vitality of others in her MCG group. When asked what most stayed with her from the group experience, she replied:

> "The thing that stood out the most was how varied the people were even in the same age group as I am. There were so many people that still had goals and dreams…still were looking forward to their lives, and I thought that was very uplifting. And not everybody is, at this certain age, is getting ready to retire and go sit in…a rocking chair…not one person in our group was doing that...I thought that was really impressive."

This participant later explained that coming into contact with other older adults who broke her own age stereotypes transformed her previously glum ideas about what she could be and do both at her current age and in the future.

Generativity. Several participants spoke of their desire to help future generations by starting some form of a community garden. For example, one participant who was asked what effect the MCG groups had on her life, if any, said:

> "It's made me think more about expanding [sharing] my own gardening knowledge. Like maybe going down to the local school and planting a bean plant or something…that maybe I could do something more than just for myself. And, especially in this economy, a lot of people are not eating like they should 'cause they can't afford the food…So, I think, I wanna make a bit more of an effort to help—somebody, in some small way."

For this participant, who was very knowledgeable about gardening before the present study, the intervention seemed to provide a way for her to realize how much she knows, and the emphasis on *community* gardening catalyzed her thinking about how she could contribute her knowledge to help others. A participant in the other MCG group replied in a strikingly similar way to the same question about the effect of the group on her life:

> "It makes me want to continue…not so much as a community garden with other adults, but, I really enjoy working with children…I understand that there are some schools that sometimes will somebody come and start a garden with a group of kids. And to see the awe in a child's face when they pull their first radish, or they pull their first carrot, is *it* to me. So…when it gets cooler, I am going to try and, um, connect with children groups."

The above participants' responses to the question of how the groups affected *their* life reveal maturing individuals' desire to contribute to future generations, and suggest that the community gardening groups showed them a means to do so, i.e., by introducing youngsters to both the tangible and intangible benefits that they themselves have enjoyed through gardening. A participant in the TCG group answered the same question about the effect of the groups on her life with a comparable response:

> "I intend to stay connected to the community garden. And I saved all your resources about how to start a community garden. And I just keep thinking about ways to do that…'cause I think that would be so wonderful."

Although this participant seemed to be in a more preliminary stage of thinking about starting a community garden, it is notable that of all the ways the groups might have affected the participants, a common way was to influence their ideas about how to direct their time and energy in the future.

Both of the themes related to aging that are highlighted here suggest that community gardening could provide a means of keeping aging individuals engaged in meaningful activity and making a contribution to the wider community. These are important tasks for our aging, but youth-focused, society. These themes of views on aging and generativity were not examined quantitatively in the current study, and the interview data suggest that this could be a key area for future research.

Using the Study Intervention to Cope with Difficulties

Based on the theoretical substrate of this study in socio-ecological systems thinking, attention restoration theory, and the biophilia hypothesis, it was hypothesized that the study interventions would contribute to participants' ability to cope with their difficulties by, respectively, increasing social support, enhancing mindful awareness, and re-awakening a sense of connection to the natural world. Thus participants were asked about challenges they had experienced in the past six months and how they had coped with these challenges. To avoid prompting the participants to respond that the gardening groups had helped them cope, they were not asked whether the groups had been useful in this regard.

Participants' reports of their major challenges fell into five categories: (1) the economic downturn and work dissatisfaction; (2) issues with their own health and functionality; (3) issues with others' health (e.g. partners, parents, siblings); (4) bereavement; and (5) other relationship issues (marital discord, family estrangement). Participants described many ways that they responded to these difficulties, including avoidance behaviors, cognitive coping, psychotherapy, religious coping, and seeking social support (outside the gardening group). Unsolicited, six of the twelve interviewees (four MCG and two TCG participants) specifically mentioned that some aspect(s) of the intervention groups had helped them cope with their challenges. These are described below. (Several of the interviewed participants mentioned using their personal gardening for coping, describing it as "soothing" or "centering," but only intervention-related impacts on coping are included in this section.)

Mindfulness. One MCG group member had been diagnosed the previous year with a serious autoimmune disorder, then was unexpectedly laid off from work just as her brother was diagnosed with a chronic movement disorder that limited his functioning. She became his primary support person. The participant described how she used her new mindfulness skills, or "paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally" (Kabat-Zinn, 1994, p. 4), to understand her brother's changing mood and needs:

> "For me, the whole being mindful…is paying attention to, to figure out him, because people [with his condition] commit suicide, you know, they can be very depressed…And I'm really trying to pay attention to him…He's on some pretty heavy drugs right now, so every time I see him,

> I'm trying to be mindful about how, how is he doing mentally?...You know, is he depressed?"

Careful observation also helped her meet the challenge of balancing, on the one hand, closely caring for her brother, and on the other, respecting his autonomy as an adult:

> "Mindfulness, in this particular situation has really helped me to kind of assess it and see what he needs and then not be…nagging…'are you taking your medication?' I'm trying to pay attention to him, so that I can kinda be there for him…keeping myself in check and being mindful—he is an adult, he can do this…So that he knows that I'm there for him, but I'm not going overboard… that's the tough part for me right now."

This participant's mindfulness practice also helped her, under difficult circumstances, to accept her own limitations, to remain composed, and to stay present to her brother:

> "The mindfulness, it sort of helps to keep me, like I can't do everything for him, you know, just—just try to stay calm, I guess…In the moment when I'm with him or talking to him on the phone, I'm reminding myself all the time, you know, 'listen to him, look at him, think of him, don't start talking, try to pay attention.'"

This example demonstrates that mindfulness taught in the context of a specific activity through MCG can generalize beyond the garden. A participant in the other MCG group who had been grappling in the past few years with family conflict and estrangement, economic downturn resulting in major financial losses, and the death of her best friend, describes how the group focus on paying attention non-judgmentally adjusted her day-to-day attitude to one that was much more adaptive:

> "I think with mindful meditation and a word you said…"no judgment"…I found out that I was so unhappy with the things I had lost in the past that I was judging my life now—that every day was not good enough, that I

> would give this day for 15 minutes of the past. And that was very judgmental. And so that just totally turned me around, actually…I feel now that every day is the best day of my life. It wasn't 25 years ago. It's every day…"

This participant's comment highlights an important benefit of mindfulness training that was not assessed in the quantitative portion of the study, as a mindfulness measure of acceptance/non-judgment was not included. This participant also utilized the suggestion offered throughout the MCG groups to think of the garden as a metaphor for one's life, to cope with her sister's betrayal and her family's ensuing, inexplicable disownment of her:

> "Another thing that you brought up that helped me tremendously is weeding the garden and that sometimes you have to weed things. And these experiences that have happened to me with my family, I don't *understand* them. But I need to get the negativity out of my life so I can continue…The negativity cannot continue to hold me down… I needed to weed my sister and her family out of my garden. And I feel so much better, now…I'm really…I'm going forward."

This comment points to the unique benefits of teaching mindfulness in the context of the garden. By doing so, an intangible aspect of mindfulness—being aware and making conscious choices about what to cultivate in one's life—was brought to life through the tangible activity of weeding—removing what is unwanted so that it will no longer suck energy away from what you do want to flourish. It became clear over the course of the interview that in the first half of 2009, this participant had gone through a major transition from depression, irritability, fear, emotional pain, and rejection of what was happening in her life to acceptance, reprioritization, and values-based action. When asked what helped her to make those changes, she replied, "I think the mindful meditation helped me," and she

went on to describe a new point of view that reflects greater emotional complexity: "I lost my rose-colored glasses…I'm seeing life and it's kinda crummy, you know, but it's OK too."

A blend of social support, distraction, contribution, and serenity. One TCG participant spoke of extreme distress around her marital problems, as well as caregiving for an ill parent, both in the context of recently moving to the local area from out-of-state. She had been coping by talking with friends, going to the gym, and seeing a psychotherapist. She also stated:

> "…and I had the community garden…On a physical and psychological level…what I've experienced by answering that little ad. It was almost like it was meant to, it was supposed to happen to get me through personal problems."

When this participant was queried about how the community garden helped, she spoke of commonalities among the group members and how this provided opportunities for social support:

> "It's just incredible how things happen and somebody comes by to help. The transition [in my life], I mean, it's just really wonderful…I hope [the group members] really do work to stay in contact because we're all the same age, more or less, and what I've learned is that we're all the same. And at some point everybody's gonna go through the same thing…We all have issues…we could be really be helpful for each other."

Although this participant had mentioned using a number of coping strategies, including professional psychotherapy, she clearly felt that she had made a significant transition in coping over the course of the gardening groups and attributed this in part to the group experience.

A participant in the other TCG group had been caring for her chronically ill partner, who underwent a major surgical procedure with a substantial degree of

risk during the course of the groups. She cried as she responded to the initial interview question about what she felt was most important for me to know about her experiences in the gardening groups:

> "The emotional support that I received…[crying]…Let me stand up, I can talk better if I stand up…[standing]…The emotional support was very good. Being able to get away and talk about something and do something else, that I wanted to do, just for me. Without being, what I would consider selfish…Okay, I think I can sit back down."

As with the participant above, this woman had a wide variety of coping resources, including a strong background in personal growth activities, daily exercise, a social support group for caregivers, and children who provided emotional as well as instrumental support. Yet all of these resources did not dilute the impact of the gardening groups. When asked at the end of the interview what effect she would say the groups have had on her life, if any, she replied:

> "Peace. I think they brought me peace. Um [long pause]…the experience of working in the garden, it was very peaceful in itself just being there. Hot sometimes, but peaceful. And I think that's what my takeaway would be, was that, the whole experience was a very giving, peaceful, and receiving experience."

The TCG group, which was not structured as a support group, nevertheless yielded support that this participant found beneficial in coping with her challenges. This is probably why she missed only one of the nine groups despite demanding and unpredictable life circumstances. She also said, "…the garden group…filled an emotional need in me, as well as gave me an opportunity to look forward in the future, [to] how I can apply this [gardening] information…hopefulness is a good word."

Taken altogether, this participant's narrative highlights five elements of the groups that were helpful to coping with adversity. First, community gardening provided an "escape activity," or distraction from day-to-day cares ("being able to get away…and do something else"). Second, the gardening activities—planting seeds and planning ahead—promoted a positive future orientation, which provided hope. Third, when she chose to discuss her challenges with others, she received direct emotional support. Fourth, making a contribution through community gardening—giving in addition to receiving—allowed for self-care without being selfish. Fifth, the serenity of the garden itself ("just being there") was restorative.

Cycles of nature. What made this garden a restorative environment? Would the same benefits have accrued from another peaceful activity? One MCG participant expressed that she felt other group activities would not have provided the same benefits in coping with her challenges:

> "It has had a positive impact on my life, at a time when I needed it most. And I wonder if that was just coincident…or if it was providence…or if it was, um, just because of what community gardening is. You know, if it had been another nine-month project—basket-weaving—you know, I don't think that it would have had that same kind of impact. …Basket-weaving is certainly an artistic process and there's something of that in the gardening. Um, the basket-weaving is our little example here!…[It] would have perhaps had, as a group experience, there would be those commonalities. But there was just so much more dimension to the community gardening process. And maybe it was because…it was a springtime process and so in spring, gardens change so quickly… it was just inspiring to be there. It was easy to be there, and connect with it and enjoy it and use the senses, and…you wouldn't get that kind of dimension at all [in another activity]."

This participant intimates that the transformational process evident in the garden provided her with encouragement, perhaps providing a model for growth, renewal, and expansion after a period of decay, challenge, and contraction. In fact, this participant had recently faced a combination of major challenges, including caregiving for her spouse, financial setbacks at work due to the economic downturn, as well as several of her own chronic and acute health issues. When asked how she had been coping with these stressors prior to the study, she replied:

> "Not well at all…I would drink wine every night …and just kind of get numb and go to sleep early…And my life got to the point where…there weren't other activities, there was just, go to work when you can, on the days that you are not working, you are looking for work…I was in a state of depression…I was not a pleasant person…I was dealing with some real disappointment in myself, and disappointment with life."

When her husband saw the advertisement for the community gardening groups, he encouraged her to call. She described how the MCG group provided her with insight into the impermanence of her own situation:

> "Truly it was something else to focus on, but there was another interesting thing that I learned…There is a cycle for things. The garden goes through a cycle. We started out looking at blossoms on the apple trees. And before we left there were apples...You can apply those things to your life, so really, it helped. It helped a lot…It just reminded me that, that's the way it happens, it goes through cycles…It's okay, you know this could get worse, but it could get better. It could go in cycles…I've lived long enough to see the economy be in good times and bad times. Um, you know, these health problems were—they were not fun, but they were not, like, life-threatening…I could put those in perspective and stop being so concerned or overwhelmed by them."

This participant went on to say that in the 2½ months between the last community gardening group and the interview, her external circumstances had remained

challenging—she was still looking for work, still caring for her functionally limited and depressed husband, and had had a new health issue arise. Nevertheless, she stated:

> "I think that I am coping much better. You know, my outlook is much more positive. I had the interest in doing something different in the evening, you know—going out into the garden or, um, I'm writing a book, you know, getting to that again, and I had put that on the shelf for quite some time…Things are much better…I still have some of these very same challenges, but I have a different perspective."

It is important to note that the MCG group content included coaching on observing the cycles of life in the garden and invited participants to consider gardening as a metaphor for their own lives.

Experiences with the Mindfulness Aspect of the Intervention

In addition to the goal of determining the feasibility of conducting a randomized, controlled trial of community gardening, the present study sought to gather preliminary data on mindful community gardening. Thus, the interview themes highlighted below consider how participants responded to this novel intervention. In particular, these comments highlight the benefits of mindful gardening, both those unique to this approach and those common to most mindfulness programs.

Surprise, surprise—we're meditating. As mindfulness was to be part of the study experience for only one-third of participants, the printed recruitment materials did not mention meditation, and the consent form (Appendix A) provided minimal information regarding the extent to which mindfulness would be practiced by some groups. Thus, many MCG participants were surprised by the

focus in the gardening groups on mindfulness. Many valued this, even if it was unexpected or they would have liked to have spent more time gardening or learning about gardening, as evidenced by the following statements from four MCG participants:

> "I thought the project was about learning how to garden…I really kind of missed that whole meditation process…But it was a pleasant surprise."
>
> "I enjoyed the gardening…and…I enjoyed the meditation part of it. When I was signing up for that, I paid more attention to the gardening part...I remember that it said meditation, but I actually was focusing on the gardening. So I was maybe a little surprised that there was that much of the meditation, although I was really happy about it."
>
> "I felt it was extremely beneficial. And the most important thing to me when I came every Saturday was the mindful meditation, which I really appreciated. And I think I got a lot out of that…"
>
> "I thought it was very relaxing, I mean, when I had my bike ride home, I was always thinking, 'Boy, I'm glad I went—it was another good day.'"

Other participants participated in mindfulness exercises with reluctance, which likely contributed to attrition. Nevertheless, one MCG participant who was open about not being interested in the mindfulness aspect of the group, especially sitting meditation, still reported that she was content overall with the group:

> "I enjoyed it very much…and I'm really glad that you organized it. It was a very, very positive experience."

Gardening to cultivate mindfulness. Certain elements of the mindfulness aspect of the MCG intervention groups were described earlier in the section on *Using the study intervention to cope with difficulties.* For example, as a result of mindfulness being approached in part as paying attention to which "mental seeds" one is watering, one participant eloquently expressed how awareness of the need

to pull weeds in the garden helped her divest herself of her anguish over long-standing family conflicts. In this way, the tangible experience of gardening shed light on an intangible mindfulness practice.

Another participant expressed how gardening, compared to other ways that she enjoys being in nature—from driving her Jeep on scenic trails to hiking—contributes to being present:

> "When you're gardening, you're right there close to it [nature]. You can touch it, feel it, smell it. In a Jeep, you're more removed, and you're observing from a distance. Hiking…your goal is to get to a place…Although you look at stuff along the way, that's not your main objective. Your main objective is to hike to a location, have a picnic or…swim or do whatever…When you're gardening though, your goal is different. You're focusing on just being there… rather than to get somewhere or something."

She points out that the multi-sensory experience of gardening contributes to being present—there is so much to pay attention to, using all of the senses. Does this elicit "fascination" as described by Stephen Kaplan? Here is a snapshot of what one MCG participant does when she is engaged in mindful gardening at home:

> "Almost every day I do mindful gardening—get out there with my garden hose and I take a deep breath, and feeling the water, listening to the water…I do enjoy meditating."

This participant's later description of her experience while tending her garden includes language often used to illustrate the benefits of meditation:

> "Gardening is one of those things that helps to keep me refreshed…Your mind just gets bogged down in everything that's going on and it's just something that's really…for me, it's a relaxing thing…It has been a very centering experience."

"Refreshed," "relaxing," and "centering" are used here to describe an activity that often makes one sweaty and dirty, but which at the same time, can gather a

scattered mind and spirit and restore one's energy and focus. These quotes highlight how gardening and mindfulness complement one another.

The benefits of being present. When she was asked what she would like me to know about her experiences in the gardening groups, the interviewee who was clear about not being into mindfulness mentioned, in addition to the social and gardening aspects of the group that she most enjoyed, a direct benefit of mindfulness practice:

> "I pay more attention when I'm walking, that I don't think that I ever did before…I've walked just down the street a hundred times and I say 'Oh, well look at that! I never saw that before.' So, I think the walking meditation made an impression on me…I enjoy walking more. [chuckles] It's more interesting…It's not just a means of getting there, it's an enjoyable act of…walking to get there. So that's…the biggest thing I've noticed."

An item about paying attention while walking appears in the MAAS, and this might be one reason why the MCG group did show significant improvements on the MAAS at follow-up, compared to the control group. Other MCG group participants also commented on how helpful they found it to pay attention to the present moment:

> "'Mindful,' I really like that term. It comes up in my life a lot, about paying attention to the moment. Because I'm the kind of person that's always looking [to the end]. 'What do I want out of whatever's happening?' And so instead of staying right there, I'm trying to figure out how to make whatever's going, be perfect. So…that word alone, 'mindful,' is one that I keep with me every day, so that's been helpful."

This is the participant noted earlier who used mindfulness to cope with the challenge of her brother's illness, paying careful attention both to his needs and to reactions arising within her.

Practicing mindfulness in the context of gardening expanded some participants' awareness of, and gratitude for, their relationship to the rest of the natural world:

> "I have always loved to get my hands into the dirt…The community garden project gave me a different spin on that connection…to be just aware. 'OK, let me just stop…and use my senses, and I'll smell this, and I'll taste that, or I'll feel this warmth, or I'll do whatever.'…That community gardening project allowed me to find a new way to kind of connect in, and probably deepen that appreciation."

As this participant notes, she has a long-standing liking for the visceral experience of gardening, which raises the empirical question of whether pre-existing preferences moderate the degree to which mindful gardening might deepen one's sense of connectedness to nature. This participant went on to describe how being truly present had enhanced her experience of gardening at home:

> "You know, in January, I would have gone out there and—I guess I'll use just the word 'perfunctory' work—gone out there and made my rows and put in the seeds and put the water down, and…whatever. But now…I can actually just kind of sit and *be*, in that garden. I don't have to *do* anything…to enjoy it. So, yeah, it's just a different kind of experience. There's more dimension to it…than there has been in the past."

The shift from *doing* to *being present* made her leisure activities more pleasurable and valuable, including not only gardening, but yoga. Being present was not always easy, however, as she shares here:

> "I've ended up my yoga sessions with…three to five minutes…to think…'What is it that I want to have achieved by the end of this day?'. So, it would be more of a goal-setting experience. So I sort of had a platform when you came along…Now I'll…use my senses and…sort of get in touch with myself…That turned out to be very difficult to do…Those old habits of letting my mind stray to further down the day were difficult to break."

This participant went on to say that she had never understood what meditation was before taking part in the MCG groups. I asked her what her understanding of meditation was now:

> "It's a process. It is a learned skill…The benefit of this is that the world has a way of imposing upon you as a person, and so I think that having that skill set, where you have such control of your mind and its ability to stay focused, allows you that sort of breath of opportunity that—you know, it's not just relaxation. It's a protection of sorts—it's a security of sorts. I think it's a wellness process."

I asked for elaboration:

> "It's knowing where you're at and who you are at all times…It might be easier to describe what mindfulness is *not*…Again, there is such a pace to the world and our lives, and so many distractions and so many sensory inputs, that it is so easy to forget where you're at. Or just not being aware of…even what you're talking about, or what your intent is in terms of a communication, or in terms of a health practice …it's just loss of perspective on things. And, so, being mindful, to me, is maintaining that perspective at all times, which I don't know is possible, but I do think that any bit of time that you spend in a mindful condition has benefit."

