

Urban agriculture education for teens: A multidimensional study of positive psychosocial and metacognitive outcomes

Mecca E. Howe^{a *} and Jennifer Meta Robinson^b
Indiana University

Submitted May 7, 2024 / Revised August 13, November 6, and December 12, 2024 / Accepted December 13, 2024 /
Published online April 23, 2025

Citation: Howe, M. E., & Robinson, J. M. (2025). Urban agriculture education for teens: A multidimensional study of positive psychosocial and metacognitive outcomes. *Journal of Agriculture, Food Systems, and Community Development*, 14(2), 339–354. <https://doi.org/10.5304/jafscd.2025.142.018>

Copyright © 2025 by the Authors. Published by the Lyson Center for Civic Agriculture and Food Systems. Open access under CC BY license.

Abstract

Research shows that youth participating in engaged agricultural learning gain important practical skills and knowledge. The physicality, setting, and social aspects of agricultural and horticultural projects are opportune for improving mental, emotional, and social well-being—yet the psychosocial and metacognitive impacts of agricultural learning are still

unclear. This study examines psychosocial impacts among youth participants, ages 13–17, in the Felege Hiywot Center’s 2023 STEAM (science, technology, engineering, agriculture, and math) Farm Camp. The Farm Camp combines hands-on urban agriculture with employable skills training while addressing food insecurity in an urban neighborhood with limited access to affordable and nutritious foods. During the camp, students design and maintain garden plots where they grow food, prepare shared meals, and participate in integrative science projects. Using a mix of quantitative and

^{a *} Mecca E. Howe, PhD, Department of Anthropology, Indiana University.

Dr. Howe is now at the Urban Institute, University of North Carolina Charlotte; Sycamore Hall; 9310 Mary Alexander Road; Charlotte, NC 28223 USA; +1-502-751-0200; mhowebur@charlotte.edu;  <https://orcid.org/0000-0002-9202-9825>

^b Jennifer Meta Robinson, PhD, Professor of Practice, Department of Anthropology, Indiana University; 701 East Kirkwood Avenue; Bloomington, IN 47459 USA; jenmetar@iu.edu;  <https://orcid.org/0000-0003-0599-7586>

Funding Disclosure

This study was supported with funding from an Indiana University Emerging Area of Research grant to support Sustainable Food System Science and from a Lilly Endowment grant to the Felege Hiywot Center.

Authors’ Note

This project was approved by Indiana University’s institutional review board (IRB), protocol #11718.

qualitative data collected from surveys and facilitated journaling, we explored the positive psychosocial and metacognitive impacts of camp participation. We found gardening instilled positive feelings and was perceived as a source of stress relief and accomplishment among participants. Teens also gained social support through the development of friendships and mentorships. Furthermore, their participation in the program was associated with metacognitive skills development, including self-awareness and reflection. This case study provides a compelling example of how to engage youth from an underserved area in sustainable urban agriculture while fostering metacognitive skills development and positive psychosocial experiences. We conclude that urban youth agricultural learning programs have valuable impacts on participants that go beyond agricultural education and the achievement of practical skills. These findings—which highlight the potential to contribute to psychosocial well-being, social support, and metacognitive abilities associated with maturation and personal development—may be particularly useful for other programs addressing at-risk and vulnerable youth.

Keywords

youth agriculture, urban agriculture, psychosocial, metacognition, agricultural education, STEM education, journaling, reflection, farm, camp

Introduction and Literature Review

Youth-participatory agricultural programs offer fertile ground for fostering knowledge, life skills, and community ties—benefits that are especially valuable for disadvantaged populations such as urban youth from low-income backgrounds and communities. Since the early 1900s, enthusiasts have endorsed participatory learning programs for youth to learn about and connect with food and sustainable agriculture (Rogers, 2018). More recent initiatives benefit youth through community gardening, agricultural projects, and urban school gardens (Rogers, 2018). Youth programs in urban spaces aim to address food insecurity in historically underinvested and discriminated areas with limited access to affordable nutritious food (Walker, 2023). These projects often also teach job skills and foster

community engagement. The scholarly literature is saturated with evidence showing that youth in such programs gain various hard (e.g., engineering, agriculture) and soft (e.g., leadership, teamwork, problem-solving) skills along with knowledge of growing practices, nutrition, and sustainability (Layton, 2022; Nzaranyimana, 2020; Russ & Gaus, 2021). However, few studies focus on the psychosocial impacts of youth participation in engaged gardening or agricultural learning programs, and even fewer have assessed metacognitive skills development among youth participants in these programs.

We focus on “psychosocial” interrelations between the social environment and psychological factors because this interconnection plays an important role in mental and physical well-being (Woodward, 2015). Some social-environmental contributions to psychosocial outcomes include socioeconomic circumstances, adverse experiences, (in)access to safe and nutritious foods, and neighborhood context. For example, living in low-income neighborhoods is associated with negative psychosocial conditions, such as discrimination, segregation, crime, and low access to healthy food, healthcare, and social services (Raposa et al., 2019).

While little documentation exists on the psychosocial impacts of participation in urban youth agricultural programs, assessments of school garden initiatives, a related phenomenon, commonly find feelings of enjoyment and satisfaction (Ohly et al., 2016). Youth farm and gardening programs have also been associated with feelings of confidence and reward and improvements in self-esteem and self-worth (Bahamonde, 2019; Cruz-Piedrahita et al., 2020; Holloway et al., 2023; Ohly et al., 2016; Swank & Shin, 2015). Furthermore, a recent review shows that youth garden and agriculture programs can foster positive social relationships and community engagement (Rogers, 2018).

Based on such findings that urban youth agriculture is associated with increased access to nutritious foods and green spaces, positive feelings and self-esteem, social interactions, and community building, we expect that participation also fosters positive psychosocial experiences. A logical conclusion, therefore, is that implementing urban agri-food initiatives and their positive associations in

low-resource neighborhoods may mitigate negative psychosocial outcomes for vulnerable individuals and communities.

Hands-on gardening and agricultural initiatives can also encourage metacognition and the growth of metacognitive skills among participants, although this has yet to be investigated among youth. Metacognition, “a critical awareness of one’s thinking and learning and oneself as a thinker and learner” (Chick, 2013, para. 1 rests on such skills as self-reflection, self-awareness, and intention. Programs that incorporate reflective exercises and team challenges can provide substantial opportunities for participants to build their metacognitive capacity. Practiced in an outdoor setting with access to nature-based feedback loops and challenging physical work, agri-food programs can effectively motivate mindfulness and support metacognitive development.

