

**Incorporating Mindful Eating Education into a Culinary Nutrition Program for
Adolescents in an Urban Food Desert**

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ABSTRACT

Culinary nutrition programs can shape children's long-term eating behaviors. Mindful eating has also been an effective tool for nutritional behavior change in youth and adults by encouraging awareness of food choices, sensory experiences, and internal hunger cues. However, there is limited research on incorporating structured mindful eating education in youth culinary education programming.

This study examined the development, implementation, and evaluation of a five-lesson mindful eating-focused curriculum at an after-school cooking program using an exploratory, sequential, mixed-methods design. Short-term outcomes were evaluated using baseline and post-intervention surveys, class recordings, and real-time feedback on mindful eating principles: sensory awareness, understanding the food system, and recognizing environmental distractions.

The baseline and post-intervention surveys showed a 9.9% increase in willingness to try new vegetables, 12.3% increase in students' mindful attention, and a 1.8% increase in approach and persistence. Results from the midway survey showed 70% of students reported changes in their food choices.

Qualitative results from the midway survey displayed the practical application of Kolb's Experiential Learning Cycle by identifying mindful eating techniques outside of the classroom seven students reported identifying food sources, six used their senses, three limited distractions, and seven practiced awareness of hunger and fullness levels.

In conclusion, incorporating mindful eating into cooking curricula is feasible and can positively influence students' awareness and application of healthy eating habits. The implications suggest educational programs incorporating mindful eating techniques can be beneficial in promoting nutrition education and helping students optimize their food choices, potentially addressing aspects of food insecurity. Future research should examine the long-term effects of mindful eating education and explore diverse teaching methods to enhance its effectiveness. Developing more sophisticated surveys and assessment tools will also be crucial for accurately measuring short-term outcomes and student learning objectives.

Keywords: Adolescents, Children, Cooking Curriculum, Food Insecurity, Mindful Eating, Mindfulness

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Introduction

Background and Setting

In the heart of Washington, DC's food-insecure neighborhoods (Hunger Report 2023 - CAFB Hunger Report, 2023) lies an opportunity for adolescents enrolled in the Washington Nationals Youth Baseball Academy after-school program. This program, a health and wellness course, includes elective cooking classes focused on cooking fundamentals and nutrition education (Nationals Philanthropies, 2023). These classes are made possible through a collaboration with DC Central Kitchens Nutrition Engagement Team, whose program is crafted to equip youth with essential culinary skills and nutritional knowledge, empowering them to lead healthier lives (DC Central Kitchen, 2024). Through this partnership, students gain access to nourishment and education.

DC Central Kitchen recognized the need for a new, innovative curriculum due to the limited options available. After discussing the development of a mindful eating curriculum with key stakeholders, which included program directors and the Nutrition Engagement Team, they expressed strong support. They agreed that the curriculum would be beneficial for their students and thought it was a great idea, showing enthusiasm for its potential impact.

The mindful eating lesson plan was tailored and inspired by the pilot study Foodie U mindful eating program, which was implemented in low-income households in rural Northern California. This program aimed to foster healthy food-related behaviors within the community (Pierson et al., 2019). Given that low-income households are at a higher risk of experiencing food insecurity (USDA ERS, 2022), the results from the Foodie U curriculum included increased fruit consumption, decreased craving responses, and notable changes in awareness among the female students in the intervention group (Pierson et al., 2019).

Mindful eating holds significance in underserved neighborhoods where access to nutritious food options may be limited (Giampaoli et al., 2019). In these communities, food insecurity, socioeconomic disparities (Bessems et al., 2020), and environmental barriers can contribute to unhealthy eating habits and higher rates of diet-related health issues (Compton & Ku, 2022). Mindful eating practices can offer a valuable tool to navigate these challenges and cultivate a healthier relationship with food (Giampaoli et al., 2019).

Students at Nationals Youth Baseball Academy reside primarily in Wards 7 and 8 of Washington, DC. In 2022, the U.S. Census Bureau reported that the median household income in Ward 7 of Washington, DC was \$62,243 and \$48,609 in Ward 8 (Census Reporter, 2022). These are compared to the median average household income throughout the DC area of \$101,027 (Census Reporter, 2022). Wards 7 and 8, in particular, grapple with food security challenges and are classified as food deserts (DC Policy Center, 2021). The term "food desert" denotes geographical regions where residents face restricted access to nutritious food options. However, the DC Policy Center (2021) has redefined the term to address the prevailing barriers in DC, such as the distance to food sources, transportation limitations, and socioeconomic status.

DC Central Kitchen conducted previous surveys to provide context for addressing the needs of the students and to offer insights into the dietary habits of adolescents in this setting. During the Washington Nationals Youth Academy January Session #2 in 2023, surveys revealed increased preferences with a 16% rise in willingness to try new fruits and a 60% increase in willingness to try new vegetables. Additionally, there was a remarkable 441% increase in confidence in experimenting with flavors. By fostering greater awareness through mindful eating (Nelson, 2017), students can continue to explore new flavors in a non-judgmental manner.

Statement of the Problem

A gap in the literature exists regarding adolescents and mindful eating in geographically underprivileged areas (Renshaw, 2016), as well as a lack of studies on integrating mindful eating education into hands-on cooking curriculums. Therefore, this pilot study aimed to evaluate the feasibility of introducing mindful eating techniques into a cooking curriculum to promote better diet quality and investigate factors influencing students' likelihood of incorporating these techniques into their daily lives.

Purpose of the Project

Key research question: How can a mindful eating intervention be integrated into a culinary nutrition program serving adolescents living in a food desert?