This participant's description suggests that an inherent benefit of practicing mindfulness is being "centered" in the midst of life's concerns and busyness. In her new practice of ten minutes of mindfulness after yoga, she finds encouragement:

> "It feels really, really good…I have another tool, if you will. Because I do believe that meditation is a very helpful practice. So, it's an affirmation. Another affirmation. 'I'm okay. I'm going to be okay.'"

This participant seems to be saying that her practice enhances her self-efficacy, which in turn results in feeling stable and safe.

Letting go of judgment and rumination. Several participants reported that the MCG groups had helped them let go of judgment. One person described a

tendency towards extreme rumination on situations she judged as negative, to the point of "boiling inside:"

> "I tend to be judgmental, and I like the idea of trying to go [to the garden] and not be judgmental, although I find that very hard to do…I think I'm better about it [now]…not getting …outwardly upset…And also I think a little bit inwardly, not letting things affect me…I'm letting these things go. I'm not dwelling on the negative… I'm just…letting that part go. And changing my focus…to something positive."

This aspect of mindfulness—letting go of judgment—was not measured in the quantitative portion of the study. When this participant was asked what helps her changer her focus, she spoke about deep breathing: "I try to take, you know, a deep breath and…be calm." Notably, concurrent with the gardening groups, this participant had engaged in five weekly psychotherapy sessions, focusing on similar issues. I asked if the breathing was something she had learned in counseling.

> "No, that's probably something more I learned from the [mindful gardening] class…I don't do the focusing on…how we did our meditation…but I do think that the breathing helps."

She also shifts her attention, by choice, to counteract insomnia:

> "I've redirected my focus…I would go to bed and I would be thinking about…things that upset me and…just lay there and lay there and lay there…and just think about it and think about it and think about it…And I don't do that now. If I start thinking about it…then I think of something else that I like…like a movie… and the character and what they said and how they reacted and then…I go to sleep [chuckles]."

The MCG group regularly practiced shifting attention from one sense to another in the garden, spending some time on each one. These exercises in paying attention, as this participant indicates, might have strengthened the ability to redirect one's focus at will. In fact, this hypothesis is supported by her later

mention of broadening her experience in one moment in one place in the garden, by simply shifting the spotlight of her awareness to a different sense:

> "You can focus on your different senses and be in the same experience, but experience something different…Like if you're focusing on what you see, maybe the colors or the bugs…Then you're in the exact same situation, and you focus on your hearing, you might hear crickets…If you focus on your different senses, you can be in the same place, in the same situation, and you can be experiencing something different."

The importance of regular practice. The MCG participant quoted earlier who had gained insight into her own life challenges by observing the cycles of life in the garden, noted the importance of a 9-week group to the development of her new perspective:

> "I am going to give credit to the community gardening project…it was an opportunity, a new place. But it was also nine weeks. You know, if it had been a gardening workshop or an afternoon, it wouldn't have had the same impact. That…every week, think about this and see change and you know, get a new skill, and have a chance to think about that, come back and learn a new skill, and talk about more things and…yeah."

In other words, the MCG groups provided the chance to observe, learn, discuss, practice, and digest the material in a way that allowed this participant to develop awareness, insight, and perspective, ultimately contributing to a profoundly positive change in her approach to coping with adversity. She reported at the interview that she had continued practicing mindfulness for ten minutes, three to four times each week. Another participant noted that she had continued to practice mindfulness after the groups ended by sitting and breathing for ten minutes every morning, aware of her in-breath and out-breath, or focusing on seeing herself as a flower and a fragrance. Other participants felt that more frequent groups would be needed for them personally to develop a "meditation habit."

> "It wasn't quite long enough to, I think, imprint that activity to me…maybe if it was two times a week instead of once a week…'cause I was doing it [at home]. But it didn't become a habit."

This particular participant was quite committed to a home mindfulness practice, as evidenced by a log that she turned in each week. Despite not having created a sitting meditation practice that lasted beyond the groups, she did in fact experience a transformation, which was releasing judgment and rumination, as described earlier.

Taken together, the three interview themes highlighted here provide insights into how the participants' experiences in the community gardening groups interacted with their views on aging, reveal how participants utilized the groups—both mindful and traditional—to cope with their life challenges, and construct a rich picture of the participants' perceptions of a new approach to teaching mindfulness, through gardening. Much of this information would not have been known from the quantitative data that were collected. Implications of the qualitative results, ways that the qualitative findings extend the quantitative results, and puzzles that arose in the quantitative results, are explored further in the Discussion.

Unexpected Findings

In the process of analyzing the interview data, it became apparent that the young research assistants working on this project were personally benefiting from reading the transcripts. They verbalized feeling inspired by the ways that older people were handling stressors with insight and wisdom, and also staying actively engaged in life and pursuing new activities. RAs expressed pleasant surprise that

people over age 55 were interested in meditation, concerned about and involved in sustainability efforts, and felt deeply connected to the natural environment. They had thought these topics were more salient to the present younger generation. Thus, while analyzing interview data, age stereotypes were shattered. This benefited them by allowing the development of a deepened respect for and curiosity about older persons, and as communicated by several RAs, a newfound sense of hopefulness about the aging process.

DISCUSSION

The present study served as a pilot experiment to examine the feasibility of conducting a randomized, controlled trial of community gardening and to provide an initial assessment of a new intervention—"mindful community gardening," or mindfulness training in the context of gardening. In addition to these goals, this study sought to obtain preliminary outcomes on a number of hypotheses. In particular, I examined whether urban community gardening, with or without mindfulness training, enhanced subjective well-being among older adults and increased social support, attention and mindfulness, and connectedness to nature. I expected that participation in either Traditional Community Gardening or Mindful Community Gardening would be positively associated with increases in subjective well-being. I also expected that the TCG and MCG interventions would differentially increase social support, attention and mindfulness, and connectedness to nature, as laid out in the hypotheses. Finally, I proposed that increases in these variables would mediate the effect of the intervention on SWB.

Sample Implications

Four aspects of the study sample have critical implications for the interpretation of the findings and their generalizability. First, due to a small sample size, the present study was underpowered to detect small to medium effects. Null statistical findings should be interpreted in light of this knowledge. In other words, it would be premature to conclude that Mindful Community Gardening and Traditional Community Garden are largely ineffectual. Instead, it is important to give careful consideration to the qualitative data in interpreting the quantitative results and focus on findings that should be probed further in a larger, better-funded study.

Second, it is important to consider the characteristics of the sample at baseline. In particular, psychosocial health was extremely high. This community-dwelling, volunteer sample reported high levels of well-being, little depression, and high levels of social support and community integration, and performed very well on the working memory task at baseline. As a result, the amount of improvement that participants could make in these domains was limited. Although small changes could be clinically meaningful, power to statistically detect these incremental increases was low. Again, the focus should be on utilizing the present study as a pilot to inform future research.

Third, more than half of the sample was already actively engaged in individual gardening at the time of study enrollment. This could have weakened the novelty of the intervention and the chance to detect effects, although the fact that baseline levels of gardening were not related to baseline levels of subjective

well-being suggested that there was an opportunity to develop an association between the novel community gardening interventions and SWB. Similarly, more than one-quarter of the sample was already actively engaged in meditation at the time of study enrollment, although less than half of these individuals reported that they practiced mindfulness. It is fortunate that this number was small because weekly hours of mediation was modestly related to baseline quality of life and positive affect.

Finally, the limited diversity of the sample has implications for the external validity of the results. Although a number of ethnic groups were represented in this study and the age range of participants was wide, the sample was mostly white, highly educated, and female. It is unclear whether the preliminary results of this pilot study would apply to more diverse populations.

Feasibility of a Randomized, Controlled Trial

Gardening and community gardening have been studied previously, but I believe that this was the first attempt to conduct a randomized, controlled trial (RCT) of community gardening. At the same time that this study provides support for the feasibility of conducting an RCT of community gardening, it also identifies two sets of obstacles to doing so.

First, as with many intervention studies, critical issues of timing, attrition, and sample size intertwined. Often participants drop out as they wait for an intervention to begin because circumstances in their lives change and preclude their continued participation. Wait-list control participants also frequently drop out later in a study because they do not feel they are involved in an important

way. I aimed to minimize pre-intervention attrition with a short time interval between recruitment and the start of groups. Nevertheless, although they were recruited, completed baseline assessments, and were expected to begin gardening groups within one to six weeks, seven (17%) of the participants randomly assigned to gardening groups dropped out prior to the first group. Aware that this study might suffer the same challenge of control group attrition that affects other RCTs, I chose to ask the dropouts if they would be willing to be a part of the control group, to which they graciously agreed. Thus, to maintain sample size and increase power, the tradeoff was a loss of random assignment for some participants. After the nine-week intervention period, 44% of the participants randomly assigned to the control group, and 31% of the total number of control participants, did not return for follow-up and did not provide reasons.

Future RCTs on community gardening for older adults might avert these problems by using the figures in this study to estimate attrition rates, then recruiting more participants than power analyses indicate are needed, and running multiple waves of groups in order to have an adequate sample size but keep the time between recruitment and the start of groups to a minimum. As well, providing monetary compensation to study participants, particularly those in the control group, might increase their commitment to attending follow-up assessments. Naturally, these procedures require sufficient funding.

Second, an obstacle to conducting an RCT of community gardening is the degree of similarity of the research study's garden environment and processes to "real-life" community gardens. How similar were these in the present study? To

answer this question, I think it is best to delineate ways in which this study's garden environment was similar, and dissimilar, to other community gardens, keeping in mind that there are many forms of community gardens. Similarities included the presence of a garden coordinator, the layout of the garden, the types of work that were done, and the time commitment of once a week for 2.5 hours, although frequency of visits is likely to be greater in many gardens. Dissimilarities included the commitment to the garden for only nine weeks, which would be a very short growing season, and the fact that the garden was only "open" in the afternoons. Although many community gardens have set "open" hours, many are flexible in this regard, offering people the opportunity to garden at a time that is convenient to, or cooler for, them.

In addition, a number of field study complications arose that should be considered in future research on community gardens. First, heat was a major factor impacting participant enjoyment and participation. Afternoon temperatures sometimes reached the high 90's. On the other hand, tolerance of this could have contributed to greater mindfulness, an element of which is an accepting attitude. Second, rain was a rare, but significant occurrence. This study was granted use of the porch of a house on the property for rainy days, so that garden design work could be done in lieu of other gardening activity. Third, I was fortunate to find an existing garden that could be utilized for this research. The garden coordinator was enthusiastic about the research and worked to be inclusive of participants in his planning of activities. However, at times he was uncomfortable allowing dozens of strangers to "do what they will" in the garden. This is a stumbling block

that likely decreases individual sense of ownership in a community garden and should be considered when conducting research in an existing garden. Fourth, flood irrigation was conducted off-schedule by the water utility company, occasionally resulting in extremely muddy conditions. On these days, alternate garden activities were planned, such as a neighborhood garden tour and container gardening, and in some cases, the participants did not like these. Fifth, the community garden in this study did not have a restroom. Instead, participants walked several blocks to a neighborhood restaurant that supported the garden and this research by allowing community gardeners to use their facilities. This was an inconvenience that was especially difficult for individuals with certain health issues. Future researchers are advised to find ways to secure on-site bathroom facilities for older gardeners.

Mindfulness Findings

This study introduces Mindful Community Gardening as a new approach to teaching mindfulness and provides the first findings on this approach. MCG stems from the main investigator's personal observation that gardening is conducive to the development of mindfulness. The approach involves sitting meditation, but it is of less emphasis and much shorter duration than that of some other psychological treatment approaches, including mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1990) and mindfulness-based cognitive therapy (MBCT; Segal, Williams, & Teasdale, 2002), both of which rely on 45-minute meditations. This was by design, aimed at making mindfulness practice more accessible and attractive to more people, since many individuals are not interested

in lengthy sitting meditation periods and find them too difficult. In MCG, mindfulness is cultivated both through sitting meditation and mindful engagement in routine activities, with a focus on the latter. Participants are asked to focus their attention on an ordinary activity—gardening—and carefully observe using the five senses, notice thoughts as they come up, and resume focus on one's gardening. Mindfulness is then gradually extended to related activities, including walking, eating, and conversation. Smith (2004) has argued that mindfulness training might be especially beneficial to and suitable for older adults, and in qualitative research, he found that MBCT was helpful to older people with recurring depression (Smith, Graham, & Senthinathan, 2007).

The drop-out rate of 29% in this study's MCG group is comparable to drop-out rates documented in other mindfulness groups with older adults. For example, a randomized, controlled, 8-week study of MBSR for older adults with chronic low back pain had a drop-out rate of 32% from the MBSR group (Morone, Greco, & Weiner, 2008), and other clinical mindfulness training groups for persons over 65 have had drop-out rates just under 25% (Smith, 2004). I suspect that the rate would have been lower if participants had been provided with more information about the mindfulness intervention in advance and had enrolled in the study with an interest not only in community gardening, but in mindfulness. Given conditions as they were, it is interesting that 71% of the MCG participants adhered to the intervention and commented positively on their group experiences in the open-ended questionnaire and interviews.

A surprising finding was that age correlated differently with the two scales assessing mindfulness at baseline. Dimensions of mindfulness in older adults have not been extensively examined, and the few previous studies of mindfulness interventions in older adult populations have most often assessed outcomes such as chronic pain acceptance or physical functioning without measuring changes in mindfulness. However, one study with a mostly well-educated, white sample of 35 community-dwelling adults age 65 or older with chronic back pain found high baseline levels of mindfulness, including on the MAAS (Morone, Rollman, Moore, Qin, & Weiner, 2009). In fact, the means on the MAAS in that investigation (M = 4.4, SD 0.8 in mindfulness group, M = 4.7, SD 0.6 in control group) were comparable to the baseline levels of mindfulness on the MAAS in the current study (M = 4.4, SD = .6). In the present study, although not statistically significant, scores on the MAAS increased as age increased. A sample MAAS item is, "I rush through activities without being really attentive to them." Indeed, several MAAS items tap into a sense of time urgency. Older adults might be more likely to say that they almost never feel this sense of time urgency when engaging in daily activities, because the tempo of daily activities tends to slow down with age. On the other hand, in the present study, scores on the KIMS decreased as age increased. A sample KIMS item is, "I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing." Perhaps with increased age, people habituate to their environment and are less likely to pay attention in the moment to common environmental stimuli. The differential correlations of different aspects of mindfulness with age could be elucidated in future research.

The qualitative and quantitative data converged around the finding that Mindful Community Gardening enhanced awareness in terms of paying attention and decreasing mind*less*ness. Recall that the MAAS has been described as more of a measure of the absence of mindlessness, due to the item content and phrasing (Brown & Ryan, 2003). However, it must be noted that the significant effect of MCG on follow-up MAAS scores disappeared when the analysis was conducted with the smaller dataset of only randomly assigned participants. It is likely that this was due to the decreased sample size and not to a truly different effect, given that the baseline MAAS scores of the seven participants who had been placed in the control group by non-random assignment had not differed from those of other participants. An additional note is that interview data indicated that acting with awareness can help people find increased satisfaction in daily life, e.g., by paying attention to one's surroundings while taking a walk, and can help people cope, e.g., by being fully present to loved ones who are facing very difficult situations.

The qualitative reports of Mindful Community Gardening participants extended the quantitative findings by revealing benefits of the intervention that were not assessed quantitatively, e.g., being accepting and nonjudgmental. Quantitative measures of such a non-evaluative stance are available, but were not included in the present study due to a combination of a priori thinking that this aspect of mindfulness would be less impacted by the interventions than would observation and acting with awareness, and a desire to decrease participant burden in completing a lengthy battery of questionnaires. The interview data indicate that

there would be value to including a measure of acceptance/nonjudgment in future research on MCG.

In the assessment of observation—another core aspect of mindfulness—the qualitative and quantitative findings diverged. Mindful Community Gardening interviewees alluded to observing both external stimuli, such as textures and aromas, and internal experiences, such as the breath and thoughts. However, the KIMS Observe scale did not find that MCG significantly increased noticing. This was unexpected, given that MCG participants were explicitly directed to attend to things that were reflected in KIMS items, e.g., to notice the breath, to notice bodily fatigue while gardening and adjust position or rest as needed, to pay attention while walking, to attend to the sensations of water while hand-washing after gardening, and to notice visual elements in nature, such as colors. One explanation for the discrepancy is that such observational skills were honed in MCG participants, but that the changes were too small in the current sample to be detected on the KIMS. A complementary explanation is that MCG did not focus on noticing emotions, which is a key element of the KIMS Observe subscale.

However, in seeking to understand why the Mindful Community Gardening group did not show improvement on the KIMS, a puzzle arises in that the Traditional Community Gardening group, despite receiving no explicit instruction in observation, improved significantly on this measure. The fact that participation in TCG as compared to the control group accounted for 14% of the variance in follow-up KIMS scores indicates that community gardening—without overt mindfulness training—has a medium-sized effect on mindfulness. This

suggests that gardening and/or the garden setting are conducive to noticing and attending to a variety of stimuli. This provides a different angle of support for Attention Restoration Theory. I posit that gardening and mindfulness both involve cultivation of directed attention and fascination. Further theory-building and research are needed to determine whether this effect can be replicated. If it is, TCG would offer a unique way of extending the benefits of mindfulness to more people, especially those who would not otherwise practice mindfulness.

The differential effects of TCG and MCG on the KIMS and the MAAS, and the fact that these measures correlate differently with other constructs, illustrates that these questionnaires tap different aspects of mindfulness. This was the reason for selecting two measures of mindfulness for use in the present study. The finding of a nonsignificant correlation between the MAAS and the KIMS Observe scale (r = .07) at baseline is consistent with previous research demonstrating that the two scales are uncorrelated (r = .02, *ns*; Baer, Smith, & Allen, 2004).

In addition to the finding that intervention group differentially impacted the two measures of mindfulness assessed in this study, each measure was differentially correlated with SWB at baseline. The MAAS was strongly negatively related to Negative Affect, as predicted, but was only modestly and nonsignificantly related to other measures of SWB (r's range from .12 to .16). As past research has found the MAAS to be significantly related to various indicators of well-being, including pleasant affect at a modest level (r = .16; Brown & Ryan, 2003), it appears that again, sample size was insufficient to detect statistical

significance. The KIMS Observe scale was unrelated to Positive Affect, but was modestly correlated with the other measures of SWB (*r*'s range from .17 to .22, all *ns*) in the unexpected direction. Although these correlations were not statistically significant, their magnitude is of sufficient degree that they should not be dismissed. As Baer, Smith, & Allen (2004) found the Observe scale to be correlated with clarity of feeling, but unrelated to life satisfaction, it is possible that those who are more observant of internal and external stimuli are generally more clear about their mood states, and if these mood states are unpleasant, this could be associated with lower levels of SWB.

Social Support Findings

In examining social relationships in the current study, the qualitative data helped to explain the absence of improvements found by the quantitative measures. For example, some individuals mentioned that they had always had friends and did not get involved in the community gardening research study for social reasons, but rather to learn about gardening. In other cases, however, the qualitative and quantitative data diverged. For example, even participants with good social support prior to study involvement spoke of their enjoyment of the social interactions they experienced during the groups and the bonding that took place. Other individuals noted that they had recently moved to the area and found that community gardening was an excellent way to make new friends. Certain participants spoke of the isolation they had felt before the groups and how MCG helped them overcome this. Interviewees' comments on the social aspects of the

community gardening groups appear in the qualitative codes (Appendix O) under Heading 12.

Subjective Well-Being Findings

Neither TCG nor MCG participation was positively associated with increases in SWB, compared to a wait-list control group. These quantitative results differ from the interview findings, in which numerous participants reported that community gardening conferred mental health benefits. The qualitative findings are consistent with brief reports noted in previous research, in which community gardeners reported that they perceived that the garden provided mental health benefits (Wakefield, Yeudall, Taron, Reynold, & Skinner, 2007).

