

The Association Between Home or Community Garden Access and Adolescent Health

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Little is known about the influence of home or community garden (HCG) access on adolescent health. The objective of this study was to determine the association between adolescent self-rated health, nutrition knowledge, attitudes, and intake with HCG access. Urban high school students ($n = 401$) completed a questionnaire prior to a nutrition education intervention. Point biserial correlations and one-way analyses of variance evaluated garden access and health variables. Garden access differed by race ($P < .001$), and students with HCG access consumed more vegetables than students who did not ($P = .003$) and rated themselves as healthier ($P = .034$). Findings suggest that garden access is associated with higher adolescent vegetable consumption and higher self-rated health. Future research should investigate adolescent levels of engagement in HCGs.

Key words: adolescent health, community gardening, fruit and vegetable intake, home gardening, self-rated health

PREVENTING OBESITY through nutrition education and healthy lifestyle promotion is a central approach within public health due to the lasting benefits of healthy eating behaviors.¹ Adolescents are often targeted to prevent adulthood chronic diseases, including obesity, type 2 diabetes, or cardiovascular disease.¹ Healthy eating habits directly influence weight management and decrease

cardiometabolic risk.^{2,3} Adolescents may not engage in positive health behaviors due to a lack of nutrition knowledge, access, or physical activity opportunities, thereby continuing early developed health habits into adulthood.^{2,4} Often, adolescents are aware of behavior changes necessary for healthier habits but lack the resources to take action due to their living environment.⁵

Lower-income urban communities are at an exacerbated risk for food insecurity, cultivating health inequities.⁶ Structural racism influencing food access may be addressed through interventions focusing on environmental change.⁷ To alleviate these issues, studies suggest increasing nutritional safety nets through changes in food environments.^{6,7} Community-level studies that aimed to improve health have demonstrated that environmental impacts disproportionately affect Black communities.⁷ Initiatives to address these inequities include the evaluation of safety or condition of neighborhoods for walkability^{5,7} and evaluating availability of healthy, affordable food in local stores.^{8,9} However, these options do not address the potential for changes within a household, which should be further explored.¹⁰

Few studies have examined home or community garden (HCG) access as a potential contributor to health equity and healthy eating among adolescents. In 2013, only 2.1% of US high school students met vegetable intake recommendations and 8.5% met fruit intake recommendations.¹¹ In US adults, there is an association between fruit and vegetable intake and home gardening, with higher garden presence and participation in rural communities.¹²⁻¹⁴ A survey

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of 8500 European adolescents (aged 12-18 years) in a rural setting demonstrated a positive association with healthy dietary habits and high participation in home gardening for adolescents, demonstrating promise for the role of HCGs in health promotion.¹³ In urban settings, gardens have displayed significant impacts on improving food access,^{7,15} which can assist in alleviating food access issues specific to urban households beyond grocery and corner stores.^{13,15,16} Studies in urban settings should further examine how healthy eating habits are impacted by improved access.

Little is known about the impact of HCG access on adolescent health in an urban context. Existing evidence suggests the presence of an HCG may be associated with healthier behaviors in children and adults. Such an association may help alleviate difficulties with food access while reinforcing the importance of fresh fruit and vegetable intake.¹⁶ Therefore, the present study explored HCG access in an urban environment as a potential contributor to positive health behaviors and health equity in adolescents. The study sought to highlight differences within adolescent health in relation to HCG access, including fruit/vegetable intake, self-rated health, and nutritional factors of knowledge, attitudes, and self-efficacy.

METHODS

Study design and sample

This cross-sectional analysis was completed as part of the 5-pillar Community Health Pipeline (CHP) program for urban adolescents designed to provide nutrition education and career development within community health and food systems.¹⁷ Data were obtained from the self-report questionnaire used to gather baseline information prior to a brief 3-week nutrition and food-sampling intervention. Students from 6 urban high schools were selected on the basis of previous participation in a healthy eating intervention.^{17,18} Students' ages ranged between 13 and 19 years ($M = 15.32$, $SD = 1.35$), mostly in 10th grade ($n = 153$, 52.6%), followed by 12th grade ($n = 74$, 25.4%), 9th grade ($n = 37$, 12.7%), and then 11th grade ($n = 25$, 8.6%; $n = 112$ not reported, 27.9%). Participants were 60% female and 40% male and were primarily African American ($n = 237$, 60.5%) or Latinx/Hispanic ($n = 95$, 24.2%).