Theoretical Framework

The study's framework revolved around the principles of experiential learning theory, consisting of a four-stage model of active experimentation, concrete experience, reflective observation, and abstract conceptualization (Kolb, 1984). The study was custom-tailored for the mindful eating cooking curricula. Incorporating hands-on training, encouraging active participation through experiences with mindful eating concepts. Central to this process was reflection, facilitated through instructor-led questioning and class discussions. Through reflective practice, participants extract meaning from their experiences and apply their newfound insights to future scenarios (Kolb, 1984). With this theoretical framework, the goal was to develop an interactive learning environment, both in and out of the classroom, aimed at deepening participants' connection with food through the introduction of diverse skills and techniques.

The rationale behind selecting Kolb's Experiential Learning Theory closely aligned with the research objectives. Through the implementation of a pilot mindful eating cooking lesson

plan, participants were introduced to novel skills and techniques, delving into the intricacies of the food system and its interplay with mindful eating. Engaged in hands-on activities, such as exploring the journey of food from its source to the participants' plates, provided concrete experiences that lay the groundwork for learning and behavior change (Kolb, 1984, p.21).

Review of Literature

Cooking Interventions

Research has shown that most eating habits and health behaviors are developed before the age of fifteen (Charlton et al., 2020); and parents and siblings continue to have the most influence on food choice preference (Brown, 2002). Understanding this, youth nutrition education emerges as an effective intervention for the prevention of diet-related diseases. Addressing the persistent concern of increased overweight and obesity rates (Childhood Obesity Facts, 2024) among children are cooking intervention programs in school and community settings (Dimple & Ramesh, 2023). Hersch et al. (2014) conducted a systematic review of cooking interventions, which varied in duration from one month to six months. Each session lasted between thirty minutes and one hour and forty-five minutes. The review covered a range of cooking intervention styles, including pre- and post-survey assessments to measure participants' cooking skills and their confidence levels in the kitchen. Marshall and Albin (2020) unveiled a consistent theme titled "empowering." This theme describes how youth participants highly appreciated the skills imparted, such as knife safety, egg cracking, and blender usage. These acquired skills notably fostered greater involvement in family meal preparation. This insight stems from feedback provided by both child participants and volunteers. Findings from Fulkerson et al.'s (2010) randomized controlled trial indicated that the intervention group, comprising twenty-two participants from eight to ten years of age, experienced improvement in

food preparation skill development. The intervention group's outcomes demonstrated a significant increase of three-quarters in servings of fruits and vegetables in comparison to the control group (Fulkerson et al., 2010).

These studies have demonstrated the benefits of incorporating cooking interventions among school-aged children. Research shows that mindful eating can improve adaptive eating behaviors like slowing the pace of eating, increasing healthy food choices, and decreasing emotional and binge eating episodes (Monroe et al., 2021). Mantzios et al. (2019) describe mindless eating as consuming food without paying attention to what and how much is being eaten. By encouraging individuals to pay more attention to their eating habits and choices, mindful eating helps build a better relationship with food. Additionally, introducing participants to new foods increases dietary variety and facilitates improving diet quality (Monroe et al., 2021). These mindful eating interventions support an improved relationship with food and help prevent mindless eating, leading to overall better diet quality.

Mindful Eating

Mindful eating, as described by Kabat-Zinn (2003), is “paying attention in a particular way, on purpose, in the present moment, and nonjudgmentally.” This practice entails cultivating both internal and external awareness: internal awareness pertains to recognizing the body's physiological cues, while external awareness involves being mindful of the surrounding environment (Grider et al., 2021). This means to remove oneself from distractions while eating (Grider et al., 2021). Barardia (2020) highlights the findings of a study indicating individuals rely on external cues, such as the amount of food remaining on their plate, to gauge their fullness.

The implemented intervention emphasized understanding the origins of food, fully engaging the senses while savoring meals, minimizing distractions during eating, and accurately discerning hunger and fullness signals. Research indicates that integrating mindful eating into cooking interventions can encourage participants to achieve overall increased diet quality (De Tomás et al., 2020). Mindful eating involves building awareness of food origins, recognizing hunger and satiety cues, engaging the senses, and practicing non-judgmental awareness and acceptance (Mindful Eating, 2023; Hong et al., 2018). Organizations such as Kids Cooking for Life have successfully integrated mindful eating into culinary education by addressing individual food preferences based on texture, taste, smell, or appearance.

Origins of food

Studying the cultivation process of produce and its journey through importation routes sheds light on the interconnectedness of various elements within the food system (Nelson, 2017). Recognizing the origins of the food and the effort of those who prepared it, as discussed by Hanh et al. (2010), highlights the food system's significance in the practice of mindful eating. However, limited research examines the relationship between food origins and mindful eating practices in intervention settings.

Senses

Engaging all senses involves individuals taking a moment to pause and attentively observe the diverse qualities present in food items (Baradia & Ghosh, 2021). This includes noting the color and vibrancy, discerning the various aromas and scents, listening for any sounds emitted by the food, touching it to explore different textures, and finally, tasting it. These sensory experiences greatly influence whether the food is deemed acceptable or enjoyable (Baradia & Ghosh, 2021). Understanding that sensory experiences affect food acceptance can help tailor the

intervention to make the cooking process more engaging and satisfying for participants, thereby increasing motivation and involvement in the program.

Limiting Distractions

Limiting distractions involves minimizing external stimuli during meals (Monroe, 2015). Studies have indicated that adolescents tend to consume more palatable foods when engaged in screen time (Rocka et al., 2022), potentially due to engaging in mindless eating behaviors (Pierson et al., 2019). Palatable food refers to food that stimulates the appetite, irrespective of the body's actual energy requirements (Appelhans et al., 2011). While research on the feasibility of limiting distractions during eating is limited, evidence indicates that failure to reduce external stimuli may contribute to obesity risk factors (Stiglic & Viner, 2019). By encouraging individuals to minimize external distractions such as television or smartphones, mindful eating can help create a more intentional eating environment (Nelson, 2017).

