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The wellbeing of allotment gardeners: A mixed methodological study

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**Abstract**

**Purpose:** The potential for ‘green’ interventions to promote mental wellbeing and reduce mental distress is increasingly being recognised. Preliminary evidence suggests that allotment gardening activities may have a significant effect on mental wellbeing, but a need for further research has been highlighted. This study investigated the relationships between allotment gardening, feeling connected to nature and wellbeing.

**Design:** A mixed methods design was utilized. Measures of subjective wellbeing (quality of life), eudemonic wellbeing and connectedness to nature were administered

and qualitative data were collected via a cross-sectional online survey of 171 allotment gardeners in the United Kingdom.

**Findings:** Allotment gardeners' eudemonic wellbeing and quality of life in the environmental domain were significantly higher than population means reported in the literature. Regression analysis showed that the amount of time gardeners spent on their allotment during summer predicted eudemonic wellbeing. This relationship was fully mediated by feelings of connectedness to nature. Four main themes emerged from the qualitative data: allotments provided a space of one's own, meaningful activity, increased feelings of connectedness, and improved physical and mental health.

**Conclusions:** The results suggest that allotment gardening is associated with increased eudemonic wellbeing, but not subjective wellbeing. Furthermore, a mechanism through which allotment gardening enhances wellbeing is suggested: increased connectedness to nature. Limitations of the study and clinical and research implications are discussed.

**Keywords:** allotment gardening, connectedness to nature, wellbeing, eudemonia.

### **Allotment Gardening and Wellbeing**

With its roots within working class communities, allotments are typically small rented plots of horticultural land to grow fruits and vegetables for small scale, usually personal and family, consumption (Acton, 2011). Recently there has been a renewed interest in allotments, as people are increasingly opting for greener lifestyles (Wiltshire & Burn, 2008). A number of health and wellbeing benefits of allotment gardening have been claimed, including stress reduction, a sense of accomplishment and enjoyment (Hawkins, Mercer, Thirlaway & Clayton, 2013), and increased physical activity, relaxation and community cohesion (Hope & Ellis, 2009). However, despite the

growing interest in the wellbeing benefits of allotment gardening, research in this area is still in early stages.

Much of the research into allotment gardening to date has been in the form of qualitative investigations of social and therapeutic horticulture for people with mental health difficulties. Fieldhouse (2003) reported participants experiences of social and therapeutic horticulture were consistent with both Kaplan's (1995) attention restoration theory (see below) and flow; a subjective psychological state accompanying absorption in an activity, characterised by self-motivation, enjoyment and feelings of self-worth and competence (Csikszentmihalyi, 1990).

The literature on social and therapeutic horticulture reports common themes of facilitating wellbeing in individuals with mental health difficulties through an affirming and inclusive social milieu, the development of skills and social networks, and the restorative environment (Diament & Waterhouse, 2010; Fieldhouse, 2003; Galvin, Sharples, Hume & Dumbrell, 2000; Sempik, Aldridge & Becker, 2003).

Similar themes have been reported in non-clinical populations. Milligan, Gattrell and Bingley (2004) identified a sense of satisfaction, achievement and aesthetic pleasure experienced by older allotment gardeners. Community gardeners reported nutritional benefits of consuming produce from the garden, increased exercise, improved mental health and increased community cohesion (Kingsley, Townsend & Henderson-Wilson, 2009; Wakefield, Yeudall, Taron, Reynolds & Skinner, 2007). Fathers have reported developing stronger relationships with their children through spending time together on the allotment (Mason & Conneeley, 2012). Moreover, other research has indicated that the activity of gardening and 'being' in allotments both contribute to a sense of wellbeing (Hawkins et al, 2013).

The sparse research quantitative research on this subject has also indicated that allotment gardening may benefit subjective wellbeing. A study of allotment holders in the Netherlands reported that gardening was significantly better than reading as an activity for reducing stress (measured using salivary cortisol levels) and improving positive mood Van den Berg and Custers (2011). Van den Berg, Winstrum-Westra, De Vries and Van Dillen (2010) found that older allotment gardeners scored better than a control group of their neighbours on measures of life satisfaction and loneliness. There were no significant differences between younger allotment gardeners and controls, which Van den Berg et al. (2010) attributed to older gardeners being more active on their allotments.