In this paper, we assess the psychosocial and metacognitive impacts of participation in a summer youth urban agricultural education program. The STEAM Farm Camp is organized by the Felege Hiywot Center (FHC), a youth-oriented and faith-based program co-founded and directed by Aster Bekele and located in an inner-city neighborhood of Indianapolis, Indiana (see Figure 1.) The FHC STEAM Farm Camp combines hands-on urban agriculture with employable skills training while addressing food insecurity in a particular urban setting of constrained food supply. The Farm Camp includes an intensive summer camp where youth learn to cultivate and manage their personal urban gardens and obtain practical life and business skills (Felege Hiywot Center, n.d.) (Figure 2). More specifically, the camp teaches science, technology, engineering, agriculture, and math while youth develop interpersonal abilities such as teamwork, leadership, and perseverance (Felege Hiywot Center, n.d.). The STEAM Farm Camp is just one initiative within FHC’s larger RISE Initiative. The RISE Initiative (which stands for Resilience and drive; Inquiry and ingenuity; Social impact, and Economic security) supplements conventional education with a suite of programs that help people in

middle school, high school, “college, and beyond” to acquire advanced skills through workshops, internships, and mentorships (Felege Hiywot Center, n.d.).

FHC is a particularly apt site for the study of these issues due to its location in the Martindale-Brightwood neighborhood on the near northeast side of the city of Indianapolis, Indiana. The city identifies this area as a “neighborhood” for targeted information dissemination and development planning. Historically, the area is demarcated by 30th Street, Massachusetts Avenue, 21st Street, Sherman Drive, and the Norfolk Southern Railroad tracks (The Polis Center, n.d.).¹ Founded in the late 19th century, Martindale-Brightwood was originally two independent neighborhoods whose mostly blue-collar residents were African American and Western European immigrants working in industries such as railroads, machining, and manufacturing. Like other urban areas, industry declined during the 20th century and white residents migrated out. The remaining, largely Black, citizens were challenged not only by lack of employment opportunities but also by interstate highway incursions, school busing, school consolidation, and additional institutionalized disempowerment. Today, Martindale-Brightwood continues to be a largely residential neighborhood flecked with vacant lots, small manufacturers, and industrial brownfields (City of Indianapolis, 2021), although gentrification is also visible. According to the 2020 U.S. Census, 63% of residents are Black and 15% describe themselves as other minorities. More than 40% of residents live in poverty (median income US\$24,000), making this the poorest area in the county (Indianapolis Business Journal, 2018; Statistical Atlas, n.d.). In 2024, Martindale-Brightwood did not have a full-scale grocery store within its official boundaries.

Previous assessments of the FHC farm camp have documented the benefits of participation including the promotion of “life skills, entrepreneurship, and healthy eating intentions for minority youth participants” (Nzaranyimana, 2020, p. 11; Hernandez & Robinson, 2022). Here, we provide

¹ This brief history of the Martindale Brightwood neighborhood is drawn largely from a more detailed one by the Polis Center at Indiana University Indianapolis.

new insights by exploring the psychosocial and metacognitive impacts among youth participating in the camp using data collected from surveys and facilitated journaling. The research contributes a valuable evaluation of the positive outcomes of participatory agricultural learning programs beyond practical skills and knowledge obtainment, providing support for similar initiatives for disadvantaged youth and low-resource areas.

Research Methods

Indiana University researchers were contracted as external investigators by the Felege Hiywot Center to design and conduct research on the social impacts of the camp. Our involvement began with designing the original research proposal in collaboration with FHC, which was submitted to and funded by the Lilly Foundation. At that time, Indiana University Anthropology graduate student

Figure 1. The FHC Logo is Printed on a Small Shed on the Main FHC Grounds

The painting features the letters “FHC” with two children of color and a community icon. It sits next to a black rain barrel.



June Guo, under the advice of faculty members Shellye Suttles and Jennifer Meta Robinson, developed the initial idea to use student journals to explore the program's impact using creative qualitative data. That plan was revised, operationalized, and piloted in 2022 by Robinson and graduate student Gerardo Hernandez. In 2023, we refined the journaling protocol and collected significant qualitative and quantitative data (from journals, surveys, and participant observation) on the impact of the RISE Initiative's STEAM Camp on student participants. This analysis, particularly, focuses on the psychosocial and metacognitive impacts among youth participants. The program evaluation, data analysis, and report writing were led and completed by the authors who were external researchers (not part of the FHC organization). The authors declare no conflicts of interest.

This study was approved by the Indiana University Institutional Review Board (protocol #11718) for research integrity and compliance.

Parental consent and youth assent were received and housed by FHC staff members. Before camp and participation began, parents and youth attended an orientation where they were informed of the research including the objectives and methodologies (both the surveys and the journaling sessions). All camp participants and their parents agreed to participate in the research as part of their camp experience and employment hours; all submitted signed parental consent and assent prior to the survey administration and journaling sessions. Therefore, all participants were recruited for this analysis.