Hunger and Satiety Cues

This mindful eating principle entails being attentive to the body's sensations both during and before eating. Due to the delayed signal from the brain indicating fullness to the stomach, individuals may be prone to overeating (Monroe, 2015). Research indicates that children are born with an inherent ability to respond to hunger and satiety cues (Brown, 2020). As children grow older and begin to react to external influences, their innate ability can become influenced by external cues (Grider et al., 2021).

Behavior Change

Mindful eating is interwoven into programs used to promote behavior change among adolescents (Baradia & Ghosh, 2021); it does this by developing a better connection with food (Baradia & Ghosh, 2021). The teachings of mindful eating have been associated with improved

outcomes for those who have disordered eating, and those experiencing unintentional weight loss (Kumar et al., 2018), although weight loss is not the primary purpose of mindful eating (Nelson, 2017). A study conducted by Hong et al. (2018) noted that individuals undergoing mindfulness training displayed a heightened inclination to sample various vegetables, compared to the exposure and controlled groups, highlighting the practice of mindful eating. One study conducted a quasi-experiment comparing a control group to the intervention using a curriculum developed around experiential learning theory, emphasizing the principle of learning through hands-on experience (Pierson et al., 2019). Pierson et al. (2019) found that the intervention group displayed less craving when exposed to palatable foods, along with increased fruit consumption amongst the females. However, they reported having a small sample size and would recommend completing a lesson longer than six sessions to identify if behavior change occurred. Although incorporating mindful eating techniques into cooking lessons is a relatively new concept, this framework has the potential to encourage awareness of the overall eating experience.

Summary

Cooking interventions have proven effective, with participants reporting enjoyment in educational sessions, enhancement of food preparation skills, and increased consumption of fruits and vegetables. The integration of mindful eating techniques into these interventions has become prominent, encouraging greater consumption of healthier options, and fostering a positive relationship with food. The efforts aim to determine the feasibility of incorporating mindful eating lesson plans into cooking curriculums offers a practical approach to reinforcing learned concepts, providing hands-on experiences, facilitating reflection, and promoting sustained adoptions of mindful eating practices.

Reflexivity

With this mixed methods study, I acknowledged the interplay between scholarly insights presented in the literature review and my own lived experiences, both contributing to my perspective on the research topic of mindful eating. The review underscored the importance of addressing nutrition disparities and empowering youth with essential skills and knowledge to make healthier choices, emphasizing the significance of integrating mindful eating practices into cooking interventions. Drawing from personal experiences, understanding mindful eating not only validates its potential impact but also emphasizes the importance of staying true to one's innate eating habits regardless of environmental factors. Acknowledging personal experiences about the teachings of mindful eating within the focused population may lead to confirming pre-existing beliefs about its efficacy in promoting healthier dietary choices.

My goal was to evaluate the feasibility of integrating mindful eating education into a cooking curriculum to promote healthier dietary habits among adolescents in food-insecure areas. The study aimed to assess the effectiveness of these interventions and their impact on youth dietary choices. By exploring the potential benefits of mindful eating, the study sought to contribute to developing evidence-based interventions for enhancing adolescent health through hands-on cooking education.

Project Design and Methodology

Target Population

The population of interest comprised of preadolescents and adolescents 10 to 14 years of age who attended the Washington National Youth Baseball Academy and selected the cooking class as their elective. This diverse group includes both seasoned participants and newcomers from all neighborhoods in Wards 7 and 8 in Washington, DC, characterized by food insecurity,

which is a condition defined by the U.S. Department of Agriculture as having “limited or uncertain availability of nutritionally adequate and safe foods or uncertain ability to acquire food in socially acceptable ways.” Through observation the demographic makeup of the group was 100% African American.

Research Design

The cooking course was scheduled once a week for one hour, spanning five class lessons. This program resulted from a collaboration between DC Central Kitchen and the National Youths Baseball Academy, where participants were already familiar with DC Central Kitchen staff. Routine pre- and post-surveys were administered at the beginning and end of the first and last class. As this was a new intervention, the initial survey is called the baseline survey while the final survey is called post-intervention survey. Modifications included introducing a mindful eating curriculum into the cooking intervention, incorporating three additional handouts to accompany three of the lessons, and administering a midway survey.

A mixed-method approach was employed to holistically assess student familiarity with mindful eating techniques at baseline and post-intervention. Specifically, it aimed to evaluate the impact of mindful eating training and identified factors that affect students to integrate mindful eating techniques into their daily lives after the intervention.

Methodology

Needs were assessed using pre-intervention surveys to identify knowledge gaps by asking students if they knew what mindful eating was, if they had practiced it, how they would describe it, and whether they were interested in learning about the topic. Additionally, interviews with program directors familiar with the target population were conducted to determine if a mindful eating curriculum was applicable to this population.

Based on the pre-intervention results, a new curriculum was created, drawing inspiration from Foodie U's mindful eating curriculum with significant alterations to align with the needs and mission of DC Central Kitchen. Because Foodie U's lesson plan was structured for a class session ranging from 45 to 50 minutes, adjustments were made to highlight key information within a five to ten minute instruction period. The components discussed in each of the four lesson plans consisted of identifying the origin of food, limiting distraction in one's environment, using senses to slow down and observe food items, and lastly, understanding hunger and satiety cues. Each lesson plan consisted of student learning objectives, which were measured during the lesson through questions and responses provided by the students. Additionally, each lesson included an inquiry section that covered topics discussed in the current or previous class, that reinforced the learned and applied mindful eating techniques.

