JOURNAL of YOUTH DEVELOPMENT

http://jyd. pitt. edu/ | Vol. 13 Issue 3 DOI 10.5195/jyd.2018.621 | ISSN 2325-4017 (online)

Teens as Teachers in the Garden: Cultivating a Sustainable Model for Teaching Healthy Living

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Abstract

School gardens are an ideal space to deliver a healthy living curriculum, such as nutrition and physical activity education, to elementary school youth. However, public schools often lack the resources and support to establish sustainable garden-based programming. We created the Healthy Living Ambassador program, a collaborative after-school garden program in low-income communities that brought together resources from schools, community programs, and University of California Cooperative Extension. This school garden program featured culturally competent teens as teachers to serve as near-peer educators and mentors to elementary school youth. The program development model incorporated lessons from

sustainable community-based health program interventions and essential elements of teens-as-teachers programs. We share the program logic model and discuss the successes and challenges of this program model that we encountered while developing a long-term, maintainable community garden program to teach healthy living.

Key words: teen teachers, garden, healthy living, logic model, after-school, cultural competency

Introduction

Given high obesity rates among youth in the United States and the associated risk of chronic diseases (Hales, Carroll, Fryar, & Ogden, 2017), it is in society's best interest to investigate and develop innovative programs that promote healthful youth behaviors to mitigate this issue. Schools have an important role to play in promoting the health of a nation, as they are the primary place where most children can be easily reached. Furthermore, school gardens are a practical and effective tool for connecting children to food sources that promote healthier lifestyles and greater academic achievement (Ozer, 2007). Garden-based nutrition education programs can improve fruit and vegetable intake (McAleese & Rankin, 2007; Lautenschlager & Smith, 2007) and increase preferences for fruits and vegetables among youth whose original preferences were low (Lineberger & Zajicek, 2000; Ratcliffe, Merrigan, Rogers, & Goldberg, 2011). Additionally, teaching lessons in the school garden may increase children's physical activity and decrease sedentary time throughout the school day (Rees-Punia et al., 2017). Yet, even with the fiscal support of public incentives, creating and sustaining school garden programs remain a challenge (Hazzard, Moreno, Beall, & Zindenberg-Cherr, 2012).

With the "garden in every school" initiative launched in 1994 across California, thousands of school garden beds were built (Eastin, 2013). Yet, school administration and local educational values often determine the level of support for garden programming (Boyle, 2013; Hazzard et al., 2012). Many schools are inadequately equipped with the people, funds, materials, and training needed to achieve and sustain their school garden programming goals (Hazzard, Moreno, Beall, & Zindenberg-Cherr, 2011; Hazzard et al., 2012), resulting in fallow, unused garden beds. Overcoming these barriers is paramount to implementing and maintaining garden programming that successfully promotes healthy living education (Lekies & Eames-Sheavly, 2008). Leveraging cooperative partnerships linking schools, after-school programs, and community-based organizations could provide the needed resources to support sustainable school garden programming and enhanced learning opportunities for youth, families, and community members (Robinson-O'Brien, Story, & Heim, 2009).

This paper reports on the 4-H Healthy Living Ambassador (HLA) program developed and delivered in San Mateo and San Francisco Counties in California. The HLA program brought health, teen leadership, and teamwork to local elementary school gardens through a multifaceted approach connecting University of California Cooperative Extension (UCCE), community-based partnerships, and teens in teaching roles. We frame our discussion of the program's development using the Substance Abuse and Mental Health Services Administration's (SAMHSA) (2017) five-step strategic planning framework. We provide an overview of program development during the first three growing seasons (2013-2016). Although school gardens were the context, in this paper we specifically focus on the development of the teens-as-

teachers aspect of the program and the logic model that guided the program's development; Bolshakova, Gieng, and Sidhu (2018) report details about the garden curriculum and logistics.

Program Development

We modeled our program development framework after a systemic community-based approach (SAMHSA, 2017) that ensures the strengths of both the community and program leadership team are used to create an accurate, valid, and sustainable plan. The five steps in this Strategic Prevention Framework include needs assessment, capacity building, strategic planning, implementation, and evaluation. Sustainability and cultural competency principles were integrated throughout the process to cultivate meaningful, locally relevant programming.

Community Assessment

As a first step, we identified pressing health-related problems and needs as well as some of their contributing factors. Cooperative Extension, working in partnership with the San Mateo County Health System, the San Mateo County Food Systems Alliance, and school districts throughout San Mateo and San Francisco Counties, identified youth well-being and science literacy as key priorities, and school gardens as an underutilized resource that could support youth wellness and science literacy goals. Through these early inquiries, we determined the level of readiness among local community partners and available resources to address these factors. By examining locally relevant data and surveying the community, we began the planning process more efficiently.