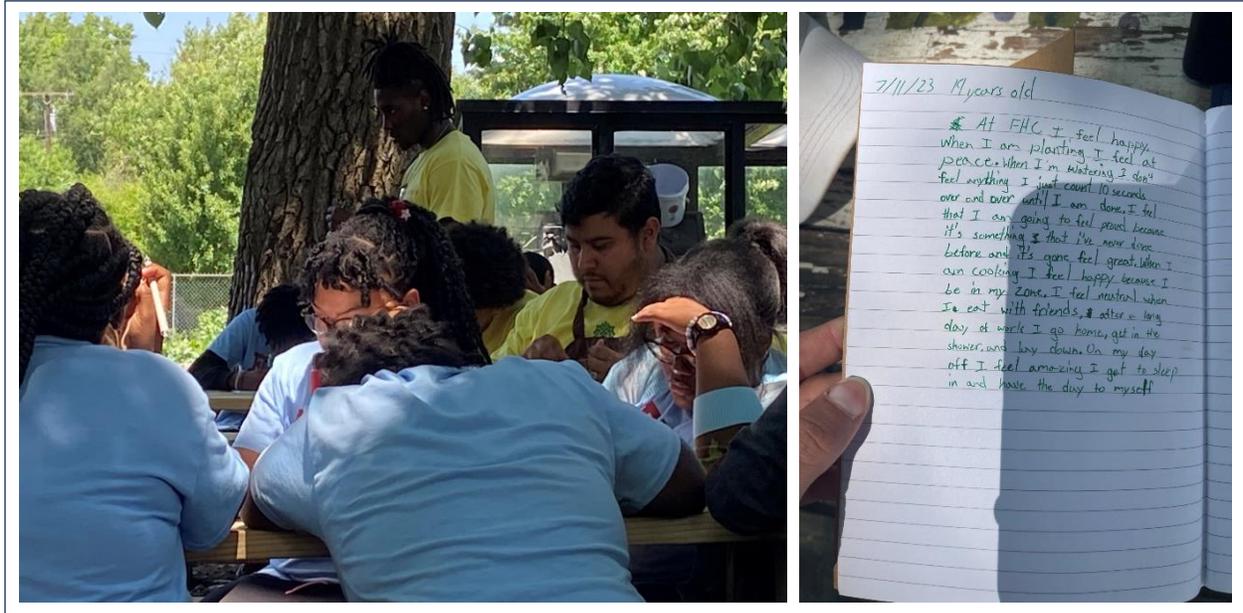
The 2023 summer STEAM Farm Camp took place between June 5 and July 22, 2023. Two online surveys were administered using After-School HQ, a youth program management software. Students took one survey (named pre-survey) during the second week of camp and a second survey (post-survey) during the last week of camp.

Figure 2. Campers' Garden Plots at the Felege Hiywot Center, Main Grounds

The raised garden beds are made of concrete blocks and feature an array of vegetables and fruits. Two counselors and one camper are shown watering the gardens.



Figure 3. Left: Campers (in Blue) and Counselors (in Yellow) Write in their Journals During a Facilitated Journaling Session. Right: A Journal Entry Written by a Camper in Response to Various Prompts Beginning with “Let me tell you how I feel...” (i.e., at FHC, when planting in the garden)



The surveys collected demographic information (age, gender, race) and included questions about students’ perceptions and experiences of the summer Farm Camp.

Solicited journaling was used to collect qualitative data on youths’ experiences and relationships with food, identity, and people (Figure 3). Journaling is a valuable qualitative method that can provide data that would be otherwise difficult to obtain. Journaling allows researchers to gather real-time data to understand experiences during the study period and information about individuals’ pasts, future goals, and experiences outside the study site. It is a method that allows the researchers to “get close to participants but leaves them enough space for personal reflections” (Kaun, 2010, p. 139). This is especially important when studying vulnerable groups like teens, where building trust and rapport to alleviate hesitancy are invaluable for collecting rich and truthful data. In addition, journaling is a metacognitive act as it motivates mindfulness and requires self-reflection. For example, one must be focused and both physically and mentally present to write, and journal prompts related to one’s experiences, self (e.g., personality, likes/dislikes), perceptions/opinions, and

goals require self-reflection. Finally, by using data recorded by the participants themselves, the method mitigates recall bias.

The journaling sessions (Figure 3) took place at FHC and were facilitated twice a week for five weeks. All students who were present participated in these sessions. Sessions lasted around 90 minutes, on average. Journal prompts were provided to participants to facilitate directed writing. The writing topics included food preferences, food culture, lived experiences, opinions, feelings, personalities, sense of self, knowledge and skills gained at camp, camp gardening and farming activities, and perceptions of FHC and the STEAM farm camp throughout their time participating in the summer program. Students also participated in a group listing activity where they were asked to list things to be happy about using the book *14,000 Things to be Happy About* by Barbara Ann Kipfer as a model. The group exercise was conducted four times: once during the first week, once during the third week, and twice during the fifth (last) week of camp. While not initially an activity for research purposes, we observed that the lists and conversations were connected to students’ positive experiences at camp, particularly related to social support

and positive relationships. Thus, we decided to include the qualitative data from these lists in our analysis.

All student participants had access to and were prompted to participate in pre- and post-surveys. The demographic and open-ended survey data were analyzed, and summary statistics were collected using Excel (version 2310). Qualitative data came from journal entries associated with feelings and experiences while participating in the summer farm camp and the final “things to be happy about” list. Qualitative data from journaling and group lists were analyzed separately from survey data using inductive coding in NVivo 14 (Bernard, 2011). Codes were quantified into themes and conceptualized by the research question. For example, we coded for positive experiences and then created child codes to classify the positive experiences such as stress relief, mentorship, and gratitude, among others. Similarly, we coded for metacognitive experiences with subcodes such as reflection and self-awareness.

Findings

Thirty-six campers participated in the camp and journaling. A smaller number, 25, completed both the pre- and post-surveys (all those who submitted the surveys also participated in journaling). These participation numbers differ because some individuals left or were removed from the summer farm camp before the program ended. For this analysis, surveys were used only if participants completed both the pre- and post-surveys. In addition, journal entries were used when they applied to this paper’s research questions and objectives.

Based on the survey data, 48% of participants identified as female, 44% as male, and 4% as non-binary at the time of the post-survey.² Ages ranged from 13 years to 17 years, with a mean age of 15 years. Seventy-two percent of youth identified as Black or African American, 16% as white, and 8% as American Indian or Alaska Native.³

To make novel contributions to the literature on understanding the effects and potential of such a program, we focus here on the psychosocial and

metacognitive experiences indicated by the data. In total, we coded 62 positive psychosocial and metacognitive experiences (out of 99 cases coded) expressed by participants in the journals or open-ended survey responses. Core themes related to psychosocial impacts included positive feelings, stress reduction, and positive social interactions, including social support and community. Metacognitive skills development encompassed self-awareness, reflection, and gratitude.

Psychosocial Impacts

Psychosocial impacts encompassed subthemes of positive feelings, stress reduction, social support, and community.

Positive Feelings

Several psychosocial impacts were detected in the data. First, positive feelings were found in entries related to how teens felt at FHC, in the garden, while watering plants, and while cooking at FHC. We also documented positive feelings in letters students wrote to staff and future selves in their journals. Twenty students mentioned they felt happy or joy in some capacity while at FHC. For example, one wrote, “When I’m watering, I’m also happy. Watering is actually like my favorite part. Once again, I love watching my plants grow healthy. So, while watering I feel happy & relaxed.”

Fifteen participants described feelings of pride or accomplishment as the result of gardening, harvesting, and/or cooking at the center. These tended to be connected to feeling “good,” “great,” or “amazing,” as shown in this entry: “When I harvest food from the garden, I feel accomplished knowing I did everything right to get the food. So, it feels good.”

