

Urban agriculture education and youth civic engagement: A scoping review

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Abstract

Urban agriculture education is increasingly used to foster civic engagement among youth. To better understand empirical research on this topic, we analyzed peer-reviewed journal articles that focus on civic engagement among high-school-age students in urban agriculture education programs in the U.S. Using a scoping review approach, we identified 10 relevant research articles published between 2004 and 2018. These articles show that urban agriculture education programs prepare youth for future civic engagement, including by enhancing their understanding of social justice and community assets, and by building their leadership skills. In addition to promoting skills for future civic engagement, these programs engage youth in current civic actions in their neighborhoods, such as creating community gardens and donating food. Although the long-term effect of these programs on youth is still unclear, analyzed articles offer convincing evidence that urban agriculture education programs can be instrumental in helping youth address social and environmental issues in their communities.

1. Introduction

Many urban agriculture education programs are aiming to strengthen youth civic engagement. These programs prepare young people to transition into adulthood as responsible, contributing, and civically engaged members of their communities who participate in public affairs, community building, problem solving, and sustaining democracy (cf. Camino and Zeldin, 2002; Flanagan and Levine, 2010; Travaline and Hunold, 2010). Because urban agriculture education programs are embedded in real communities with social and environmental problems that call for civic action, they seem to offer a compelling context to foster civic engagement.

Urban agriculture – which can host education programs conducted by nonprofits, schools, and other organizations – is a form of farming or gardening that occurs in cities, sometimes

accompanied by food processing and distribution. Urban agriculture sites include, for example, community gardens, school gardens, and urban farms, where one can find container gardening, rooftop gardening, greenhouses, hydroponic systems, horticulture, animal husbandry, and agroforestry (Hodgson, Campbell, and Bailkey, 2011; Mougeot, 2000; Cohen and Reynolds, 2015). Some scholars suggest that urban agriculture also includes or is often connected to farmers' markets, food coops, community-supported agriculture, garden-to-café initiatives, and other programs that focus on fair and sustainable food systems (Jarosz, 2008; Burt, Koch, and Contento, 2017). Urban agriculture can contribute to food security, economic development, public health, individual well-being, and community revitalization (Brown, Carter and Bailkey, 2003). In addition, it can promote civic life (McIvor and Hale, 2015), empower communities to address food justice and other local issues (Cohen and Reynolds, 2015), and cultivate citizenship and equity (Poulsen, 2017).

Similarly to how urban agriculture is a multifunctional activity with “financial, environmental, health, social/educational, and community development” goals (Reynolds, 2015), urban agriculture education also has multiple aims. These aims include gardening and farming skills, understanding of food systems and healthy eating, connection to nature, awareness of local problems, social justice activism, leadership, teamwork, public speaking, and other aspects of positive youth development (Ackerman et al., 2014; Reynolds and Cohen, 2016; Sonti et al., 2016; Rogers, 2018; Rogers et al., 2020). At the same time, some urban agriculture educators view youth as agents of change in their communities, and intend to empower them to take actions that strengthen social justice and address environmental issues (Hung, 2004; Delia and Krasny, 2018). Furthermore, urban agriculture education programs can teach students about ecological citizenship (Travaline and Hunold, 2010), decolonization of the food systems and dismantling structural racism (London et al., 2020), social movements (Walter, 2013), the right to reorganize urban space (Gray, Elgert, and WinklerPrins, 2020), democratic development (Lawson, 2005), and other civic and social justice topics (Reynolds, 2017). In other words, some aims of urban agriculture education echo the idea of civic engagement.

For the purpose of this review, *civic engagement means improving the life of your community or addressing broader public issues beyond your self-interests*. Yet urban agriculture educators and researchers can use various definitions of civic engagement, which may highlight, for example, active citizenship, community service, collective action, social change, and political involvement (Adler and Goggin, 2005; Macedo, 2005). Examples include:

- *Civic engagement means working to make a difference in the civic life of our communities and developing the combination of knowledge, skills, values, and motivation to make the difference. It means promoting the quality of life in a community, through both political and nonpolitical processes* (Ehrlich, 2000, p. vi),
- *Civic engagement describes how an active citizen participates in the life of a community in order to improve conditions for others or to help shape the community's future* (Adler and Goggin, 2005), and
- *Civic engagement can be defined as the feelings of responsibility toward the common good, the actions aimed at solving community issues and improving the well-being of its members and the competencies required to participate in civic life* (Lenzi et al., 2013).

Some scholars further unpack the idea of civic engagement. For example, they distinguish between individual forms of civic engagement, such as giving money to charity and recycling, and collective forms, such as volunteering and working with other individuals and with community-based organizations (Ekman and Amnå, 2012). Other researchers observe a continuum between individual and collective forms of civic engagement where specific civic actions can be characterized by their frequency, duration, intensity, and incentives, rather than a clearcut dichotomy (Adler and Goggin, 2005). In addition, certain authors consider civic engagement such as participation in community-based organizations as a different phenomenon from political actions such as voting, demonstration, signing petitions, and contacting political representatives (Ekman and Amnå, 2012). However, others view political actions as one form of civic engagement (Macedo, 2005; Metzger et al., 2018), or consider civic service and political action as distinct yet mutually reinforcing factors (Sherrod et al., 2010). Further, civic engagement overlaps with other terms, such as civic involvement and civic participation (Putnam, 2000), political socialization and civic service (Sherrod et al., 2010), and public leadership, community engagement, and community building (Jacoby, 2009). While any of these perspectives on civic engagement can inform urban agriculture education programs, they all essentially describe citizens who address public or community problems.

