



Gardening and age-related weight gain: Results from a cross-sectional survey of Denver residents

Jill S. Litt^{a,*}, Jeffrey Richard Lambert^b, Deborah H. Glueck^b

^a Environmental Studies Program, University of Colorado Boulder, 4001 Discovery Drive, Boulder, CO 80303, United States

^b Department of Biostatistics and Informatics, Colorado School of Public Health, 13001 E. 17th Place, Aurora, CO 80045, United States

ARTICLE INFO

Keywords:

Community gardens
Body mass index
Obesity
Neighborhoods
Community-based interventions
Place-based

ABSTRACT

This study examined whether gardening modifies the association between age and body mass index (BMI). We used data from the Neighborhood Environments and Health Survey, which was conducted in Denver (N = 469) between 2006 and 2007. We fit two general linear mixed models. The base model had BMI in kg/m² as the outcome, and age, an indicator variable for non-gardening status and the age-by-non-gardening status interaction as predictors. The adjusted model included as covariates the potential confounders of education, ethnicity and self-reported health. We assessed self-selection bias and confounding. BMI was 27.18 kg/m² for non-gardeners, 25.62 kg/m² for home gardeners, and 24.17 kg/m² for community gardeners. In the base model, a statistically significant association was observed between age and BMI for non-gardeners but not for the combined community and home gardening group (F = 9.27, ndf = 1, ddf = 441, p = 0.0025). In the adjusted model, the association between age and BMI in non-gardeners was not statistically significant (F = 1.72, ndf = 1, ddf = 431, p = 0.1908). Gardeners differed on social and demographic factors when compared to non-gardeners. The results from the base model are consistent with the hypothesis that gardening might offset age-related weight gain. However, the cross-sectional design does not permit differentiation of true causal effects from the possible effects of bias and confounding. As a follow-up study, to remove bias and confounding, we are conducting a randomized clinical trial of community gardening in Denver.

1. Introduction

This study aims to explore gardens for their potential to offset age-related weight gain, a major risk factor for chronic diseases such as cancer, diabetes, and cardiovascular disease. Based on data from 2011 to 2014, the CDC reports that over 34% of adults and 17% of children are obese (Ogden et al., 2015). Moreover, cross-sectional and prospective cohort studies have found that sedentary populations tend to have increasing BMI as they age (Williams and Wood, 2005). Despite these population-level patterns of obesity, there are few proven options to ameliorate age-related increases in BMI.

Significant population-wide behavioral change is necessary to decrease the morbidity and mortality incurred by obesity and its complications (NIH Obesity Research Task Force, 2011; Luckner et al., 2012). Public health guidelines, including guidelines from the American Cancer Society, recommend maintaining healthy and active lifestyles, which includes light to moderate activities such as walking and gardening, and a high-fiber diet of fruits and vegetables (Kushi et al., 2012).

It has been repeatedly demonstrated that consuming nutrient dense, low calorie foods is effective in promoting weight loss and decreasing rates of chronic disease (Kumanyika et al., 2010; Bertolio et al., 2015; Guthrie and Lin, 2014; Ramage et al., 2013). Such changes in diet, however, may necessitate improvements in social and physical environments that influence the availability, affordability, and accessibility of healthy food and the social milieu that influences what is socially acceptable, desirable, and appropriate to eat (Brug et al., 2008). Despite this recognition, the evidence is mixed on the association between environmental factors and healthy eating (Brug et al., 2008; Belon et al., 2016).

Physical inactivity is a crucial part of the energy balance equation as it contributes to the opportunities to gain weight over time because energy intake may exceed energy expenditure (Williams and Wood, 2005). More exercise and less sitting are distinct facets of activity behaviors and both are important for weight loss and weight maintenance. Mounting evidence shows that Americans do not generally adhere to activity guidelines, and increased sedentary time is associated with development of chronic disease (Wilmot et al., 2012; Owen et al.,

* Corresponding author.

E-mail addresses: jill.litt@colorado.edu (J.S. Litt), Deborah.Glueck@ucdenver.edu (D.H. Glueck).

2010). According to Owen and others, sedentary behavior is not just the absence of intensive physical activity but rather a distinct set of behaviors, such as increased television viewing time, overall daily sitting time, and time spent travelling by automobile that result in prolonged sitting and consequently a range of health consequences (Owen et al., 2010, 2011).

In the United States, only 21% of adults meet federal guidelines for aerobic and strengthening activity, which is important for achieving improved physical fitness (Roger et al., 2012). Moreover, one third of the population does not engage in at least 10 min of light physical activity per day (Pearson et al., 2013). This level of inactivity is higher among women and increases across the lifespan. Moreover, non-Hispanic black and Hispanic adults are more likely to be inactive than non-Hispanic white adults (Go et al., 2013).

While diet, physical activity and sedentary behaviors are central to disease prevention and health promotion, it is difficult to change behaviors in an environment that does not provide the necessary substrate for change (Kushi et al., 2012; Pearson et al., 2013). As such, multi-component, multilevel interventions that influence behavior change and weight maintenance are needed (Mikkelsen et al., 2016). This is particularly salient for people of color, those of low socioeconomic position, and those that lack access to the social networks and physical amenities that support healthy living (Burke et al., 1992; Duelberg, 1992; Winkleby et al., 1999, 1998; Kimmons et al., 2009; Ogden et al., 2012; McPherson et al., 2006).