Relatedly, seven students mentioned improved self-esteem or confidence during their time in the program, particularly in their abilities related to growing and cooking food. For example: “When I’m cooking [at FHC], I feel confident and excited for other people to try my food and ready to eat it myself.”

Less common but still notable, a few partici-

² One participant did not provide an answer for gender.

³ One participant did not provide an answer for racial identity.

pants mentioned they felt comfortable and/or “safe” at FHC. One explained that FHC is a place where “I can fully be myself and say anything.” When students were asked to write about what they see and how they feel while sitting near the gardens, one participant wrote:

What I see is blooming trees that look like golden in the sun. I see bushes and flowers looking beautiful as mountains in the snow. I feel cooled and regulated when the wind blows on my skin, and I feel safe and beautiful. The leaves move in a unique way, back, and forth, back and forth which is nice, I also see and hear the leaves rustling around and the lovely birds.

Similarly, the survey data showed more students felt comfortable in the FHC gardens at the end of camp compared to the start (48% vs 60%).

Stress Reduction

Many participants described stress-reducing impacts, including therapeutic aspects of gardening, particularly planting and watering. Some also noted positive feelings and mindfulness from simply being in the garden space. Specifically, 11 students wrote they felt relaxed while working in the garden, and nine referred to feelings of peace. One participant stated they felt “at peace and a little dirty” when planting in the garden. Another noted, “I don’t have to care about anything but the plants in the ground, which is relaxing.”

A few mentioned feeling “clear-minded” and “focused” while working—characteristics of relaxation and stress reduction.

Social Support

We found substantial social benefits of camp participation, including the formation of positive peer relationships (i.e., friendships), mentorships between participants and staff, team bonding experiences (i.e., social cohesion), and community building.

There were 15 references to friendships made during camp, not only among peers but also between campers and camp counselors. Counselors and staff also served an important mentor role for

teens, of which 18 journal entries spoke positively. For example,

Now I know it sounds crazy or out of the ordinary to be good friends with a counselor, but tbh [i.e., to be honest] we [are] just cool like that. See me and [counselor] have that brother bond, with professional boundaries of course. I feel like [counselor] is really the main person I can go to when I have something on my mind and need guidance. He gives me his input from a big brother standpoint, but also a counselor.

The theme of social support and community emerged in relation to team experiences and peers. There were 23 positive references to participants’ teams, often connected to fun, joy, “good people,” teamwork, collaboration, support, and respect. By the end of the program, 60% of participants stated in the post-survey that they felt like a member of a team after their experience at FHC.

In writing to a camp team member, one student described the support they received:

I’m glad that I get to work with you sometimes. You will talk to me about something that I have going on and then talks help me out. So, thank you for being there for me even when you don’t have to be. You are one of the best people I have ever met and I’m thankful for so much you have done for me. You have this fun playful side and when you’re in that mood you light up the room and a lot of people need that. Everyone can agree you are a great person. Thank you for coming into my life and helping me out with a lot of things.

This quote is just one example of the positive social interactions and cohesion that participants experienced while working at the summer farm camp. It highlights the value of social interaction as a key part of the program and the pro-social behaviors that took place.

Social support was also found in relationships between participants and staff. For example, one journal entry expressed:

Dear [staff member], I'm very grateful that you welcomed me into FHC. I was new so I didn't know anyone. I feel like you observed that I was shy & you came to talk to me. I really love that you took the time to chat with me. You were very nice and open it was like we were friends. You have impacted me by uplifting me, asking about my life, talking to me about your life a bit. ... I really thank you for talking to me and welcoming me to FHC. I hope we'll both be here next summer as well. I really enjoyed your company. You've made me feel like I have someone here for me. So, I thank you a lot a lot.

Another explained:

[Staff member] makes a safe welcoming space for all campers and he notices when I don't feel myself. Sometimes when I get in my head and start to overthink, I feel down, and at those times [staff member] notices and makes sure to let me know that I can talk to him. When I'm around him I feel in a good mood, and he always tries to lift spirits.

These positive social bonding experiences were also evident in the group's final "things to be happy about" list. Sixty-four percent of the last list consisted of names of camp counselors, staff members, teams, and campers, highlighting the profound impact that social interactions, including peer relationships and formal mentorships, had on participants. Furthermore, the centralization of others in this final list of gratitude exemplifies bidirectional prosocial behaviors—on the one hand, students were recipients of positive behaviors like altruism, caring, supporting, and comforting, and on the other, they exhibited these behaviors through naming peers, staff, and teams in their list of things to be happy about.

Community

Lastly, students also gained a sense of community and civic responsibility within and beyond the center. While more students indicated they felt like a member of the community in the post-survey compared to the pre-survey, the changes were not sub-

stantial (64% vs 68%). However, the theme was apparent in journal entries and open-ended survey questions in which participants emphasized the importance of community in building a more sustainable and better world, and the benefits of contributing to the community by growing and sharing food. Some noted positive feelings they felt by helping their community and feeding others. Additionally, more students felt comfortable eating food grown where they live at the end of camp compared to the beginning, which could represent changes in perceptions of community (20% vs 40%).

Negative feelings, experiences, or perceptions were presented in 37 cases, but primarily in entries by the same handful (6) of participants. Journal entries that relayed negative emotional responses were associated with feeling annoyed, irritated, or frustrated by the weather or labor, feelings of being watched or at school, and dislike of the program activities (e.g., watering).

Metacognitive Development

Metacognitive development encompassed the sub-themes of self-awareness, reflection, inspiration and motivation, and gratitude.

Self-Awareness

During the last two journaling sessions, participants were asked to write a series of letters that indirectly prompted them to speak on the skills they learned and/or used throughout the program. Following knowledge assessment, the second most common topic youth wrote about was self-awareness. Fifteen participants noted that their experience at the farm camp helped them recognize their interests and passions mostly concerning gardening, agriculture, and/or business. For example, one journal entry expressed:

What I have learned this summer can help me going forward by showing myself that if I try new things, I can actually learn more of who I am and what I like to do in life. Before FHC I had no interest in farming or planting. But now that I have tried it, I actually love planting and watching my plants grow.