Table 1: San Mateo County School Garden Needs Assessment Results

Areas assessed	Public	Private
Number of schools surveyed	23	7
Garden space (adequate and safe)	87%	85%
Tools for kids to garden (present)	39%	100%
Garden plants (present)	22%	85%
Human resource support for garden programming (present)	35%	85%

In the fall of 2013 and spring of 2014, our team (from UCCE in San Mateo and San Francisco Counties) visited and surveyed a subset of San Mateo County public and private elementary school gardens (23 public and seven private). To represent the scope of the school gardens, we selected sites distributed across the counties where we had an existing UCCE program connection that could provide access to the garden (e.g., 4-H or Master Gardener volunteers, schools that visit UC Elkus Ranch Environmental Education Center, UC CalFresh or Expanded Nutrition Education Program [EFNEP] partner schools). We evaluated the physical space (garden beds, rows, soil, benches, etc.), tools (watering cans, digging tools, etc.), and the presence of cultivated plants and human resource supports associated with garden programming. One key finding from this assessment was that although there were many school gardens across San Mateo County having comparable physical features (e.g., garden beds for planting, soil, water, etc.), across private and public schools, most low-income public school

gardens lacked gardening tools, plants, and key personnel to facilitate any type of educational programming in the gardens (Table 1).

UC CalFresh partners who worked with local communities and elementary schools identified youth health and nutrition needs. Of the garden sites surveyed, 20 of the 23 public schools were identified as having at least 50% of their student populations that qualified for the free or reduced-price school meals administered by the USDA National School Lunch Program.

We identified the teens as teachers of younger youths approach (Lee & Murdock, 2001) as a possible sustainable solution to providing garden programming. The teens-as-teachers model has demonstrated promising results, with teens learning and adopting the healthful behavioral practices that they teach to youths (Arnold et al., 2016). Further, the model provides opportunities for adolescents to extend learning for individual growth, and provides a nurturing space to contribute to community growth (Worker, Iaccopucci, Bird, & Horowitz, 2018). Collaborating with after-school tutoring and homework programs was a natural approach for 4-H, as many out-of-school programs lack capacity and resources to provide students with rigorous, project-based academic programming. Further, reaching underserved youth throughout the state of California was a priority based on the healthy living initiatives launched by the 4-H Youth Development Program. Based on the resource gaps identified, we developed a collaborative, teens-as-teachers support model that would equip, coordinate, and engage multiple stakeholders' involvement in a widespread network to provide sustainable garden programming and realize the garden as a space for developing healthy behaviors.

Capacity Building

This next step built upon the community assessment where we found unmet needs and developed solutions to address them. A focus on building capacity ensured that our counties had the resources and connections necessary to support this newly created teens-as-teachers garden program. Building capacity involved locating sources of funding, engaging stakeholders, and networking with other organizations.

Teens as Teachers in the Garden

In fall 2013, National 4-H Council, with support from the Coca-Cola Foundation, solicited interest from 4-H professionals to apply for a year-long "Youth Voice: Youth Choice" Healthy Living 4-H grant. The focus of the program was on combating obesity by encouraging positive nutritional choices and physical activity. The Council sought to capitalize on 4-H'ers understanding of healthy, balanced living to transform underserved communities. We envisioned this as an opportunity to connect teens as near-peer teachers and mentors to elementary school youth to promote healthy living in underused gardens that needed additional resources. Furthermore, it was an opportunity to develop culturally relevant 4-H programming in targeted neighborhoods previously lacking representation in this organization. Recruiting local teens to serve and teach children (sometimes siblings) from the communities where they were from automatically provided a level of cultural competence and locally relevant understanding of the neighborhood dynamics. With the long history of 4-H training teens to teach across ages being implemented with a variety of content and in a variety of settings (Bird & Subramaniam, 2011; Emil, Dworkin, & Skelly, 2007; Ripberger & Blalock, 2013; Schmitt-McQuitty, 2012; Smith & Enfield, 2002), we had multiple resources to consult. However, to our knowledge, using this

model of training teens to teach and deliver garden-based nutrition and physical activity education is the first we are aware of in the published literature.