Scholars mention several precursors of civic engagement, which include *civic skills*, *civic knowledge*, *civic disposition*, *civic networks*, and actual *civic action*. *Civic skills* reflect one's ability to be an active member of civil society (Bobek, Zaff, and Lerner, 2009). These skills include collaborating with others to promote common interests, communication and presentation skills, collective decision-making, critical thinking, and ability to solve problems, including in stressful situations (Clark et al., 1997; Patrick, 2002; Kirlin, 2003; Metzger et al., 2018). *Civic knowledge* means an understanding of democratic citizenship, community life, politics, government, power, human rights, and justice (Patrick, 2003; Orr, 2020). *Civic dispositions* describe one's moral traits, responsibility, commitment, interest, and desire to make positive contributions (Patrick, 2002). *Civic networks* provide citizens a social context to develop and exercise their civic engagement (Verba, Schlozman, and Brady, 1995); this factor resonates with social cohesion, social capital, reciprocity, trust, and bonding among community members (Bobek, Zaff, and Lerner, 2009). Youth can experience supportive civic networks in their education programs through youth-adult partnerships, dialogue, and coaching that facilitate a gradual increase of their responsibilities in planning and implementing civic actions (Camino and Zeldin, 2002). Finally, *civic action*, which is actual participation in betterment of communities, can itself predict one's future civic engagement (Verba, Schlozman, and Brady, 1995; Flanagan and Levine, 2010).

2. Research Question

While urban agriculture can be viewed as a form of social and environmental activism (Reynolds, 2015), many educators regard urban agriculture education as a catalyst of urban ecological citizenship and community leadership in addressing food equity and social justice (Travaline and Hunold, 2010; Poulsen, 2017). In the U.S., numerous high-school-age youths are involved in urban agriculture education programs as participants, interns, volunteers, and organizers (Hodgson, Campbell, and Bailkey, 2011). These programs often focus on positive youth development, youth empowerment, community sustainability, and social justice (Hung,

2004; Reynolds and Cohen, 2016), which resonate with the idea of youth civic engagement. Although one can hypothesize that urban agriculture education programs can contribute to youth civic engagement, we are not aware of reports summarizing research on this topic. Thus, our work was guided by this question: *What research evidence is known about youth's civic engagement fostered by urban agriculture education in the U.S.?*

3. Method

Using the scoping review method, which is useful for synthesizing evidence on a broad topic rather than exploring the effect of an intervention (Arksey and O'Malley, 2005; Pham et al., 2014), and using PRISMA guidelines (Page et al., 2021), we identified peer-reviewed English-language scholarly journal articles that discuss the impact of urban agriculture education programs on civic engagement among high-school-age students in the U.S. The research questions, eligibility criteria, information sources, and search strategy were developed a priori according to the research question, and a pre-registered protocol is available on Open Science Framework (<https://osf.io/4dyzv>).

We developed a comprehensive search strategy with the assistance of the Cornell University Library. Because using a combination of databases is advised for reviews that synthesize evidence (Bramer et al., 2017), we performed the search in six databases that provide robust coverage of academic journals across multiple relevant disciplines, including agriculture, education, and civic studies, which are likely to contain most articles of our interest. These databases included Scopus (Elsevier), CAB Abstracts (Web of Science), Web of Science Core Collection (Web of Science), ERIC (EBSCO), GreenFILE (EBSCO), and Agricola (EBSCO). While adapting the search syntax for each database, we used the search terms “civic engagement,” “urban agriculture” and “youth,” as well as their synonyms and overlapping terms (see Appendix A for full search details). Whereas we generated synonyms and overlapping terms for “urban agriculture” and “youth” ourselves, we used four highly cited articles (Youniss et al., 2002; Adler and Goggin, 2005; Einfeld and Collins, 2008; Ekman and Amnå, 2012) to identify search terms that reflect different aspects and variations of “civic engagement.”

The initial search in all six aforementioned databases was conducted on March 9, 2020. Combined records from six database searches ($n = 1045$) were exported to the Covidence review management system for deduplication and application of inclusion criteria (Figure 1). After the duplicates were removed ($n = 791$), both authors independently applied the inclusion criteria to titles, abstracts, and keywords. Studies were eligible for inclusion if they met the following predetermined criteria: (1) describe the impact of urban agriculture education; (2) report youth civic engagement or similar results; (3) involve high-school-age students; (4) be conducted in the U.S.; (5) be conducted in urban settings; (6) be published in English; and (7) present original research. Conflicts that arose during independent inclusion were collaboratively resolved, and eligible articles ($n = 54$) were downloaded as full-text PDF files. Thereafter, both authors independently applied the same inclusion criteria to the downloaded full-text articles, and, after new conflicts were collaboratively resolved, authors determined the final set of articles that satisfy all inclusion criteria ($n = 10$).