The discrepancy in the present study might be due to a combination of the high well-being level of the sample at baseline, which limited opportunities for improvements, and by limitations in the sensitivity of the selected self-report instruments to detect subtle, but meaningful changes among generally high-functioning individuals. In this sample, participants' baseline reports of the number of hours they spent gardening each week showed non-significant, zero-order correlations with SWB measures, ranging from .02 with Negative Affect to .10 with Quality of Life. This could reflect this healthy sample having many sources of SWB, such that gardening does not add much. Number of hours spent in meditation each week at baseline also showed non-significant correlations with SWB measures, but these ranged ranging from .03 with Vitality to .22 with Positive Affect and Quality of Life. Although nonsignificant, these correlations

could be true to the population, and the current sample size was too low to detect significance.

In addition, the mental health benefits described in the interviews were distinct from the measures of SWB used in this study. The strongest benefits described were related to a newfound sense of hope, inner peace, and enhanced ability to cope with various challenges. These experiences were not measured in the quantitative component of the study.

A hypothesis that emerged from the interviews was that community gardening was most helpful to those with major stressors. People who were struggling benefited most from the respite of the garden, mindfulness practice, seeing the impermanence of garden conditions, seeing things grow, and social support. In this way, the "socio-ecological space of the garden" (Tidball & Krasny, 2007) contributed to their resilience.

Successful Aging

The qualitative results indicated that positive modeling of "successful aging" was occurring. Successful aging has been defined as a high level of cognitive and physical functioning, and active engagement with life (Rowe & Kahn, 1998). In the present study, many participants were exemplars of successful aging, and some participants inspired others.

Although it was not the aim of this study, one result that emerged was that the negative age stereotypes of the research staff under age 35 were directly challenged by working with a healthy community sample of people between 55 and 79. This seems to have occurred organically through simple, ongoing contact.

The pervasive fear of aging that exists in this youth-oriented society (Wilkinson & Ferraro, 2002) was lessened, and a deeper valuation of older adults arose. The implication is that more opportunities for inter-generational contact are needed to enhance attitudes toward aging and toward the growing segment of the population comprised by older adults.

With an aging population and awareness that older persons comprise one of the most neglected citizen groups (Cheng & Heller 2009), active research into ways to promote successful aging is extremely important. Phillips and Davidoff (2004) conclude that successful aging requires and is characterized by maintaining regular physical exercise, social involvement, and cognitive challenges. Community gardening seems uniquely suited to simultaneously offer physical, social, and cognitive engagement. As well, because volunteering has been demonstrated to be important for the SWB of older persons (van Willigen, 2000; Greenfield & Marks, 2004), community gardening initiatives are encouraged to include more older adults, especially when the produce is at least in part donated to food banks.

Limitations of the Study

The current research was a pilot study with a number of limitations. The small sample size decreased power to detect effects and limits the generalizability of the results. There was an apparent selection effect in that the sample consisted of mostly physically active, socially connected, and cognitively high-functioning individuals with little particular need. It is plausible that the absence of group differences on subjective well-being measures is attributable to the high baseline

functioning of this sample. Past research has found that the effects of physical activity, such as walking or gardening, on mood were associated with baseline mood level, with the greatest effects seen when baseline mood was depressed (Kanning & Schlicht, 2010). As well, 86% of the sample were non-Hispanic white. It also is not clear whether the results of the current study would generalize to other groups of older adults, such as an ethnically diverse group, inner city residents, or more physically challenged individuals. Also, due to the presence of a garden coordinator in this study with understandable hesitance to allow a large group of strangers to plant whatever desired, especially given that their commitment was for just nine weeks, the participants had limited autonomy in the garden. This limited the similarity of this research to real-life community gardens.

As well, this study did not directly assess effects of physical activity. This is another pathway to enhancement of subjective well-being that is worth examining, and it is a competing explanation for results on any gardening study. This study also did not examine natural environment benefits, such as increased habitat and biodiversity.

Future Directions

The study of community gardening is very much in its infancy within the psychology literature. The present research demonstrated that community gardening can be examined through a randomized, controlled trial, and can, even without explicit mindfulness training, lead to increases in mindfulness. Future studies of TCG or MCG would be most useful if conducted with clinical samples and larger sample sizes. A sample with greater variability in psychosocial health

might permit more powerful tests of the effects of the gardening groups. These would provide better tests of the mediational model introduced in this study, whereby contact with nature leads to enhanced mindfulness, attention, social support, and connectedness to nature, which ultimately leads to increases in subjective well-being. More diversity in future samples would also be desirable to learn more about who benefits from community gardening and increase conceptual generalizability.

Future studies with better funding might be able to compensate people for their participation, resulting in the ability to attract larger samples and decrease attrition. An attention-matched control group to account for the effects of nonspecific or supportive treatment elements is recommended to better understand the contribution of community gardening to meaningful outcomes. This might also decrease the number of drop-outs from the control group.

Future studies could assess the hypothesis that emerged from the interview data that MCG and TCG are most helpful to those with serious life stressors. Related to this, expanding access to the garden beyond once a week could increase the stress reduction effects of either kind of community gardening. This hypothesis is supported by research on workplace stress in 656 randomly selected people in Swedish cities, which found that increasing workers' opportunities to take a break in a green garden from once a week at most to more than once a week was associated with decreases in self-rated stress (Stigsdotter, 2004). Thus, offering people a place/activity of respite and free access to it, rather than limited access, could reduce stress levels and enhance the chance of restoration.

Among the numerous populations that might benefit from stress reduction are family caregivers of older adults with significant cognitive and/or physical impairments. Those caring for individuals with dementia or other chronic illnesses often experience high levels of psychological distress (e.g., Sörensen & Conwell, 2011). Community gardening could provide a way for caregivers to continue to engage in activities that interest them, without feeling selfish, as was indicated by a study participant in the Traditional Community Gardening who was providing care for her partner as he awaited and then underwent organ transplantation. The effects of community gardening on caregiver distress, calmness, and vitality could be examined. Additionally, given findings that reducing social isolation and increasing satisfaction with the social support network decreased caregiver depression (Roth, Mittelman, Clay, Madan, & Haley, 2005), the impact of community gardening on social contact and social support could also be studied.

An additional direction for future research would be to measure mindfulness and other outcomes in community gardeners by using ecological momentary assessment (EMA; Stone & Shiffman, 1994). EMA allows for the observation of study participants during their day-to-day routines by repeatedly asking them about their current experiences. This data collection methodology would allow a greater number of observations, decrease reliance on retrospective recall, and allow assessment of mindfulness, attention, well-being, and other endpoints in real time.

Conclusions

The present study finds support for the feasibility of conducting a larger, randomized, controlled trial of community gardening, and introduces "mindful community gardening" to the psychology literature. Future research with clinical samples is recommended. We can learn much from the healthy sample in this study that might be helpful to future generations.

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Table 1

Two Subystems of Attention, Conceptualized By Related Fields of Study

Early Psychology (William James, 1892)	Environmental & Cognitive Psychology (Kaplan & Kaplan, 1989)	Mindfulness Meditation Training (e.g. Delmonte, 1987)	Cognitive Neuroscience (Corbetta & Shulman, 2002)	Neuroanatomy (Corbetta & Shulman, 2002)
Voluntary attention	Directed attention	Concentrative—attention restricted to a specific focus, such as the breath	Endogenous Orienting (top-down)—Voluntary—activated by presentation of cues indicating features of stimuli to which one should direct attention	Dorsal attention system—Bilateral dorsal frontoparietal system
Involuntary attention	Fascination	Receptive—attention is "objectless," open to the entire field of awareness and "readied" for direction to currently experienced sensations, thoughts, emotions, memories	Exogenous Alerting (bottom-up)— Stimulus-driven—activated during abrupt changes in stimuli and detection of salient targets, especially when they're unexpected, are outside of the focus of attention, and have low probability of occurrence	Ventral attention system—Right-lateralized ventral frontoparietal system

Table 2

Description of Intervention Groups

Traditional Community Gardening Group		Mindful Community Gardening Group	
Session #	Contents	Session #	Contents
1	Introduction to the facilitators Introduction of participants What do you want to get out of this group? History of the Garden Garden Tour and Tasting with Bob What is growing here? Intro to compost Safety in the Garden & Tools Demonstration Sun, rest & hydration Bending & lifting techniques Careful where you step Distribute gloves Composting or Harvesting tepary beans	1	Introduction to the facilitators Introduction of participants What do you want to get out of this group? History of the Garden Garden Tour and Tasting with Bob What is growing here? Intro to compost Safety in the Garden & Tools Demonstration Sun, rest & hydration Bending & lifting techniques Careful where you step Distribute gloves Composting or Harvesting tepary beans Goal: Enhance observation skills & increase awareness using the 5 senses Observation, noticing; using the 5 senses; mindfulness: “paying attention in a particular way—on purpose, in the present moment, and without judgment” Check-in: What did you notice with your senses?

2	Planting & watering	2	Planting & watering Goal = expand awareness using 5 senses & introduce mindful breathing Review Check-in: would anyone like to share observations/noticing of past week? What does it mean to you to "pay attention in the present moment" or to be present in the here and now? Invite bell for time of observation using 5 senses – sitting still & noticing Mindful breathing facing out – 5 minutes Check-in: What did you notice with your sense of touch? smell or taste? Invite to save kitchen scraps—and to touch, smell, taste what goes in
3	All about the soil—what's in it, what it needs, and how we feed it organically	3	All about the soil—what's in it, what it needs, and how we feed it organically Goal = ask participants to sit for 5 minutes a day at home Mindful breathing – 5 minutes

4	Fertilizing organically	4	Fertilizing organically Goal = increase awareness of connection to earth through walking; plan a home practice Mindful breathing – 10 minutes; Mindful walking
5	Harvesting	5	Planting Gently Goal = help participants establish a home practice Mindful walking; Mindful breathing – 10 minutes Posture – how it helps your sitting practice "Cat Food Lessons"
6	Introduction to compost	6	Introduction to Compost; Harvesting Goal = introduce silence as way to increase awareness using 5 senses Mindful breathing – 15 minutes Introduce mindful eating Mindful walking Silent work – 5 minutes

7	Controlling pests/weeds using natural methods	7	Controlling pests/weeds using natural methods Mindful breathing – 15 minutes Mindful walking Mindful conversations
8	Weeding	8	Weeding Mindful breathing – 20 minutes Mindful walking Mindful conversations Mindfulness in any activity—driving, grocery shopping, knitting
9	Group check-in on the experience; Potluck celebration	9	Group check-in on the experience; Potluck celebration Review of mindful gardening practices; Potluck celebration includes mindful eating

Table 3

Demographic and Other Background Characteristics of the Sample (N)[a]

Characteristic	*N*	%	M	SD	Actual Range
Age (years)	50		63.42	5.67	55-79
Gender	50				
Female		84			
Race	50				
White		86			
Asian		4			
American Indian/Alaskan Native		2			
Hispanic or Latino		6			
Other		2			
Education	50				
High school diploma or less		8			
Some college		26			
Bachelor's degree		18			
Some graduate school		14			
Master's degree or higher		34			

[a] The *N* varies due to missing data for one participant on amount of gardening and meditation.

Characteristic	*N*	%	M	SD	Actual Range
Marital Status	50				
Married		52			
Separated		6			
Divorced		28			
Widowed		10			
Never Married		4			
Employment Status	50				
Working Now For Pay		32			
Self-employed		8			
Looking for Work		2			
Temporarily Laid-off		2			
Retired		46			
A Homemaker		4			
Something else		6			
Self-Rated Health	50		3.76[b]	0.87	2-5
Body Mass Index[c]	50		28.33	7.24	18-58

[b] Self-rated health was rated from 1 to 5 (1= Poor , 5=Excellent). The sample mean falls between 3 (good) and 4 (very good).
[c] Body Mass Index Guidelines: Underweight = <18.5 kg/ m^2, Normal Range 18.5-24.99 kg/ m^2, Overweight 25-29.9 kg/m^2, Obese ≥30 kg/m^2 [Source: World Health Organization Global Database on Body Mass Index at http://apps.who.int/bmi/index.jsp?introPage=intro_3.html]

Characteristic	*N*	%	M	SD	Actual Range
Weekly Hours of Gardening	49		1.54	1.93	0-7
Self-identified active gardener	28	57			
Volunteer at a community garden	0	0			
Weekly Hours of Meditation[d]	49		0.91	1.80	0-7
Self-identified active meditator	14	29			
Practice mindfulness	6	12			
Depression[e]	50		1.18	1.79	0-7

[d] Weekly Hours of Meditation was highly positively skewed, with 71% of the sample reporting no regular meditation practice (skewness = 3.25).
[e] Depression was highly positively skewed, with most of the sample reporting no depression (skewness = 4.6), and highly kurtotic (kurtosis = 22.6).

Table 4

Descriptive Statistics for Subjective Well-Being Variables at Baseline (N = 50)

Measure	M	SD	Possible Range (Anchors)	Actual Range	Skewness	Kurtosis	Alpha
Positive Affect[a] (10 items)	37.41	4.97	10.00-50.00 (None of the Time, All of the Time)	22.00-48.00	-0.54	1.29	.88
Negative Affect[b] (10 items)	17.96	5.69	10.00-50.00 (None of the Time, All of the Time)	10.00-34.00	0.51	0.03	.90
Quality of Life, Enjoyment and Satisfaction[c] (16 items)	64.89	8.35	16.00-80.00 (Very Poor, Very Good)	45.87-78.93	-0.64	-0.18	.88
Vitality[d] (4 items)	4.52	0.87	1.00-6.00 (None of the Time, All of the Time)	2.00-5.75	-1.14	0.77	.90

[a] Higher scores reflect more positive affect (higher subjective well-being).
[b] Higher scores reflect more negative affect (lower subjective well-being).
[c] Higher scores reflect more quality of life, enjoyment, and satisfaction (higher subjective well-being).
[d] Higher scores reflect more vitality (higher subjective well-being).

Table 5

Descriptive Statistics for Hypothesized Mediators at Baseline (N = 50)

Measure[a]	M	SD	Possible Range (Anchors)	Actual Range	Skewness	Kurtosis	Alpha
Kentucky Inventory of Mindfulness Skills - Observe subscale (12 items)	3.72	0.61	1.00-5.00 (Never or very rarely true, Almost always or always true)	1.92-4.67	-0.63	0.44	.86
Mindful Attention Awareness Scale (15 items)	4.40	0.57	1.00-6.00 (Almost always, Almost never)	3.13-5.60	-0.38	-0.18	.82
Digit Span Backward (performance test measuring attention (working memory))	7.26	2.07	0-14	4-12	0.54	-0.26	n/a
Social Support (6 items)	3.90	0.86	1.00-5.00 (None of the time, All of the time)	1.50-5.00	-0.51	-0.21	.93

[a] All of the hypothesized mediators are coded so that higher scores reflect higher levels of the construct.

Measure[a]	M	SD	Possible Range (Anchors)	Actual Range	Skewness	Kurtosis	Alpha
Connectedness to Nature (14 items)	3.92	0.53	1.00-5.00 (Strongly disagree, Strongly agree)	2.57-5.00	-0.23	-0.21	.85
Community Integration (6 items)	6.12	1.08	1.00-7.00 (Agree strongly, Disagree strongly)	2.83-7.00	-1.44	1.44	.78
Social Relations (2 items)							
Number of new friends made in last two months	1.12	1.33		0-5	1.09	0.37	
Number of close friends	5.70	6.50		0-45	4.91	29.41	
Number of close friends (Windsorized)	5.08	3.27		0-14	1.14	1.12	

[a] All of the hypothesized mediators are coded so that higher scores reflect higher levels of the construct.

Table 6

Intercorrelations[a] *of Demographic Variables (N = 50)*

Measure	1	2	3	4	5	6	7	8
1. Age	--	.01	.17	-.01	-.31*	-.32*	.13	.14
2. White Race		--	.02	.20	-.16	.09	.02	-.09
3. Female Gender			--	-.26	.20	-.02	.15	-.16
4. Bachelor's +				--	-.27	.24	-.04	.23
5. Married					--	-.20	.07	-.21
6. Working for Pay						--	-.25	.05
7. Weekly Gardening[b]							--	.19
8. Weekly Meditation[b]								--

*p < .05. **p < .01. ***p < .001.

[a] Continous x Continuous, Pearson's *r*. Categorical x Categorical, Phi from Chi-Square Tests. Continuous x Categorical, Pearson's *r*.

[b] Due to missing data for one participant on amount of gardening and meditation, $N = 49$ for these correlations.

Table 7

Correlations[a] *Between Demographic Variables and Subjective Well-Being at Baseline (N = 50)*

Measure	Age	White Gender	Female	Bachelor's Degree or Higher	Married	Working For Pay	Self-Rated Health
1. Positive Affect	.24	-.06	.06	-.10	.02	-.20	.39**
2. Negative Affect	-.33*	.02	-.18	-.13	.15	.16	-.08
3. Quality of Life, Enjoyment and Satisfaction	.19	-.07	-.07	-.10	.18	-.37**	.40**
4. Vitality	.17	-.16	-.13	-.01	.25	-.41**	.35*

*p < .05. **p < .01. ***p < .001.

[a] All correlations were performed with Pearson's *r*.

Table 8

Correlations[a] Between Demographic Variables and Hypothesized Mediators at Baseline (N = 50)

Measure	Age	White Race	Female Gender	Bachelor's Degree or Higher	Married	Working For Pay	Self-Rated Health
1. KIMS[b]	-.31*	.09	-.24	.24	-.11	.03	.26
2. MAAS[b]	.28	-.02	.12	.11	-.30*	-.04	-.33*
3. Digit Span Backward	.00	.02	.18	.34*	-.03	.30*	-.08
4. Social Support	.06	.23	.22	-.07	.21	-.22	.15
5. Connectedness to Nature	-.14	.18	-.26	.04	-.31*	.16	.20

*p < .05. **p < .01. ***p < .001.

[a] All correlations were performed with Pearson's *r*.

[b] KIMS = Kentucky Inventory of Mindfulness Skills – Observe subscale. MAAS = Mindful Attention Awareness Scale.

Table 9

Correlations Between Gardening, Meditation, and Subjective Well-Being at Baseline (N = 49)[a]

Measure	1	2	3	4	5	6
1. Weekly Hours of Gardening	--	.19	.04	.02	.10	.04
2. Weekly Hours of Meditation		--	.22	-.17	.22	.03
3. Positive Affect			--	-.43**	.62**	.41**
4. Negative Affect				--	-.36*	-.30*
5. Quality of Life, Enjoyment, and Satisfaction					--	.66**
6. Vitality						--

*p < .05. **p < .01. ***p < .001.

[a] For these correlations, $N = 49$ due to missing data for one participant on amount of gardening and meditation.

Table 10

Correlations Between Gardening, Meditation, and Hypothesized Mediators at Baseline (N = 49)[a]

Measure	1	2	3	4	5	6	7
1. Weekly Hours of Gardening	--	.19	-.12	.16	.02	.18	.24
2. Weekly Hours of Meditation		--	.17	.15	.19	.19	.33*
3. Kentucky Inventory of Mindfulness Skills – Observe subscale			--	.07	.06	.02	.30*
4. Mindful Attention Awareness Scale				--	.21	.07	.17
5. Digit Span Backwards					--	.12	.06
6. Social Support						--	.00
7. Connectedness to Nature							--

*p < .05. **p < .01. ***p < .001.

[a] For these correlations, $N = 49$ due to missing data for one participant on amount of gardening and meditation.

Table 11

Correlations Between Subjective Well-Being and Hypothesized Mediators at Baseline (N = 50)

Measure	Positive Affect	Negative Affect	Quality of Life, Enjoyment, and Satisfaction	Vitality
Kentucky Inventory of Mindfulness Skills – Observe subscale	-.03	.17	-.21	-.22
Mindful Attention Awareness Scale	.12	-.41**	.12	.16
Digit Span Backwards	-.20	-.14	-.21	-.16
Social Support	.49**	-.26	.48**	.21
Connectedness to Nature	.15	.14	.03	-.07

*p < .05. **p < .01. ***p < .001.

Table 12

Comparison of Groups at Baseline on Demographic and Other Background Characteristics (N)[a]

Measure	MCG (*n* = 17) N	%	TCG (*n* = 17) N	%	WLC-all (*n* = 16) N	%	χ^2 (df = 2)	WLC-ran (*n* = 9) N	%	χ^2 (df = 2)
Female Gender	15	88	15	88	12	75	1.42	7	78	.65
White Race	16	94	13	76	14	88	2.24	8	89	2.28
Bachelor's Degree or Higher	13	76	9	53	11	69	2.18	7	78	2.70
Married	9	53	10	59	7	44	.76	3	33	1.57
Working for Pay	9	53	4	24	7	44	3.20	3	33	3.22

[a] The *N* varies between analyses including all participants (WLC-all; *N* = 50) and the analyses excluding participants placed in the control group by non-random assignment (WLC-ran; *N* = 43).

Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WLC-all = Wait-List Controls, including non-randomly assigned participants. WLC-ran = Wait-List Controls, excluding non-randomly assigned participants.

Note: Brown-Forsythe tests were performed and did not yield any differences from the unadjusted *F*s.

Measure	MCG (n = 17) Mean	SD	TCG (n = 17) Mean	SD	WLC-all (n = 16) Mean	SD	One-Way ANOVA (F) (df = 2, 47)	WLC-ran (n = 9) Mean	SD	One-Way ANOVA (F) (df = 2, 40)
Age	62.18	5.93	63.24	5.60	64.94	5.46	.99	66.22	5.56	1.49
Self-Rated Health	3.76	.83	4.06	.66	3.44	1.03	2.20	3.56	.66	1.35
Body Mass Index	27.43	6.59	26.24	4.26	31.51	9.44	2.54	30.53	7.35	1.55
Weekly Hours of Gardening	1.41	1.69	2.26	2.40	.87	1.34	2.26[b]	1.11	1.60	1.26
Weekly Hours of Meditation	.38	.70	1.60	2.55	.73	1.49	2.16[b]	.89	1.69	1.89

[b] Due to missing data for one participant on baseline amount of gardening and meditation, for these ANOVAs, (df 2, 46).
Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WLC-all = Wait-List Controls, including non-randomly assigned participants. WLC-ran = Wait-List Controls, excluding non-randomly assigned participants.
Note: Brown-Forsythe tests were performed and did not yield any differences from the unadjusted *F*s.

Table 13

Comparison of Groups at Baseline on Subjective Well-Being (N)[a]

Measure	MCG (n = 17) Mean	SD	TCG (n = 17) Mean	SD	WLC-all (n = 16) Mean	SD	One-Way ANOVA (F) (df = 2, 47)	WLC-ran (n = 9) Mean	SD	One-Way ANOVA (F) (df = 2, 40)
Positive Affect	36.41	3.61	38.80	4.56	37.00	6.42	1.06	38.44	4.10	1.58
Negative Affect	18.29	7.04	17.76	5.30	17.81	4.76	.04	18.67	4.80	.07
Quality of Life, Enjoyment & Satisfaction	61.94	8.59	69.43	5.12	63.18	9.20	4.47*	63.57	7.52	4.96*
Vitality	4.53	1.00	4.62	.66	4.39	.96	.28	4.47	.84	1.00

*p < .05. **p < .01. ***p < .001.

[a] The N varies between analyses including all participants (WLC-all; N = 50) and the analyses excluding participants placed in the control group by non-random assignment (WLC-ran; N = 43).
Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WLC-all = Wait-List Controls, including non-randomly assigned participants. WLC-ran = Wait-List Controls, excluding non-randomly assigned participants.
Note: Brown-Forsythe tests were performed and did not yield any differences from the unadjusted Fs.

Table 14

Comparison of Groups at Baseline on Hypothesized Mediators (N)[a]

Measure	MCG (*n* = 17) Mean	SD	TCG (*n* = 17) Mean	SD	WLC-all (*n* = 16) Mean	SD	One-Way ANOVA (*F*) (df = 2, 47)	WLC-ran (*n* = 9) Mean	SD	One-Way ANOVA (*F*) (df = 2, 40)
KIMS	3.63	.66	3.79	.62	3.73	.58	.29	3.76	.70	.28
MAAS	4.47	.71	4.42	.44	4.31	.55	.32	4.50	.47	.08
Digit Span Backward	7.76	1.75	6.88	2.34	7.13	2.09	.82	6.89	1.90	.96
Social Support	3.62	.75	4.04	.95	4.06	.85	1.45	4.04	.78	1.29
Connectedness to Nature	4.04	.48	4.13	.42	3.57	.55	6.21**	3.84	.48	1.22

*p < .05. **p < .01. ***p < .001.

[a] The *N* varies between analyses including all participants (WLC-all; *N* = 50) and the analyses excluding participants placed in the control group by non-random assignment (WLC-ran; *N* = 43).
Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WLC-all = Wait-List Controls, including non-randomly assigned participants. WLC-ran = Wait-List Controls, excluding non-randomly assigned participants. KIMS = Kentucky Inventory of Mindfulness Skills – Observe subscale. MAAS = Mindful Attention Awareness Scale.
Note: Brown-Forsythe tests were performed and did not yield any differences from the unadjusted *F*s.

Table 15

Baseline and Follow-up Means by Group on Subjective Well-Being (N)[a]

	Mindful Gardening (n = 15-16)		Traditional Gardening (n = 15-17)		Wait List Control (n = 10-11)	
Measure	Baseline M(SD)	Follow-up M(SD)	Baseline M(SD)	Follow-up M(SD)	Baseline M(SD)	Follow-up M(SD)
Positive Affect	36.00(3.64)	38.13(3.81)	38.80(4.56)	39.53(5.70)	35.00(6.25)	36.64(4.32)
Negative Affect	18.87(7.24)	17.33(5.46)	17.76(5.30)	16.88(5.10)	18.09(4.78)	16.55(5.66)
Quality of Life, Enjoyment, & Satisfaction	61.44(8.60)	62.78(11.13)	69.43(5.12)	65.95(8.23)	62.72(9.30)	62.77(8.38)
Vitality	4.48(1.02)	4.28(1.21)	4.62(.66)	4.34(.97)	4.41(.96)	4.11(1.00)

[a] The *N* varies between analyses due to differing amounts of missing data on different measures. Means and standard deviations were calculated for each measure in each group for only those who completed both baseline and follow-up testing.

Table 16

Baseline and Follow-up Means by Group on Hypothesized Mediators (N)[a]

	Mindful Gardening (n = 15-16)		Traditional Gardening (n = 15-17)		Wait List Control (n = 10-11)	
Measure	Baseline M(SD)	Follow-up M(SD)	Baseline M(SD)	Follow-up M(SD)	Baseline M(SD)	Follow-up M(SD)
Kentucky Inventory of Mindfulness Skills Observe subscale	3.59(.64)	3.68(.55)	3.79(.62)	4.13(.57)	3.67(.47)	3.63(.56)
Mindful Awareness Attention Scale	4.35(.65)	4.53(.76)	4.42(.44)	4.43(.51)	4.16(.57)	4.00(.70)
Digit Span Backwards	7.60(1.64)	8.07(2.05)	6.87(2.39)	6.80(2.21)	7.80(2.15)	7.40(2.50)
Social Support	3.59(.77)	3.88(.82)	4.04(.95)	4.07(.73)	4.06(.90)	3.88(.93)
Connectedness to Nature	3.99(.44)	4.10(.46)	4.13(.42)	4.16(.47)	3.51(.61)	3.47(.67)

[a] The *N* varies between analyses due to differing amounts of missing data on different measures. Means and standard deviations were calculated for each measure in each group for only those who completed both baseline and follow-up testing.

Table 17

Summary of Seven Regression Analyses Predicting Positive Affect at Follow-up[a]

Models	All Participants (N = 50)					Randomly Assigned Participants (N = 43)				
	B	SE B	β	t-value	ΔR^2	B	SE B	β	t-value	ΔR^2
1) MCG vs. TCG	-0.87	1.54	-.09	-0.57	.006	-0.95	1.66	-.10	-0.57	.008
2) MCG vs. WL	1.74	2.09	.19	0.83	.026	-0.50	3.03	-.05	-0.17	.003
3) TCG vs. WL	1.36	1.66	.14	0.82	.008	0.88	2.05	.09	0.43	.004
4) MCG vs. TCG	-0.31	1.52	-.03	-.21		-0.35	1.63	-.04	-.22	
Dose	0.26	0.16	.25	1.62		0.28	0.17	.28	1.62	
MCG vs. TCG x Dose	-0.32	0.31	-.16	-1.03	.021	-0.34	0.33	-.17	-1.02	.022

[a] In all these analyses, baseline scores on Positive Affect, for which R^2 was .132, were added into the equation to control for the influence of individual differences in the criterion variable prior to the intervention.

Note: The grouping variables (e.g., MCG vs. TCG) were centered by using contrast coding, with the first group in the contrast coded as +.5 and the second group in the contrast coded as -.5.

Note: All analyses were based on 50 observations. For comparisons of MCG and TCG, 34 observations contained complete data. For comparisons of either MCG or TCG with the WL group, 33 observations contained complete data.

Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WL = Wait-List Control Group.

Models	All Participants (N = 50) B	SE B	β	t-value	ΔR^2	Randomly Assigned Participants (N = 43) B	SE B	β	t-value	ΔR^2
5) MCG vs. TCG	-0.78	1.49	-.09	-0.52		-0.83	1.61	-.09	-0.51	
Baseline NA	0.11	0.13	.13	0.87		0.07	0.14	.08	0.47	
MCG vs. TCG x BNA	-0.40	0.24	-.25	-1.66†	.059	-0.43	0.26	-.28	-1.67†	.071
6) MCG vs. WL	1.73	2.13	.18	0.81		-1.16	2.88	-.12	-0.40	
Baseline NA	0.07	0.17	.08	0.43		0.13	0.22	.16	0.56	
MCG vs. WL x BNA	-0.06	0.42	-.04	-0.15	.000	-0.46	0.67	-.30	-0.68	.043
7) TCG vs. WL	1.23	1.66	.13	0.76		0.71	2.10	.07	0.34	
Baseline NA	0.02	0.13	.02	0.15		-0.07	0.16	-.09	-0.43	
TCG vs. WL x BNA	0.46	0.32	.24	1.44	.064	0.47	0.44	.25	1.09	.056

†p<.10. *p < .05. **p < .01. ***p < .001

Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WL = Wait-List Control Group. BNA = Baseline Negative Affect.

Table 18

Summary of Seven Regression Analyses Predicting Negative Affect at Follow-up[a]

Models	All Participants (N = 50)					Randomly Assigned Participants (N = 43)				
	B	SE B	β	t-value	ΔR^2	B	SE B	β	t-value	ΔR^2
1) MCG vs. TCG	-0.29	1.47	-.03	-0.02	.002	-0.30	1.37	-.03	-0.22	.001
2) MCG vs. WL	0.26	1.40	.03	0.19	.002	1.98	1.70	.19	1.17	.029
3) TCG vs. WL	0.52	1.43	.05	0.37	.004	2.64	1.68	.25	1.57	.058
4) MCG vs. TCG	-0.41	1.23	-.04	-0.34		-0.43	1.18	-.04	-0.36	
Dose	-0.29	0.14	-.27	-2.09*		-0.28	0.14	-.26	-2.04*	
MCG vs. TCG x Dose	-0.57	0.26	-.26	-2.21*	.062	-0.54	0.25	-.25	-2.14*	.055

[a] In all these analyses, baseline scores on Negative Affect, for which R^2 was .457, were added into the equation to control for the influence of individual differences in the criterion variable prior to the intervention.

Note: The grouping variables (e.g., MCG vs. TCG) were centered by using contrast coding, with the first group in the contrast coded as +.5 and the second group in the contrast coded as -.5.

Note: All analyses were based on 50 observations. For comparisons of MCG and TCG, 34 observations contained complete data. For comparisons of either MCG or TCG with the WL group, 33 observations contained complete data.

Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WL = Wait-List Control Group.

Models	All Participants (N = 50)					Randomly Assigned Participants (N = 43)				
	B	SE B	β	t-value	ΔR^2	B	SE B	β	t-value	ΔR^2
5) MCG vs. TCG	-0.24	1.45	-.02	-0.16		-0.25	1.36	-.03	-0.18	
Baseline NA	0.64	0.10	.71	6.20***		0.63	0.11	.72	6.01***	
MCG vs. TCG x BNA	-0.21	0.24	-.12	-0.86	.011	-0.19	0.23	-.11	-0.84	.010
6) MCG vs. WL	0.28	1.40	.03	0.20		2.00	1.72	0.19	1.16	
Baseline NA	0.64	0.12	.70	5.36***		0.61	0.16	.69	3.88***	
MCG vs. WL x BNA	-0.08	0.26	-.05	-0.32	.005	-0.02	0.34	-.01	-0.05	.001
7) TCG vs. WL	0.52	1.43	.05	0.37		2.49	1.70	.24	1.47	
Baseline NA	0.61	0.11	.67	5.74***		0.58	0.14	.66	4.16***	
TCG vs. WL x BNA	0.12	0.30	.06	0.40	.000	0.21	0.36	.11	0.60	.000

†p<.10. *p < .05. **p < .01. ***p < .001

Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WL = Wait-List Control Group. BNA = Baseline Negative Affect.

Table 19

Summary of Seven Regression Analyses Predicting Quality of Life at Follow-up[a]

Models	All Participants (N = 50)					Randomly Assigned Participants (N = 43)				
	B	SE B	β	t-value	ΔR^2	B	SE B	β	t-value	ΔR^2
1) MCG vs. TCG	2.35	2.56	.13	0.92	.014	2.61	2.84	.14	0.92	.018
2) MCG vs. WL	1.76	3.10	.10	0.57	.011	0.36	4.37	.08	0.08	.001
3) TCG vs. WL	-1.88	3.23	-.10	-0.58	.012	-2.34	4.37	-.13	-0.54	.016
4) MCG vs. TCG	4.16	2.43	.23	1.71†		4.52	2.64	.25	1.72†	
Dose	0.68	0.23	.34	2.96**		0.74	0.25	.38	2.99**	
MCG vs. TCG x Dose	-0.65	0.45	-.16	-1.43	.026	-0.70	0.49	-.18	-1.43	.031

[a] In all these analyses, baseline scores on Quality of Life, for which R^2 was .402, were added into the equation to control for the influence of individual differences in the criterion variable prior to the intervention.

Note: The grouping variables (e.g., MCG vs. TCG) were centered by using contrast coding, with the first group in the contrast coded as +.5 and the second group in the contrast coded as -.5.

Note: All analyses were based on 50 observations. For comparisons of MCG and TCG, 34 observations contained complete data. For comparisons of either MCG or TCG with the WL group, 33 observations contained complete data.

Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WL = Wait-List Control Group.

Models	All Participants (N = 50)					Randomly Assigned Participants (N = 43)				
	B	SE B	β	t-value	ΔR^2	B	SE B	β	t-value	ΔR^2
5) MCG vs. TCG	3.10	2.48	.17	1.25		3.40	2.71	.19	1.25	
Baseline NA	0.46	0.19	.28	2.39*		0.50	0.21	.32	2.38*	
MCG vs. TCG x BNA	-0.55	.36	-.18	-1.51	.028	-0.60	0.40	-.20	-1.51	.034
6) MCG vs. WL	1.77	2.90	.10	0.61		1.04	4.07	.06	0.26	
Baseline NA	0.33	0.23	.20	1.45		0.44	0.34	.28	1.28	
MCG vs. WL x BNA	0.05	0.58	.02	0.09	.001	-0.13	0.81	-.04	-0.16	.000
7) TCG vs. WL	-2.51	2.81	-.13	-0.89		-3.97	3.78	-.21	-1.05	
Baseline NA	0.27	0.19	.16	1.40		0.14	0.26	.09	0.55	
TCG vs. WL x BNA	1.09	0.48	.29	2.26*	.099	1.15	0.65	.31	1.77†	.100

†p<.10. *p < .05. **p < .01. ***p < .001

Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WL = Wait-List Control Group. BNA = Baseline Negative Affect.

Table 20

Summary of Seven Regression Analyses Predicting Vitality at Follow-up[a]

Models	All Participants (N = 50)						Randomly Assigned Participants (N = 43)					
	B	SE B	β	t-value	ΔR^2		B	SE B	β	t-value	ΔR^2	
1) MCG vs. TCG	0.07	0.22	.03	0.30	.007	.608	0.07	0.23	.04	0.32	.002	
2) MCG vs. WL	0.13	0.29	.06	0.43	.004	.605	-0.19	0.41	-.09	-0.47	.004	
3) TCG vs. WL	0.03	0.24	.02	0.14	.000	.601	-0.16	0.03	-.08	-0.55	.004	
4) MCG vs. TCG	0.11	0.22	.05	0.49			0.12	0.23	.06	0.51		
Dose	0.03	0.02	.12	1.16			0.03	0.03	.13	1.15		
MCG vs. TCG x Dose	-0.03	0.05	-.07	-0.68	.005	.618	-0.03	0.05	-.08	-0.68	.006	

[a] In all these analyses, baseline scores on Vitality, for which R^2 was .601, were added into the equation to control for the influence of individual differences in the criterion variable prior to the intervention.

Note: The grouping variables (e.g., MCG vs. TCG) were centered by using contrast coding, with the first group in the contrast coded as +.5 and the second group in the contrast coded as -.5.

Note: All analyses were based on 50 observations. For comparisons of MCG and TCG, 34 observations contained complete data. For comparisons of either MCG or TCG with the WL group, 33 observations contained complete data.

Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WL = Wait-List Control Group.

Models	All Participants (N = 50)					Randomly Assigned Participants (N = 43)				
	B	SE B	β	t-value	ΔR^2	B	SE B	β	t-value	ΔR^2
5) MCG vs. TCG	0.06	0.22	.03	0.27		0.07	0.23	.03	0.28	
Baseline NA	0.01	0.02	.06	0.59		0.02	0.02	.09	0.85	
MCG vs. TCG x BNA	-0.05	0.04	-.14	-1.21	.016	-0.05	0.04	-.14	-1.20	.017
6) MCG vs. WL	0.14	0.29	.06	0.47		-0.23	0.50	-.11	-0.59	
Baseline NA	-0.00	0.02	-.02	-0.16		-0.01	0.04	-.05	-0.27	
MCG vs. WL x BNA	0.04	0.06	.11	0.68	.014	0.06	0.09	.18	0.73	.033
7) TCG vs. WL	-2.51	2.81	-.13	-0.89		-0.20	0.30	-.09	-0.67	
Baseline NA	0.27	0.19	.16	1.40		-0.01	0.02	-.05	-0.37	
TCG vs. WL x BNA	0.08	0.05	.19	1.77†	.000	0.09	0.06	.20	1.43	.042

†p<.10. *p < .05. **p < .01. ***p < .001

Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WL = Wait-List Control Group. BNA = Baseline Negative Affect.

Table 21

Summary of Seven Regression Analyses Predicting Social Support at Follow-up[a]

Models	All Participants (N = 50)					Randomly Assigned Participants (N = 43)				
	B	SE B	β	t-value	ΔR^2	B	SE B	β	t-value	ΔR^2
1) MCG vs. TCG	-0.01	0.25	-.01	-0.06	.000	-0.01	0.23	-.01	-0.03	.000
2) MCG vs. WL	0.31	0.27	.20	1.15	.037	-0.23	0.36	-.15	-0.65	.018
3) TCG vs. WL	0.18	0.26	.11	0.70	.011	-0.28	0.33	-.18	-0.83	.032
4) MCG vs. TCG	0.02	0.25	.01	0.07		0.02	0.23	.01	0.09	
Dose	0.02	0.03	.14	0.93		0.02	0.02	.14	0.91	
MCG vs. TCG x Dose	-0.01	0.05	-.03	-0.19	.001	-0.01	0.05	-.03	-0.20	.001

[a] In all these analyses, baseline scores on Social Support, for which R^2 was .259, were added into the equation to control for the influence of individual differences in the criterion variable prior to the intervention.

Note: The grouping variables (e.g., MCG vs. TCG) were centered by using contrast coding, with the first group in the contrast coded as +.5 and the second group in the contrast coded as -.5.

Note: All analyses were based on 50 observations. For comparisons of MCG and TCG, 34 observations contained complete data. For comparisons of either MCG or TCG with the WL group, 33 observations contained complete data.

Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WL = Wait-List Control Group.