We integrated best practices identified by Lee and Murdock's (2001) Ten Essential Elements of Teens as Teachers (Table 2), which were associated with the desired outcomes of our teens-as-teachers program. The Ten Essential Elements (E1-E10) were incorporated in the Healthy Living Ambassador Logic Model, which is presented in Figure 1. We designed this program to provide training and mentorship to culturally competent teen teachers, who in turn would deliver garden-based nutrition and physical activity education to local elementary school children.

Table 2. Ten Essential Elements of Teens as Teachers

Element 1 (E1)	Dedicated Adults Who Support Teens
Element 2 (E2)	Active Teen Recruitment
Element 3 (E3)	Strong Curriculum
Element 4 (E4)	Initial Training
Element 5 (E5)	Ongoing Training and Support
Element 6 (E6)	Attention to Details
Element 7 (E7)	Recognition and Reward
Element 8 (E8)	Team Building
Element 9 (E9)	Setting Teens Up for Success
Element 10 (E10)	Feedback and Evaluation

See Lee & Murdock, 2001

Cooperative Extension Gets Cooperative

Health promotion must be structured as part of a societal commitment (e.g., a social innovation), where comprehensive strategies are realized through local partnerships and collaborations. These collaborations among young people, families, teachers, researchers, and community partners combine resources and supportive efforts, which in turn may provide the impetus to catalyze social change that addresses societal needs such as obesity and chronic disease (Bastien & Holmarsdottir, 2017). The UCCE offices are local problem-solving centers; they are part of a statewide network of UC researchers and educators who bridge UC research with the communities they serve, dedicated to the development of healthy people, communities, food systems, and environments. We leveraged UCCE's expertise in agriculture, natural resources, and human resources along with our strong relationships, understanding, and collaborations among our programs and partners, especially those with a youth focus. These partners included 4-H Youth Development, UC CalFresh (California's Supplemental Nutrition Assistance Program Education [SNAP-Ed] program) and EFNEP, UC Elkus Ranch Environmental Education Center, and Master Gardeners, and our community stakeholders (e.g., schools, out-of-school programs). With the 4-H Youth Development program's goal to expand the reach and diversity of youth, and the UC CalFresh program's goal to provide comprehensive nutrition education programming to schools with at least 50% of their students eligible for free or reduced-price school meals, we incorporated serving a diverse audience, with most of youth coming from low-income neighborhoods.

The UCCE collaboration and partnership with community stakeholders led to the development of the HLA program in San Mateo and San Francisco Counties. The 4-H Youth Development Program provided expertise in training and program implementation with positive youth development and youth volunteer program management dimensions. The UC CalFresh program provided nutrition education expertise, community partnerships with schools, and nutrition educators as adult allies and mentors for the youth and teen ambassadors. Elementary schools provided fallow school gardens and the desire to cultivate the garden spaces and youth. Out-of-school tutoring and homework support programs welcomed the academic enrichment for their students that the HLA program provided through the teens as teachers.

Strategic Planning

The planning process used information gleaned from the community assessment and capacity building steps to establish a plan of action. Here, the HLA program leadership team considered the steps needed to reach immediate goals and considered how to sustain those goals for the future. The resulting logic model incorporates youth development and health promotion principles that designate teens as instigators of change addressing a social need for community health.

Healthy Living Ambassador Program Logic Model

A logic model presents a conceptual map or pathway of how an effort or initiative is supposed to work and/or the logic of how change happens (Center for Community Health and Development, 2018). Logic models can be effective tools in rallying a community of participants together around an initiative to keep efforts moving in the same direction. Further, they have been used in many educational contexts, including community nutrition education (Medeiros et al., 2005; Scherr et al., 2014), youth development (Maslow et al., 2013; Wells & Arthur-Banning, 2008), and health promotion (Afifi, Makhoul, El Hajj, & Nakkash, 2011; Saunders, Evans, & Joshi, 2005; Steckler & Linnan, 2002).

The HLA program logic model (Figure 1) is built upon prior research in the public health and youth development fields. Specifically, we incorporated Lee and Murdock's (2001) essential elements for teen teachers (identified as E1 to E10 from Table 2) and the steps in SAMHSA's (2017) strategic planning framework.