Community and home gardening present relatively scalable and affordable intervention opportunities that address active living, healthy eating, and weight maintenance (Alaimo et al., 2016). Previous studies have shown that garden participation can promote healthy eating, improve food security, and increase the availability of affordable, healthy food (Alaimo et al., 2016; Morris and Zidenberg-Cherr, 2002; Heim et al., 2009; Robinson-O'Brien et al., 2009; Johnson and Smith, 2006; Litt et al., 2011; Carney et al., 2012; Okvat and Zautra, 2011; Alaimo et al., 2008a). Garden programs also encourage physical activity and limit sedentary activity (Alaimo et al., 2016; Hermann et al., 2006; Park et al., 2009). These studies not only shed light on the direct effects of gardening on physical activity and nutrition but also on the emotional and social processes by which gardens enhance wellbeing and happiness and, in turn, influence health behaviors and health status (Segar et al., 2011). More recently, Zick and others showed that garden participation affects weight status (Zick et al., 2013). Their findings suggest that gardeners, when compared to their non-gardening siblings and non-gardening neighbors, have lower body mass index (BMI) and lower risk of being overweight or obese (Alaimo et al., 2016; Zick et al., 2013).

We aim to explore the association between garden participation, age and BMI, drawing on data from a population-based cross-sectional survey of a cohort of Denver residents.

2. Methods

2.1. Study design and sampling

The Neighborhood Environments and Health Survey was a cross-sectional, population-based survey conducted in Denver from 2006 through 2007. Survey data were collected using a multi-frame sampling design consisting of an area-based sample of the general population and a list-based census of community gardeners. The initial sampling design called for a recruitment goal of 480 total households to be randomly selected from 1454 available households in the sampling frame. Of the initial households, 655 (45%) could not be contacted due to gated and secured premises, no soliciting signs, and unrestrained dogs. Of the remaining 799 households, 473 households completed the survey (59%). 469 individuals with complete height and weight data were included in this analysis.

2.2. Measures

2.2.1. Height and weight

Data were collected through self-report during a 45-minute in-person survey. The questionnaire included items to characterize demographics, general outlook, the social environment, the physical environment, physical activity, diet and gardening activities among others. Participants were asked if they did not garden, conducted home gardening, or gardened in a community garden. *Body mass index (BMI)* was defined as weight (kg) divided by height (m) squared.

2.2.2. Self-rated health

A single item from the Behavioral Risk Factor Surveillance System (BRFSS) asked respondents to rate their general health on a scale of 1 (*Poor*) to 5 (*Excellent*) (Centers for Disease Control and Prevention, 2005). This item has been shown to be a reliable and valid predictor of health status (Fayers and Sprangers, 2002).

2.2.3. Gardening status

Survey items asked, “Do you garden?” Respondents who answered yes to this question were then asked whether they gardened at home ($n = 215$) (or at a neighbor's home) or in a community garden ($n = 63$).

2.2.4. Covariates

Potential covariates were identified based on their established association with body mass index, and/or relationship to gardening status. Covariates included participant age (years), highest year of school completed (some high school, high school graduate or some college, college graduate), and ethnicity/race (White, Black, Hispanic, Other). Income was not included in the analysis due to the large number of missing responses ($n = 42$) and the significant correlation between income and education level.

2.3. Data analysis

We used an a priori planned approach for model fitting. The first step was to find the best fitting base model to describe associations between gardening, age, and BMI. The second step was to add a set of covariates to the best fitting model, to assess if the results would be altered by the presence of covariates. The covariates, selected from the literature, included the potential confounders of education, ethnicity and self-reported health.

To find the best fitting base model, we used a planned backwards stepwise approach. We began with a mixed model that had BMI in kg/m² as the outcome, and age, gardening status (none, home, and community gardening), and the age-by-gardening status interaction as predictors. This is the full model in every cell (Muller et al., 2002) design matrix. The full model in every cell allows comparisons of slopes and intercepts between the gardening groups. To account for nested observations among different block groups, we included a random intercept in the model.

We then followed a planned model reduction strategy to find the most parsimonious model which best explained the data. The strategy involved a cascade of tests, which stops for any significant result. We tested for a difference in the slopes of three gardening groups, and conducted secondary tests to identify whether we could combine the groups. We assessed whether the slopes in age were equal to zero, a finding that if true, would indicate that BMI did not change with age for one or more groups. We tested for a difference in the intercepts between the three gardening groups. We performed general linear hypothesis tests using a Wald F-test with Kenward-Roger degrees of freedom and a Type I error rate of 0.05.

As is common in observational studies, possible associations between gardening and age-related increase in BMI may in fact be confounded by other measured or unmeasured variables.

Download English Version:

<https://daneshyari.com/en/article/8818706>

Download Persian Version:

<https://daneshyari.com/article/8818706>

[Daneshyari.com](https://daneshyari.com)