Data collection tools

Demographic information is displayed in Table 1. Use of federal assistance was defined as answering yes to "Have you or your family ever used federal

TABLE 1. Demographics Differences in Participants

	Garden		Sig	Missing Values n (%)
	Yes n (%)	No n (%)		
Sex	69 (17.2)	282 (70.3)		50 (12.5)
Male	31 (22.3)	108 (77.7)		
Female	38 (17.9)	174 (82.1)	$\chi^2_1 = 1.02, P = .313$	
Race/ethnicity	76 (20.9)	287 (79.1)	$\chi^2_6 = 69.55, P < .001^{**}$	38 (9.5)
Black (non-Hispanic)	34 (58.1)	185 (63.4)		
White (non-Hispanic)	1 (1.3)	6 (2.1)		
Hispanic/Latinx	16 (21.1)	69 (24.0)		
Asian/Pacific Islander	21 (27.6)	7 (2.4)		
Other ^a	5 (6.6)	23 (8.1)		
Federal/state assistance	66 (20.9)	250 (79.1)	$\chi^2_2 = 0.91, P = .633$	85 (21.2)
Yes	34 (51.5)	129 (51.6)		
No	10 (15.0)	49 (19.6)		
Don't know	22 (33.3)	72 (28.8)		
	M (SD)	M (SD)		
Age (13-19 y)	15.14 (1.26)	15.34 (1.34)	$t_{336} = -1.06, P = .292$	35 (8.7)
GPA (0.6-5.0)	3.17 (0.67)	3.06 (0.64)	$t_{252} = 1.20, P = .232$	130 (32.4)

**Significant at $P = .01$.

^aIndicates combination of low-frequency races/ethnicities, including Arab American/Middle Eastern and Native American.

or state assistance programs (eg, free or reduced lunch, subsidized housing, Bridge Card, Medicaid, etc)?" Participants were asked a single question to rate their own health as "excellent," "very good," "good," "fair," or "poor."¹⁹ Finally, participants were asked, "Does your family maintain a home or community vegetable garden?" with the option of answering "yes," "no," or "don't know." Because of the nature of the question, this was interpreted as adolescent access to either a home garden or a community garden and "don't know" was interpreted as "no."

The Centers for Disease Control and Prevention's Youth Risk Behavior Survey food frequency questions were utilized to identify which food groups were consumed within the past 7 days.²⁰ Two questions addressed the frequency of fruit and 100% fruit juice consumption with 11 answer options ("I did not eat this in the past 7 days" to "4 or more times per day"). Four questions addressed vegetable consumption; the frequency of potatoes eaten (not fried), carrots, green salad, and "all other" vegetables. These responses were summed into Fruit Intake ($\alpha = .63$) and Vegetable Intake ($\alpha = .79$) categories. The low α value for Fruit Intake questions may be due to the low number of questions in the scale rather than low reliability.²¹ Two questions inquired about students' knowledge on daily serving sizes of fruit and vegetables ($\alpha = .77$). Their nutrition-related attitudes were measured by "Healthy foods taste good" and "I tell my family and friends to eat fruits and vegetables" (Yes, all of the time/yes, most of the time/yes, some of the time/never). Self-efficacy was measured through a 3-question sequence asking confidence levels for improving eating habits, identifying healthy foods, and possessing the ability to cook healthy meals on a 5-point Likert scale ("Not at all confident" to "Completely confident"). Attitudes and Self-efficacy scores were combined and summed to create the Attitudes/Efficacy variable ($\alpha = .70$).¹⁸ The overall reliability was sufficient ($\alpha = .70$).

Statistical analyses

Missing data were missing at random and accounted for through mean replacement ($\chi^2 = 260.05$, $P = .35$). Descriptive statistics verified statistical assumptions and normal distributions within variables. Frequency analyses determined the number of students with access to an HCG. Chi-square tests compared categorical demographic variables based on garden access, and continuous variables were compared through t tests (Table 1). Point biserial correlations were conducted to determine the strength of the association with

HCG access and adolescent nutritional knowledge, healthy eating self-efficacy/attitudes, fruit intake, vegetable intake, and self-rated health. A one-way analysis of variance (ANOVA) was conducted to identify significant differences based on garden access. The a priori level of significance was set at $P < .05$.

RESULTS

Seventy-seven of 369 participants reported that their families maintain a HCG (20.9%). Thirty-two participants (8.0%, total $N = 401$) chose not to answer the garden question. The only significant difference in HCG access found within the demographic results was by race/ethnicity ($\chi^2 = 69.55$, $P < .001$). Use of federal/state assistance was not significantly different by race/ethnicity ($\chi^2_{14} = 14.96$, $P = .38$). Whether adolescents reported their families maintaining an HCG when separated by race showed a higher proportion of Asian participants having access to an HCG than other racial groups; Asian participants were 3 times more likely to have an accessible garden than not to have HCG access ($n_{\text{yes}} = 21$, $n_{\text{no}} = 7$).