Figure 1. Healthy Living Ambassador Program Logic Model

Community Assessment–What needs is the program intended to address?	Capacity Building–Ensure community has the resources and connections necessary to support new program.	Strategic Planning–Develop process informed by needs assessment and capacity building.	Implementation–Execute the plan with activities and record keeping of results about challenges and strategies.	Evaluation–Address challenges that may occur in process, making alterations to maximize impact.
Needs	**Inputs**	**Activities**	**Outcomes**	**Impact**
• Poor diet and limited physical activity in children contribute to high rates of obesity and chronic diseases. • Limited support in public schools to maintain and use school gardens as an educational resource. • Cross-collaboration among multiple Cooperative Extension programs and stakeholders needed to build internal and external capacity and recognition. • Sustainability is integrated throughout the entire program development process considering human, social, and capital resources in the community. • Cultural competency is a key priority in delivering high quality programs to diverse populations.	***Funding*** • Grants • Local/state government • Local foundations • Program cost-share ***Personnel*** • Adult allies/mentors (E1) • Teen teachers (E2) • School staff • Program coordinator • Youth and health community advocates and organizations • Civic/government leadership ***Materials*** • Strong curriculum (E3) • Garden supplies • Recognition & rewards (E7) • Evaluation ***Facilities*** • Schools • Garden spaces • Training facilities	***Supports*** • Active teen recruitment (E2) • Active adult recruitment • Initial training (E4) • Ongoing training and support (E5) • Recognition & rewards • Setting up teens for success (E9) ***Programming*** • Team building (E8) • Garden program delivery • Attention to details (E6) ***Evaluation (E10)*** • Baseline data collection • Ongoing feedback from HLA team members • Surveys and interviews • Observations • Analysis of data	***Challenges*** • Reaching underrepresented teen and adult audiences • Curriculum and training that facilitates teen teacher delivery of garden, nutrition, and physical activity concepts in the school garden • Successfully coordinate, communicate, integrate, and inspire ideas and actions among multiple stakeholders ***Strategies*** • Partner and network among all youth organizations • Openness to non-traditional youth–adult roles • Flexibility and adaptability of curriculum and training based on feedback and evaluation • Participatory and research-based methods for communication, coordination, and data collection	***Desired Results*** • Sustainable school garden programs inspire lifelong healthy living behaviors • Participating youth live healthier lives, have positive relationships with community, lead health initiatives • Sustainable partnerships between nutrition and youth development programs within Cooperative Extension • Local 4-H program engages more culturally diverse youth in meaningful, youth-led activities • Program alumni lead healthy living efforts in their community and elsewhere • Recognition and replication of Cooperative Extension programming

Outputs, Outcomes, and Impacts

During the initial implementation of the garden program in the spring of 2014, we addressed the teens-as-teachers essential elements (Table 2) based on our available resources. We outline these areas in a series of tables and describe our key strategies and their resulting short-term outputs, outcomes, and impacts as addressed in the implementation and evaluation phases of our framework.

Implementation

Over the past five years (2013-2018), we have been creating, supporting, and implementing the teens-as-teachers garden program to promote healthy behaviors in underserved communities. The original program, called Nutrition to Grow On, Energized!, began planning in the fall of 2013 in San Mateo County, and has since been renamed and rebranded as the Healthy Living Ambassador (HLA) program, now in San Mateo and San Francisco Counties.

During the implementation phase, we initiated community activities and record keeping. As we continued, details emerged about the challenges and strategies of program implementation that were critical to the program's desired impacts and sustainability. Throughout the entire process, our team was constantly evaluating to address the challenges that arose. While some concepts related to supporting this program flourished in our community, others required modifications to maximize their effect.

Engaging Culturally Competent, Local Youth

Teen recruitment focused on local teens, particularly in underserved communities. We made a concerted effort to include diversity representative of the local community, which included teens outside typical 4-H demographics. By focusing on local teens in the neighborhoods and high schools in close proximity to the elementary school gardens, we were able to recruit some teens that had previously attended the same elementary schools and therefore related with common cultural norms. We met and developed relationships with local youth workers and educators, and integrated our staff into classrooms and meeting spaces. We found many teens looking for leadership and skill development opportunities. The concept of giving back to younger students in their community and having their own space (the garden) to work together appealed to many teens. Transportation was provided when needed (e.g., to the training at UC Elkus Ranch); however, the goal was to have students locally placed in elementary school gardens within walking distance of their high school or home to eliminate the transportation barrier.

Further, students could gain up to 40 hours of community service per season while participating in the program – an incentive, because community service hours are mandated and required at some schools to graduate high school.

Tables 3 and 4 summarize our teen teacher and elementary student participant demographics. The majority of youth who participated during the first two garden harvests (2014 and 2015) were Latino, while the majority group shifted in 2016 to Asian.