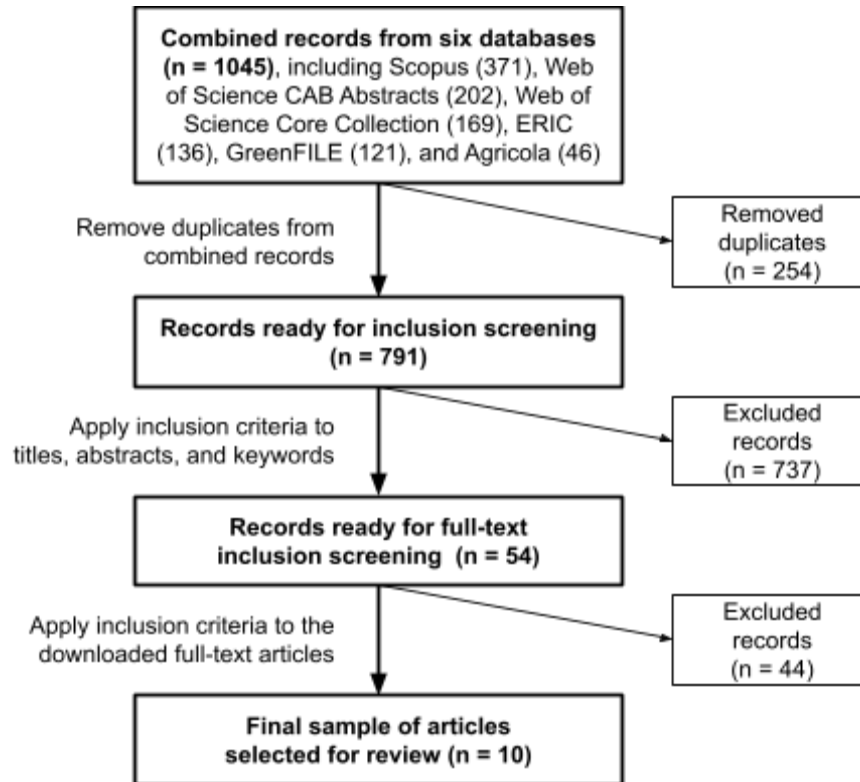


Figure 1. Search results diagram.

While reading the final set of included articles, we created summaries of every program, including a brief program description, location, and participants' demographics; we also identified which research methods were used to measure or describe civic engagement outcomes and searched for any outcomes that may contribute to youth civic engagement. Then, to make sense of these civic engagement outcomes, we classified them using emerging categories. All selected articles were independently read and analyzed by both authors of this review. The authors compared the results of article analysis, and reached a consensus through several discussions.

4. Results

4.1. Reviewed Programs and Participants

The final sample includes 10 academic journal articles published between 2004 and 2018. They describe nine different urban agriculture education programs. The described urban agriculture education programs were spread across the continental U.S.; some of them were located in communities with high poverty (Sonti et al., 2016; McCabe, 2014; Fifolt et al., 2017). These programs were led by nonprofits, community-based organizations, and high schools, often in partnership with one another or with community gardens and urban farms. They offered students unpaid internships, paid youth employment programs, vocational training, and positive youth development and science education programs. These programs used hands-on activities to teach youth agricultural skills. Most of these programs also taught students about other related topics, such as nutrition, health, leadership, community organizing, and life skills.

All programs included high school students (ages 14-18); some articles did not report age yet described participants as “high school students” or “employed youth” (Voluntad et al., 2004; Kennedy and Krasny, 2005; Weissman, 2015; Fifolt et al., 2017). Besides high-school-age students, these programs often involved younger children (e.g. Sonti et al., 2016), young adults (e.g. Ceaser, 2012; McCabe, 2014) and older community members as participants, volunteers, and organizers (e.g. Weissman, 2015), whose data was not included in this review. Though three articles reported little or no data on participants’ demographics (Voluntad et al., 2004; Fifolt et al., 2017; Kennedy and Krasny, 2018), some programs included mostly African American or Black students (Ceaser, 2012; Hatchett, 2015; Pierce, 2017), or culturally and ethnically diverse populations as in most other programs. Except for one program intended for male youth (McCabe, 2014), most programs included participants of different genders.

4.2. Research Methods Used

To explore the results of urban agriculture education programs related to civic engagement, researchers used various methods. Out of the 10 included studies, five relied on qualitative data, including data from focus groups (Fifolt et al., 2017; Hatchett et al., 2015), ethnographic observations and interviews (Ceaser, 2012), participatory observations (Weissman, 2015), and narrative inquiry (Delia and Krasny, 2018). Three studies used Likert scale surveys, which were combined with open-ended survey questions (Sonti et al., 2016), participant interviews (Pierce et al., 2017), or review of participants’ testimonials. The two remaining articles did not report their research methods; thus, to not overestimate their research rigor, we assumed they used anecdotal evidence such as informal observations or interviews (Kennedy and Krasny, 2005; McCabe, 2014).

4.3. Reported Civic Engagement Results

Selected articles described various types of outcomes and impacts of urban agriculture education programs. Some articles focused on such results as community safety and stability (McCabe, 2014; Weissman, 2015), physical and mental health (Pierce et al., 2017), and various life skills (Voluntad et al., 2004). However, we analyzed only results that reflect youth civic engagement. Although few articles used the actual term “civic engagement” (Sonti et al., 2016) or a closely related “community engagement” (Hatchett et al., 2015; Fifolt et al., 2018), all articles described some aspects of civic engagement frameworks.