Quantitative baseline and post-intervention survey data were analyzed using Microsoft Excel to evaluate the Mindful Eating Curriculum program by assigning numerical values to each response when appropriate. The mean response was compared to each question before and after the intervention. The hunger and fullness scale used in this study was designed by Christina Martinez a contributor to the Foodie U Mindful Eating research project conducted by Pierson et al. (2017). The scale was calculated by obtaining the average from the before and after lesson responses.

Qualitative data collection consisted of conducting audio recordings as the lesson plan was presented. In each lesson, questions specific to the mindful eating principles taught were asked. After the lesson, participants engaged in a hands-on cooking activity. During this time, inquiry checks were performed by visiting each table, conversing with students, and assessing what information had been retained. This approach of conducting rounds at the individual tables

made one-on-one interviews with participants manageable and effective. Specific questions from the lesson three senses handout were developed by Catharine Hannay founder of MindfulTeachers.org and a contributor to the Foodie U Mindful Eating research project conducted by Pierson et al. (2017).

This methodology ensured that the curriculum was tailored to the participant's existing knowledge and interest levels, as identified by the pre-intervention needs assessment survey, and allowed for continuous assessment and adjustment based on real-time feedback during the lessons.

Data Collection

The collected and analyzed data comprised of the baseline, midway, and post-intervention surveys. The project also involved transcribing and coding recorded class sessions from lessons one through four. The recordings included the initial five to ten minutes of instruction and subsequent knowledge checks. In lesson one, students received a handout detailing various components of the food system, which was later discussed in class. The lesson traced the journey of food from planting seeds and growing crops to harvesting. The handout illustrated the progression: produce was sent to a factory, transported by truck to a shipping container for export, and then shipped to a grocery store. The consumer purchased the item and brought it to the cooking site.

Additionally, partially completed handouts were used to focus on practicing the use of all senses, and hunger and fullness scale ratings before and after lessons. The senses handout was used in lesson three, where students described the outside and inside of food items located on their desks. In lesson four, the hunger and fullness scale handout, ranging from one to ten (with

one being extremely hungry and ten as extremely full), was used. Students rated their hunger levels before and after the hands-on cooking intervention.

The baseline survey gathered responses from eleven students, predominantly eleven-years-of age in the sixth grade, with a majority being females. The survey included additional questions on mindful eating, which revealed that 100% of the class was familiar with mindful eating and 91% had practiced it.

Results

Baseline and Post-Intervention Results

The study initially involved 11 participants between 10 and 14 years of age. However, after the second lesson, the number of participants increased to 13 in the cooking course. In the pre-intervention survey, 76% of the class reported that they knew what mindful eating is. Additionally, 59% of participants reported practicing mindful eating. When asked to describe mindful eating, responses were categorized into two themes: food groups and eating etiquette. Examples of the food group theme included “when you try your best to include all the stuff you need” and “when you eat healthy food, and they give you all the types of nutrition.” For eating etiquette, examples included “not eating messy” and “being respectful when you are eating, like chewing with your mouth closed.” Furthermore, 56% of participants expressed interest in learning more about mindful eating.

Figure 1 displays the percentage of students who selected "always" or "sometimes" on the baseline and post intervention survey. The x-axis are the survey questions, and the y-axis are the percentages. The results indicated very little change overall when comparing responses baseline and post-intervention surveys. Although there was a slight increase in the willingness to try new vegetables, responses to questions about eating fresh fruits and vegetables at home were

decreased. Additionally, there was a decrease in self-reported practice of mindful eating. The baseline and post-intervention questions can be found in Appendix A and Appendix C

Figure 2 shows baseline and post intervention survey results based on components from a mindfulness student questionnaire by Renshaw (2017), which was split into three sections: mindful attention, mindful acceptance, and approach and persistence consisting of the x-axis and the y-axis is the students calculated average. The results of practicing mindful attention increased by 12.3%, suggesting that students began to perform mindful behaviors more automatically, with less conscious thought or effort. The approach and persistence category increased by 1.8%, indicating that students' ability to engage and persevere through learning a new concept improved over the course of the lessons. Meanwhile, the mindful acceptance category slightly decreased by 1.4%, indicating that limited behavior change was achieved.

Midway Survey Results

Figure 3 presents the results from question one of the midway survey, which asked students how they practice mindful eating outside the classroom and instructed them to circle all applicable options. The x-axis represents various mindful eating practices, including identifying food sources, using senses, limiting distractions, and practicing hunger and fullness awareness. The y-axis indicates the number of participants. Ten responses were collected. Results showed that seven students selected "looking at where their food came from" and "listening to hunger and satiety cues." Additionally, six participants chose "using their senses," and three selected "limiting distractions." The midway survey can be found in Appendix B.

Questions one and two of the midway survey included two parts. The second part asked participants to describe and provide examples of how they practiced the selected mindful eating skills outside of class. Figure 4 builds on the categories from Figure 3 by adding subcategories:

packaging labels and DC Central Kitchen for food sources; see, smell, and taste for using senses; television and phone for limiting distractions; and identifying both hunger and fullness levels. Figure 4 is labeled with categories, subcategories, the number of participants, and quotes from the participants. The "Senses" section did not include quotes, because there was no additional section for students to elaborate on their use of senses. The results were seven participants selected "smell," six chose "see," and five picked "taste."

Figure 5 shows results from question two of the midway survey, which asked if students' food choices had changed since learning about mindful eating. Out of ten responses, 70% answered "yes," 10% selected "maybe," 10% chose "no," and 10% left the question blank. Three participants provided additional comments in the second part of the survey, stating: "I've felt more healthy," "ate smaller portions," and "I eat healthier now."

Figure 6 displays the results from question three of the midway survey, which asked participants who encourages them to practice mindful eating. The x-axis represents the encouraging figures, while the y-axis shows the number of participants. Seven participants identified their mothers as the primary encouragers of mindful eating. Other responses included an uncle, an aunt, a sibling, a coach, themselves, and the practice of eating without distractions. This highlights the significant role of family members, particularly mothers, in influencing mindful eating habits.