### **Concepts of Wellbeing**

Over recent years there has been a shift in ethos of mental health services in the United Kingdom towards a social wellbeing approach, with a focus on promoting positive mental health and wellbeing across society (British Psychological Association, 2009). There has also been a shift in government policy; promoting wellbeing has become a key part of both mental health and public health strategies (Department of Health, 2011; Department of Health, 2010).

Wellbeing has been conceptualised in a variety of ways. Subjective wellbeing (Diener, 1984; 2006) refers to the presence of positive affect, low levels of negative affect and high life satisfaction. Quality of life, defined as “An individual’s perception of their position in life, in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards and concerns” (WHOQOL

Group, 1995, p. 1404) has been described as synonymous with subjective wellbeing (Camfield & Skevington, 2008).

Eudemonic wellbeing is rooted in ideas of a life well lived originally proposed by Aristotle. Central to this idea is living in a manner true to oneself. In the eudemonic tradition emphasis is placed on a way of living that is intrinsically worthwhile, pursuing life goals that provide meaning and purpose and allow development of personal potentials, rather than on mental state or positive feeling (Waterman et al., 2010)

### **Connectedness to Nature and Wellbeing**

There is growing evidence supporting the benefits to wellbeing of exposure to nature at various levels (Bell, Hamilton, Montarzino, Rothnie, Travlou, & Alves, 2008). A review of gardening as a mental health intervention highlighted reduced symptoms of anxiety and depression following gardening-based interventions and benefits to emotional and social functioning, physical health and vocational development (Clatworthy, Hinds & Camic, 2013).

A number of theories have been proposed to explain the relationship between the experience of the natural environment and wellbeing. Attention restoration theory (Kaplan & Kaplan, 1989) suggests that we derive some degree of cognitive recuperation from being in inherently fascinating environments by stimulating involuntary attention. This allows directed attention, which is effortful and goal driven, to recharge, and therefore reducing mental fatigue. Typically, although not exclusively, it is natural environments that consistently provide these restorative opportunities (e.g., Kaplan, 1995). In a similar way, Ulrich and colleagues (e.g., Ulrich, Simons, Losito, Fiorito, Miles, & Zelson, 1991) proposed psycho-physiological stress reduction theory,

emphasises the benefits of contact with nature for physiological and emotional functioning.

The construct of connectedness to nature is essentially an individual's belief about the extent to which they perceive themselves to be in community with the natural world (e.g., Zelenski & Nisbet, 2014). There is however, some degree of variation in understandings and measures regarding connectedness to nature, spanning ideas of cognitive inclusion (e.g., Schultz, 2002), to more affective based conceptualisations (e.g., Sparks, Hinds, Curnock, & Pavey, 2014). In particular, and despite suggestions to the contrary (Perrin & Benassi, 2009), the connected to nature scale (CNS) was proposed as a measure of an “*affective, experiential relationship to the natural world*” (Mayer & Frantz, 2004, p. 504)

Importantly however, for the present research, some studies have found a link between connectedness to nature and subjective wellbeing, including life satisfaction (Nisbet, Zelenski & Murphy, 2011) and positive mood (Mayer, Frantz, Bruehlman-Senecal & Dolliver, 2009). Relationships between connectedness to nature and aspects of eudemonic wellbeing have also been demonstrated, including purpose in life (Cervinka, Roderer & Hefler, 2012), intrinsic aspirations (Weinstein, Przybylski & Ryan, 2009), vitality (Nisbet et al., 2011) and autonomy (Weinstein et al., 2009).

### **The Present Study**

The present study investigated the relationship between allotment gardening and both subjective and eudemonic wellbeing in a sample of allotment gardeners from the UK. It has been proposed that wellbeing benefits of nature contact may be related to increased feelings of connectedness to nature, therefore this was also investigated.



The following hypotheses were proposed: Participants who spend more time allotment gardening (measured in hours per week spent on the allotment and number of years of allotment gardening) will report higher levels of: connectedness to nature; subjective wellbeing and eudemonic wellbeing. Higher levels of connectedness to nature will be associated with higher levels of wellbeing. Feeling connected to nature will mediate the relationship between time spent on the allotment and wellbeing outcomes. Allotment holders will report significantly more positive wellbeing than the general population.