Models	All Participants (N = 50)					Randomly Assigned Participants (N = 43)				
	B	SE B	β	t-value	ΔR^2	B	SE B	β	t-value	ΔR^2
5) MCG vs. TCG	0.00	0.24	.00	0.01		0.01	0.22	.01	0.03	
Baseline NA	0.02	0.02	.15	1.14		0.02	0.02	.17	1.15	
MCG vs. TCG x BNA	-0.05	0.04	-.18	-1.15	.028	-0.04	0.04	-.18	-1.15	.028
6) MCG vs. WL	0.31	0.27	.20	1.18		-0.20	0.35	-.13	-0.58	
Baseline NA	0.02	0.02	.14	0.91		0.02	0.03	.19	0.81	
MCG vs. WL x BNA	-0.02	0.05	-.08	-0.44	.002	-0.03	0.07	-.12	-.44	.005
7) TCG vs. WL	0.19	0.25	.12	0.75		-0.28	0.33	-.18	-0.83	
Baseline NA	0.01	0.02	.07	0.52		0.00	0.02	.02	0.08	
TCG vs. WL x BNA	0.05	0.05	.15	0.93	.028	0.05	0.07	.16	0.68	.026

†p<.10. *p < .05. **p < .01. ***p < .001

Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WL = Wait-List Control Group. BNA = Baseline Negative Affect.

Table 22

Summary of Seven Regression Analyses Predicting Attention (Working Memory) at Follow-up[a]

Models	All Participants (N = 50)					Randomly Assigned Participants (N = 43)				
	B	SE B	β	t-value	ΔR^2	B	SE B	β	t-value	ΔR^2
1) MCG vs. TCG	0.75	0.56	.17	1.35	.030	0.75	0.56	.17	1.33	.032
2) MCG vs. WL	0.80	0.62	.18	1.31	.045	0.88	0.76	.19	1.16	.046
3) TCG vs. WL	-0.01	0.69	-.00	-0.01	.000	-0.05	0.88	-.01	-0.06	.000
4) MCG vs. TCG	0.73	0.56	.17	1.29		0.72	0.57	.17	1.27	
Dose	0.01	0.07	.01	0.09		0.01	0.07	.01	0.08	
MCG vs. TCG x Dose	0.10	0.16	.11	0.64	.000	0.11	0.16	.12	0.69	.000

[a] In all these analyses, baseline scores on Attention (Working Memory), for which R^2 was .483, were added into the equation to control for the influence of individual differences in the criterion variable prior to the intervention.

Note: The grouping variables (e.g., MCG vs. TCG) were centered by using contrast coding, with the first group in the contrast coded as +.5 and the second group in the contrast coded as -.5.

Note: All analyses were based on 50 observations. For comparisons of MCG and TCG, 34 observations contained complete data. For comparisons of either MCG or TCG with the WL group, 33 observations contained complete data.

Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WL = Wait-List Control Group.

Models	All Participants (N = 50)					Randomly Assigned Participants (N = 43)				
	B	SE B	β	t-value	ΔR^2	B	SE B	β	t-value	ΔR^2
5) MCG vs. TCG	0.70	0.52	.16	1.34		0.68	0.50	.16	1.37	
Baseline NA	0.06	0.04	.14	1.27		0.08	0.05	.21	1.69†	
MCG vs. TCG x BNA	0.14	0.09	.19	1.53	.019	0.13	0.09	.18	1.47	.013
6) MCG vs. WL	0.87	0.57	.19	1.54		1.34	0.69	.29	1.95†	
Baseline NA	0.04	0.05	.11	0.94		0.14	0.07	.37	1.95†	
MCG vs. WL x BNA	0.17	0.11	.22	1.57	.039	-0.07	0.16	-.09	-0.41	.009
7) TCG vs. WL	-0.06	0.62	-.01	-0.09		0.16	0.70	.03	0.22	
Baseline NA	0.09	0.04	.23	2.10*		0.15	0.05	.40	3.06**	
TCG vs. WL x BNA	-0.05	0.14	-.06	-0.38	.001	-0.25	0.14	-.28	-1.79†	.062

†p<.10. *p < .05. **p < .01. ***p < .001

Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WL = Wait-List Control Group. BNA = Baseline Negative Affect.

Table 23

Summary of Seven Regression Analyses Predicting Mindfulness as Measured by the KIMS—Observe Subscale at Follow-up[a]

Models	All Participants (N = 50)					Randomly Assigned Participants (N = 43)				
	B	SE B	β	t-value	ΔR^2	B	SE B	β	t-value	ΔR^2
1) MCG vs. TCG	-0.36	0.15	-.30	-2.35*	.082	-0.37	0.16	-.31	-2.31*	.083
2) MCG vs. WL	0.05	0.19	.04	0.25	.001	-0.05	0.23	-.04	-0.19	.001
3) TCG vs. WL	0.46	0.15	.39	3.12**	.140	0.45	0.20	.35	2.28*	.115
4) MCG vs. TCG	-0.37	0.15	-.31	-2.51*		-0.38	0.15	-.31	-2.48*	
Dose	-0.00	0.02	-.01	-0.05		-0.00	0.02	-.01	-0.07	
MCG vs. TCG x Dose	0.06	0.03	.22	1.71†	.049	0.06	0.03	.22	1.70†	.050

[a] In all these analyses, baseline scores on the KIMS—Observe Subscale, for which R^2 was .374, were added into the equation to control for the influence of individual differences in the criterion variable prior to the intervention.

Note: The grouping variables (e.g., MCG vs. TCG) were centered by using contrast coding, with the first group in the contrast coded as +.5 and the second group in the contrast coded as -.5.

Note: All analyses were based on 50 observations. For comparisons of MCG and TCG, 34 observations contained complete data. For comparisons of either MCG or TCG with the WL group, 33 observations contained complete data.

Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WL = Wait-List Control Group.

Models	All Participants (N = 50)					Randomly Assigned Participants (N = 43)				
	B	SE B	β	t-value	ΔR^2	B	SE B	β	t-value	ΔR^2
5) MCG vs. TCG	-0.37	0.15	-.31	-2.41*		-0.38	0.16	-.31	-2.34*	
Baseline NA	0.01	0.01	.10	0.81		0.01	0.01	.05	0.42	
MCG vs. TCG x BNA	-0.01	0.03	-.05	-0.39	.002	-0.01	0.03	-.06	-0.41	.002
6) MCG vs. WL	0.06	0.19	.05	0.30		-0.04	0.24	-.03	-0.16	
Baseline NA	0.01	0.02	.13	0.89		0.00	0.02	.02	0.11	
MCG vs. WL x BNA	-0.03	0.04	-.16	-0.95	.034	-0.01	0.05	-.03	-0.13	.003
7) TCG vs. WL	0.47	0.14	.39	3.26**		0.46	0.20	.36	2.25*	
Baseline NA	0.01	0.01	.12	0.98		0.00	0.02	.04	0.21	
TCG vs. WL x BNA	-0.03	0.04	-.12	-0.83	.026	0.00	0.05	.02	0.07	.000

†p<.10. *p < .05. **p < .01. ***p < .001

Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WL = Wait-List Control Group. BNA = Baseline Negative Affect.

Table 24

Summary of Seven Regression Analyses Predicting Mindfulness as Measured by the MAAS at Follow-up[a]

Models	All Participants (N = 50)					Randomly Assigned Participants (N = 43)				
	B	SE B	β	t-value	ΔR^2	B	SE B	β	t-value	ΔR^2
1) MCG vs. TCG	0.15	0.17	.11	0.89	.018	0.14	0.17	.11	0.86	.021
2) MCG vs. WL	0.34	0.17	.25	1.99*	.060	0.18	0.23	.14	0.79	.019
3) TCG vs. WL	0.23	0.20	.17	1.13	.017	-0.03	0.27	-.02	-0.12	.002
4) MCG vs. TCG	0.12	0.17	.09	0.74		0.12	0.17	.09	0.71	
Dose	-0.02	0.02	-.10	-0.77		-0.02	0.02	-.11	-0.77	
MCG vs. TCG x Dose	0.02	0.04	.06	0.52	.000	0.02	0.04	.07	0.55	.000

[a] In all these analyses, baseline scores on the Mindful Awareness Attention Scale, for which R^2 was .489, were added into the equation to control for the influence of individual differences in the criterion variable prior to the intervention.
Note: The grouping variables (e.g., MCG vs. TCG) were centered by using contrast coding, with the first group in the contrast coded as +.5 and the second group in the contrast coded as -.5.
Note: All analyses were based on 50 observations. For comparisons of MCG and TCG, 34 observations contained complete data. For comparisons of either MCG or TCG with the WL group, 33 observations contained complete data.
Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WL = Wait-List Control Group.

Models	All Participants (N = 50) B	SE B	β	t-value	ΔR^2	Randomly Assigned Participants (N = 43) B	SE B	β	t-value	ΔR^2
5) MCG vs. TCG	0.18	0.17	.13	1.07		0.17	0.16	.13	1.03	
Baseline NA	-0.01	0.01	-.07	-0.63		-0.01	0.02	-.13	-0.95	
MCG vs. TCG x BNA	-0.02	0.03	-.08	-0.65	.008	-0.02	0.03	-.09	-0.65	.009
6) MCG vs. WL	0.37	0.17	.27	2.14*		0.22	0.22	.16	0.97	
Baseline NA	-0.01	0.02	-.08	-0.66		-0.00	0.02	-.01	-0.06	
MCG vs. WL x BNA	-0.01	0.04	-.06	-0.38	.002	-0.05	0.05	-.22	-0.97	.016
7) TCG vs. WL	0.23	0.20	.17	1.12		0.01	0.27	.01	0.03	
Baseline NA	-0.01	0.02	-.08	-0.63		-0.01	0.02	-.06	-0.29	
TCG vs. WL x BNA	0.01	0.04	.02	0.10	.000	-0.04	0.06	-.17	-0.62	.008

†p<.10. *p < .05. **p < .01. ***p < .001

Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WL = Wait-List Control Group. BNA = Baseline Negative Affect.

Table 25

Summary of Seven Regression Analyses Predicting Connectedness to Nature at Follow-up[a]

Models	All Participants (N = 50)					Randomly Assigned Participants (N = 43)				
	B	SE B	β	t-value	ΔR^2	B	SE B	β	t-value	ΔR^2
1) MCG vs. TCG	0.02	0.16	.01	0.10	.000	0.00	0.14	.00	0.02	.001
2) MCG vs. WL	0.29	0.18	.25	1.61	.055	0.06	0.23	.06	0.25	.006
3) TCG vs. WL	0.23	0.19	.19	1.20	.028	0.07	0.20	.07	0.32	.007
4) MCG vs. TCG	0.04	0.16	.04	0.27		0.03	0.14	.03	0.19	
Dose	0.01	0.02	.12	0.84		0.01	0.02	.13	0.85	
MCG vs. TCG x Dose	-0.03	0.04	-.11	-0.74	.012	-0.02	0.03	-.11	-0.68	.014

[a] In all these analyses, baseline scores on Connectedness to Nature, for which R^2 was .453, were added into the equation to control for the influence of individual differences in the criterion variable prior to the intervention.

Note: The grouping variables (e.g., MCG vs. TCG) were centered by using contrast coding, with the first group in the contrast coded as +.5 and the second group in the contrast coded as -.5.

Note: All analyses were based on 50 observations. For comparisons of MCG and TCG, 34 observations contained complete data. For comparisons of either MCG or TCG with the WL group, 33 observations contained complete data.

Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WL = Wait-List Control Group.

Models	All Participants (N = 50)					Randomly Assigned Participants (N = 43)				
	B	SE B	β	t-value	ΔR^2	B	SE B	β	t-value	ΔR^2
5) MCG vs. TCG	-0.01	0.15	-.01	-0.05		-0.02	0.13	-.02	-0.12	
Baseline NA	0.03	0.01	.28	2.63**		0.03	0.01	.35	2.56*	
MCG vs. TCG x BNA	-0.03	0.03	-.16	-1.24	.023	-0.03	0.02	-.18	-1.23	.028
6) MCG vs. WL	0.29	0.17	.24	1.75†		0.05	0.21	.05	0.24	
Baseline NA	0.03	0.01	.30	2.51*		0.03	0.02	.35	1.54	
MCG vs. WL x BNA	-0.03	0.03	-.13	-0.89	.022	-0.01	0.04	-.06	-0.24	.008
7) TCG vs. WL	0.28	0.18	.23	1.53		0.09	0.20	.09	0.44	
Baseline NA	0.03	0.01	.26	2.25*		0.02	0.01	.22	1.24	
TCG vs. WL x BNA	0.02	0.03	.07	0.49	.000	0.03	0.04	.18	0.84	.009

†p<.10. *p < .05. **p < .01. ***p < .001

Note: MCG = Mindful Community Gardening. TCG = Traditional Community Gardening. WL = Wait-List Control Group. BNA = Baseline Negative Affect

Table 26

Power Analyses Determining Total Sample Size Needed for Various Effect Sizes and Numbers of Predictors[a]

Number of of Predictors	Effect Size .02	Effect Size .06	Effect Size .08	Effect Size .10	Effect Size .12	Effect Size .14	Effect Size .30
2	485	164	124	100	84	72	36
4	602	204	155	125	105	91	45
6	688	234	177	143	120	104	53

[a] All analyses were conducted for F-tests in linear multiple regression, with alpha set at .05 and power set at .80.

Figure 1

Theoretical Model of Social Support Pathway and Attention/Mindfulness Pathway Between Two Forms of Community Gardening and Subjective Well-Being

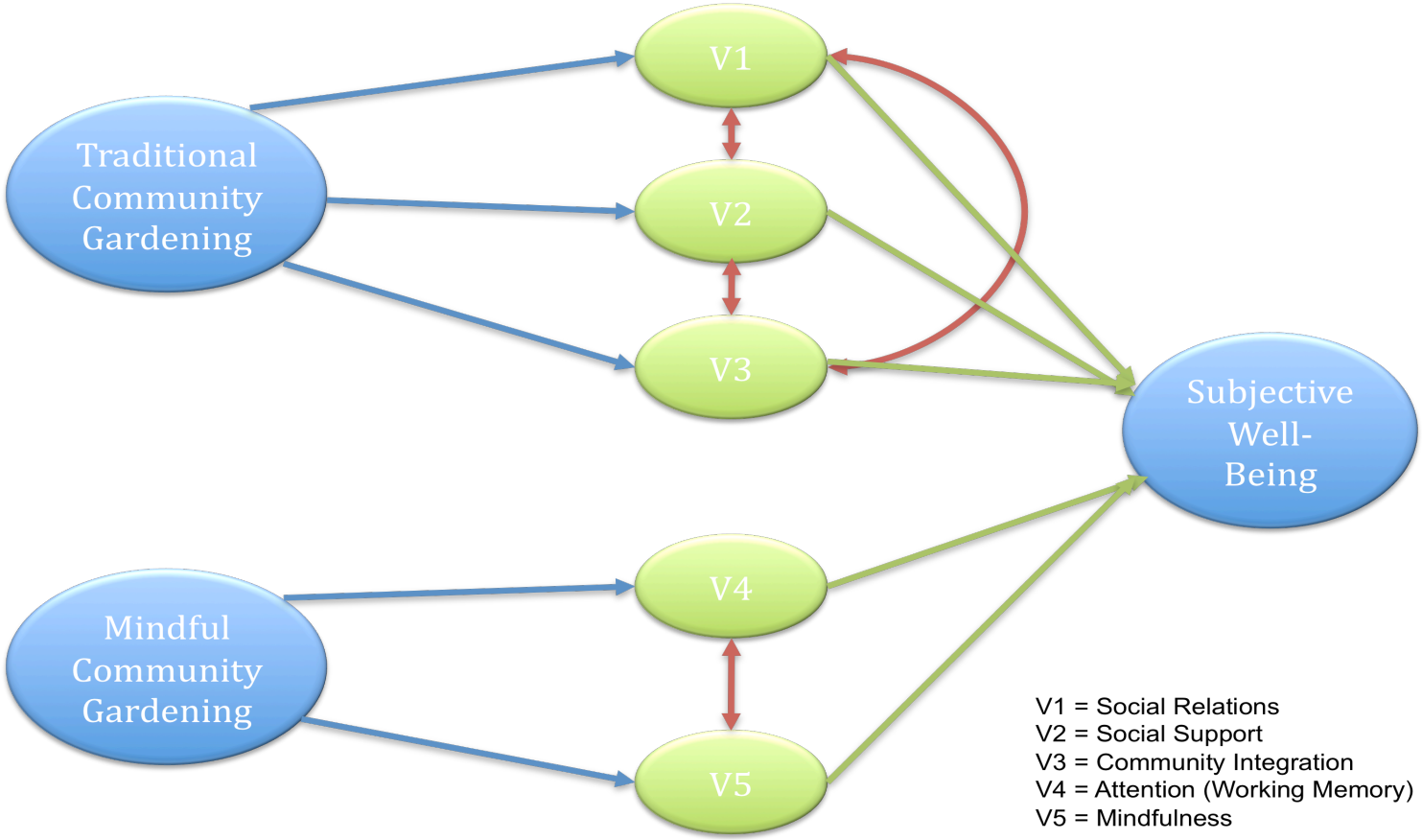


Figure 2

Theoretical Model Exploring Connectedness to Nature as a Pathway From Community Gardening to Subjective Well-Being

