

# Previous Gardening Experience and Gardening Enjoyment Is Related to Vegetable Preferences and Consumption Among Low-Income Elementary School Children

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## ABSTRACT

**Objective:** To examine if gardening experience and enjoyment are associated with vegetable exposure, preferences, and consumption of vegetables among low-income third-grade children.

**Design:** Cross-sectional study design, using baseline data from the Texas! Grow! Eat! Go! study.

**Setting:** Twenty-eight Title I elementary schools located in different counties in Texas.

**Participants:** Third-grade students (n = 1,326, 42% Hispanic)

**Main Outcome Measures:** Gardening experience, gardening enjoyment, vegetable exposure, preference, and consumption.

**Analysis:** Random-effects regression models, adjusted for age, sex, ethnicity, and body mass index percentile of child, estimated means and standard errors of vegetable consumption, exposure, and preference by levels of gardening experience and enjoyment. Wald  $\chi^2$  tests evaluated the significance of differences in means of outcomes across levels of gardening experience and enjoyment.

**Results:** Children with more gardening experience had greater vegetable exposure and higher vegetable preference and consumed more vegetables compared with children who reported less gardening experience. Those who reported that they enjoyed gardening had the highest levels of vegetable exposure, preference, and consumption.

**Conclusions and Implications:** Garden-based interventions can have an important and positive effect on children's vegetable consumption by increasing exposure to fun gardening experiences.

**Key Words:** gardening, gardening enjoyment, vegetable consumption, low-income children, Hispanic, cross-sectional (*J Nutr Educ Behav.* 2016; ■:1-7.)

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## INTRODUCTION

Diets rich in fruits and vegetables (F&V) are known to have important health benefits. Studies suggest that increased F&V consumption is associated with lower risk of coronary heart disease,

type 2 diabetes, some cancers, and all-cause mortality.<sup>1-3</sup> Fiber content and essential micronutrients (such as vitamins, minerals, and a diverse range of phytochemicals, especially antioxidants) concentrated in F&V comprise their health benefits.<sup>4</sup> Therefore, promot-

ing habits of regular and adequate F&V consumption is a priority public health goal.<sup>5,6</sup>

Despite these well-known benefits, consumption of F&V, especially vegetables, remains low. Fewer than 1 in 10 adults meet dietary guidelines for F&V consumption.<sup>7</sup> Furthermore, the variety of F&V consumed is very low.<sup>7</sup> Orange juice comprises most of the overall fruit intake among adults and adolescents, and potatoes dominate vegetable consumption.<sup>8</sup> Dark green and orange vegetables and legumes account for only a small portion of vegetable intake.<sup>9</sup> Diets without a variety of whole fruits, dark green, and orange vegetables lack the full nutrient-rich and digestive benefits of F&Vs.<sup>10</sup>

Low prevalence and diversity of vegetable consumption is similarly problematic among children. Although 24-hour dietary recall data from the National

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Health and Nutrition Examination Survey (NHANES) surveys from 2003 to 2010 suggest that whole fruit intake increased over this period among 2- to 18-year-olds, vegetable consumption remained constant.<sup>9</sup> No socio-demographic group met the Healthy People 2020 target for vegetables [1.1 CEPC (cup-equivalents per 1000 calories)], and only 2- to 5-year-old children met their target of 0.9 CEPC fruits. Furthermore, about a third of their vegetable intake was white potatoes, mostly eaten fried or as potato chips.<sup>9</sup> These findings are concerning, given that preferences for foods and dietary habits in adulthood are established at an early age.<sup>11</sup> Therefore, identifying factors and activities that are related to children's intake of vegetables is both a research and a public health imperative.