Table 3. Teen Teacher Participant Demographics

Teen demographics	2014	2015	2016
Hispanic or Latino	53%	42%	19%
Asian	6%	16%	51%
African American	12%	3%	4%
White	29%	34%	21%
Two or more races	0%	5%	4%

Table 4. Demographics for Elementary Children Participating in HLA Program

Elementary children demographics	2014	2015	2016
Hispanic or Latino	45%	53%	6%
Asian	25%	26%	58%
African American	5%	2%	3%
White	27%	14%	19%
Two or more races	8%	4%	11%
Not reported	5%	1%	3%

Youth Program Participation Evolves over Time

While the overall program goal was maintained (to provide academically enriching experiences for both teen teachers and elementary children in the garden), the frequency and intensity of student activities changed through time to improve and meet multiple program outcome goals. Tables 5 and 6 describe our teen teacher and elementary student participation. From year one (2014) of the program implementation to year three (2016), the amount of training hours for teen teachers increased (from 23 hours to 32 hours) as well as the frequency and duration of

the weekly lessons teens delivered in the school gardens (from 6 weeks to 10 weeks, from one lesson/week to two lessons/week). Each year of the program, the HLA program widened its reach, adding a new school garden site each year (expanding from five school gardens to seven school gardens), while retaining the majority of school partnerships from the previous school years (only one school partnership was discontinued after the first year of program implementation). With the increased amount of time spent teaching in the garden, the number teens per team situated at each school garden also increased. In 2014, we had two to four teens per school garden team. By 2015, no team had fewer than four teen teachers per site. When we increased to two lessons per week in 2016, our HLA garden teams had between six and eight teen teachers dedicated at each site.

Table 5. Number of Teen Teachers Trained and Hours of Service Each Provided to the Program

Year	Number of teens trained	Percent		Hours at initial training
		Male	Female	
2014	17	59%	41%	23
2015	33	32%	68%	30
2016	52	30%	70%	32

Table 6. Number of Elementary Children Participating in HLA Garden Program

Year	Number of elementary children reached	Number of gardens	Program duration	Program hours | approximate minutes per lesson
2014	220	5	6 weeks	6 hours | 60
2015	400	6	8 weeks	10 hours | 75
2016	165	7	10 weeks	15 hours | 45 (twice per week)

Additional Opportunities

As the program progressed, the HLAs (teen teachers) were provided with additional leadership opportunities in their community to cultivate their interests and skills. They had further opportunities to participate in other UCCE programming such as Connecting Youth to Nature day camps held at UC Elkus Ranch. With these added opportunities, HLAs were "Leaders in Training," assisting in leading hands-on lessons in environmental science, nutrition, and physical

activity through a high quality outdoor educational experience. Through these experiences, HLAs gained extensive access to a network of people, knowledge, and resources along the continuum from local community to the university, helping open pathways to colleges and careers.

Evaluation

During the evaluation step, we examined the challenges and successes of implementing the HLA program, which are presented in Tables 7 through 10. As the program evolved through 2015 and 2016, we identified that the 10 essential elements (Lee & Murdock, 2001; see Table 2) could be divided into four broad areas: (a) key personnel; (b) program curriculum and instruction essentials; (c) details, recognition, and teamwork; and (d) review, revise, and success. We collected information at every step to help us improve the effectiveness of the program. We integrated stakeholder feedback into our data collection process via observation, surveys, interviews, and by soliciting feedback from contributors at all levels (e.g., elementary students, teen teachers, program partners and staff, and volunteers) (Bolshakova et al., 2018). By incorporating the stakeholder perspective, we were able to build program buy-in that contributed to community-level promotion of the program. Obtaining buy-in increased local interest that eventually led to securing additional funding from the county government and other youth- and health-focused organizations.

In Table 7, we identify key challenges and strategies for establishing key personnel as well as actions that showed promise as indicators of success (+) and aspects that remain a work in progress (-).

Table 7. Key Personnel—Teens as Teacher Essential Elements

Challenges	Strategies	(+) Indicators of success and (-) Work in progress
Teens as Teacher Essential Element: Dedicated adults who support teens (E1)		
Identify dedicated adults where no 4-H program support existed Ensure adults have clarity on roles and expectations	Active recruitment of parents in partnership with teens Invite parents to the teen overnight trainings and to the garden sites Site consistency between years	(+) Achieved consistent adult support with Cooperative Extension staff (UC CalFresh and 4-H) and after-school program staff (+) Hired program coordinator to facilitate the role of the dedicated adult (-) Had few dedicated parent or other adult volunteers
Teens as Teacher Essential Element: Active teen recruitment (E2)		
Increase awareness of new program in communities where 4-H lacked familiarity	Partner with UC CalFresh network of school and out-of-school programs in low-income neighborhoods Promote earning of volunteer hours through participation (a mandate to graduate in many local high schools) Involve returning teens with recruitment process	(+) Increased teen recruitment to program capacity (from 16 teens in 2014 to 52 teens in 2016) (-) Low level of teen retention and assimilation into established 4-H club program

In Table 8, we identify key challenges and strategies for establishing strong program curriculum and instructional methods, as well as actions that showed promise as indicators of success (+) and aspects that remain a work in progress (-).