Significant correlations were found between HCG access and vegetable intake ($r_{\text{pb}} = 0.16$, $P = .005$) and self-rated health ($r_{\text{pb}} = -0.11$, $P = .034$). Self-rated health was reverse coded; therefore, smaller values indicated higher levels of self-rated health. Table 2 demonstrates results of the one-way ANOVA. Having access to a HCG did not have a significant relationship with levels of fruit intake, attitudes/self-efficacy, or nutrition knowledge compared with their peers without HCG access. However, vegetable intake frequency was significantly higher in those with garden access ($F_{1,353} = 9.25$, $P = .003$, $d = 0.39$). While most participants reported having "good," "very good," or "excellent" health ($n = 295$, 73.6%), those who reported having garden access were more likely to rate their own health higher on the 5-point scale ($F_{1,360} = 4.51$, $P = .034$, $d = 0.27$).

DISCUSSION

HCG access in urban areas and the relationship to adolescent health and well-being had yet to be investigated until the present study. Findings suggest that access to a HCG is associated with higher vegetable consumption and a more positive self-perception of individual health. Given that gardens typically focus on fresh vegetables,¹³ an association between HCG and vegetable consumption is not surprising. This study supports that self-rated health in adolescents is lower among those without garden access, as these families are more likely to be socioeconomically disadvantaged.²² To further

TABLE 2. Analyses of Variance Comparing Mean Differences Surrounding Home and Community Garden Access^a

Between-Groups Results	Garden: Yes	Garden: No	Min/Max	F	P
	M (SD)	M (SD)			
Efficacy/attitudes	15.78 (3.15)	15.03 (3.44)	5-25	1.90	.17
Fruit intake	7.95 (5.44)	7.20 (4.89)	0-20	1.27	.26
Vegetable intake	12.03 (7.89)	8.93 (7.71)	0-40	9.25	.003**
Knowledge	5.18 (1.63)	5.66 (1.46)	1-10	2.72	.10
Self-rated health	2.57 (1.02)	2.84 (0.97)	1-5	4.51	.034*

^aSelf-rated health is reverse coded, meaning the lower the value, the higher the rating of health.

*Significant at $P = .05$.

**Significant at $P = .01$.

support this idea, self-rated health has previously been linked to both socioeconomic status and garden access.²²⁻²⁴ This study also highlights racial differences in garden access, in which rationale for these differences should be considered when examining communities in the future. Compared with other racial/ethnic groups, Asian students were 3 times more likely to have access to a garden than not to have access. HCG access may be a significant factor in aiding urban populations with healthy food access.¹⁵ Regardless of race, this study supports existing literature that identifies the potential role of HCG presence to improve nutrition intake.¹³

A systematic review suggests that fruit/vegetable intake increases with the implementation of gardening interventions, supporting the need for interventions that encourage increased intake.¹⁶ In addition, previous studies have demonstrated a decreased risk of depression with fruit/vegetable intake, emphasizing the importance of the results of this study.²⁵ Future studies should address the potential connection displayed between garden access, self-rated health, and mental well-being.²² Garden access may assist in contributing to environmental changes that alleviate food insecurity in urban communities and may encourage adolescents to eat more fresh vegetables. Future interventions should consider the impact of HCGs on both self-rated health and vegetable consumption, explore how to implement community-level and household-level gardening practices,²⁴ and determine whether there is a causal relationship between HCG and healthy eating habits.¹⁵ Environmental contributors to weight management and health behaviors should be further integrated into behavioral health through policy and practice.^{2,6,13,16,26}

Limitations of the study include the cross-sectional nature, limiting understanding of long-term impact. The risk for social desirability bias

increases with self-report measures. In addition, this study could not examine the level of adolescent participation in HCGs, as the question focused on family access to an HCG. Other questions that contributed to missing data, such as family use of state/federal assistance, may not be reported accurately by adolescents. Even with a “don’t know” answer option, 85 (21.2%) chose to leave the question blank. Limitations from missing data were accounted for.

CONCLUSION

This study suggests that access to a HCG has a positive relationship with vegetable intake, a significant contributor to adolescent and adult health.^{14,26} Results indicated that students ate more vegetables on average than fruit and ate significantly more vegetables with access to a HCG while having a higher self-perception of health. Adolescent fruit and vegetable access and consumption should continue to be examined and evaluated as a potential tool for changing nutrition-related behavior.^{11,13} Future research should continue to evaluate how HCG access could influence mental health and well-being in adolescence. Finally, future policies should address the influence of HCG on food access and implement environmental changes that increase access to healthy food. HCGs may play a significant role in contributing to healthy eating behaviors in adolescents and fighting health inequities in urban populations.

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