

# Harvest for Healthy Kids Pilot Study: Associations between Exposure to a Farm-to-Preschool Intervention and Willingness to Try and Liking of Target Fruits and Vegetables among Low-Income Children in Head Start



Betty T. Izumi, PhD, MPH, RD; Cara L. Eckhardt, PhD, MPH; Jennifer A. Hallman; Katherine Herro, MS; Dawn A. Barberis, EdD

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## ABSTRACT

**Background** Most US children do not meet recommendations for daily fruit and vegetable intake.

**Objective** Our aim was to evaluate the hypothesis that at post-intervention, children exposed to the Harvest for Healthy Kids pilot study will have greater willingness to try and liking of target foods vs children in the comparison group, controlling for baseline differences.

**Design** We conducted a quasi-experimental pilot study with comparison, low-intervention, and high-intervention groups. Pre- and post-intervention survey data were collected.

**Participants/setting** The intervention period was October 2012 to May 2013. The analysis sample was 226 children within the higher-level unit sample of five participating Head Start centers (Portland, OR); 231 children dropped out of or enrolled in Head Start mid-year, were absent during or refused to participate in the assessments, or were missing covariates.

**Intervention** The comparison group received no intervention components; the low-intervention group received foodservice modifications; the high-intervention group received foodservice modifications and nutrition education.

**Main outcome measures** Willingness to try and liking of target foods were tested and analyzed as binary variables.

**Statistical analyses performed** McNemar's tests were used to assess differences between pre- and post-intervention scores by intervention group. Fixed slope, random intercept multilevel logistic models were used to assess associations between intervention group and post-intervention scores controlling for covariates, adjusting for baseline values, and accounting for center level clustering.

**Results** The difference between pre- and post-intervention willingness to try and liking of target foods was statistically significant for a variety of foods; for example, 44.2% of children liked rutabaga pre-intervention compared with 78.1% post-intervention ( $P=0.004$ ). Multilevel modeling indicated similar associations.

**Conclusions** The Harvest for Healthy Kids pilot study suggests a positive association between the intervention and willingness to try and liking for target foods among study participants. Additional research is needed to assess the impact of the program on fruit and vegetable intake.

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**D**IETS RICH IN FRUITS AND VEGETABLES (F/V) ARE associated with lower risk of all-cause mortality and reduced prevalence of risk factors for chronic diseases, including cardiovascular diseases,<sup>1</sup> certain cancers,<sup>2</sup> and type 2 diabetes.<sup>3</sup> The 2010 Dietary Guidelines for Americans<sup>4</sup> identifies F/V as foods that should be eaten most often. According to current national guidelines, children aged 2 to 8 years should consume 1 to 1½ cups each of F/V

daily.<sup>5</sup> Most US children do not meet these recommendations.<sup>6</sup> Specifically, only 9.8% of girls and 13.8% of boys aged 4 to 8 years consume the recommended daily amount for F/V.<sup>7</sup> Given that lifelong food preferences are formed during the first years of life,<sup>8</sup> and are difficult to change once established,<sup>9</sup> early intervention to promote F/V intake is critical.

Farm-to-preschool programs are at the vanguard of efforts to promote F/V intake among young children. The programs are

modeled after farm-to-school programs in which schools and districts source locally grown foods for school meals and provide students with complementary educational activities that emphasize food, nutrition, and agriculture (eg, school gardens, classroom visits from farmers, field trips to local farms). Farm-to-school programs have been identified by the Centers for Disease Control and Prevention<sup>10</sup> as a key strategy for teaching healthy eating behaviors through increased exposure to F/V.<sup>11</sup> Repeated exposure to unfamiliar or disliked foods has been shown to be effective in increasing children's liking for the foods,<sup>12-14</sup> and studies have shown that children's liking of vegetables is a primary predictor of their vegetable intake.<sup>15,16</sup> A recent study of farm-to-elementary school programs showed an increase in children's willingness to try F/V and knowledge of nutrition and agriculture; consumption of F/V among those with the lowest intakes also increased.<sup>17</sup> In addition to promoting healthy eating habits among children, farm-to-school programs create new markets for locally grown food and are therefore important strategies for supporting vibrant and resilient food systems.<sup>18-20</sup> Despite widespread interest in farm-to-preschool programs, no studies have assessed their impact on eating behaviors of children in pre-school settings.