Reflection

Teens engaged in personal reflection, becoming more aware of their strengths, qualities, opportunities, and goals. The strengths and positive qualities most mentioned were related to work ethic, passion, and kindness. But beyond specific characteristics or skills, the camp helped youth reflect and learn about themselves more generally. For example, one student wrote:

This center has taught me so much more than a school ever can. This center helped me find my voice, myself, my friends, my mind, my leadership, and so much more. Without the center and its multiple teachers, I would've ended up an entirely different person. This center has been filling my mind with unforgettable experiences, and I hope many, many, many more people's hearts, minds, and souls are influenced by this incredible event that is FHC.

Some teens also described how their time working at the Farm Camp allowed them to reflect on their behaviors, and this self-awareness fostered a motivation to make self-improvements. Most self-improvements were in regard to respect, work ethic, and school. Here is an example of these themes:

This summer, I've learned I speak my mind and getting better with controlling my feelings and handle them better and I love that for myself. How this can help me in the future is not doing crazy things off of how I'm feeling and learning sometimes to walk away, and I feel like that can help me a lot in the long run when I get older, so I stay out trouble and staying on track with my life.

Inspiration and Motivation

According to seven journal entries from the last session, the camp experience invoked inspiration and motivation in the participants—sometimes concerning the program and gardening, but often beyond. Some camp attendees wrote that they wanted to return to the STEAM Farm Camp next summer. A few were inspired to start a farm or

business, while others shared broader newfound goals such as improving their performance at school, focusing harder on extracurricular activities, and finding a job more generally.

Dear future self[:] I changed a lil [i.e. little] bit throughout this summer. I changed a lil because I became respectful this summer and [learned] self-control this summer. I learned how to plant and how to take care of plants. [What] I hope to accomplish the remainder of the summer is to buy me school clothes[,] and for the next school year[,] I want to have passing grades.

Gratitude

Students became grateful for their experience and social interactions as the camp went on. By the end of the camp, a sense of gratitude was a concrete topic in 16 journal entries and, as formerly mentioned, the final “things to be happy about” list. More specifically, students were thankful for the opportunity to work and learn new skills, the friendships and mentorships they made, the support and kindness they felt, and the food they grew and cooked. As an example, one participant wrote in their letter to the FHC director:

I want to thank you for giving me a chance. I love working here. I am grateful for all the opportunities and experiences you have let me experience working here. You have made a positive impact on my life. Before working here, I would stay in the house all day doing nothing. Working here I have made lots of friends. Thank you.

Discussion

In this analysis, we evaluated survey responses and qualitative data from solicited journaling to explore the psychosocial and metacognitive impacts of youth participation in the 2023 Felege Hiywot Center (FHC) STEAM Farm Camp. We found support for positive experiences and outcomes distinct from the well-established benefits associated with knowledge achievement and practical skills development. Participants experienced positive feelings (e.g., enjoyment and happiness), and many

recognized the actions and spaces associated with gardening and agriculture as therapeutic. Teens formed valuable social relationships including friendships and mentorships and gained a sense of social support and community from these interactions. In addition to these positive psychosocial aspects, participants gained and utilized metacognitive skills associated with self-awareness and reflection. As such, we provide evidence that the benefits of youth participation in urban agricultural programs stretch beyond the project site and participation period. Rather, participation can provide youth with long-lasting emotional and social benefits and metacognitive skills that may mitigate negative experiences and risks among vulnerable youth. Below we outline our findings in connection with previous investigations.

Positive Feelings

Youth participants of the FHC Farm Camp retrieved positive feelings during their participation. While there are no studies, to our knowledge, focusing on feelings among urban youth participating in agricultural programs, our results align with studies among adults and youth participating in an urban greening initiative (e.g., Soga et al., 2017; Rauk et al., 2023; Wadumestrigue Dona et al., 2021). The positive feelings that participants experience in relation to gardening and agriculture likely contribute to emotional and mental health benefits. For example, a study among adolescents participating in home gardening found that gardening is significantly associated with better mental and emotional well-being, including lower levels of depressive symptoms and better social relationships (Lier et al., 2016).

Gardening prompted feelings of pride, reward, and confidence among participants. These feelings have been documented among other youth farm and gardening programs (e.g., Bahamonde, 2019; Ohly et al., 2016; Russ & Gaus, 2021). These benefits may stem from the physicality and difficulty of the work, learning and applying new skills, overcoming challenges and solving problems, finding social support through teamwork and mentorship, and/or the concreteness of their accomplishments when participants witness a product they created and nurtured (Ohly et al., 2016). These positive

self-evaluations may be further strengthened when participants share their products with others such as those in their communities (Ohly et al., 2016; Russ & Gaus, 2021), suggesting a promising area of development for the FHC program.

Stress Reduction

Students indicated through their journaling that they felt relaxed, at peace, and clear-minded at the center's farm and orchard, especially when working with their gardens. Our findings are consistent with others that have documented the contributions of gardening and agriculture in stress reduction and even improved mental health among individuals of all ages, including urban samples (Bahamonde, 2019; Cruz-Piedrahita et al., 2020; Nicholas et al., 2023; Wadumestrigue Dona et al., 2021). A comprehensive review of urban garden projects also posits that gardens reduce stress and have positive impacts on youth attitudes (Rogers, 2018). While not specifically a youth agricultural program, a study among youth participating in an urban greening initiative found that working in nature "allowed them (i.e., the participants) to relax and enjoy themselves" (Rauk et al., 2023, p. 193). Thus, our study corroborates findings that the mental relaxation and mindfulness experienced through gardening and agriculture can contribute to mental and emotional well-being.

Positive Social Interactions, Support, and Community

The social aspect of the camp was of significant value to participants. They formed positive peer and mentor relationships, social support, and community—all of which played a substantial role in the enjoyment and reward of youths' participation in the program. Furthermore, the center's provision of an environment where youth were free to be themselves enriched participants' feelings of social support and community. Other studies have also documented community-building and personal connections with peers and leaders as positive outcomes of urban youth agriculture programs (Russ & Gaus, 2021; Wadumestrigue Dona et al., 2021), school gardening initiatives (Davis et al., 2015; Ohly et al., 2016), and participation in FHC's former farm camp, specifically (Nzaranyimana, 2020).

In their review, Rogers (2018) stresses that youth-led urban gardens improve peer relations and motivate prosocial behaviors. Similarly, we found prosocial behaviors among our participants, in which youth became kinder, more respectful, and more grateful throughout the camp.