We found that urban agriculture education programs produced two types of civic engagement results. First, these programs fostered competencies that can contribute to youth’s future civic engagement (Table 1, column 3). These competencies range from understanding of inequality (Caesar, 2012), to leadership and teamwork (Pierce et al., 2017), to a sense of becoming community change agents (Fifolt et al., 2017). Second, educators and leaders involved youth in civic actions during their education programs to directly benefit local communities (Table 1, column 4). These actions range from creating a farmers’ market (Weissman, 2015), to donating food to food banks (Voluntad et al., 2004). The results from the analysis of all articles is presented in Table 1, including programs, research methods, and civic engagement results.

Table 1: Civic engagement results of urban agriculture education programs.

Research articles, and described programs	Research methods	Civic engagement results	
		Civic engagement competencies developed by programs among youth	Civic actions, in which students participated during programs
Voluntad, Dawson, and Corp, 2004 A garden education program in a community garden developed on a vacant lot in Pendleton, OR.	Pre/post Likert-scale surveys of leadership and communication, and testimonials of 35 youth participants.	<ul style="list-style-type: none"> • Ability to collaborate with community members. • Leadership and communication skills. 	<ul style="list-style-type: none"> • Creating a community garden. • Donation of food to homebound seniors and food banks.
Kennedy and Krasny, 2005 A garden-based science education program offered through a high school in Sacramento, CA.	Anecdotal evidence.	<ul style="list-style-type: none"> • Awareness of neighborhood assets, including food availability and natural areas. 	<ul style="list-style-type: none"> • Co-designing a garden to teach youth about native plants. • Donation of vegetables to a local food bank.
Ceaser, 2012 A farming program at an alternative high school in New Orleans, LA.	Ethnographic observations and group interviews of 10-20 students.	<ul style="list-style-type: none"> • Understanding of social inequality, food insecurity, and environmental racism. • Organizational skills to repair damaged communities and improve access to healthy food. • Self-efficacy in enacting pro-environmental behavior. 	<ul style="list-style-type: none"> • Building compost piles, greenhouses, aquaponics, and rain catchment systems. • Creating a farmers' market.
McCabe, 2014 A community garden program employing youths in a high-poverty neighborhood of Lawrence, MA.	Anecdotal evidence.	<ul style="list-style-type: none"> • Ability of at-risk youths to become contributing members of their communities. 	<ul style="list-style-type: none"> • Converting abandoned lots and brownfields into gardens. • Preventing urban youth violence and improving neighborhood safety.
Hatchett et al., 2015 A five-month paid urban farming and cooking internship offered through a community-school partnership in Chicago, IL.	Work history survey, demographic survey, and focus groups with several 15-18-year-old youths and adult staff.	<ul style="list-style-type: none"> • Teamwork skills. • Understanding of urban agriculture, community engagement, and community health promotion in low-income neighborhoods. • Intergenerational respect and collaboration. 	<ul style="list-style-type: none"> • Improving food access in low-income communities through farm stands and markets. • Developing healthy food habits for self and family.

Weissman, 2015 Youth programs in several urban farms in Brooklyn, NY.	Participatory observations of youth and adults, and interviews with adult farmers, activists, leaders, and participants in six urban farms.	<ul style="list-style-type: none"> • Entrepreneurial skills to promote alternatives for conventional agro-food. • Readiness to participate in alternative food networks. • Youth empowerment, political organizing, and leadership skills. • Understanding of neighborhood problems and solutions. 	<ul style="list-style-type: none"> • Promoting alternative food networks, such as farmers' markets, community supported agriculture, and urban farming.
Sonti et al., 2016 An urban agriculture internship program organized by a food justice organization at an urban farm in Brooklyn, NY.	Survey of 50 former program interns, who were 13-18 years old at the time of their internships.	<ul style="list-style-type: none"> • Sense of community connection and responsibility. • Awareness of social, environmental, and political issues. • Decision-making, public speaking, self-efficacy, confidence, management, and communication skills. 	<ul style="list-style-type: none"> • Promoting the stewardship of public green spaces in the community.
Fifolt, Morgan, and Burgess, 2017 An urban farming nonprofit partnered with public schools teaching urban agriculture and nutrition in Birmingham, AL.	Semi-structured focus groups of students, including 9 middle-school-age and 4 high-school-age students, and their parents.	<ul style="list-style-type: none"> • Connection with peers, parents, and communities through meaningful interactions at urban farms. • A sense of becoming change agents in communities. • Teamwork and conflict resolution skills. 	<ul style="list-style-type: none"> • Nurturing positive connections among students, peers, instructors, and families. • Helping families adopt healthier cooking. • Community outreach, including selling produce in an area formerly known for crime.
Pierce et al., 2017 A summer nutrition, health, and farming program in an urban farm in Baltimore, MD.	Pre- and post-program surveys (on physical activity, stress, and nutrition), interviews, and focus groups of 36 ninth and tenth graders; and parent interviews.	<ul style="list-style-type: none"> • Self-efficacy. • Leadership and job skills such as cooperation, teamwork, and financial literacy. 	<ul style="list-style-type: none"> • Passing healthy behaviors and cooking skills from students to their parents and community.
Delia and Krasny, 2018 An urban agriculture internship program in Brooklyn, NY (the same program as described in Sonti, et al., 2016).	Interviews with 9 returning 15-18-year-old interns, and analysis of a researcher's field observations and reflections.	<ul style="list-style-type: none"> • Positive youth development, including competence, contribution, critical consciousness, and leadership. • Understanding of environmental, food systems, and social and food justice concepts. 	<ul style="list-style-type: none"> • Contributing to local sustainable agriculture and economic development by growing and selling food.