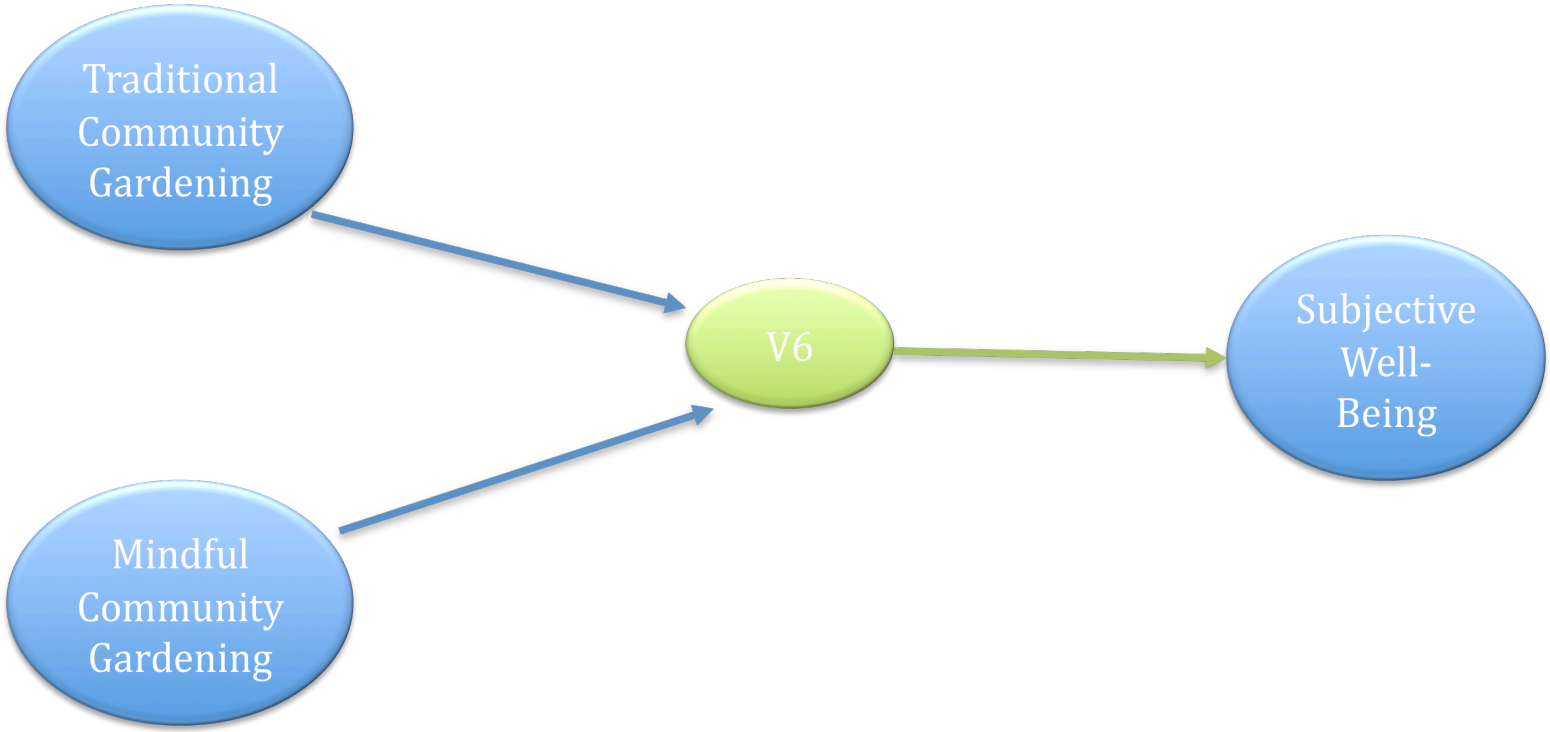


Figure 3. Study Procedures Flow Chart

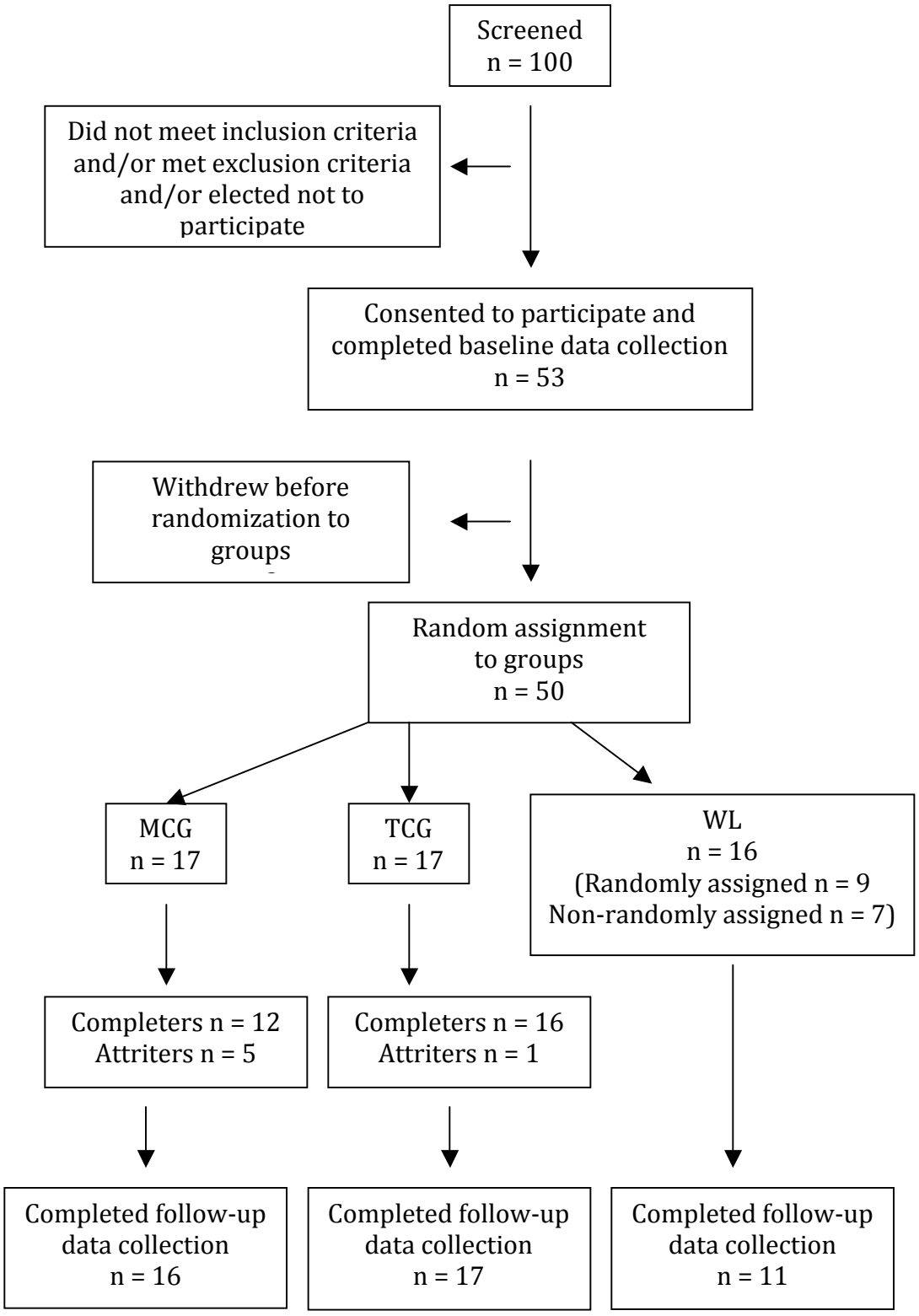


Figure 4. Form of the Interaction MG vs. WL x Dose Predicting Negative Affect at Follow-Up

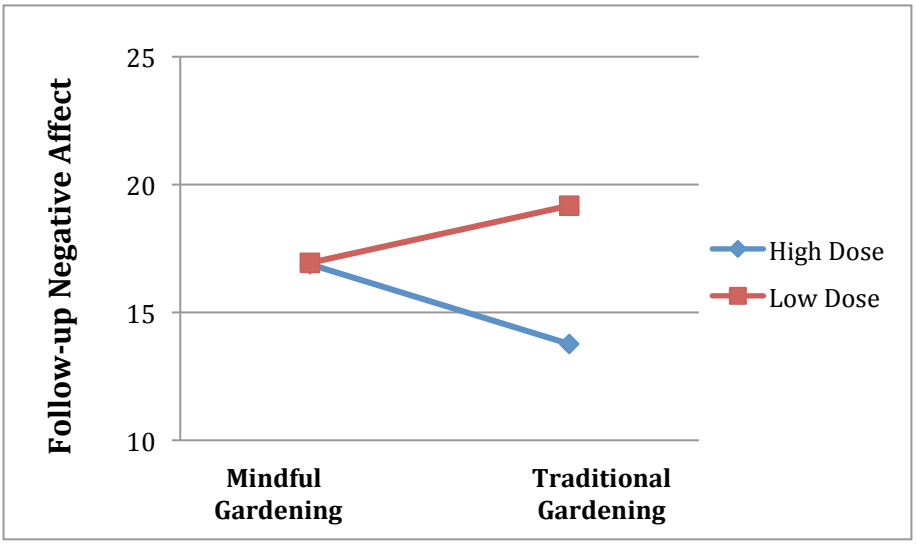
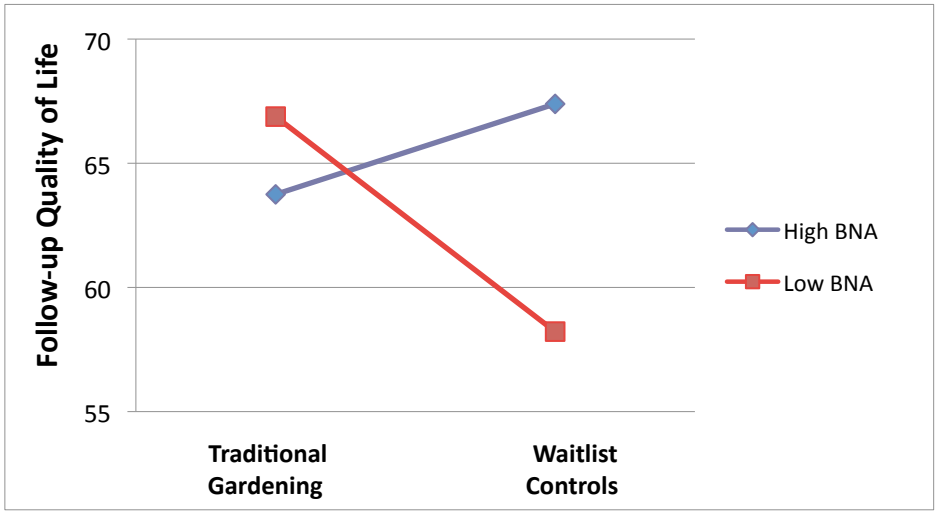


Figure 5. Form of the Interaction TG vs. WL x BNA Predicting Quality of Life at Follow-Up



APPENDIX A

Consent Form

CONSENT FORM

Arizona State University
Consent to Participate in a Research Study

Study Title: Community Gardening for Older Adults

INTRODUCTION

The purposes of this form are 1) to provide you, as a prospective research study participant, with information that may affect your decision as to whether or not to participate in this research and 2) to record the consent of those who agree to be involved in the study.

RESEARCHERS

Dr. Alex Zautra, Professor of Psychology in the College of Liberal Arts and Sciences at Arizona State University (ASU), Dr. Christopher Wharton, Assistant Professor of Nutrition at ASU, and Ms. Heather Okvat, Doctoral Candidate in the Department of Psychology in the College of Liberal Arts and Sciences at ASU, invite your participation in this research study.

STUDY PURPOSE

As you know, living in a large metropolitan area can limit opportunities for connection with nature. Additionally, daily life is often stressful. In this study, we are looking at gardening as a way to reconnect with nature in the city and to help you experience less stress. Few studies have been conducted looking into the beneficial effects of gardening. The purpose of this research is to study how organic gardening in small groups of older adults influences the course of people's everyday life. This study is open to people aged 55 to 79 who are planning to be in the local area through May 2009 and who can transport themselves to a garden located in Tempe near Mill Avenue and University Drive.

It is important that you understand that if you decide to participate, you will be "randomly assigned" to one of three groups after you rank your preference for days of the week that would be best for you to come to the garden.

There is a 2 in 3 chance that you would be gardening with a small group of older adults starting in the Winter of 2009, most likely in February, and a 1 in 3 chance that you would be gardening starting in the Spring of 2009, most likely in April. In the winter, two kinds of organic gardening will be introduced, and you will be randomly selected to join one or the other. Regardless of which of the three groups you are selected to join, you will be given the opportunity to garden with other older adults in all three.

DESCRIPTION OF RESEARCH STUDY

Approximately 90 people will be participating in this study. If you decide to participate, then you will join this study involving research on gardening and relaxation, and the following will occur:

1) You will be asked to sign this "Consent to Participate In a Research Study" form after you have read it and after all of your questions have been answered, and to mail it back to Heather Okvat, Box 871104, Arizona State University, Tempe AZ 85287, in the envelope provided.

2) You will be asked to come to Tempe St. Luke's Medical Office Building, 1492 S. Mill Ave., Tempe AZ for about 2½ hours to fill out a number of questionnaires that look at your diet, friendships, sense of connection to nature, feelings and mood; to do some short tasks that look at your memory and concentration; to have your height and weight measured; and to get a "food log" and instructions on how to use it to help you keep track of your eating for one week. You have the right to skip questions, and to stop participation at any time. Then a staff member will accompany you in a walk to the garden two blocks away where the gardening groups will take place so you are familiar with the location. This visit will probably take place in February 2009.

3) You will be asked to fill out a food log every other day for one week, for a total of four days. This is a way to keep track of what you are eating.

4) You will be "randomly assigned" to one of three gardening groups, as described above.

5) For 9 weeks, you will be asked to come to Highest Heaven garden, located on private property at 1104 S. Ash Avenue, Tempe, AZ, one afternoon per week for 2½ hours. The day of the week and time of day will be the same each week. In the garden, you will help grow fruits, vegetables, and herbs using organic methods. Typical gardening tasks include planting, watering, weeding, digging, and harvesting. Your level of physical ability will be respected. Tools to make the process easier will be available, e.g. wheelbarrows will be used to transport things rather than having to carry them. Additionally, adaptive tools will be available as needed, e.g. kneeling benches to make weeding and planting more comfortable, or extended reach tools. Rather than having individual plots as occurs in some community gardens, in which each person tends their own separate piece of land, here everyone will work together to grow the produce for the overall garden. Participants will get a taste of the produce. The majority of the produce will be sold locally, with proceeds going back to the garden for its ongoing sustenance, e.g. purchasing garden supplies. You will have a role in what gets planted in the

garden and how things get done. In some groups, there will also be guided meditation exercises that focus on developing awareness, concentration, and relaxation. During the 9 weeks of group gardening, you will be asked to keep up your gardening and relaxation exercises at home; for example, you will be given a plant to take care of at home. Each week when you arrive in the garden, you will be asked to answer a short questionnaire about your activities during the past week.

6) You will be asked to fill out one more food log every other day for one week, for a total of four days.

7) You will be asked to come to Tempe St. Luke's for one more visit of about 2½ hours to fill out questionnaires, do some short tasks that look at your memory and concentration, and have your height and weight taken. This visit will probably take place in April 2009.

8) You might also be invited to participate in an interview one time for about one hour, after the 9 weeks of group gardening. The interview would ask you questions about your experiences in life and in the gardening group. We would like to audiotape this interview. You will not be recorded unless you give permission on a separate form. If you give permission to be taped, you have the right to ask for the recording to be stopped.

9) After the 9 weeks of group gardening, if you would like to continue to participate in the garden, you may do so. At this time, you may choose to come the garden on a different day of the week, or more frequently, or for longer or shorter time periods.

10) You will be invited to come to a harvest gathering in the Fall of 2009, to learn the results of this research study and to share food with all of the participants in this study.

RISKS

Taking part in this study involves risks associated with typical gardening activity: 1) falling, 2) garden pests, 3) cuts and scrapes, or 4) physical overexertion. The first risk is falling. To reduce this risk, you will be asked to wear closed-toe shoes that support and stabilize you. You will also have a garden safety orientation, covering topics such as making sure that tools are safely put away when not in use, paying attention to where your feet are stepping as you walk, and using a kneeling pad while weeding and rising slowly when done. The second risk is garden pests, such as ants, bees, or mosquitoes. To reduce the risk of a bite, you will be given a pair of gardening gloves, and you might wish to wear long pants rather than shorts. Natural insect repellent will be kept in the garden for use if desired. The third risk is cuts and scrapes. To reduce this risk, you are

encouraged to wear your gardening gloves, and you might wish to wear long sleeved shirts rather than short sleeves. The garden safety orientation will also cover proper use of tools to prevent cuts and scrapes. The fourth risk is physical overexertion. To reduce this risk, you are encouraged to rest as needed and go about your gardening at a pace that's right for them. Additionally, adaptive tools will be available to make gardening tasks easier. In addition, your participation involves the risk of feeling discomfort when asked about your personal experiences in questionnaires, group check-ins, or an individual interview. You are free to skip questions, refrain from sharing, or to quit the study at any time without penalty.

BENEFITS

You may or may not benefit personally from this study. The possible main benefits of your participation in this research are getting more exercise, learning organic gardening techniques, feeling more relaxed and better able to manage stress, making new friends, contributing your time and experience in satisfying ways, slightly increasing your supply of fresh fruits and vegetables, and enjoying a place for quiet reflection in the midst of the city. Additionally, your participation may lead to knowledge that will help others in the future as they start community gardens or manage them.

CONFIDENTIALITY

All information obtained in this study is strictly confidential. The results of this research study may be used in reports, presentations, and publications, but the researchers will not identify you. In order to maintain confidentiality of your records, you will be given a unique participant number. This number will be used in place of your name on all of the data that you provide. All of your records and questionnaires will be kept in a locked file cabinet in a locked office. Only study personnel will have access to the data. If you participate in an interview that is audiotaped, the tapes will be erased after data analysis.

WITHDRAWAL PRIVILEGE

Participation in this study is completely voluntary. It is ok for you to say no. Even if you say yes now, you are free to say no later, and withdraw from the study at any time. If you withdraw from the study, the data you provided up to that point will be used in the research.

COSTS AND PAYMENTS

Your participation may pose some costs to you, such as for transportation to and from the garden. There is no payment for your participation in the study.

STATEMENT OF VOLUNTARY CONSENT

Any questions you have concerning the research study or your participation in the study, before or after your consent, will be answered by the Co-Investigator, Ms. Heather Okvat, at 480-965-4626, or by the Principal Investigator, Dr. Alex Zautra, at 480-727-

8227. You may reach both of them by mail at Box 871104, Arizona State University, Tempe AZ 85287-1104.

If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you may contact the Principal Investigator, Dr. Alex Zautra, or the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at 480-965-6788.

This form explains the nature, demands, potential benefits, and possible risks of the project. By signing this form you agree knowingly to assume any risks involved. You are also agreeing to discuss any concerns you have about your health or ability to participate with your physician before consenting to participate. Additionally, if emergency medical treatment is necessary while participating in this study, you are consenting to the provision of emergency medical treatment to the extent that the treatment is necessary in the opinion of the medical professional rendering the treatment.

Remember, your participation is voluntary. You may choose not to participate or to withdraw your consent and discontinue participation at any time without penalty. In signing this consent form, you are not waiving any legal claims, rights, or remedies. A copy of this consent form will be given (offered) to you.

Your signature below indicates that you consent to participate in the above study.

_____	_____	_____
Participant's Signature	Printed Name	Date

INVESTIGATOR'S STATEMENT

"I certify that I have explained to the above individual the nature and purpose, the potential benefits and possible risks associated with participation in this research study and have answered any questions that have been raised. These elements of Informed Consent conform to the Assurance given by Arizona State University to the Office for Human Research Protections to protect the rights of human subjects. I have provided (offered) the participant a copy of this signed consent document."

_____	_____	_____
Investigator's Signature	Printed Name	Date

APPENDIX B

Physical Functioning

SF-36 Physical Functioning Subscale

Instructions: The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

	Yes, Limited a Lot	Yes, Limited a Little	No, Not Limited at All
Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports?	**1**	**2**	**3**
Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling or playing golf.	**1**	**2**	**3**
Lifting or carrying groceries.	**1**	**2**	**3**
Climbing several flights of stairs.	**1**	**2**	**3**
Bending, kneeling, or stooping.	**1**	**2**	**3**
Walking more than one mile.	**1**	**2**	**3**
Walking several blocks.	**1**	**2**	**3**
Walking more than one block.	**1**	**2**	**3**
Bathing or dressing yourself.	**1**	**2**	**3**

APPENDIX C

Revised Physical Activity Readiness Questionnaire

Regular physical activity is fun and healthy, and increasingly more people are starting to become more active every day. Being more active is very safe for most people. However, some people should check with their doctor before they start becoming much more physically active.

If you are planning to become much more physically active than you are now, start by answering the questions below. This will tell you if you should check with your doctor before you start. If you are over 69 years of age, and you are not used to being very active, you should check with your doctor.

Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly.

Please mark YES or No to the following:	**YES**	**NO**
1. Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?	____	____
2. Do you feel pain in your chest when you do physical activity?	____	____
3. In the past month, have you had chest pain when you were not doing physical activity?	____	____
4. Do you lose your balance due to dizziness or do you ever lose consciousness?	____	____
5. Do you have a bone or joint problem that could be made worse by physical activity?	____	____
6. Do you have any other health problem that causes you pain or any limitations that must be addressed when developing an exercise program (e.g. diabetes, osteoporosis, high blood pressure, high cholesterol, arthritis, anorexia, bulimia, anemia, epilepsy, respiratory ailments, back problems, knee problems, hip problems, etc.)?	____	____
7. Is your doctor currently prescribing medications (for example, water pills) for your blood pressure or heart condition?	____	____
8. Have you had a recent surgery?	____	____
9. Do you have any allergies that would prevent you from gardening?	____	____

	YES	NO
10. Do you know of <u>any other reason</u> why you should not do physical activity, either based on your own experience or a doctor's advice?	____	____

If you have marked YES to any of the above, please elaborate below:

Do you have any chronic illness or physical limitations such as Asthma, diabetes? YES/NO

Do you have any injuries or orthopedic problems such as bursitis, bad knees, back, shoulder, wrist or neck issues ? YES/ NO. Please specify:

Do you take any medications, either prescription or non-prescription, on a regular basis? YES/NO

If YES, what is the medication for?

How does this medication affect your ability to exercise or achieve your fitness goals?

Has your medication been changed at all in the past 3 months?