Indeed, “social relationships” may be among the most potent outcomes of the FHC program. In a recent review of urban agriculture programs, Wadumestrige Dona and colleagues (2021) noted that “social relationships” were the most documented benefit, arising in 43 different publications related to urban agriculture. Despite this, social interactions are undervalued in investigations of urban youth agricultural programs. One study looking at youth participation in an urban greening program found that mentorships and peer support were factors underpinning youths’ enjoyment and engagement in the program (Rauk et al., 2023). These studies suggest the social benefits identified from the FHC program are likely to have further emotional and mental health advantages among these vulnerable and at-risk youth.

Participants also felt that FHC was a space where they could contribute to a community. Some noted in their journal entries the positive feelings of helping their community and feeding others. A recent review shows that community engagement and a sense of civic responsibility are common outcomes of urban youth agriculture programs, and students gain positive feelings related to helping their peers, families, and community at large by producing and sharing nutritious and safe food (Russ & Gaus, 2021).

Positive peer interactions, social support, and healthy mentorships are associated with lower odds of depression and risk behaviors such as violence and delinquency (Pardini et al., 2012; Raposa et al., 2019; van Harmelen et al., 2016). Additionally, feelings of connectedness promote healthy youth development (Lerner, 2021) and are protective against risk factors, including depression, anxiety, and sexual activity among vulnerable youth (Foster et al., 2017).

Metacognitive Skills Development

Both the type of experiences youths encountered at the camp and the solicited journaling activities fos-

tered metacognitive skills development. These skills included self-awareness and reflection, which motivated behavioral changes, inspired plans, and engendered a sense of gratitude among the participants. These findings are aligned with a previous assessment of participants in the FHC Farm Camp (Nzaranyimana, 2020). Among adults associated with the Ground-Up agricultural initiative in Singapore, researchers found that involvement encouraged self-awareness and reflection and, among some participants, motivated behavioral changes (Nicholas et al., 2023). However, metacognitive impacts are not a central theme within investigations of youth agricultural programs. Despite the lack of previous research, the ecological and social environments combined with the physical and mental work associated with gardening and agriculture create an ideal space for mindfulness and reflection. Furthermore, a setting where youth are supported and encouraged to reflect on who they are and their actions, goals, and opportunities can fuel self-awareness and behavioral changes. Metacognitive skills, therefore, are likely outcomes of youth agricultural learning programs as well as general youth initiatives for at-risk youth.

Limitations

Limitations include possible social desirability bias in surveys and self-reported data, potentially distorting the accuracy of the data. This possibility persists even though the researchers did not personally supervise the anonymized surveys and teens appeared more deeply attuned to their peers’ approval than that of our researchers. A limitation is the lack of direct evaluation of social desirability factors. In addition, the sample size is small, and this is a cross-sectional survey. Future research could explore longer-term impacts on participants’ lives and careers, a more comprehensive program evaluation, and mechanisms acting on participants’ affective responses. Longitudinal investigations across multiple years would provide stronger evidence for the impacts, including the long-term advantages of improved metacognitive skills.

Implications

The positive psychosocial and metacognitive impacts of participation in the FHC urban youth

agricultural learning program suggest that similar programs designed for disadvantaged youth may mitigate risks and disparities. Psychosocial impacts—positive feelings, therapeutic indicators, social support, and community engagement—and metacognitive impacts—self-awareness, reflective capacity, inspiration, motivation, and gratitude—highlight the importance of continuing such initiatives among vulnerable populations along with assessments of their psychosocial and metacognitive impacts. While most urban garden programs have been established for high-resource elementary and middle schools (Rogers, 2018), the effectiveness of the FHC STEAM Farm Camp suggests that agricultural educational initiatives aimed at urban and low-income youth are likely to be impactful investments for psychosocial health. Such critical interventions during adolescence can help establish long-standing behaviors, academic and career-related opportunities, and mental health (Bluth et al., 2016; Eisman et al., 2015). Moreover, intervention during this age may mitigate the negative effects of mental health disorders, risky behaviors, and poor academic performance (Bluth et al., 2016; Eisman et al., 2015). The implication is that the most vulnerable young people, based on their socioeconomic status, race, and ethnicity (Alegría et al., 2015) and the resultant social-ecological inequities (Alegría et al., 2015; Eisman et al., 2015), may make important gains from equivalent investments. Moreover, the impacts on disadvantaged high school students suggest that agricultural learning opportunities can have profound positive and protective effects on youths' well-being, mental and social health, and futures beyond the program, through the provision of positive environments, social support, and positive peer interactions (Alegría et al., 2015). In short, urban youth agri-food education programs make a good investment toward a healthier and more equitable society. Expressed in the voices of children, we can hear how kids themselves connect what they learned in camp with their hopes for the future: "I became respectful this summer and [learned] self-control this summer. ... For the next school year I want to have passing grades."

The Farm Camp environment and activities at FHC encouraged positive feelings, including com-

petence and confidence, as well as therapeutic feelings associated with relaxation and peace. The provision of stress-reducing experiences and a safe, supportive space may be similarly replicated in other agri-food initiatives. Furthermore, our evaluation shows that programs that incorporate positive social interactions and foster the development of valuable peer and mentor relationships can fuel positive experiences and have long-term impacts on youth participants. The extension of FHC's successful programming may lead to a similar sense of connection, support, and community among participants at other urban agri-food initiatives.

Lastly, youth agricultural programs such as the FHC STEAM Farm Camp can promote valuable metacognitive awareness and skills, including self-awareness, reflection, motivation, and inspiration, that also serve as long-term advantages. Metacognitive knowledge, skills, and awareness may improve academic performance, increase learning and self-motivation, and assist in the development of a growth mindset among socioeconomically disadvantaged youth (Smith et al., 2017; Wang et al., 2021; Zepeda et al., 2015). Thus, youth agricultural education programs that target under-resourced areas, provide an environment conducive to metacognition, and involve activities that require metacognitive skills can provide both immediate and long-term benefits. The development of these valuable skills provides youths with tools they can utilize beyond the centers and programs and that may mitigate disadvantages associated with low-resource areas or institutions and, relatedly, a lack of support. As such, we encourage similar programs to incorporate activities that utilize reflection and self-awareness, and we encourage future assessments to incorporate measures of metacognitive skills development and benefits.

Conclusion

I can actually learn more of who I am and what I like to do in life.