## **Method**

### **Design**

A mixed-methods design was utilized, employing a cross-sectional online survey to administer measures of connectedness to nature, eudemonic wellbeing and subjective wellbeing. Three open-ended questions, which were analysed qualitatively using thematic analysis, augmented standardised measures in order to give participants an opportunity to express how allotment gardening impacted wellbeing. Allotment gardeners' scores on wellbeing measures were compared with scores reported in the general population.

### **Participants**

One hundred and seventy one allotment gardeners, mostly white British (96.5%) took part in this study with females making up the majority (67.8%). The mean age of participants was 50 years (range 24-78 years) with a large proportion having a tertiary education (84.8%). The mean length of time allotment gardening was 7 years (range 0-44 years). On average, participants spent 12 hours per week on their allotments in the

summer (range 1-50 hours) and 4 hours per week in the winter (range 0-40 hours). Further demographic information is also presented (see Table 1).

Table 1 here

## Measures

Responses to all measures, unless otherwise indicated, were on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree).

The Connectedness to Nature Scale (CNS; Mayer & Franz, 2004) contains 14 items ( $\alpha = .85$ ) measuring the extent to which participants see themselves as part of the natural world and feel emotionally connected to it.

The Questionnaire for Eudemonic Wellbeing (QEWB; Waterman et al., 2010) is a 21-item scale ( $\alpha = .82$ ). Items assess six aspects of eudemonic wellbeing: self-discovery; perceived development of one's best potentials; a sense of purpose and meaning; investment of significant effort in pursuit of excellence; intense involvement in activities and enjoyment of activities as personally expressive.

The World Health Organisation Quality of Life-Brief Version (WHOQOL-BREF; WHOQOL, 1998) contains 24 items providing a measure of quality of life across four domains. Physical ( $\alpha = .82$ ) was measured with 7 items (e.g., "How satisfied are you with your health?"); Psychological ( $\alpha = .8$ ) was measured with 6 items (e.g., "To what extent do you feel your life to be meaningful?"), Social ( $\alpha = .71$ ) was measured with 3 items (e.g., "How satisfied are you with your personal relationships?") and Environmental ( $\alpha = .79$ ) was measured with 8 items (e.g., "How satisfied are you with the conditions of your living place?"). It is used in the current study as a measure of subjective wellbeing. Items are answered on a five-point Likert scale with higher scores reflecting increased satisfaction or ability to experience things.

In addition to demographic questions, respondents were asked to report the number of years they had been allotment gardening and the average number of hours they spent on their allotment each week in the summer and in the winter. Three open-ended questions were included: “Why did you take up allotment gardening?”, “What do you enjoy most about allotment gardening?” and “How do you think allotment gardening impacts your wellbeing?”

### **Procedure**

Participants were recruited through allotment gardeners’ associations and online allotment gardeners’ groups and forums. Although the target of the research was for participants who had individual plots, the survey targeted a range of allotment forums and so some participants may have been involved with community plots. An incentive of entering a prize-draw to win vouchers for gardening supplies was offered. Only completed surveys were used in the analysis. A total of 171 allotment gardeners completed the survey.

### **Data Analysis**

**Quantitative analysis.** Bivariate correlations were calculated to investigate relationships between predictor and dependent variables. Differences between wellbeing scores reported by allotment gardeners and those reported in the literature for the general population were investigated using one-sample *t*-tests. Skevington and McCrate (2012) reported average scores for each WHOQOL-BREF domain in samples of both healthy individuals and people with various health conditions in the UK. Mean scores reported by allotment gardeners in this study were compared with those reported for healthy individuals ( $N = 1324-1328$ ). Scores on the WHOQOL-BREF did not meet parametric assumptions in the current study, therefore robust *t*-tests were carried out

employing bootstrapping. Bootstrapping analyses were performed using 10,000 samples and bias corrected and accelerated confidence intervals (Hayes, 2009).

A series of regression equations were used to test whether connectedness to nature mediated the relationship between time on the allotment and wellbeing, following the causal steps strategy outlined by Baron and Kenny (1986). Preacher and Hayes (2008) recommend bootstrapping as a method of testing for indirect effects, an approach that has more power and reasonable control over Type 1 error rates. A SPSS macro described by Preacher and Hayes (2008) was therefore used to bootstrap the indirect effects of time spent on the allotment on wellbeing.