Head Start, the largest early childhood education program for low-income children in the United States, is an ideal setting in which to promote F/V intake through farm-to-preschool programming.<sup>21</sup> During the 2013 to 2014 program year, nearly 950,000 children aged 3 to 5 years were enrolled in Head Start programs throughout the nation.<sup>22</sup> In addition to their ability to reach large numbers of low-income children, Head Start programs are required by the US Department of Health and Human Services to provide children with nutritious meals and snacks; include children in developmentally appropriate food-related activities; and provide children, parents, and staff with nutrition education. Studies have shown that the Head Start infrastructure can be successfully leveraged to promote healthy eating habits through foodservice modifications<sup>23-25</sup> and nutrition education.<sup>26,27</sup>

The objective of this pilot study was to evaluate the hypothesis that at post-intervention, children exposed to Harvest for Healthy Kids will have greater willingness to try and liking of target foods vs children in the comparison group, controlling for baseline differences. Harvest for Healthy Kids is the work of a community-based participatory research partnership between Mt Hood Community College Head Start (Portland, OR) and Portland State University.

## METHODS

### Participants and Study Design

Participants were children aged 3 to 5 years who were enrolled in the Mt Hood Community College Head Start program. The Mt Hood Community College Head Start program operated 12 centers; 11 were serviced by the program's central foodservice facility. Four of these 11 centers were selected for inclusion as intervention centers in this pilot study based on their similar hours of operation and number of classrooms and were divided into two strata based on these characteristics. The first strata (two centers) operated two morning (8:30 AM to 12:00 PM) and two afternoon (12:00 PM to 3:30 PM) classrooms; the second strata (two centers) operated one mid-day classroom (9:45 AM to 1:15 PM) in addition to one

morning and one afternoon classroom. The two centers within each strata were randomized to one of two study conditions by drawing straws. This resulted in one center from each strata assigned to the low-intervention group (foodservice modification only) and one center from each strata assigned to the high-intervention group (foodservice modification plus nutrition education). Because foodservice modifications (low intervention) were made through the central foodservice facility, the one Mt Hood Community College Head Start center not serviced by the central foodservice facility was designated as the comparison group. This center operated three morning and three afternoon classrooms and did not receive any intervention components.

Parents of children enrolled at the five participating centers at any time during the study period received a letter explaining the program and the evaluation activities. Children whose parents did not opt out of participating in the evaluation activities were included in this pilot study (n=457). Baseline data were collected in September 2012. The intervention period was October 2012 to May 2013. Post-intervention data were collected in June 2013. Analyses excluded children who dropped out of or enrolled in the program mid-year or who were absent during or refused to participate in the pre- or post-intervention assessment; the analyses sample with both pre- and post-intervention data was n=226, nested within the five participating Head Start centers (Figure 1). The Institutional Review Board at Portland State University approved this study.

### Overview of the Intervention

The conceptual framework for Harvest for Healthy Kids was the ecological model,<sup>28</sup> which emphasizes the complex interplay between factors at the individual, social, institutional, and policy levels that influence health behavior. Harvest for Healthy Kids involved a variety of activities that addressed multiple levels of this model. The theoretical framework for the intervention was based on social cognitive theory<sup>29</sup> and included the following constructs: behavioral capability, observational learning, positive reinforcement, self-efficacy, and environmental changes (ie, foodservice modifications) to support F/V intake. Each month during the 8-month-long intervention period, target foods were featured in Head Start meals in the low- and high-intervention centers and in classroom activities in the high-intervention centers. The target foods were carrot, butternut squash, sweet potato, cabbage, turnip, rutabaga, berries, beet, and asparagus. These foods were chosen based on their nutrient density, abundant availability in Oregon during the academic year, and relative ease of adding to Head Start meals.

### Intervention Components

**Foodservice Modifications.** The target foods were served in the low- and high-intervention centers twice per week as the fruit or vegetable component of meals. This frequency of exposure was selected based on studies showing increases in preferences for vegetables after eight taste exposures.<sup>30,31</sup> The foods were prepared using simple recipes that met US Department of Agriculture Child and Adult Care Food Program standards that highlighted, rather than masked, their taste (eg, shredded beet salad instead of shredded beets in a muffin). Except for carrots, cabbage, and berries, the target

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