5. Discussion

Urban agriculture sites and urban agriculture education programs that support social justice, access to healthy food, community wellness, and positive youth development are widespread in the U.S. (Reynolds and Cohen, 2016; Palmer, 2018; Salin, 2018; Russ, Armstrong and Krasny, 2022). However, we found only 10 papers published between 2004 and 2018 that, according to our search criteria, promote youth civic engagement or similar concepts. These papers suggest that urban agriculture education programs can use two approaches to contribute to civic engagement among youth: (1) strengthen competencies that can lead to youth's future civic engagement, and (2) involve youth in direct civic actions in their communities.

Civic engagement competencies developed through urban agriculture programs are corresponding to civic engagement precursors described in academic publications. First, most analyzed programs were trying to strengthen practical *civic skills* among young people, which can enable them to take civic actions. For example, programs developed youth skills in decision-making, collaboration, teamwork, project leadership, public speaking, communication, political organizing, conflict resolution, and self-efficacy (e.g., Hatchett et al., 2015; Weissman, 2015; Fifolt et al., 2017; Delia and Krasny, 2018). Second, these programs contributed to students' *civic knowledge*, including a general understanding of social inequality, food justice systems, and community health issues (Caesar, 2012; Hatchett et al., 2015; Delia and Krasny, 2018), as well as understanding of local food inequity, other community problems, and community assets and solutions (Kennedy and Krasny, 2005; Weissman, 2015). Third, some articles showed changes in youth's *civic dispositions*, such as their self-efficacy, readiness to participate in alternative food networks, and self-identity as change agents (Sonti et al., 2016; Fifolt et al., 2017; Pierce et al., 2017). Fourth, through these programs, students established their *civic networks* by becoming connected to community members, peers, and urban farmers who make a positive change in their neighborhoods (Sonti et al., 2016; Fifolt et al., 2017).

At the same time, all programs provided youth with the opportunity for real-life *civic action*, which is another factor that fosters future civic engagement. According to Ekman and Amnå's typology (2012), most youth in urban agriculture education programs were often involved in the *collective form of civic engagement*. For example, they worked together to create community gardens and greenhouses, construct rain catchment systems, donate fresh food to seniors and food banks, support farmers' markets in underserved communities, and/or improve public green spaces (Voluntad et al., 2004; Kennedy and Krasny, 2005; Caesar, 2012; McCabe, 2014). In addition, youth adopted healthy cooking and eating habits themselves and promoted these habits among their peers, friends and families (Hatchett et al., 2015; Fifolt et al., 2017; Pierce et al., 2017), which resembles the *individual form* of civic engagement. However, although *political participation* is sometimes also considered a form of civic engagement (Macedo, 2005; Metzger et al., 2018), reviewed programs rarely involved students in formal political participation or activism. Yet some of the reviewed programs taught students about structural inequalities, racially discriminatory urban policies, social injustice, and political organizing (Weissman, 2015; Sonti et al., 2016), which might inspire future civic action or political participation. At the same time, it is conceivable that youth in other similar programs could sign petitions, contact political representatives, and participate in organized protests related to social justice and environmental issues.

However, it remains unclear how youth evolved as civic leaders through these programs. To explore this process, researchers can use various theories. For example, given that these programs strengthened ties between youths, educators, families and community leaders in civic actions, their educational model resonates with the *social development model* (Rossi et al., 2016), in which young people gradually assimilate civic engagement values, competencies, and behaviors through interactions in their communities and organizations. In addition, if youth developed shared identities of civic leaders such as “I am a social justice activist” or “I am a healthy nutrition advocate,” these programs reflect the *community of practice framework* (Wenger, 1998), which describes the development of practice and participants’ identities in social learning contexts. Further, because civic engagement is a type of behavior, researchers can use a multitude of behavioral theories to understand how urban agriculture education programs motivate youth to become civically engaged. Examples of such frameworks include the *theory of planned behavior*, which presents the determinants of behavior (Ajzen, 2002), *theory of self-determination*, which discusses intrinsic and extrinsic behavior motivations (Ryan and Deci, 2000), and *theory of norm activation*, which links norms and a sense of responsibility to concrete action (Schwartz, 1977). Using such theories can deepen our understanding of how civic engagement and its precursors are fostered in urban agriculture education programs and inform the design of these programs.