**Qualitative analysis.** An inductive thematic analysis of responses to open-ended questions was conducted. The analysis followed the six phases outlined by Braun and Clark (2006): 1) responses were collated and read by the first author in order to become familiar with the data; 2) initial codes were generated; 3) codes were sorted into potential themes; 4) themes were reviewed in relation to both the coded extracts and the data set as a whole; 5) themes were further refined and named; 6) a report of the analysis was produced. As part of quality assurance the second and third authors reviewed coding and theme development and consensus was obtained for all codes and resulting themes.

## **Results**

### **Correlational Analyses**

No relationships were observed between the number of years participants had been allotment gardening and outcome measures. Spending more hours per week on the allotment was associated with higher connectedness to nature and eudemonic wellbeing, although surprisingly, more time on the allotment in summer was associated

with lower social quality of life. A significant relationship was observed between connectedness to nature and both eudemonic wellbeing and psychological quality of life. Correlations are displayed in Table 2.

Table 2 here

### **Mediational Analyses**

Scores on the CNS were significantly associated with time spent on the allotment and scores on the QEWB and the WHOQOL-BREF psychological scale (Table 2). Mediational analyses were performed to investigate whether connectedness to nature mediated the relationship between time spent on the allotment and each of these outcome variables (Figure 1). Time spent on the allotment in summer was used in these analyses as most allotment activity occurs in summer and the correlation with connectedness to nature was greater than for winter.

Predictor variables were not substantially correlated ( $r < .9$ ), the tolerance statistic and variance inflation factor also confirmed that multicollinearity was not a concern. Casewise diagnostics showed that residuals were within acceptable limits, indicating the data represented a fairly accurate model. Mahalanobis distances for two cases were just outside acceptable limits (Barnett & Lewis, 1978) indicating that these cases were outliers. However, the values of Cook's distances and DFBeta statistics for these two cases were less than one, indicating that they did not unduly influence the model. Histograms and P-P plots indicated a normal distribution of residuals, and assumptions of linearity and homoscedasticity appeared to be met.

**Psychological quality of life.** Regression analysis indicated that scores on the CNS significantly predicted psychological quality of life ( $\beta = .16, t = 2.12, p < .05$ ).

However, time spent on the allotment did not ( $\beta = .01, t = .08$ ), therefore the conditions for mediation were not met.

**Eudemonic wellbeing.** In the first step of the regression analysis time on the allotment was shown to be a significant predictor of connectedness to nature (path a;  $R^2 = .07$ ). In the second step connectedness to nature was found to significantly predict eudemonic wellbeing (path b;  $R^2 = .23$ ). In the third step, time on the allotment was also shown to significantly predict increased eudemonic wellbeing scores (path c;  $R^2 = .06$ ). In the final stage of the analysis (path c') time on the allotment and connectedness to nature were entered together as predictors of eudemonic wellbeing. As can be seen in Table 3, when connectedness to nature was entered as a mediator, the relationship between time on the allotment and eudemonic wellbeing was reduced to non-significance, suggesting that full mediation had occurred (Baron & Kenny, 1986).

Figure 1 here

Table 3 here

A test for the significance of the indirect pathway using bootstrapping supported these results, showing a significant difference between c and c' ( $Z = 3.21, p < .001, 95\% \text{BCa CI } .06 - .18$ ).

### **Comparison of Means**

Table 4 displays outcomes of robust t-tests comparing mean scores on wellbeing measures in this study to those reported in the literature for the general population. Allotment gardeners' social quality of life score was significantly lower than reported by Skevington and McCrate (2012), although the effect size was small. Environmental quality of life was significantly higher for allotment gardeners, with a medium effect size. The mean of the QEWB was significantly higher for allotment gardeners than that reported by Waterman et al. (2010), representing a large effect size.

Table 4 here

## **Thematic Analysis**

Four broad themes emerged from the data and are described below.

**1. My space.** This theme related to the increased physical space having an allotment provided participants and what this enabled participants to do. An important aspect of the theme was a sense of ownership of the allotment and the autonomy this allowed, through having choice of food variety and production methods. The allotment also provided a space to get away from every life to relax, unwind and reflect.

P3: *“...always wanted a space to grow plants and build a shed and be away from everyday life. I can be alone and relax and it’s my space to create a garden that I enjoy.”*

P1: *“... A little piece of land that is all mine, a little piece of peace and quiet that is all mine and the pleasure of growing something to eat.”*

**2. Connection.** Connectedness emerged as a theme across several domains: feeling connected to nature; connected to family (through spending time together on the allotment); connected to the past (particularly to childhood experiences of gardening) and connected to the diverse community on the allotment.