Figure 7 displays the results from question four, which identified two main categories of barriers to practicing mindful eating: people and non-persons/objects. Three participants cited individuals as barriers, specifically mentioning their mom, uncle, and themselves. The non-persons/objects category included barriers such as their dog, phone, fast food places, and snack

foods like chips, candy, and chocolate. This highlights that both interpersonal relationships and environmental factors can inhibit mindful eating practices.

Lesson 1 Results

Analysis of the first lesson's transcript highlighted students' initial understanding of mindfulness and mindful eating, as well as their knowledge gaps regarding the food system. The key findings were students had a limited understanding of mindfulness, with only one student associating mindfulness with "peace." When asked how they would practice mindful eating, multiple students mentioned activities like "making stuff at home" or "eating in a quiet space," showing some initial ideas for practical application.

During the food system discussion, the students' responses revealed a significant lack of awareness about food sourcing and import processes. Most students expressed interest in learning more about how food is transported, with one student noting, "All of it was new. I didn't know they went through this to get over to here."

Finally, when asked about mindful eating, a student responded, "It's about paying attention to different things you're eating and what's going on through your body," demonstrated an improved understanding of the concept of mindful eating by the end of the lesson.

Lesson 2 Results

The second lesson focused on environmental influences on food consumption, with students identifying various distractions. Their responses varied, including distractions such as "when watching a show," "when a special song comes on," "my cell phone," and "when my mom calls my name." When asked for examples of how to prevent distractions while eating, one student suggested, "You can pay attention to your food" and "turn off your phone."

Technical difficulties prevented data collection recordings during the knowledge check portion, which included questions about examples of distractions and ways to prevent them. The key findings of lesson two were that students recognized a range of common distractions while eating and provided practical suggestions for minimizing these distractions.

Lesson 3 Results

The results from lesson three focused on exploring sensory experiences related to food. Thirteen senses handouts were distributed, and three were completed, covering all the senses: see, feel, hear, smell, and taste. A response from one student described both the outside and inside of the food as follows:

See: “a rough outer layer, green inside”

Feel: “a rough packing, slimy, wet”

Hear: “water splashing or ripping sound, the plastic”

Smell: “limey, strong”

Taste: “bitter, sour.”

A prominent theme was that taste was the most favored sensory experience with students using more descriptive words for taste. Students shared that they enjoyed tasting food, for its sweetness and spice.

During the activity portion of the lesson, students were asked to describe what they saw and smelled in pre-filled Ziplock bags, each containing a different item: cheese, green onion, cilantro, or lime. One student identified the green onion, saying, “It’s green, and I use this in my ramen.” When describing the smell, three out of seven responses noted the item smelling strong. Other descriptors included “a surprising smell” when referring to grated cheese, while cilantro was described as smelling like grass.

In the inquiry phase of the lesson, students were prompted to reflect on their experiences and were asked how they practiced mindful eating at home. Most students described using their senses, with one student mentioning that they practiced mindful eating by smelling. Other mindful eating practices included looking at where their food came from and finding ways to limit distractions. One student noted that they saw their bread came from New York and liked it because it was full of flavor, thus practicing more than one concept of mindful eating by including the sense of taste. Additionally, when asked where a food item came from that was located on their desk, two out of three responses indicated Mexico, as indicated on the food item and another student demonstrated understanding by noting, “I took that sticker off.” Key findings of lesson three were students successfully identified the sensory qualities of food.

Lesson 4 Results

In the fourth and final lesson, hunger and satiety cues were observed and measured using the hunger and fullness scale. The average of ten responses resulted in a score of 4.6 before eating, indicating students felt either at number 4 (comfortably hungry) or number 5 (not hungry, but not full). After the hands-on cooking intervention, the average score increased to 5.9, suggesting students felt between number 5 (not hungry, but not full) and number 6 (satisfaction).

Objectives from previous lessons were integrated into the final session to consolidate all information about mindful eating techniques and facilitated their application. During the knowledge check, students were asked what mindful eating was and shared their understanding of the food system. One student responded, “Mindful eating is minimizing distractions,” while another discussed the food system, saying, “For the fruit, they grow it, pick it, transport it, and then us people we buy it and then eat it.”

The key takeaways from lesson four were that students demonstrated an understanding of hunger and satiety cues, and the ability to apply mindful eating techniques learned from previous lessons. They articulated the concept of mindful eating and provided a simplified explanation of the food system.

Discussion

The findings of this project provide insights into the impact of mindful eating training on students' awareness and implementation outside the classroom when living in food-insecure areas. Additionally, the project aimed to assess the feasibility of implementing the training into a culinary nutrition education program. Not only did it prove feasible but the intervention also influenced students' understanding of healthy eating and identified factors that may facilitate or impede the adoption of mindful eating techniques. The key finding indicated that students increased their awareness of food origin, environmental distractions, sensory experiences, and internal hunger and satiety cues, demonstrating an ability to connect mindful eating techniques to their daily lives and improving their nutritional intake. Although quantitative data from survey results indicated a decrease in the practice of mindful eating skills, qualitative data showed that students have practiced and applied these skills throughout the course and outside of the classroom setting.

Strengths

This study demonstrated the feasibility of integrating mindful eating into culinary nutrition education. Additionally, the mixed-method approach allowed for a comprehensive understanding of students' experiences with mindful eating. The use of qualitative data provided rich, detailed insights into students' application of mindful eating techniques, complementing the quantitative survey data. Moreover, the real-time feedback and adjustments made during the

lessons ensured that students were actively engaged and able to connect the techniques to their daily lives.