6. Limitations

The following are the limitations and gaps of this review, which could inspire future research. (1) Exploring urban agriculture programs only in the U.S. is limiting our understanding of urban agriculture education programs’ design, curricula, and teaching approaches related to civic engagement. (2) Although we included a wide range of alternative terms in our search strategy (see Appendix A), our rigorous search process may have excluded some relevant research articles. (3) We focused only on journal articles and excluded other publications such as books, dissertations and reports, which could paint a richer picture of education programs and their pedagogical models. (4) While the quality of analyzed empirical research was acceptable, two of the reviewed articles documented only anecdotal evidence. (5) Significant variability among urban agriculture education programs and a relatively small number of empirical studies about them makes it difficult to conduct a systematic review (as opposed to a scoping review) that could explore a causal relationship between these programs and civic engagement. (6) The reviewed studies did not discuss a long-term or sustained effect of urban agriculture education on youth civic engagement. (7) Studies did not show whether urban agriculture education programs create a spillover effect that help youth apply their new civic engagement skills to other spheres of their lives and communities beyond urban agriculture and food justice. (8) This review did not explore these programs from a critical perspective, such as whether these programs help youth not only understand flaws of food systems, but also address structural inequalities in their communities, which may be the cause of many social problems. (9) By focusing only on civic engagement results, this review offers only a partial view of analyzed urban agriculture education programs that have other learning goals, such as learning about plant biology or learning farming and other job skills. (10) This review uncovered only a static image of civic engagement precursors fostered by urban agriculture programs, and it remains unclear how these factors interact with each other to produce a lasting effect on youth civic engagement.

7. Conclusion

While urban agriculture generates many benefits – such as food production, science education opportunities, jobs training, social integration, green space for recreation, and improving the urban environment – this review demonstrates that it also offers space for educational programs that foster civic engagement. Although the number of relevant empirical studies is still limited, they show that urban agriculture education programs are fostering civic engagement precursors, such as civic engagement skills and involvement in civic actions. As we accumulate knowledge about these programs, we will better understand their long-term effect on youth civic engagement. Nevertheless, publications already offer convincing evidence that urban agriculture education can be an important element of civic education that strengthens a democratic form of decision-making and action in communities, and empowers young people to be contributing members of society.

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Appendix A: Database Search Strategies

1.1 Search Summary

Total records = 1045

Total records after deduplication = 791

Supplementary Table 1. A summary of the search strategy over six databases.

Database name	Platform	Date of search	Number of results
1. Scopus	Elsevier	3/9/20	371
2. Web of Science CAB Abstracts	Clarivate Analytics	3/9/20	202
3. Web of Science Core Collection	Clarivate Analytics	3/9/20	169
4. ERIC	EBSCOhost	3/9/20	136
5. GreenFILE	EBSCOhost	3/9/20	121
6. Agricola	EBSCOhost	3/9/20	46

1.2 Search Terms and Syntax

1.2.1 Scopus (Elsevier)

Date of Search: March 9, 2020

Number of results: 371

TITLE-ABS-KEY indicates title, abstract, and keywords. Curly brackets are used for phrases, except for phrases with asterisks, which have quotation marks around them.

1. TITLE-ABS-KEY({urban agriculture} OR "aquaponic*" OR "aquaculture" OR "aeroponic*" OR "animal husbandry" OR "beekeeping" OR "city farm*" OR "community garden*" OR "container garden*" OR "digital agriculture" OR "greenhouse" OR "high-tech agriculture" OR "hydroponic*" OR "microgarden*" OR "pocket garden*" OR "rooftop garden*" OR "rooftop farm*" OR "urban agroforestry" OR "urban farm*" OR "urban garden*" OR "urban horticulture" OR "urban soil*" OR "vertical farm*" OR "vertical garden*")
2. TITLE-ABS-KEY({civic engagement} OR "active citizen*" OR "advocacy" OR "associational involvement" OR "boycott*" OR "citizen engagement" OR "citizen participation" OR "civic activit*" OR "civic competence" OR "civic development" OR "civic education" OR "civic order" OR "civic responsibility" OR "civic skill*" OR "civil participation" OR "collective action*" OR "communal activit*" OR "community activit*" OR "community building" OR "community service" OR "consumer participation" OR "democratic citizenship" OR "democratic practice*" OR "efficacy" OR "electoral participation" OR "empower*" OR "engage*" OR "individual action*" OR "multicultural competenc*" OR "organizational involvement" OR "party activities*" OR "petition*" OR "political action*" OR "political activism" OR "political behavior*" OR "political engagement" OR "political involvement" OR "political leadership" OR "political movement*" OR "political participation" OR "political process*" OR "political representation" OR "political voice*" OR "protest activit*" OR "protest behavior" OR "service activit*" OR "service learning" OR "service-learning" OR "social engagement" OR "social involvement" OR "social justice" OR "social responsibilit*" OR "voluntary association*" OR "voluntary work" OR "volunteer program*" OR "volunteer*" OR "youth develop*")
3. TITLE-ABS-KEY(youth* OR adolescent* OR teen* OR "high school*" OR "secondary school*" OR "young adult*" OR "student*")
4. 1 AND 2 AND 3

1.2.2 Web of Science CAB Abstracts

Date of Search: March 9, 2020

Number of results: 202

TS on the Web of Science platform indicates title, keywords, and abstract.