P12: *“Having an allotment has changed my life for the better, I now have a social life, new friends...all families should have an allotment, and you’re putting something back into the community.”*

P78: *“I love the smell of nature, its colours and sound. I feel lucky I am able to be in contact with the insects, birds, foxes and frogs. I like the process of the seeds getting into plants.”*

P132: *“The lifestyle it brings, we get out to the plot once a day, with the kids, and work together. I can teach my daughter about where food comes from, about nature and the seasons.”*

**3. Health.** A number of participants described the benefits to physical health of increased exercise and eating healthy food from the allotment. Benefits to mental health

were also reported, such as improved mood. Some participants described how having an allotment aided their recovery from physical or mental illness.

P71: *“It makes me feel happy. I am so energized and inspired by even a short time spent in the allotment. It clears my mind, and sometimes if I am down, it completely eliminates feelings of despair.”*

P42: *“Four years ago I was critically ill recovering from a brain tumour...recovering from the surgery I needed was very hard and seemed like a mountain at times, the allotment gave me a place to reach, a goal to achieve...I don't think I would be as well as I am today if I hadn't had the plot.”*

**4. Meaningful Activity.** Many participants reported their allotment gave them a focus or a sense of purpose. For some this was to grow their own food or save money, others felt it was an activity aligned to their values (such as living more sustainably). Growing your own food was described as a positive challenge and an opportunity for learning and skill development. Participants described the joy of gardening and described feelings of accomplishment and satisfaction from seeing their hard work come to fruition.

P28: *“Gives me a purpose, something to get out of bed for, an excuse for not having a television, pleasure of planting a seed and watching it grow into something you can eat feels good.”*

P154: *“There is a certain sense of achievement walking up the garden path with a basket full of beautiful fruit and veg that goes straight into the kitchen to be prepared for dinner. You really appreciate the fruits of your labour and feel like you are giving something back...by knowing it has come a few foot to the dinner plate instead of hundreds of miles.”*

P36: *“It feeds my soul! I love planting, tending, harvesting, planning, weeding, composting, learning about new plants and new gardening techniques. I feel pride in what I grow.”*

## Discussion



The amount of time participants reported spending on their allotments in both summer and winter was positively associated with connectedness to nature and eudemonic wellbeing. Contrary to what was predicted, no associations were observed between years participants had been allotment gardening and outcome measures. This could indicate that benefits are obtainable relatively quickly, without long term investment.

The findings did not support a relationship between allotment gardening and increased subjective wellbeing. It is possible that allotment gardeners experience increased subjective wellbeing whilst on their allotments, but the effects do not carry over into other environments. A significant negative relationship was observed between the number of hours spent on the allotment in summer and social quality of life scores, indicating that time on the allotment is associated with poorer subjective wellbeing in the social domain.

A significant relationship was observed between connectedness to nature and two wellbeing outcomes: eudemonic wellbeing and psychological quality of life. Psychological quality of life encompasses positive and negative feelings, self-esteem, thinking and concentration, and body image. The findings add to a growing body of literature demonstrating an association between connectedness to nature and wellbeing.

Furthermore, regression analysis revealed that time spent on the allotment in summer was a significant predictor of eudemonic wellbeing and this relationship was fully mediated by connectedness to nature. This suggests a possible mechanism through which allotment gardening could impact wellbeing: increasing feelings of connectedness to nature. The natural environment may be perceived as a benign entity that promotes meaningful and rewarding stress recovery benefits (e.g., Ulrich et al, 1991), which may be at the heart of a process that forges a relationship with nature that

then elicits wellbeing. To merely work the land without developing this meaningful context may restrict the degree to which wellbeing is achieved and why connectedness to nature operates as a mediating variable.

A comparison of mean scores on wellbeing measures in the current study with those reported in the literature indicated that allotment gardeners reported significantly higher eudemonic wellbeing and environmental quality of life than the general population. Environmental quality of life is a measure of subjective wellbeing encompassing physical surroundings, access to relaxation and leisure activities, and opportunities to learn and develop skills. Higher scores on this scale were congruent with two themes which emerged from the qualitative analysis: that the allotment provided meaningful activity, with opportunities for skill development and a space to get away and relax.