Limitations

The study faced several limitations that may affect the generalizability of the findings. First, the small sample size limited the depth of the data collected. Technical difficulties during data collection further reduced the number of insightful responses from students. Additionally, reducing the planned five lessons to four, due to combining lesson four and five, may have impacted the curriculum's overall effectiveness. The familiarity of the students with the DC Central Kitchen instructors also posed a challenge; having a new instructor teach the intervention may have affected classroom dynamics. Another limitation was the inability to track individual student growth due to fluctuating class attendance, which was not monitored. Finally, the lack of follow-up on the components of mindful eating techniques and behavior changes further limited the study's ability to measure long-term impact.

Recommendations

Future research should aim to include a larger, more diverse sample and a longer study period to obtain more specific results. Conducting a longitudinal study would be beneficial in determining how frequently mindful eating techniques are applied outside of the classroom and in assessing the long-term impacts of mindful eating education on students' eating habits and overall health. Additionally, studies could explore different teaching methods and curricula to determine the most effective approaches for teaching mindful eating. Research on the role of parents and home environments in reinforcing mindful eating techniques could also offer important information on how these practices can be supported outside the classroom. Developing more advanced surveys and assessment tools will be essential for accurately

measuring short-term outcomes and student learning. Implementing a 5-point Likert scale may provide more accurate data compared to the current survey formatting.

Conclusion

In conclusion, this study demonstrated the feasibility of integrating mindful eating into culinary nutrition education, highlighting its potential to enhance adolescents' awareness of their eating habits and promote healthier behaviors among those living in food-insecure areas. Despite some decline in practice indicated by quantitative data, qualitative findings highlight students' ongoing application of mindful eating skills beyond the classroom. The mixed-method approach provided rich insights into students' experiences despite limitations such as a small sample size and shortened curriculum duration. Moving forward, expanding sample sizes, conducting longitudinal studies, and exploring diverse teaching methods are recommended to explore the sustained impact of mindful eating education and its broader applicability in promoting health among adolescents.

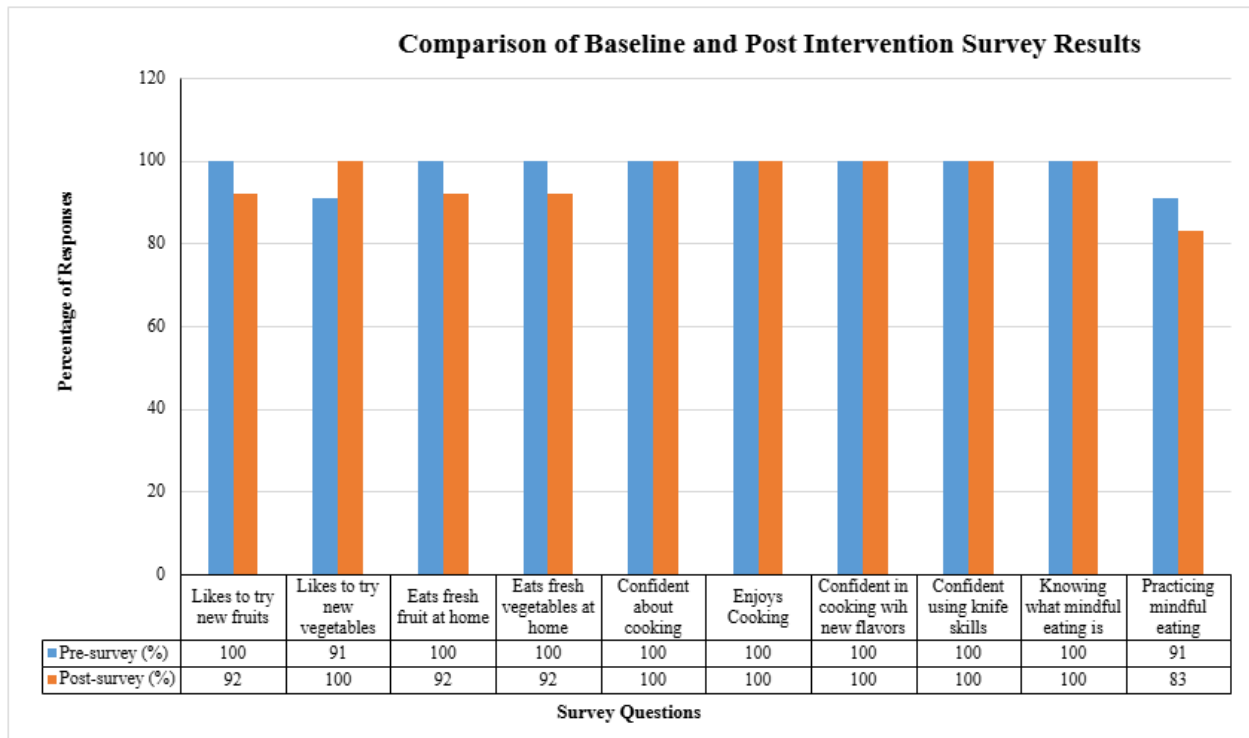


Figure 1. Comparison of Baseline and Post Intervention Survey Results.

Figure 1 displays the percentage of students who selected "always" or "sometimes" on the baseline and post intervention survey. The x-axis lists the survey questions, with the y-axis representing the percentage of responses. The specific formatting of the questions can be found in Appendix A and Appendix C.