Gardening is a promising strategy to improve children's dietary habits. The US has experienced a resurgence of home and community gardening activity similar to the Victory Garden Movement; there has been a 17% increase in gardening over the past 5 years.<sup>12</sup> The National Gardening Association (NGA) found that 42 million households in America are now growing food at home or in a community garden, and 15 million of these households include children as gardeners.<sup>12</sup> However, home-based gardens require substantial time and resource investment on the part of parents and cannot be universally prescribed as a means of engaging children in gardening. Similarly, although community gardens allow for the sharing of gardening responsibilities, time commitment, and resources in a way that facilitates participation by diverse socio-demographic groups,<sup>13</sup> community gardens require special coordination to host children.

School-based gardens are a solution tailored for children. Schools increasingly use gardens as a popular teaching tool.<sup>14-17</sup> According to the US Department of Agriculture (USDA) Farm-to-School Census, there are nearly 2,400 documented school gardens across the US.<sup>18</sup> School gardens range in their utility, combining classroom lessons across a diverse array of subjects with experiential learning and hands-on outdoor activities. Research examining the impact of school gardens on children's eating behavior shows positive trends in F&V preference, willingness to try vegetables, increased nutrition knowl-

edge, and improved weight status.<sup>19-26</sup> Given the interest in school garden programs as one increasingly popular strategy to improve healthy eating among children, it is interesting to note that no studies specifically examining the association between gardening experience and healthy eating among groups of children have been conducted. The main purpose of this report is to fill this gap in the literature.

How much students enjoy their gardening experience may contribute to the potential association between gardening experience and healthy eating. An evaluation of qualitative data from 14 elementary schools participating in the *Junior Master Gardener* (JMG) program, a school-based gardening program, showed that students enjoyed the program, shared what they learned with others, and wanted to participate in more JMG and gardening-type activities.<sup>27</sup> A 12-week pilot program at a YMCA summer camp found a very high level of child enjoyment in garden-related activities (> 95%).<sup>23</sup> Several studies have found enjoyment to be a positive predictor of participation in other behaviors such as physical activity, but none have examined the relation between levels of enjoyment of gardening and healthy eating.<sup>28-30</sup> Thus, given the paucity of research examining the relationships among gardening experience, level of enjoyment, and healthy eating, the purpose of this report was to examine these relationships among a group of ethnically diverse elementary school-age children.

## METHODS

### Study Design

The current analyses use cross-sectional data collected for the baseline measurement of the Texas Grow! Eat! Go! (TGEG) intervention study. The TGEG study used a 2 × 2 factorial group randomized controlled trial, with 28 low-income elementary schools, to examine the impact of 2 interventions (ie, one focused on gardening and the other focused on physical activity) on the prevalence of healthy eating and physical activity behaviors and body mass index (BMI) among low-income third-grade students and parents. The present ana-

lyses examined the baseline student survey data before intervention. All recruitment and data collection procedures and protocols were approved by each university's institutional review board and by the appropriate school districts' research authorities.

**Participant recruitment.** Third-grade students were recruited through elementary schools that were located in 5 different counties in Texas during the months of September and October in 2012 and 2013. All schools served a student population of which at least 40% were living in low-income households, and 85% of children in the schools were eligible for Free and Reduced Lunch. All third-grade students received a TGEG study packet that they were asked to take home and give to their parents. The TGEG study packet included a letter introducing the Texas Grow! Eat! Go! study, parental consent forms for the child and parent to participate, a media release form, and the TGEG Parent Survey. All documents were available in both English and Spanish. Parents interested in having their child participate in the study were asked to complete the parental consent form and return the packet to their child's teacher. Inclusion criteria for the students were (1) enrollment in the third grade at a study school and (2) willingness to complete the Student Survey 4 times during the study. Exclusion criteria included (1) being on a special diet and (2) primary language not English or Spanish. Students received a small incentive worth approximately \$3.00. Parents received no incentive.

**Baseline data collection.** At a time arranged with each school's administrative staff, the TGEG research team collected both survey data (the TGEG Student Survey) and anthropometric data (height and weight measurements) from all third-grade students with signed parental consent. Before any data collection occurred, each child was also asked to complete an assent form. Trained research staff proficient in both English and Spanish conducted all data collection, and the TGEG Student Survey was available in both English and Spanish languages.

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