The comparison of means also showed that social quality of life was significantly lower in this study than reported in the general population (although the effect size was small). This was unexpected given that a connection with other gardeners was an often cited benefit of allotment gardening in previous studies, as well as in the current study. Allotment gardening may appeal to individuals who prefer solitude to socialisation and use their allotment as a place to get away rather than socialise. Indeed other research has found that engaging in quiet, physical gardening activities may also operate as an escape from social interactions and pressures (Hawkins et al, 20113). However, as the present study did not record explicitly if participants were either on communal or personal plots, there must be some degree of caution in regard to these particular conclusions.

There may also be a connection between the increased eudemonia reported by participants and lower social wellbeing. The ability to reflect is central to the

development of autonomy and therefore to eudemonia, as through the process of reflection considered choices can be made, in line with one's values (Ryan, Huta & Deci, 2006). Therefore, spending time away from others may be expected in individuals who report greater eudemonic wellbeing.

In responses to open-ended questions, the vast majority of participants reported that allotment gardening supported their wellbeing. The benefits of allotment gardening described by participants included participation in meaningful activity, providing purpose, challenge and a sense of accomplishment; increased feelings of connectedness to others and to the natural world; a space of one's own, allowing greater autonomy and a place to get away and reflect; and improved physical and mental health.

Central to the theory of eudemonia is choosing life goals that provide meaning and purpose, the motivation for which is the value intrinsic to the activity, rather than the subjective experiences accompanying it. Eudemonic activities are likely to involve the investment of a great deal of effort and make full use of an individual's skills and talents (Waterman et al., 2010). Qualitative data suggested that allotment gardening provided such an activity for participants in this study, as well as an opportunity for the basic psychological needs for autonomy, competence and relatedness described by Deci and Ryan (2000) in self-determination theory, a model of eudemonia, to be met. In this way, the qualitative findings supported the quantitative data.

An important aspect of eudemonic activity is that it is personally meaningful and is in keeping with the talents, abilities and preferences of the individual (Waterman et al., 2010). Although benefits to eudemonic wellbeing have been observed in the current study, these benefits may only be possible if allotment gardening is an activity consistent with one's talents and potentials. It emerged from the qualitative data that

allotment gardening can support wellbeing in a number of ways, including through physical activity, contact with nature, social connection, escape from the pressures of daily life and the sense of accomplishment in growing one's own food. The allotment is a therefore versatile environment which has the potential to appeal in different ways.

### **Limitations**

The study relied on internet-based self-report measures which allow no control over the conditions under which questionnaires were completed (Hewson, Yule, Laurent & Vogel, 2003) and are susceptible to unrepresentative reporting due to social desirability, acquiescence or fatigue. Participants did not represent a diverse group with regard to ethnicity, sex, income, and education and therefore generalizability of the results is limited.

Much of the current research was correlational in design; therefore assumptions about causation cannot be drawn. Moreover, the QEWB score reported by Waterman et al., (2010), used for comparison in the current study, were from a sample of college students in the United States, younger and of a different nationality to the participants in the current study.

### **Conclusions and Implications**

This study investigated the wellbeing of allotment gardeners. A relationship between allotment gardening and subjective wellbeing was not supported. However, both quantitative and qualitative data supported a relationship between spending time on an allotment and increased eudemonic wellbeing. Furthermore, the relationship between time on the allotment and eudemonic wellbeing was mediated by increased feelings of connectedness to nature, suggesting this as a mechanism through which allotment gardening may impact wellbeing. Results of this study support an

association between connectedness to nature and eudemonic wellbeing reported elsewhere in the literature (e.g. Cervinka et al., 2012; Nisbet et al., 2011; Weinstein et al., 2009).

As evidence for the value of gardening-based interventions grows (Clatworthy et al., 2013), consideration could be given to ways of making allotment gardening more accessible, through allotment sharing projects, offering allotment gardening on prescription, or incorporating allotment activities into therapy.

Further research could include longitudinal ethnographic research to examine communities of allotment gardeners over time as well as employing randomised control trials to examine quality of life in relation to specific health conditions. Greater understanding of aspects of allotment gardening which confer wellbeing benefits would be useful, for example, comparing outcomes for solitary allotment gardeners with those engaged in community gardening.

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