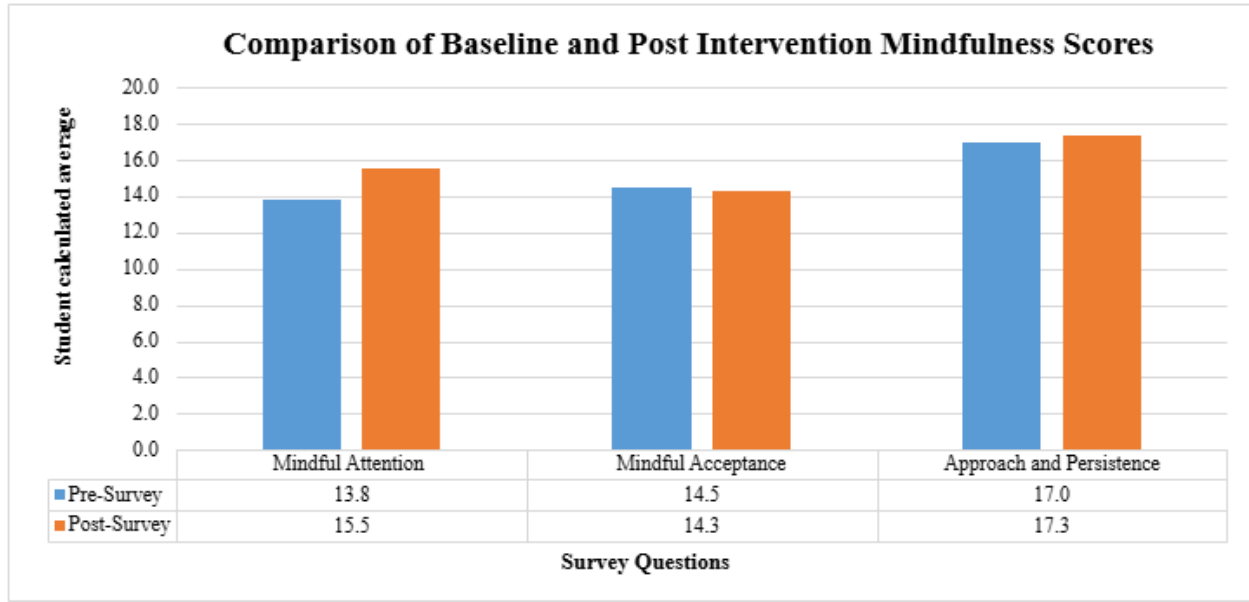


Figure 2. Comparison of Baseline and Post Intervention Mindfulness Scores.

Figure 2 shows baseline and post intervention survey results based on components from a mindfulness student questionnaire by Renshaw (2017), which was split into three sections: mindful attention, mindful acceptance, and approach and persistence consisting of the x-axis and the y-axis is the students calculated average.

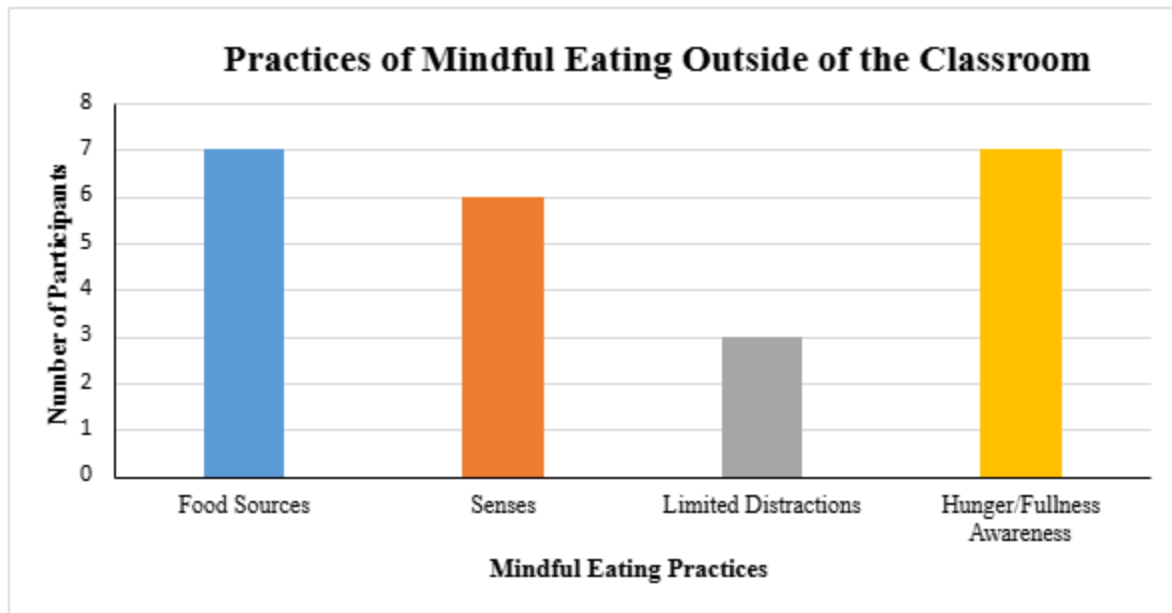


Figure 3. Practices of Mindful Eating Outside of the Classroom.

Figure 3 presents question one of the midway survey, which asked students how they practiced mindful eating outside the classroom and instructed them to circle all applicable options. The x-axis represents various mindful eating practices, including identifying food sources, using senses, limiting distractions, and practicing hunger and fullness awareness. The y-axis indicates the number of participants. The midway survey available in Appendix B.

Category	Sub-Category	Participants	Quotes
Food Sources	Packaging Label	4	"On the back"
	From DC Central Kitchen	2	"DC Central Kitchen"
Senses	Smell	7	
	See	6	
	Taste	5	
Limited Distractions	Television	2	"No T.V."
	Phone	3	"Phone"
Hunger/Fullness Awareness	Hunger	2	"My stomach starts to hurt"
	Fullness	2	"When I feel like I can't eat anymore."

Figure 4. Expansion on Categories of Mindful Eating Practices.

Figure 4 expands on the categories from Figure 3 by incorporating subcategories: packaging labels and DC Central Kitchen for food sources; see, smell, and taste for using senses; television and phone for limiting distractions; and identifying both hunger and fullness levels. The figure includes categories, subcategories, the number of participants, and quotes from the participants. However, the "Senses" section does not feature quotes, as there was no space for students to elaborate on their use of senses.