1. TS=("urban agriculture" OR "aquaponic*" OR "aquaculture" OR "aeroponic*" OR "animal husbandry" OR "beekeeping" OR "city farm*" OR "community garden*" OR "container garden*" OR "digital agriculture" OR "greenhouse" OR "high-tech agriculture" OR "hydroponic*" OR "microgarden*" OR "pocket garden*" OR "rooftop garden*" OR "rooftop farm*" OR "urban agroforestry" OR "urban farm*" OR "urban garden*" OR "urban horticulture" OR "urban soil*" OR "vertical farm*" OR "vertical garden*")
2. TS=("civic engagement" OR "active citizen*" OR "advocacy" OR "associational involvement" OR "boycott*" OR "citizen engagement" OR "citizen participation" OR "civic activit*" OR "civic competence" OR "civic development" OR "civic education" OR "civic order" OR "civic responsibility" OR "civic skill*" OR "civil participation" OR "collective action*" OR "communal activit*" OR "community activit*" OR "community building" OR "community service" OR "consumer participation" OR "democratic citizenship" OR "democratic practice*" OR "efficacy" OR "electoral participation" OR "empower*" OR "engage*" OR "individual action*" OR "multicultural competenc*" OR "organizational involvement" OR "party activities*" OR "petition*" OR "political action*" OR "political activism" OR "political behavior*" OR "political engagement" OR "political involvement" OR "political leadership" OR "political movement*" OR "political participation" OR "political process*" OR "political representation" OR "political voice*" OR "protest activit*" OR "protest behavior" OR "service activit*" OR "service learning" OR "service-learning" OR "social engagement" OR "social involvement" OR "social justice" OR "social responsibilit*" OR "voluntary association*" OR "voluntary work" OR "volunteer program*" OR "volunteer*" OR "youth develop*")
3. TS=(youth* OR adolescent* OR teen* OR "high school*" OR "secondary school*" OR "young adult*" OR "student*")
4. 1 AND 2 AND 3

1.2.3 Web of Science Core Collection

Date of Search: March 9, 2020

Number of results: 169

TS on the Web of Science platform indicates title, keywords, and abstract.

1. TS=("urban agriculture" OR "aquaponic*" OR "aquaculture" OR "aeroponic*" OR "animal husbandry" OR "beekeeping" OR "city farm*" OR "community garden*" OR "container garden*" OR "digital agriculture" OR "greenhouse" OR "high-tech agriculture" OR "hydroponic*" OR "microgarden*" OR "pocket garden*" OR "rooftop garden*" OR "rooftop farm*" OR "urban agroforestry" OR "urban farm*" OR "urban garden*" OR "urban horticulture" OR "urban soil*" OR "vertical farm*" OR "vertical garden*")
2. TS=("civic engagement" OR "active citizen*" OR "advocacy" OR "associational involvement" OR "boycott*" OR "citizen engagement" OR "citizen participation" OR "civic activit*" OR "civic competence" OR "civic development" OR "civic education" OR "civic order" OR "civic responsibility" OR "civic skill*" OR "civil participation" OR "collective action*" OR "communal activit*" OR "community activit*" OR "community building" OR "community service" OR "consumer participation" OR "democratic citizenship" OR "democratic practice*" OR "efficacy" OR "electoral participation" OR "empower*" OR "engag*" OR "individual action*" OR "multicultural competenc*" OR "organizational involvement" OR "party activities*" OR "petition*" OR "political action*" OR "political activism" OR "political behavior*" OR "political engagement" OR "political involvement" OR "political leadership" OR "political movement*" OR "political participation" OR "political process*" OR "political representation" OR "political voice*" OR "protest activit*" OR "protest behavior" OR "service activit*" OR "service learning" OR "service-learning" OR "social engagement" OR "social involvement" OR "social justice" OR "social responsibilit*" OR "voluntary association*" OR "voluntary work" OR "volunteer program*" OR "volunteer*" OR "youth develop*")
3. TS=(youth* OR adolescent* OR teen* OR "high school*" OR "secondary school*" OR "young adult*" OR "student*")
4. 1 AND 2 AND 3

1.2.4 ERIC

Date of Search: March 9, 2020

Number of results: 136

TX on the EBSCO platform indicates "text", or the full text of the snapshot on EBSCO (title, abstract, keywords, authors).

1. TX("urban agriculture" OR "aquaponic*" OR "aquaculture" OR "aeroponic*" OR "animal husbandry" OR "beekeeping" OR "city farm*" OR "community garden*" OR "container garden*" OR "digital agriculture" OR "greenhouse" OR "high-tech agriculture" OR "hydroponic*" OR "microgarden*" OR "pocket garden*" OR "rooftop garden*" OR "rooftop farm*" OR "urban agroforestry" OR "urban farm*" OR "urban garden*" OR "urban horticulture" OR "urban soil*" OR "vertical farm*" OR "vertical garden*")
2. TX("civic engagement" OR "active citizen*" OR "advocacy" OR "associational involvement" OR "boycott*" OR "citizen engagement" OR "citizen participation" OR "civic activit*" OR "civic competence" OR "civic development" OR "civic education" OR "civic order" OR "civic responsibility" OR "civic skill*" OR "civil participation" OR "collective action*" OR "communal activit*" OR "community activit*" OR "community building" OR "community service" OR "consumer participation" OR "democratic citizenship" OR "democratic practice*" OR "efficacy" OR "electoral participation" OR "empower*" OR "engag*" OR "individual action*" OR "multicultural competenc*" OR "organizational involvement" OR "party activities*" OR "petition*" OR "political action*" OR "political activism" OR "political behavior*" OR "political engagement" OR "political involvement" OR "political leadership" OR "political movement*" OR "political participation" OR "political process*" OR "political representation" OR "political voice*" OR "protest activit*" OR "protest behavior" OR "service activit*" OR "service learning" OR "service-learning" OR "social engagement" OR "social involvement" OR "social justice" OR "social responsibilit*" OR "voluntary association*" OR "voluntary work" OR "volunteer program*" OR "volunteer*" OR "youth develop*")
3. TX(youth* OR adolescent* OR teen* OR "high school*" OR "secondary school*" OR "young adult*" OR "student*")
4. 1 AND 2 AND 3