Lifestyle Related Questions:

1) Do you smoke? YES NO If yes, how much?_____

2) Do you drink alcohol? YES NO If yes, how many glasses per week?_____

3) How many hours do you regularly sleep at night? _____

APPENDIX D

Background Questionnaire

Background Questions

1. How would you rate your overall health? Please circle one.

Poor	Fair	Good	Very good	Excellent

2 What is your date of birth? _____/ _____ / _____
(month) (day) (year)

3. What is your gender? Please check one.
   - ❑ Female
   - ❑ Male

3. Race/ethnicity:
   - ❑ American Indian or Alaskan Native
   - ❑ Asian
   - ❑ Black or African American
   - ❑ Hispanic or Latino
   - ❑ Native Hawaiian or Other Pacific Islander
   - ❑ White or Caucasian
   - ❑ Other (Please specify:_____)

4. Are you married, separated, divorced, widowed, or never married?
   - ❑ Married
   - ❑ Separated
   - ❑ Divorced
   - ❑ Widowed
   - ❑ Never Married

5. Do you live…?
   - ❑ Alone
   - ❑ Alone, but with assistance from another adult such as a caregiver
   - ❑ With a spouse
   - ❑ With adult children or other relatives
   - ❑ With another adult or adults
   - ❑ With a caregiver

6. What is the highest grade of school or year of college you completed?

- Some grade school
- Eighth grade/Junior high school
- Some high school (No diploma/No GED)
- GED
- Graduated from high school
- 1 to 2 years of college, no degree
- 3 or more years of college, no degree
- Graduated from a 2-year college or vocational school, or Associate's Degree
- Graduated from a 4- or 5-year college, or Bachelor's Degree
- Some graduate school
- Master's degree
- Ph.D., Ed.D., MD, DDS, LLB, LLD, JD, or other professional degree

7. What is your current employment situation?

- Working now for pay
- Self-employed
- Looking for work
- Temporarily laid off
- Retired
- A homemaker
- A full-time or part-time student
- Something else (Please specify: _____)

8. Are you currently an active gardener?

- YES – go to question 9
- NO – go to question 11

9. How much gardening do you do?

_____ hour(s) per Week / Month
(circle one)

10. Please describe the kind of gardening you do. (Check all that apply.)

_____ (a) Container gardening, e.g. growing flowers or herbs in pots
_____ (b) I grow flowers. (Specify kind: _____)
_____ (c) I grow vegetables. (Specify kind: _____)
_____ (d) I grow herbs. (Specify kind: _____)
_____ (e) I grow fruit trees. (Specify kind: _____)
_____ (f) I use conventional methods (chemical fertilizers/pesticides)
_____ (g) I use organic methods (natural fertilizers/pest control)
_____ (h) I volunteer in a community garden (Specify which one: _____)

11. Do you currently have a meditation practice (not including prayer)?

- YES – go to question 12
- NO – go to question 14

12. How much meditation do you do (not including prayer)?

_____ hour(s) per Week / Month
(circle one)

13. Please describe the kind of meditation you do. (Check all that apply.)

_____ (a) Concentrative meditation, focusing on breath, object or mantra
_____ (b) Transcendental meditation
_____ (c) Tonglen
_____ (d) Mindfulness meditation
_____ (e) Vipassana
_____ (f) Walking meditation
_____ (g) Qi gong
_____ (h) Other (Please specify/describe: _____)

14. How much physical activity do you do (including cardiovascular, where you're getting your heart rate up, and/or strength training, and/or balance or flexibility activity, such as yoga)?

_____ hour(s) per Week / Month
(circle one)

15. What do you do for physical activity? (Check all that apply.)

_____ (a) Running
_____ (b) Walking
_____ (c) Biking
_____ (d) Tennis or racquetball
_____ (e) Dancing
_____ (f) Hiking
_____ (g) Lifting weights
_____ (h) Yoga
_____ (i) Tai chi
_____ (j) Stretching
_____ (l) Other (Please specify/describe: _____)
_____ (m) Other (Please specify/describe: _____)
_____ (n) Other (Please specify/describe: _____)

16. How much time do you spend relaxing?

_____ hour(s) per Week / Month
(circle one)

17. How do you relax? (Check all that apply.)

_____ (a) Listening to music
_____ (b) Deep breathing
_____ (c) Talking to a friend or relative
_____ (d) Watching TV or a movie
_____ (e) Getting a massage
_____ (f) Read (Please specify/describe: _____)
_____ (g) Practicing a hobby (Please specify/describe: _____)
_____ (h) Other (Please specify/describe: _____)

APPENDIX E

Geriatric Depression Scale

Mood Scale

Choose the best answer for how you have felt over the past week.

1. Are you basically satisfied with your life?	YES	NO
2. Have you dropped many of your activities and interests?	YES	NO
3. Do you feel that your life is empty?	YES	NO
4. Do you often get bored?	YES	NO
5. Are you in good spirits most of the time?	YES	NO
6. Are you afraid that something bad is going to happen to you?	YES	NO
7. Do you feel happy most of the time?	YES	NO
8. Do you often feel helpless?	YES	NO
9. Do you prefer to stay at home, rather than going out and doing new things?	YES	NO
10. Do you feel you have more problems with memory than most?	YES	NO
11. Do you think it is wonderful to be alive now?	YES	NO
12. Do you feel pretty worthless the way you are now?	YES	NO
13. Do you feel full of energy?	YES	NO
14. Do you feel that your situation is hopeless?	YES	NO
15. Do you think that most people are better off than you are?	YES	NO

APPENDIX F

Positive and Negative Affect Schedule

PANAS

Instructions: The following words describe different feelings and emotions. Please indicate the extent to which you have felt this way during the last 4 weeks by marking the circle under the choice.

	None of the time	Little of the time	Some of the time	Most of the time	All of the time
[Positive Affect Items]					
active	**1**	**2**	**3**	**4**	**5**
enthusiastic	**1**	**2**	**3**	**4**	**5**
attentive	**1**	**2**	**3**	**4**	**5**
strong	**1**	**2**	**3**	**4**	**5**
proud	**1**	**2**	**3**	**4**	**5**
alert	**1**	**2**	**3**	**4**	**5**
excited	**1**	**2**	**3**	**4**	**5**
inspired	**1**	**2**	**3**	**4**	**5**
determined	**1**	**2**	**3**	**4**	**5**
interested	**1**	**2**	**3**	**4**	**5**
[Negative Affect Items]					
guilty	**1**	**2**	**3**	**4**	**5**
afraid	**1**	**2**	**3**	**4**	**5**
hostile	**1**	**2**	**3**	**4**	**5**
nervous	**1**	**2**	**3**	**4**	**5**
distressed	**1**	**2**	**3**	**4**	**5**
jittery	**1**	**2**	**3**	**4**	**5**
irritable	**1**	**2**	**3**	**4**	**5**
upset	**1**	**2**	**3**	**4**	**5**
ashamed	**1**	**2**	**3**	**4**	**5**
scared	**1**	**2**	**3**	**4**	**5**

APPENDIX G

Quality of Life, Enjoyment, and Satisfaction Questionnaire – Short Form

QLESQ-SF

Circle the number from 1 to 5 that best describes your level of satisfaction during the past week.

	OVERALL LEVEL OF SATISFACTION				
Taking everything into consideration, during the past week how satisfied have you been with your…	Very Poor	Poor	Fair	Good	Very Good
…physical health?	1	2	3	4	5
…mood?	1	2	3	4	5
…work?	1	2	3	4	5
…household activities?	1	2	3	4	5
…social relationships?	1	2	3	4	5
…family relationships?	1	2	3	4	5
…leisure time activities?	1	2	3	4	5
…ability to function in daily life?	1	2	3	4	5
…sexual drive, interest, and/or performance?	1	2	3	4	5
…economic status?	1	2	3	4	5
…living/housing situation?	1	2	3	4	5
…ability to get around physically without feeling dizzy or unsteady or falling?	1	2	3	4	5
…your vision in terms of ability to do work or hobbies?	1	2	3	4	5
…overall sense of well being?	1	2	3	4	5
…medication? (If not taking any, check here _____ and leave item blank)	1	2	3	4	5
How would you rate your overall life satisfaction and contentment during the past week?	1	2	3	4	5

APPENDIX H

SF-36 Vitality Subscale

SF-36 Vitality Subscale

Instructions: These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks…

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
Did you feel full of pep?	**1**	**2**	**3**	**4**	**5**	**6**
Did you have a lot of energy?	**1**	**2**	**3**	**4**	**5**	**6**
Did you feel worn out?	**1**	**2**	**3**	**4**	**5**	**6**
Did you feel tired?	**1**	**2**	**3**	**4**	**5**	**6**

APPENDIX I

Digit Span Backward

DSB

(Give instructions and practice items)

Item #	Trial #	Item	Response	Trial Score	Item Score (0, 1, or 2)
1.	1 2	2 – 4 5 – 7			
2.	1 2	6 – 2 – 9 4 – 1 – 5			
3.	1 2	3 – 2 – 7 – 9 4 – 9 – 6 – 8			
4.	1 2	1 – 5 – 2 – 8 – 6 6 – 1 – 8 – 4 – 3			
5.	1 2	5 – 3 – 9 – 4 – 1 – 8 7 – 2 – 4 – 8 – 5 – 6			
6.	1 2	8 – 1 –2 – 9 – 3 – 6 – 5 4 – 7 – 3 – 9 – 1 – 2 – 8			
7.	1 2	9 – 4 – 3 – 7 – 6 – 2 – 5 – 8 7 –2 – 8 – 1 – 9 – 6 – 5 – 3			

APPENDIX J

Mindfulness

MAAS

Below is a collection of statements about your everyday experience. Using the 1 to 6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what *really reflects* your experience, rather than what you think your experience should be.

1. I could be experiencing some emotion and not be conscious of it until some time later.

1	2	3	4	5	6
almost always	very frequently	somewhat frequently	somewhat infrequently	very infrequently	Almost never

2. I break or spill things because of carelessness, not paying attention, or thinking of something else.

1	2	3	4	5	6
almost always	very frequently	somewhat frequently	somewhat infrequently	very infrequently	Almost never

3. I find it difficult to stay focused on what's happening in the present.

1	2	3	4	5	6
almost always	very frequently	somewhat frequently	somewhat infrequently	very infrequently	Almost never

4. I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.

1	2	3	4	5	6
almost always	very frequently	somewhat frequently	somewhat infrequently	very infrequently	Almost never

5. I tend not to notice feelings of physical tension or discomfort until they really grab my attention.

1	2	3	4	5	6
almost always	very frequently	somewhat frequently	somewhat infrequently	very infrequently	Almost never

6. I forget a person's name almost as soon as I've been told it for the first time.

1	2	3	4	5	6
almost always	very frequently	somewhat frequently	somewhat infrequently	very infrequently	Almost never

7. It seems I am “running on automatic” without much awareness of what I’m doing.

1	2	3	4	5	6
almost always	very frequently	somewhat frequently	somewhat infrequently	very infrequently	Almost never

8. I rush through activities without being really attentive to them.

1	2	3	4	5	6
almost always	very frequently	somewhat frequently	somewhat infrequently	very infrequently	Almost never

9. I get so focused on the goal I want to achieve that I lose touch with what I am doing right now to get there.

1	2	3	4	5	6
almost always	very frequently	somewhat frequently	somewhat infrequently	very infrequently	Almost never

10. I do jobs or tasks automatically, without being aware of what I’m doing.

1	2	3	4	5	6
almost always	very frequently	somewhat frequently	somewhat infrequently	very infrequently	Almost never

11. I find myself listening to someone with one ear, doing something else at the same time.

1	2	3	4	5	6
almost always	very frequently	somewhat frequently	somewhat infrequently	very infrequently	Almost never

12. I drive places on “automatic pilot” and then wonder why I went there.

1	2	3	4	5	6
almost always	very frequently	somewhat frequently	somewhat infrequently	very infrequently	Almost never

13. I find myself preoccupied with the future or the past.

1	2	3	4	5	6
almost always	very frequently	somewhat frequently	somewhat infrequently	very infrequently	Almost never

14. I find myself doing things without paying attention.

1	2	3	4	5	6
almost always	very frequently	somewhat frequently	somewhat infrequently	very infrequently	Almost never

15. I snack without being aware that I'm eating.

1	2	3	4	5	6
almost always	very frequently	somewhat frequently	somewhat infrequently	very infrequently	almost never

KIMS

Now, using the 1—5 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what *really reflects* your experience rather than what you think your experience should be.

1. I notice changes in my body, such as whether my breathing slows down or speeds up.

1	2	3	4	5
Never or very rarely true	Rarely true	Sometimes true	Mostly true	Almost always or always true

2. I pay attention to whether my muscles are tense or relaxed.

1	2	3	4	5
Never or very rarely true	Rarely true	Sometimes true	Mostly true	Almost always or always true

3. When I'm walking, I deliberately notice the sensations of my body moving.

1	2	3	4	5
Never or very rarely true	Rarely true	Sometimes true	Mostly true	Almost always or always true

4. When I take a shower or a bath, I stay alert to the sensations of water on my body.

1	2	3	4	5
Never or very rarely true	Rarely true	Sometimes true	Mostly true	Almost always or always true

5. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions.

1	2	3	4	5
Never or very rarely true	Rarely true	Sometimes true	Mostly true	Almost always or always true

6. I pay attention to sensations, such as the wind in my hair or sun on my face.

1	2	3	4	5
Never or very rarely true	Rarely true	Sometimes true	Mostly true	Almost always or always true

7. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.

1	2	3	4	5
Never or very rarely true	Rarely true	Sometimes true	Mostly true	Almost always or always true

8. I notice the smells and aromas of things.

1	2	3	4	5
Never or very rarely true	Rarely true	Sometimes true	Mostly true	Almost always or always true

9. I intentionally stay aware of my feelings.

1	2	3	4	5
Never or very rarely true	Rarely true	Sometimes true	Mostly true	Almost always or always true

10. I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.

1	2	3	4	5
Never or very rarely true	Rarely true	Sometimes true	Mostly true	Almost always or always true

11. I pay attention to how my emotions affect my thoughts and behavior.

1	2	3	4	5
Never or very rarely true	Rarely true	Sometimes true	Mostly true	Almost always or always true

12. I notice when my moods begin to change.

1	2	3	4	5
Never or very rarely true	Rarely true	Sometimes true	Mostly true	Almost always or always true

APPENDIX K

Social Relationships, Social Support, and Community Integration

Social Relationships

Please answer each question below. If anything is unclear, please ask a research assistant for clarification.

1. Have you made any new friends in the past two (2) months?

_____ YES (Go to Question #2)
_____ NO (Skip Question #2 and go to Question #3)

2. If you have made one or more new friends during the past two (2) months, then for each one, please write down their first name and how you met them. For example, you might have met a new friend at as senior cent1.5er or at a club or organization that you belong to.

Name How You Met Them

3. About how many close relatives do you have (people you feel at ease with and can talk to about what is on your mind)?
Please write in the number here: ____
Now, in the space below, please list the first names of your close relatives:

4. About how many close friends do you have (people you feel at ease with and can talk to about what is on your mind)?
Please write in the number here: ____
Now, in the space below, please list the first names of your close friends:

MOS SS

Next are some questions about the support that is available to you. People sometimes look to others for companionship, assistance, or other types of support. How often is each of the following kinds of support available to you if you need it?

(Circle One Number On Each Line)

	None of the time	A Little of the time	Some of the time	Most of the time	All of the time
Someone to have a good time with	1	2	3	4	5
Someone to confide in or talk to about yourself or your problems	1	2	3	4	5
Someone to get together with for relaxation	1	2	3	4	5
Someone to turn to for suggestions about how to deal with a personal problem	1	2	3	4	5
Someone to do something enjoyable with	1	2	3	4	5
Someone who understands your problems	1	2	3	4	5

CI

There are many kinds of communities. A community could be where you live, like your neighborhood. You might also belong to a religious community, or a community of people who are in contact on a regular basis to share a hobby. Considering the many ways of thinking about community, please indicate how strongly you agree or disagree that each of the following statements reflects how you have been feeling in the past month. By circling 1, 2, or 3, you are indicating that you agree with the statement. By circling 5, 6, or 7, you are indicating that you disagree with the statement. By circling 4, you are indicating that you don't know whether you agree or disagree with the statement.

a. I **don't** feel I belong to anything I'd call a community.

1	2	3	4	5	6	7
Agree strongly	Agree somewhat	Agree a little	Don't know	Disagree a little	Disagree somewhat	Disagree strongly

b. I have something valuable to give to the world.

1	2	3	4	5	6	7
Agree strongly	Agree somewhat	Agree a little	Don't know	Disagree a little	Disagree somewhat	Disagree strongly

c. I feel close to other people in my community.

1	2	3	4	5	6	7
Agree strongly	Agree somewhat	Agree a little	Don't know	Disagree a little	Disagree somewhat	Disagree strongly

d. My daily activities do **not** create anything worthwhile for my community.

1	2	3	4	5	6	7
Agree strongly	Agree somewhat	Agree a little	Don't know	Disagree a little	Disagree somewhat	Disagree strongly

e. My community is a source of comfort.

1	2	3	4	5	6	7
Agree strongly	Agree somewhat	Agree a little	Don't know	Disagree a little	Disagree somewhat	Disagree strongly

f. I have **nothing** important to contribute to society.

1	2	3	4	5	6	7
Agree strongly	Agree somewhat	Agree a little	Don't know	Disagree a little	Disagree somewhat	Disagree strongly

APPENDIX L

Sense of Connection to Nature

CNS

Please answer each of these questions in terms of the *way you generally feel.* There are no right or wrong answers. Using the following scale, in the space provided next to each question simply state as honestly and candidly as you can what you are presently experiencing.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

Highlighted items are reverse-scored.

____ 1. I often feel a sense of oneness with the natural world around me.

____ 2. I think of the natural world as a community to which I belong.

____ 3. I recognize and appreciate the intelligence of other living organisms.

____ 4. I often feel disconnected from nature.

____ 5. When I think of my life, I imagine myself to be part of a larger cyclical process of living.

____ 6. I often feel a kinship with animals and plants.

____ 7. I feel as though I belong to the Earth as equally as it belongs to me.

____ 8. I have a deep understanding of how my actions affect the natural world.

____ 9. I often feel part of the web of life.

____ 10. I feel that all inhabitants of Earth, human, and nonhuman, share a common 'life force.'

____ 11. Like a tree can be part of a forest, I feel embedded within the broader natural world.

____ 12. When I think of my place on Earth, I consider myself to be a top member of a hierarchy that exists in nature.

____ 13. I often feel like I am only a small part of the natural world around me, and that I am not more important than the grass on the ground or the birds in the trees.

____ 14. My personal welfare is independent of the welfare of the natural world.

APPENDIX M

Intervention Participant Open-Ended Questions

Open-Ended Questions

1. What did you like most about being in the gardening group?

2. What did you dislike, or what weaknesses did you see in the group/program that detracted from the experience?

3. What can we improve that might help future gardening groups of this kind?

4. What did you learn in the gardening group?

5. What other benefits did you get from the gardening group?

6. What do you see as the benefits of gardening with others, if any, over and above the benefits that you might get from gardening alone?

APPENDIX N

Interview Guide

Semi-Structured Interview Guide

The following questions were used as a guide to interview participants from the intervention groups. Text in parentheses exemplifies alternative phrases used to encourage sharing.

Opening: In this interview, I'd like to learn more about your experiences in life in general, including in the garden, but not only in the garden. I'll ask you about positive experiences and also about challenges you've faced, focusing on this calendar year (2009).

Introductory Question: To begin, what do you feel is most important for me to know about your experiences in Highest Heaven Garden?

Key Question 1: What have been some of the best experiences you've had this year?

Key Question 2: Tell me about your experience with contact with nature, and especially gardening, this year.

Key Question 3: Tell me about your experience with meditation this year.

Key Question 4: I'd like to know more about the challenges you've experienced in your life lately. This year, has anything been particularly hard for you, or stressful, or a real struggle? How has this affected you?

Key Question 5: How have you handled this? What has helped you keep going?

Key Question 6: What is your sense of your place in the natural world? (Prompt if needed: What are some ways you feel connected to the environment, plants, animals, the planet?)

Examples of Probing Questions:
What did you mean by _____?
You said _____. Tell me more about that.

Ending: Thank you for sharing with me today. Is there anything else you'd like me to know?