This study examines the psychosocial and metacognitive impacts of youth participation in the Felege Hiywot Center's 2023 STEAM (science, technology, engineering, agriculture, and math) Farm

Camp. STEAM is a summer program for urban youth in Indianapolis that blends practical agricultural learning with personal-growth activities and community engagement. Utilizing surveys and facilitated journaling, we found the program had positive psychosocial impacts—positive feelings, therapeutic indicators, social support, and community engagement—and fostered metacognitive impacts—self-awareness, reflective capacity, inspiration, motivation, and gratitude. Participants in the 2023 summer STEAM Farm Camp gained positive and therapeutic experiences and forged personal connections with the community, staff, and peers. Lastly, they learned more about themselves in just a few short weeks. Students also gained a sense of gratitude and appreciated the opportunities provided by the center and the farm camp.

In conclusion, the FHC STEAM Farm Camp provides a compelling example of how to engage young people in not just environmental sustainability and urban agriculture but also metacognitive skills development, while at the same time fueling positive psychosocial outcomes in an area and population vulnerable to negative psychosocial circumstances. Such findings communicate the value of this and potentially other youth gardening programs to funders, prospective participants, parents, and other stakeholders. Our evaluation shows support for the role of youth-centered agricultural learning programs in provisioning positive youth

experiences, especially for at-risk and vulnerable teens, beyond knowledge acquisition and life skills achievement. Moreover, it provides new support for examining improved psychosocial dimensions as outcomes of such learning opportunities so that more children in the future may experience a program that they can say “helped me find my voice, myself, my friends, my mind, my leadership, and so much more.”

Acknowledgments

We are grateful to Kelsey Lyons-Johnson for her assistance with the journal project including journal prompts creation, planning, facilitating, and transcribing, and to June Guo and Gerardo (Jerry) Hernandez for help with the development of this study. We additionally thank Executive Director Aster Bekele and the Felege Hiywot Center staff for the opportunity to collaborate on this important work. Beyond the research, it is necessary to acknowledge FHC for all that the center has done and continues to do for the youth and counselors involved in their programs. Most importantly, we thank the teens and their parents for consenting to speak with us and share their experiences. We are grateful to Lilly Endowment Inc. for providing the funding for this research and for the STEAM Farm Camp at large. Lastly, we thank our peers at Indiana University who read and provided feedback on previous drafts of this article.

References

- Alegría, M., Green, J. G., McLaughlin, K. A., & Loder, S. (2015). Disparities in child and adolescent mental health and mental health services in the U.S. William T. Grant Foundation. Retrieved March 8, 2024, from http://cfs.cbcs.usf.edu/projects-research/docs/Disparities_in_child_and_adolescent_health.pdf
- Bahamonde, A. (2019). Mental health through the art of gardening. *Journal of Therapeutic Horticulture*, 29(2), 27–44. <https://www.ahta.org/journal-of-therapeutic-horticulture-29-2---2019>
- Bernard, R. H. (2011). *Research methods in anthropology: Quantitative and qualitative approaches* (5th ed.). AltaMira Press.
- Bluth, K., Campo, R. A., Pruteanu-Malinici, S., Reams, A., Mullarkey, M., & Broderick, P. C. (2016). A school-based mindfulness pilot study for ethnically diverse at-risk adolescents. *Mindfulness*, 7(1), 90–104. <https://doi.org/10.1007/S12671-014-0376-1>
- Chick, N. (2013). *Metacognition*. Vanderbilt University Center for Teaching. <https://web.archive.org/web/20240425180639/https://cft.vanderbilt.edu/guides-sub-pages/metacognition>
- City of Indianapolis. (2021). *25th & Monon: A vision plan to guide favorable redevelopment on select city-owned brownfields in the Martindale-Brightwood Area*. <https://citybase-cms-prod.s3.amazonaws.com/6a6660065c814ebb82c88ef6656df800.pdf>
- Cruz-Piedrahita, C., Howe, C., & de Nazelle, A. (2020). Public health benefits from urban horticulture in the global north: A scoping review and framework. *Global Transitions*, 2, 246–256. <https://doi.org/10.1016/J.GLT.2020.10.001>