Table 8. Program Curriculum & Instruction Essentials—Teens as Teacher Essential Elements

Challenges	Strategies	(+) Indicators of success and (-) Work in progress
Teens as Teacher Essential Element: Strong curriculum (E3)		
Develop garden-based curricula incorporating gardening, nutrition, and physical activity, which would meet UC CalFresh education requirement and could be taught by teens through 4-H partnership	Use UC CalFresh approved curriculum, *Nutrition to Grow On,* supplemented with "ENERGIZERS" (physical activity) Create a guidebook for the teen teachers Respond to feedback from the teen teachers, and modify curriculum as new approved curricula became available	(+) Combined physical activity, gardening, and teen teaching cues into the lessons (+) Updated curriculum as new UC CalFresh qualified curricula became available (e.g., 2014*, Nutrition to Grow On,* 2015; *Jr. Master Gardeners Health and Nutrition from the Garden*, 2016; *Learn, Grow, Eat, and GO*!) (+) Teens empowered to provide feedback for curricula changes over the years
Teens as Teacher Essential Element: Initial training (E4)		
Create system for initial training, development, and inspiration to teens and adult allies to effectively begin delivery of garden program	Design training that builds content base, experiential learning in the garden, peer learning, and practice with peer/mentor feedback Provide transportation, housing, and meals for overnight teen training at UC Elkus Ranch	(+) Informed modifications to training based on teen evaluations (+) Extended initial teen training length from 23 to 32 hours at UC Elkus Ranch (including overnight camping) (+) Teens identified initial training as a highlight event

Table 8 (continued).

Challenges	Strategies	(+) Indicators of success and (-) Work in progress
Teens as Teacher Essential Element: Ongoing training and support (E5)		
Develop a system for ongoing training and support at the school garden sites weekly	Coordinate and direct adult allies to support teen teams in their delivery of the garden program each week	(+) Conducted weekly check-ins between adult mentors and teen teammates at each garden site (+) Increased number of teen teacher teammates at each site (from 2-3 teens in 2014 to 6-8 in 2016) (+) Established clearer roles for the teens (teachers), adult volunteers or Cooperative Extension staff (mentors/allies), and after-school program staff (classroom managers)

In Table 9, we highlight key challenges and strategies for accounting for the details, rewards, and recognition, and instilling a shared sense of team, as well as actions that showed promise as indicators of success (+) and aspects that remain a work in progress (-).

Table 9. Detail, Recognition, and Teamwork—Teens as Teacher Essential Elements

Challenges	Strategies	(+) Indicators of success and (-) Work in progress
Teens as Teacher Essential Element: Attention to details (E6)		
Create a system to coordinate the HLA program with its many partners, materials, and supports	Conduct regular meetings and communication among team members Distribute tasks and leadership program of different elements of the program among team members	(+) Delegated lead of youth development program components to the 4-H program (+) Delegated lead for building school nutrition partnerships to the UC CalFresh program (+) Delegated lead for program delivery to the teens (+) Hired an integrated 4-H and UC CalFresh HLA program Coordinator

Table 9 (continued).

Challenges	Strategies	(+) Indicators of success and (-) Work in progress
Teens as Teacher Essential Element: Recognition and reward (E7)		
Include compensation for efforts that are consistent with expectations of the teens	Ensure there is valuable, non-monetary compensation Ask teens to identify potential ways they can be compensated and incorporate teen feedback when possible Provide ongoing leadership opportunities by teen leaders with recognition at trainings and meetings	(+) Included end of season celebrations for the teens (+) Provided teens with a certificate of completion for volunteer hours (+) Provided teens cost-free training or internship opportunities (e.g., ServSafe certification, or UC Elkus Ranch summer internship), and 4-H scholarship opportunities and networking (+) Continued academic and career support for the teens with letters of recommendation by program leaders
Teens as Teacher Essential Element: Team building (E8)		
Create a positive teen and adult support network	Facilitate interactive team-building during initial and ongoing training, plus support at garden sites	(+) Included teambuilding and positive relationship development activities as a centerpiece of initial training (+) Cultivated continued relationships between teens and adult allies through ongoing interactions at school garden sites

In Table 10, we focus on key challenges and strategies for effectively evaluating and revising programmatic properties to set up teens for success, as well as actions that showed promise as indicators of success (+) and aspects that remain a work in progress (-).