1.2.5 GreenFILE

Date of Search: March 9, 2020

Number of results: 121

TX on the EBSCO platform indicates "text", or the full text of the snapshot on EBSCO (title, abstract, keywords, authors).

1. TX("urban agriculture" OR "aquaponic*" OR "aquaculture" OR "aeroponic*" OR "animal husbandry" OR "beekeeping" OR "city farm*" OR "community garden*" OR "container garden*" OR "digital agriculture" OR "greenhouse" OR "high-tech agriculture" OR "hydroponic*" OR "microgarden*" OR "pocket garden*" OR "rooftop garden*" OR "rooftop farm*" OR "urban agroforestry" OR "urban farm*" OR "urban garden*" OR "urban horticulture" OR "urban soil*" OR "vertical farm*" OR "vertical garden*")
2. TX("civic engagement" OR "active citizen*" OR "advocacy" OR "associational involvement" OR "boycott*" OR "citizen engagement" OR "citizen participation" OR "civic activit*" OR "civic competence" OR "civic development" OR "civic education" OR "civic order" OR "civic responsibility" OR "civic skill*" OR "civil participation" OR "collective action*" OR "communal activit*" OR "community activit*" OR "community building" OR "community service" OR "consumer participation" OR "democratic citizenship" OR "democratic practice*" OR "efficacy" OR "electoral participation" OR "empower*" OR "engag*" OR "individual action*" OR "multicultural competenc*" OR "organizational involvement" OR "party activities*" OR "petition*" OR "political action*" OR "political activism" OR "political behavior*" OR "political engagement" OR "political involvement" OR "political leadership" OR "political movement*" OR "political participation" OR "political process*" OR "political representation" OR "political voice*" OR "protest activit*" OR "protest behavior" OR "service activit*" OR "service learning" OR "service-learning" OR "social engagement" OR "social involvement" OR "social justice" OR "social responsibilit*" OR "voluntary association*" OR "voluntary work" OR "volunteer program*" OR "volunteer*" OR "youth develop*")
3. TX(youth* OR adolescent* OR teen* OR "high school*" OR "secondary school*" OR "young adult*" OR "student*")
4. 1 AND 2 AND 3

1.2.6 Agricola

Date of Search: March 9, 2020

Number of results: 46

TX on the EBSCO platform indicates "text", or the full text of the snapshot on EBSCO (title, abstract, keywords, authors).

1. TX("urban agriculture" OR "aquaponic*" OR "aquaculture" OR "aeroponic*" OR "animal husbandry" OR "beekeeping" OR "city farm*" OR "community garden*" OR "container garden*" OR "digital agriculture" OR "greenhouse" OR "high-tech agriculture" OR "hydroponic*" OR "microgarden*" OR "pocket garden*" OR "rooftop garden*" OR "rooftop farm*" OR "urban agroforestry" OR "urban farm*" OR "urban garden*" OR "urban horticulture" OR "urban soil*" OR "vertical farm*" OR "vertical garden*")
2. TX("civic engagement" OR "active citizen*" OR "advocacy" OR "associational involvement" OR "boycott*" OR "citizen engagement" OR "citizen participation" OR "civic activit*" OR "civic competence" OR "civic development" OR "civic education" OR "civic order" OR "civic responsibility" OR "civic skill*" OR "civil participation" OR "collective action*" OR "communal activit*" OR "community activit*" OR "community building" OR "community service" OR "consumer participation" OR "democratic citizenship" OR "democratic practice*" OR "efficacy" OR "electoral participation" OR "empower*" OR "engag*" OR "individual action*" OR "multicultural competenc*" OR "organizational involvement" OR "party activities*" OR "petition*" OR "political action*" OR "political activism" OR "political behavior*" OR "political engagement" OR "political involvement" OR "political leadership" OR "political movement*" OR "political participation" OR "political process*" OR "political representation" OR "political voice*" OR "protest activit*" OR "protest behavior" OR "service activit*" OR "service learning" OR "service-learning" OR "social engagement" OR "social involvement" OR "social justice" OR "social responsibilit*" OR "voluntary association*" OR "voluntary work" OR "volunteer program*" OR "volunteer*" OR "youth develop*")
3. TX(youth* OR adolescent* OR teen* OR "high school*" OR "secondary school*" OR "young adult*" OR "student*")
4. 1 AND 2 AND 3