- Davis, J. N., Spaniol, M. R., & Somerset, S. (2015). Sustenance and sustainability: Maximizing the impact of school gardens on health outcomes. *Public Health Nutrition*, 18(13), 2358–2367. <https://doi.org/10.1017/S1368980015000221>
- Eisman, A. B., Stoddard, S. A., Heinze, J., Caldwell, C. H., & Zimmerman, M. A. (2015). Depressive symptoms, social support, and violence exposure among urban youth: A longitudinal study of resilience. *Developmental Psychology*, 51(9), 1307–1316. <https://doi.org/10.1037/A0039501>
- Felege Hiywot Center. (n.d.). *Youth Farm Initiative*. Retrieved April 29, 2024, from <https://fhcenter.org/indianapolis-youth-programs/urban-farming/>
- Foster, C. E., Horwitz, A., Thomas, A., Opperman, K., Gipson, P., Burnside, A., Stone, D. M., & King, C. A. (2017). Connectedness to family, school, peers, and community in socially vulnerable adolescents. *Children and Youth Services Review*, 81, 321–331. <https://doi.org/10.1016/J.CHILDYOUTH.2017.08.011>
- Hernandez, G. & Robinson, J. M. (2022). *FHC summer 2022 report* [Unpublished report]. Indiana University.
- Holloway, T. P., Jayasinghe, S., Dalton, L., Kilpatrick, M. L., Hughes, R., Patterson, K. A. E., Soward, R., Burgess, K., Byrne, N. M., Hills, A. P., & Ahuja, K. D. K. (2023). Enhancing food literacy and food security through school gardening in rural and regional communities. *International Journal of Environmental Research and Public Health*, 20(18), Article 6794. <https://doi.org/10.3390/ijerph20186794>
- Indianapolis Business Journal. (2018, May 10). *1 in 5 Indianapolis residents lives in poverty. And many areas are getting worse*. <https://www.ijb.com/articles/68785-in-5-indianapolis-residents-lives-in-poverty-and-many-areas-are-getting-worse>
- Kaun, A. (2010). Open-ended online diaries: Capturing life as it is narrated. *International Journal of Qualitative Methods*, 9(2), 133–148. <https://doi.org/10.1177/160940691000900202>
- Layton, C. M. P. (2022). Systematization of the environmental educational experience: The home/school garden as a strategy to address food security in the post-COVID-19 confinement school. *Interdisciplinary Journal of Environmental and Science Education*, 18(3), Article e2289. <https://doi.org/10.21601/IJESE/12110>
- Lerner, R. M. (2021). *Individuals as producers of their own development: The dynamics of person-context coactions* (1st ed.). Routledge. <https://doi.org/10.4324/9781003089407>
- Nicholas, S. O., Groot, S., & Harré, N. (2023). Understanding urban agriculture in context: Environmental, social, and psychological benefits of agriculture in Singapore. *Local Environment*, 28(11), 1446–1462. <https://doi.org/10.1080/13549839.2023.2238721>
- Nzaranyimana, T. (2020). *Exploration of the role of an urban farming program in promoting youth's life skills, entrepreneurship, and healthy eating intentions for minority youth attending Felege Hiywot Center, Indianapolis* [Master's thesis, Purdue University Graduate School]. <https://doi.org/10.25394/PGS.12728618.v1>
- Ohly, H., Gentry, S., Wigglesworth, R., Bethel, A., Lovell, R., & Garside, R. (2016). A systematic review of the health and well-being impacts of school gardening: Synthesis of quantitative and qualitative evidence. *BMC Public Health*, 16(1), 1–36. <https://doi.org/10.1186/s12889-016-2941-0>
- Pardini, D. A., Loeber, R., Farrington, D. P., & Stouthamer-Loeber, M. (2012). Identifying direct protective factors for nonviolence. *American Journal of Preventive Medicine*, 43(2), S28–S40. <https://doi.org/10.1016/J.AMEPRE.2012.04.024>
- Polis Center, The. (n.d.). *The Martindale Brightwood neighborhood*. Indiana University Indianapolis. Retrieved July 24, 2024, from <https://polis.indianapolis.iu.edu/about/community-culture/project-on-religion-culture/study-neighborhoods/martindale-brightwood/>
- Raposa, E. B., Rhodes, J., Stams, G. J. J. M., Card, N., Burton, S., Schwartz, S., Sykes, L. A. Y., Kanchewa, S., Kupersmidt, J., & Hussain, S. (2019). The effects of youth mentoring programs: A meta-analysis of outcome studies. *Journal of Youth and Adolescence*, 48, 423–443. <https://doi.org/10.1007/S10964-019-00982-8>
- Rauk, L., Rupp, L., Hohl, B. C., Kondo, M. C., Ornelas, L., Carter, P. M., & Zimmerman, M. A. (2023). Lessons learned from local vacant land management organizations for engaging youth in greening. *American Journal of Community Psychology*, 72(1–2), 187–202. <https://doi.org/10.1002/AJCP.12688>
- Rogers, M. A. (2018). Urban agriculture as a tool for horticultural education and youth development. In D. Nandwani (Ed.), *Urban horticulture: Sustainability for the future*. (pp. 211–232). Springer Cham. https://doi.org/10.1007/978-3-319-67017-1_9

- Russ, A., & Gaus, M. B. (2021). Urban agriculture education and youth civic engagement in the U.S.: A scoping review. *Frontiers in Sustainable Food Systems*, 5, Article 707896. <https://doi.org/10.3389/fsufs.2021.707896>
- Smith, A. K., Black, S., & Hooper, L. M. (2017). Metacognitive knowledge, skills, and awareness: A possible solution to enhancing academic achievement in African American adolescents. *Urban Education*, 55(4), 625–639. <https://doi.org/10.1177/0042085917714511>
- Soga, M., Cox, D. T. C., Yamaura, Y., Gaston, K. J., Kurisu, K., & Hanaki, K. (2017). Health benefits of urban allotment gardening: Improved physical and psychological well-being and social integration. *International Journal of Environmental Research and Public Health*, 14(1), Article 71. <https://doi.org/10.3390/ijerph14010071>
- Statistical Atlas. (n.d.) *Household income in Martindale-Brightwood, Indianapolis city (balance), Indiana (Neighborhood)*. Retrieved July 23, 2024, from [https://statisticalatlas.com/neighborhood/Indiana/Indianapolis-city-\(balance\)/Martindale-Brightwood/Household-Income#google_vignette](https://statisticalatlas.com/neighborhood/Indiana/Indianapolis-city-(balance)/Martindale-Brightwood/Household-Income#google_vignette)
- Swank, J. M., & Shin, S. M. (2015). Garden counseling groups and self-esteem: A mixed methods study with children with emotional and behavioral problems. *The Journal for Specialists in Group Work*, 40(3), 315–331. <https://doi.org/10.1080/01933922.2015.1056570>
- van Harmelen, A. L., Gibson, J. L., St Clair, M. C., Owens, M., Brodbeck, J., Dunn, V., Lewis, G., Croudace, T., Jones, P. B., Kievit, R. A., & Goodyer, I. M. (2016). Friendships and family support reduce subsequent depressive symptoms in at-risk adolescents. *PLOS ONE*, 11(5), Article e0153715. <https://doi.org/10.1371/JOURNAL.PONE.0153715>
- van Lier, L. E., Utter, J., Denny, S., Lucassen, M., Dyson, B., & Clark, T. (2016). Home gardening and the health and well-being of adolescents. *Health Promotion Practice*, 18(1), 34–43. <https://doi.org/10.1177/1524839916673606>
- Wadumestrigue Dona, C. G., Mohan, G., & Fukushi, K. (2021). Promoting urban agriculture and its opportunities and challenges—A global review. *Sustainability*, 13(17), Article 9609. <https://doi.org/10.3390/su13179609>
- Walker, Jo. (2023, November 29). *‘Food desert’ vs. ‘food apartheid’: Which term best describes disparities in food access?* Food Empowerment Project, University of Michigan. School for Environment and Sustainability. <https://seas.umich.edu/news/food-desert-vs-food-apartheid-which-term-best-describes-disparities-food-access>
- Wang, M.-T., Zepeda, C. D., Qin, X., Toro, J. Del, & Binning, K. R. (2021). More than growth mindset: Individual and interactive links among socioeconomically disadvantaged adolescents’ ability mindsets, metacognitive skills, and math engagement. *Child Development*, 92(5), e957–e976. <https://doi.org/10.1111/cdev.13560>
- Woodward, K. (2015). *Psychosocial studies: An introduction*. Routledge.
- Zepeda, C. D., Elizabeth Richey, J., Ronevich, P., & Nokes-Malach, T. J. (2015). Direct instruction of metacognition benefits adolescent science learning, transfer, and motivation: An in vivo study. *Journal of Educational Psychology*, 107(4), 954–970. <https://doi.org/10.1037/EDU0000022>