APPENDIX 0

Qualitative Data Analysis Codes

Qualitative Data Analysis Codes

1. Likes/Positives—what stood out to you about the groups—and Impact of groups
    1.1 Enjoy meeting or working w/ people & forming friendships
        1.1.1 Participants—uplifting that so many people in my age group still had goals and dreams; friendships formed within such a diverse group; I discovered I enjoy gardening in a group—with others who enjoy it the way I do
        1.1.2 Bob
        1.1.3 Research assistant
    1.2 Impact of group - Plans to return to volunteer at Highest Heaven (HH)
        1.2.1 Intend to go back to HH & volunteer
        1.2.2 Enlisted 2 other friends to help at HH (as a one-time thing)
    1.3 What effect have your experiences in the groups had on your life?
        1.3.1/3.4/14.2 Interested in sharing gardening knowledge—helping others—starting a community garden; talking with others about the garden and/or showing HH to others
        1.3.2 Positive impact on my life at a time when I needed it most, Emotional support (tears & popping up during interview), Being able to get away [from probs] & do something without being selfish; Peace
    1.4 Miscellaneous positive comments
    1.5 Gardening
        1.5.1 Working in the garden
        1.5.2 Being with the soil
        1.5.3 Enjoying things that are growing
        1.5.4 Learning—gaining knowledge—what can grow in AZ
        1.5.6 Springtime is inspiring—quick changes & easy to connect/enjoy
        1.5.7 It was the right time of year
        1.5.8 I was amazed I didn't have physical problems
    1.6/6.10/9.5 "The respect for the planet comes out… When you nurture the planet, the planet will take care of you"
    1.7 Meditation, awareness, mindfulness – incl. surprise about this
    1.8/14.4 MCG groups provided change of perspective on life issues
    1.9 Learned about/enjoyed/appreciated neighborhood around the garden
    1.10 Widened my efforts towards sustainable living – age-appropriate - got to know the public bus system & toured the city by bus
    1.11 Emotional support

2. Experiences with mindfulness aspect of mindful gardening group
    2.1 Opinions about/feelings about sitting meditation (pros & cons)—I can not sit around for a long time

2.2 Opinions about/feelings about walking meditation (pros & cons)
Walking med. Made an impression — paying attention to what's around
    2.2.1 Walking down the street I've walked a hundred times
    2.2.2 My yard
2.3 I enjoy walking more. It's more interesting, not just a means of getting there—it's an enjoyable act of walking to get there.
2.4 Thinking about where food came from & work involved—appreciate
2.5 Expectations about meditation in the groups—pleasant, a surprise
2.6/6.11 Meditation deepened connection with nature & enjoyment of gardening & allows reconnection with nature after feeling disconnected
    2.6.1 Experiences with mindful gardening
2.7 Being, not doing—Slowing; Not thinking/planning/strategizing so much—more being present, peaceful; Relaxing; Letting things go
2.8 Incorporating mindfulness into daily life & coping with challenges
2.9 It's a process/practice/skill/habit
    2.9.1 Old habits of mind are difficult to break
    2.9.2 I wasn't good enough to stay at home—starting to wander off
    2.9.3 You don't just sit there—it's not just being physically still, or mentally empty—it's a process/skill of re-focusing the mind
    2.9.4/3.8 Helps to have had weekly group for 9 weeks to learn the skills rather than 1 day
2.10 Mindfulness is…awareness of the present moment, knowing what's going on around you
2.11 Mindfulness has benefits—it's a tool
2.12 Practice of meditation post-groups
2.13 Importance of group/guidance to expand skill
2.14 Quiet concentration on an object was difficult, not relaxing or helpful—For me, mindfulness is more being present with people/situations
2.15/11.1.9 One of the best things I learned was I had to pull some weeds
2.16 Experiences with non-judgment
2.17 Opinions about/feelings about eating meditation
2.18 Opinions about/feelings about the bell
2.19/16.4 A lot of the people weren't really committed

3. Learning about gardening/sustainability
    3.1 Thought this was a class—I learned a little about gardening
    3.2 Gardening books—there is always something to learn
    3.3 Handouts, especially the planting guide/calendar
    3.4/1.3.1/14.2 Interest in sharing gardening knowledge—helping others
    3.5 Organic gardening is pretty simple—there's not a whole lot to learn
    3.6 Learned about organics &/or specific organic techniques
    3.7 Learning to garden in Arizona & desire to create own garden
    3.8/2.9.4 Helps to have weekly group to learn the skills rather than 1 day
    3.9 Learning through Bob/Bob's teaching style
    3.10 I need to learn by doing—and I did it through these groups

4. Contributions & sense of accomplishment
    4.1 Helped other participants learn about gardening
    4.2 Problem-solving: Found ways to make the work easier
    4.3 Desire to be engaged – generativity
    4.4/18.9 Sense of accomplishment or lack thereof
        4.4.1 "One person can make a difference, but not enough people are doing it enough"
    4.5 "I've never had that much success w/ a sunflower in my life!"—"I learned a lot" & many of the veggies/flowers from the garden still thriving

5. Experiences w/ meditation or self-help outside of the community garden groups
    5.1 Being in nature, paying attention, as not meditation but *meditative*
        5.1.1 I can find peace and contentment just being where I am
    5.2 Past training in meditation or related practices—prior to 2009
        5.2.1 Buddhism class/books without sitting meditation practice
    5.3 Interpretations of mindfulness/meditation—difficult to give up busy-ness; "it wasn't challenging & felt wonderful, so I thought I hadn't meditated"; in the garden, can let the mind wander; it's getting in touch with yourself—rehash what you've done & how it could be done better; I'm not sure what meditation is; mind-numbing; Realized meditation is bringing the mind back again & again when it wanders
        5.3.1 I take meditation to be a religious type of thing
    5.4 Exploration/participation in meditation in concurrence w/ and separate from community gardening groups
    5.5 Yoga—a few minutes at the end—thinking about the day, goal-setting; Got away from yog
    a classes & signed up for CG groups to increase relaxation
    5.6 General mantra practice—"Love, Peace, Strength"
    5.7 In counseling/therapy during the community gardening groups

6. Connectedness to nature—"I'm just a little particle of everything"
    6.1 Visceral experience—I have to be outside, get my hands in the dirt love the smell, the feel of dirt, the color of flowers
        6.1.1. I find peace and beauty in nature
    6.2/7.2 Participation in gardening clubs—learning, trips to nurseries & gardens
    6.3/9.9.1 Early experiences & family connections that lead to connectedness w/ nature
        6.3.1/6.12 On the farm…it's engrained in you…like an old friend
    6.4 Started gardening as an adult
    6.5 The changes keep me coming (back to the garden); I love watching things grow
        6.5.1 It's like a miracle—I find the whole process **amazing**
        6.5.2 You put a seed in the ground and it turns into a plant or tree

6.6/11.1.1/18.6 Cycles of life

6.6.1 Denial of "metaphorical" view of cycles of life: "It's just the way it is. It's the way we are. It's the way everything is."

6.7 Humans superior or not superior (to plants or animals)—congruities—Interbeing

6.7.1 Plant "rights"

6.7.2 Animal rights/intelligence/feelings/communication

6.7.3 Interbeing—each organism has s.t. special they do & so do I

6.8 Care & consideration - Responsibility to protect—plants, animals, planet

6.8.1 We can't go on without them

6.8.2 "I think it's horrible what's happening to the earth"—it's overwhelming

6.9 "I'm not connected right now"—not taking any specific actions—but I have in the past

6.10/9.5/11.9 Respect for other organisms. When you nurture the planet/plants, the planet/plants take care of you; The more positive you are with plants, the more they give back positivity & re-energize you & give you other pleasures for all the senses

6.11/2.6 Connectedness deepened w/ increased awareness from mindfulness & meditation allows reconnection w/ nature after feeling disconnected

6.12/6.3.1 My family lives & gardens in the country; On the farm…it's engrained in you…like an old friend

6.12.1 Feelings of disconnectedness w/ nature in the city

6.12.2 In the community garden, got in touch with it again

6.13 I feel an affinity to nature & think I'm connected, but don't understand how—I'm searching—it's tied to my search for who I am & why I'm here

6.14 "I haven't had the greatest luck with people—I feel more comfortable with an animal" (6.14)

6.15 *Joie de vivre* found in the garden - You connect with life

6.16 Simplification—no phone, no television, look at the pine trees, lie in the hammock and chill out.

7. Best experiences of 2009

7.1 Not working by choice & doing simple things like gardening—doing what I want to do, rather than what I have to do

7.2/6.2 Participation in gardening activities (outside the community garden groups), e.g. Master Gardener program & gardening clubs—learning, trips to nurseries & gardens

7.3 Travel

7.4 Spending quality time with family, strengthening family relationships

7.5 Financial relief

7.6 Moving to AZ/Exploring AZ

7.7 Volunteer work (outside the garden)
7.8 Community gardening groups—time away from spouse, helped me out of my depression
7.9 Enjoying successes of family members
7.10 My significant other got the medical help he needed
7.11 Work situation improved
7.12 Spending time with friends—birthday—friends taking me out all month long

8. Food
    8.1 Trying to get a little healthier as far as what I eat
        8.1.1 Inspired by personal experience with illness
        8.1.2 I'm not immortal
        8.1.3 Types of foods added/eliminated
        8.1.4/10.1.2 Others' experience with illness—acting as a role model
    8.2/9.1 Be more local
    8.3/9.4 We can buy a can of tomatoes for 15 cents—other people are starving

9. Thoughts on sustainability & general environmental awareness
    9.1/8.2 Be more local
    9.2 Energy, Water, Carbon footprint, Others' interest in greening
    9.3 Self-sustenance
    9.4/8.3 We can buy a can of tomatoes for 15 cents—other people are starving
    9.5/6.10 When you nurture the planet, the planet will take care of you
    9.6 Differing locations have different awareness/environmental policies
    9.7 Started using the bus system in order to get to the garden
    9.8 Own actions toward sustainable living
    9.9 Previous interests &/or involvement in sustainability-related endeavors
        9.9.1/6.3 "I'm a 60's person"—the genesis of my consciousness—early experiences that led to connectedness w/ nature
    9.10 Population growth

10. Challenges of 2009
    10.1 Issues with others' health issues
        10.1.1 Partner not engaged in self-care—that's what's frustrating
        10.1.2/8.1.4 How coping with it/how it's affecting—frustration
            Try to talk to him—we just have a fight
            Learning how to communicate w/ him
            Try to ignore it—I'm not very good at that
            I don't know how I'm supposed to react
            Crying—I'm not really coping
            Stay busy w/ friends, garden clubs, exercise; Get out

Competitive tennis kept me focused [distraction from issues]
Take care of myself; reenergize myself
Friends or kids provide support
Seeking social support
Get upset
Try to let go
There's a lot of anger
Questioning
Ignore person I'm upset with
Partner suggested I get into community gardening groups
It changes our roles/relationship
Not well
Drink wine—get numb
I was in a state of depression
Show Support - be involved/ being informed
Support Group for caretakers/partners--reflection

Community gardening groups "addressed many things on many levels" – something else to focus on, provided change of perspective, people provided emotional support & friendship, provided hope

Being mindful—pay attention to sick person; figure out how he is doing mentally/emotionally; stay upbeat; don't nag him; finding a balance—he knows I'm there for him, but I'm not going overboard—I try to stay calm

"I took pictures of his healing every week"

Preparation—got things in order, made plans for the

"Get it out" with physical activity—tennis, walking, gardening

Downward social comparison

Work on each other's positive outlook

Think of my mom with Alzheimer's a lot when I'm in the garden

Going into the Garden

Making plans of my garden of the future

Tended pond and garden

10.1.3 Fear I'm gonna lose him—and he doesn't care

10.1.4 I don't know what's going through his head

10.1.5 Sibling conflict over how to handle parent's health

10.2 Role of gardening and/or gardening groups in challenges

10.2.1 Gardening is alive, growing, improving

10.2.2 Plants take care of themselves—do what they have to grow

10.2.3/11.2 I need to take a break—Restoration

10.2.4 It was supposed to happen to get me thru personal problems

10.3 Economic and/or work challenges
- 10.3.1 Transition from old life style to new life style
- 10.3.2 How coping with economic challenges
  - I don't think about it
  - I got used to what was happening
  - I stay busy
  - Acceptance
  - Not well
  - Drink wine—get numb
  - I was in a state of depression
  - Depression—coming out of it
  - [See arrows above]
  - Community gardening groups – something else to focus on provided change of perspective
  - Mindfulness meditation
  - Husband supportive—said you don't need to work
  - Using the time off work to do s.t. I like to do—volunteering
  - Finding a silver lining in the cloud
  - Being available to get brother to appointments
  - Side work—help people with computer stuff, pet-sit
  - I look on the bright side
  - I'm not worried—I've got a lot to offer—there's s.t. else
  - Reframed the problem/Reprioritized
  - Used to take everything personally, but now "I could care less"
  - Shock
  - Anger
  - Fear & catastrophizing
  - Upward social comparison—held self to parents' standard
  - Cutting corners
  - Bad attitude/complaining, uncooperative, negative
  - Applied for other jobs
  - I don't have as much optimism as I used to
  - Looking ahead to good things, e.g., visiting grandkids
  - "I lost my rose-colored glasses"
  - Acceptance
- 10.3.3/18.2 Economic issues interfacing w/ stage of life/retirement—devastating to your self-esteem

10.4 Issues with own health/functionality
- 10.4.1 How coping with health issues
  - Aggravation
  - Seeking medical care/diagnosis
  - Be careful (e.g. with knee)
  - Frustrated by functional limitations—driving, reading

Health ins. expensive so I'm not independent
Preventative measures, e.g. health screenings, but tempted to avoid these preventative measures because feel like a hypochondriac when I've always thought of myself as healthy
Not well
Drink wine—get numb
I was in a state of depression
Wasn't going to go to anymore doctors
Community gardening groups – something else to focus on, provided change of perspective
Cognitive coping—I've known people in the same situation that have thrived
Religious coping
Compromise
Engaging in positive activities

10.5 Relationship issues--emotional betrayal, shock, traumatic, raw, angry; changed living proximity to partner; family estrangement >4yrs.

10.5.1 How coping with relationship issues

Individual therapy after getting referral from HAO—joy to understand the issue better, work
Talk with a friend
Marriage counseling
Exercise
"and I had the community garden"
Mindfulness meditation
Crying
Talking with anyone—people in the street, at Costco
Seeking independence--looking for work, wants own laptop
See everyone as different/unique
I adapt—things don't bother me much
Alienation/isolation - "I felt I had nobody. And I have a wonderful husband."
Weeding—literally & metaphorically
"I have to accept it"
Depression—coming out of it
I don't have as much optimism as I used to
Looking ahead to good things, e.g., visiting grandkids
"I lost my rose-colored glasses"
Acceptance
Seeing impermanence—most problems between people end
Compartmentalizing—engaging in positive activities
Compromise

10.6 Bereavement—mother died, guilt that sister did most of the caretaking, father died, best friend died

10.6.1 How coping with bereavement

I still cry

It was expected—she was an Alzheimer's patient—she was gone for years—it was for the best

Social proof—friend still cries about mom who died 2 yrs ago;

saw other community group members who had lost people close to them & were not breaking down crying—they had accepted it

Social support from sister

Knowing mom is well cared-for

Cognitive—look at lighter side—she doesn't really know

Set the problem aside—I don't get depressed

Felt like I had nobody. And I have a wonderful husband.

I'm trying to accept it

Depression—coming out of it

"I don't know who the hell I became…I have no idea who I was"

Mindfulness meditation

Reading book on grief & writing down what I lost

"I lost my rose-colored glasses"

Acceptance

I don't have as much optimism as I used to

Looking ahead to good things, e.g., visiting grandkids

11. Benefits of gardening

11.1 Gardening for mental health – I'd go nuts if I didn't have a little plot

11.1.1/6.6/18.6 Cycles of life—sometimes you have to use your intuition – adaptability/flexibility; connecting with previous generations of gardeners, interbeing

11.1.2 Escape--takes mind off of other things

11.1.3/13.2 Reflection—provides time to think about issues

11.1.4 Clarification—solutions creep in

11.1.5 Self-efficacy: Satisfaction seeing things grow, learning what to do, sense of accomplishment, I'm getting more bold—trying more things

11.1.6 Calm/peace/tranquility--soothing

11.1.7 Hope—making plans for my gardening in the future

11.1.8 Community gardening provides space away from home life

11.1.9/2.15 One of the best things I learned was I had to pull some weeds

11.1.10 *Joie de vivre:* I cannot be encouraging to her if I don't feel good about me

11.2/10.2.3 I need to take a break—Restoration; mentally relaxing, mentally refreshing, physically exhausting: gives me the energy to do other things
11.3 Tangible – I couldn't wait to get the fruits & veggies
11.4/12.11 Bonding
11.5 Artistic outlet/Creation
11.6 Thoughts on productivity of gardening activity
11.7 Control—primary & secondary
11.8 A place of one's own—"it's my area…a comfortable little area for me to go to"
11.9 The more positive you are with plants, the more they give back positivity & re-energize you & give you other pleasures for all the senses

12. Friendships & social relationships
    12.1 I give—friends can confide in me & I'm trustworthy
    12.2/10.1.2 Friends provide emotional support
    12.3 Friends who are into gardening—exchange plants, ideas
    12.4 No contact with group members in past 2.5 mos.
    12.5 Interest in reconnecting w/ specific group members
        12.5.1 "I liked her/him" – no detail
        12.5.2 Learned s.t. from her—would like to learn more
    12.6 Enjoyment of other group members
    12.7 Pre-existing friendship w/ s.o. in group prior to group
    12.8 Some friends spur me on to do better
    12.9 I felt like I was part of the group, felt less isolated, felt comfortable w/ the group
    12.10 There has been contact with group member in the past 2.5 months
    12.11/11.4 Bonding, Camaraderie, Connection, Commonality, Emotional/instrumental support, Same wavelength; Giving & receiving
    12.12 Disconnections/reconnections in the group
    12.13 Alone again—need to get out! Looking for friends, intimate friendships New to the area—haven't met my neighbors, wanted to meet people (my age); Could help seniors establish friendships; our lives are pretty isolated
    12.14 "I've always had friends"
    12.15 "What I've learned is that we're all the same"—it was a revelation; commonality
    12.16 How physical proximity affects type of friendship
    12.17 Birds of a feather—females in group became friends & not w/ males
    12.18/17.9 Effects of sharing tangible items in the group
    12.19 Not enough time to really get to know anybody in the group
    12.20 Importance of social relationships—money, status, health can go, what's in our hearts b/w people & people & God is all we have left.

13. Attention Restoration
    13.1 Fascination takes hold/Resting directed attention
    13.2/11.1.3 Reflection—provides time to think about issues, rehash—what if

14. Thoughts on community gardening
    14.1 Reflections on COMMUNITY effort to garden vs. individual gardening
    14.2/1.3.1/3.4 Int'd in sharing gardening knowledge/enthusiasm—helping others
    14.3 Community gardening got me more engaged with my own garden; MCG groups & Master Gardening program made me bolder in gardening
    14.4/1.8 Mindful garden groups provided change of perspective on life issues
    14.5 Members took initiative/design leadership/ownership—roles changed
    14.6 It's better than basket-weaving—much more dimension
    14.7 Need site that people can get to w/out their own transportation

15. Link b/t meditation & appreciation for life, nature

16. Role of self in comparison to group (Self-concept/Social comparisons)
    16.1/18.5 I'm the youngster in the group or Age/issue comparison
        16.1.1 Respect—try to be careful, more passive
    16.2 I observe & listen—I'm more of a watcher than a participant
        16.2.1 Cultural/family value/experience—privacy, only child
    16.3 Watching others—finding hope, acceptance, or an alternative example; uplifting that so many people in my age group still had goals and dreams
    16.4/2.19 A lot of the people weren't really committed

17. Dislikes/Negatives/Neutral considerations for future groups
    17.1 Wanted to learn meditation
    17.2 Unable to do much gardening—more maintenance & talking—organize the work better
    17.3 I had hoped I would learn more
    17.4 Could consider more specific psychotherapy component for MG group, but that could also be distracting
    17.5 Ps came for different reasons—gardening, meditation, to meet people, to meet people the age I wanted to meet, new to the area, wanted to learn about gardening in AZ, reasonable distance, "the right cost," looking for something to help me out of my depression—being with people doing something constructive, to prepare for retirement
    17.6 "Can't beat the heat"--I didn't realize how hot AZ could be—that time of year was hot for me—that time of day was hot
    17.7 Thoughts on time commitment of groups

17.8 Comfort needs--Port-a-Potty, gloves w/ rubber tips, hand disinfectant
17.9/12.18 Effects of sharing tangible items in the group

18. Aging—Thoughts & experiences
    18.1 Cognitive-affective sequelae of aging
        Concentration problems--My brain is going everywhere now
        Anxiety—not calm
        Memory
        Inheriting Alzheimer's
    18.2 Awareness of aging--I'm getting older/I still feel kind of young
    18.3 Physical sequelae of aging—Hearing loss, knee problems
    18.4 Fear, Resistance & Control: "I see it dark ahead" - I don't really want to get old—What am I doing wrong?
    18.5/16.1 Comparison of own age/abilities/issues to others' age/abilities/issues
    18.6/11.1.1 Cycles of life/death, Life stages; connecting with previous generations of gardeners, interbeing
        18.6.1 When faced with own mortality—the beauty in nature and plants brings me peace
    18.7 Questions of decisional capacity & caretaking
    18.8/4.3 Desire to be engaged – generativity
    18.9/4.4 Sense of accomplishment or lack thereof
    18.10 I always valued getting old—never considered negative aspects; I've never had a problem with aging or my birthday
    18.11 I'm turning 60 & wanna make some changes—make the most of my life; I wanna prepare for retirement