Table 10. Review, Revise, Success—Teens as Teacher Essential Elements

Challenges	Strategies	(+) Indicators of success and (-) Work in progress
Teens as Teacher Essential Element: Setting teens up for success (E9)		
Ensure that teens experience success and confidence in teaching and mentoring elementary children in school garden	Provide continuous support, feedback, and reflection by the adults to the teen teachers during ongoing meetings at the garden	(+) Elementary children enthusiastically welcomed teen teachers (+) Increased number of teen teacher teammates at each site (from 2-3 teens in 2014 to 6-8 in 2016) and the number of program days per week (from 1 day in 2014 to 2 days in 2016) (+) Provided weekly feedback to teens by peers and adult allies (e.g., coaching teens on readiness and helping with garden responsibilities) (+) Integrated HLA teens into a more traditional 4-H club model that expanded learning beyond the HLA garden season (-) Limited capacity for staff to facilitate teen-expanded learning opportunities; steady pool of adult volunteers as mentors still needed to provide increased adult:teen ratio (-) Increased turnover in 4-H program staff coordination hindered continuity in program communication and comprehension

Table 10 (continued).

Challenges	Strategies	(+) Indicators of success and (-) Work in progress
Teens as Teacher Essential Element: Feedback and evaluation (E10)		
Ensure that all partners are able to provide feedback from different dimensions of the program	Use accessible evaluation tools that provide feedback for program improvement and inform applied research questions	(+) Program feedback provided by teens through formal surveys and interviews, and casually, to inform program development (+) Program feedback provided by adult allies at strategic planning meetings and implemented (+) Evaluated healthy behavioral impacts in youth as well as interest in the program through surveys and direct observation (+) Strengthened integration, communication, and recognition among Cooperative Extension programs (+) Sustained garden programming at multiple school sites (-) Limited post-program feedback by teens in some instances

Discussion and Implications for Practice

Our needs assessment of health-related issues and school gardens in San Mateo County, California, led us to consider a teens-as-teachers model to meet several goals related to promoting healthful behaviors, capacity building, and reaching underserved audiences. We adapted a framework used with sustainable community-based health program interventions (SAMSHA, 2017) to guide the program development process. Incorporating the essential elements of teens-as-teachers programs (Lee & Murdock, 2001) into a logic model, we could articulate the underlying program theory for the HLA program. Youth development researchers and practitioners note the value of using such a process (Arnold & Cater, 2016; Arnold & Nott, 2010).

All organizations involved in the HLA program benefited from the partnerships and focused effort around a need in the community: cultivating and sustaining school garden programming. Elementary schools were excited to see school gardens revitalized, often after years of lying fallow, while after-school programs were happy to have the support of more enriching hands-on science activities for their students. The HLA program brought health, science, teen leadership, and teamwork together to grow teens' self-efficacy in their own health, all the while putting them at the forefront of promoting healthy behaviors in members of their local community. The teens-as-teachers model is known for producing positive changes in the teen participants (Weybright et al., 2016; Worker et al., 2018).

Culturally competent teen teachers were at the center of the program's ability to effectively engage young students from diverse communities. Our program's structure helped us overcome a major challenge experienced by youth development programs: that of supporting participation by low-income teens. We were able to identify challenges and strategies to overcome them, as well as track indicators of success and areas where continued focus is still needed.

We discuss several key lessons learned from addressing a community need by creating, implementing, and evaluating a collaborative teens-as-teachers after-school garden program in low-income communities.

Use a Logic Model to Guide Program Development

Harnessing multiple resources from key community partnerships was critical for the program's efficacy. Bringing multiple partners together around a common vision of healthy youth, teen leadership, and sustainable school gardens can be relatively simple. Developing a united community road map for getting to that vision can be more complex (Kaplan & Garrett, 2005). So often, program development moves ahead of strategic planning in under-resourced and under-staffed environments. Lessons learned from other community-based program initiatives (such as the framework we used, SAMHSA, 2017) can be adapted to support local programmatic efforts. We dedicated essential time and space for strategic planning with multidisciplinary partners to co-develop a logic model to fit our needs locally and to guide our efforts conceptually (McLaughlin & Jordan, 1999; Saunders et al., 2005).

Logic models provide a clear and understandable framework that community partners can use to envision how the elements of a program work together (Wells & Arthur-Banning, 2008) and how their resources and expertise can most efficiently contribute to the overall goal. In

coalition-type efforts, which are often essential in low-resourced environments, a plan with actionable steps is required to move program development forward. Our logic model provided all partners with guidance, direction, and transparency; provided a structure and parameters to work within; and provided the foundation of where we came from, where we were, and where we hoped to go. With a logic model in place, our implementation and evaluation efforts were more predictable and ran more smoothly, resulting in positive feedback and trust among partners that led to program buy-in and sustainability.

Teen ambassadors (HLAs) are key stakeholders in their community, and they provided important feedback to support the logic model's development (Brandon, 1998; Dwyer & Makin, 1997). Constructing a logic model with community input through an interactive and iterative process ensures local relevancy as well as supporting program feasibility and sustainability (Afifi et al., 2011).

Ensure Cultural Competence

One of the hardest parts of creating a successful program may be including cultural competency elements. Research by Outley and Witt (2006) shows that cultural competency is an intensive part of training (i.e., it is not something that can be taught with short, one-day trainings). However, given the design of the HLA program, with teens mentoring youth in their own communities, the teens were innately, culturally competent in their ability to interact effectively with the diverse cultures of children from local elementary schools in their neighborhoods. Local teens with local experiences are keenly positioned to effectively connect, facilitate, and deliver positive, healthy leadership and behaviors by tapping into their individual aspects of geography, cultural identity, language, education, and age (Purnell, 2013). Yet, identifying contextually relevant curricula (in this case, garden- and project-based) and providing essential, effective training to teen teachers that is ongoing and sustained is essential.

In their roles as HLAs, teens provided elementary school children with culturally relevant leadership role models (Sánchez & Colón, 2005). Teens helping to revitalize fallow school gardens and lead lessons in the after-school programs provided both the necessary labor and examples of community leaders coming from similar social and economic backgrounds. Teachers in the United States public elementary school system are predominantly white females (Taie & Goldring, 2017), while the HLAs' ethnic diversity more closely reflected the community they served and have been approximately 50% males. Teens not only provided role models for the younger children, but they began to open the door for their own future employment

opportunities in health, education, and science. These benefits are similar to those found by other teens-as- teachers programs (Ponzio, Junge, Smith, Manglallan, & Peterson, 2000).

Address Barriers to Teens' Participation

Low socioeconomic status (SES) youth participation in after-school activities is lower than high SES youth (Pedersen & Seidman, 2004). Low income or SNAP-Ed eligible teens face many potential barriers to participation in demanding service-learning projects such as the HLA program. Often coming from families with immigrant parents, these teens may lack the same level or type of parental support for extracurricular projects that other teens benefit from (Mau, 1997; Perkins et al., 2007). The traditional 4-H model often relies on parents or other adult guardians to volunteer as mentors for teen projects. Children and teens in immigrant families often lack this level of support due to language and other barriers (Bohon, Macpherson, & Atiles, 2005). These families experience a level of role reversal with youth acting as translators for their parents and helping them to navigate the world (Orellana, Dorner, & Pulido, 2003); they must often independently pursue extracurricular activities, homework and college applications without parental guidance. It is also possible that extracurricular participation may be at odds with family responsibilities such as earning income or taking care of younger siblings (Perkins et al., 2007). Transportation barriers may compound teens' ability to participate (Gillard & Witt, 2008; Perkins et al., 2007), as their parents are often unable to transport them or pay for public transportation.

Nonetheless, because most already are leaders in their families, many low-SES adolescents are often also natural leaders in their communities when given support to overcome the identified barriers and challenges. Careful program planning positioned schools, community programs, and UCCE to assist many teens in the process for their participation. We identified UC CalFresh-eligible elementary schools that were near similarly qualifying high schools to help reduce the potential transportation barrier some teens may face. When needed, staff transported teens to trainings. Additionally, staff members served in the traditional 4-H parent volunteer or project leader role, facilitating teen lesson delivery and school garden revitalizations. Finally, to support teen teachers after participating in the HLA program, we provided documentation of volunteer hours, training, leadership opportunities, recognition, and letters of recommendation.

Conclusion

Using a process of intentional planning, implementation, and evaluation featuring youth as a central solution was critical to the development of this sustainable, community-based teens-as-teachers program. Working across disciplines and programs provides multidisciplinary value and insight that cannot be gleaned from one perspective. Recognizing cultural context and cultural competency is valuable when creating sustainable long-term community programming. Although our program focused on school gardens, both the logic model process and teens-as-teachers model have the potential to be used in many settings.

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