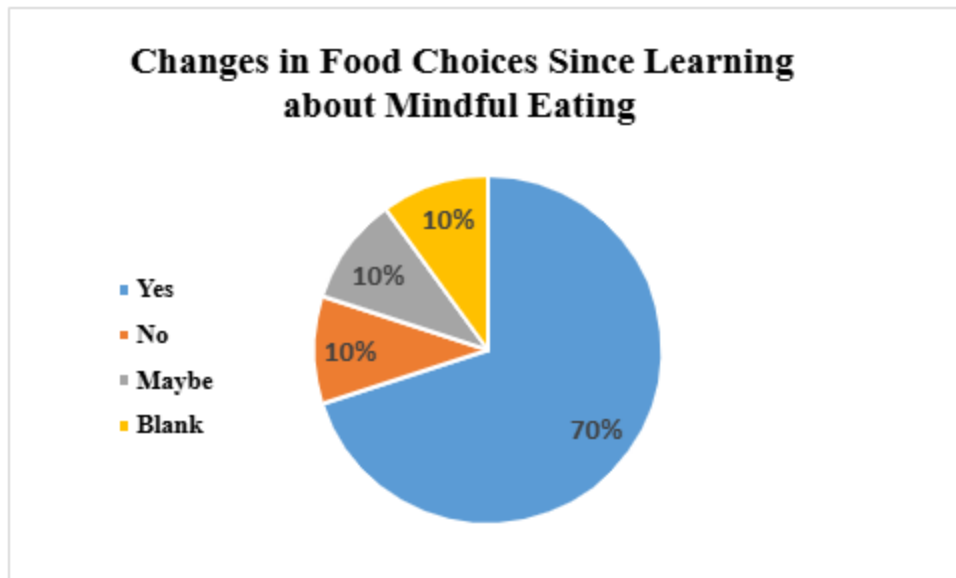


Figure 5. Changes in Food Choices Since Learning about Mindful Eating.

Figure 5 displays the results from question two of the midway survey, which asked whether students' food choices had changed since learning about mindful eating. Out of ten responses, 70% answered "yes," 10% selected "maybe," 10% chose "no," and 10% left the question blank.

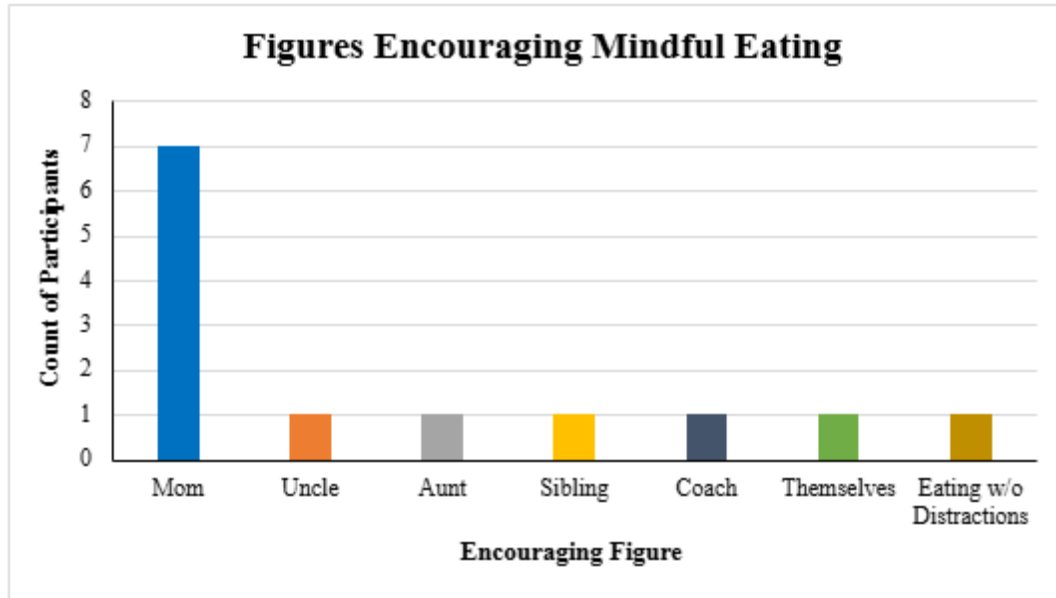


Figure 6. Encouraging Mindful Eating.

Figure 6 displays the results from question three of the midway survey, which asked participants who encourages them to practice mindful eating. The x-axis represents the encouraging figures, and the y-axis shows the number of participants. Seven participants identified their mothers as the primary encouragers of mindful eating. Other responses included an uncle, an aunt, a sibling, a coach, themselves, and the practice of eating without distractions.

Category	Barrier	Participants
Persons	Mom	1
	Uncle	1
	Themselves	1
Non-Persons/ Object	Dog	1
	Phone	1
	Fast Food	1
	Snack Foods	1

Figure 7. Barriers to Practicing Mindful Eating.

Figure 7 displays the results from question four, which identified two main categories of barriers to practicing mindful eating: people and non-persons/objects. Three participants cited individuals as barriers, specifically mentioning their mom, uncle, and themselves. The non-persons/objects category included barriers such as their dog, phone, fast food places, and snack foods like chips, candy, and chocolate.

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Appendix A

Baseline Survey

Name:

Age:

Grade:

Washington Nationals Youth Baseball Academy

Mindful Student Questionnaire



1. I have attended cooking class at Nationals Baseball Academy before
 - a. Yes
 - b. No

2. I like to try new fruits
 - a. Always
 - b. Sometimes
 - c. Never
3. I like to try new vegetables
 - a. Always
 - b. Sometimes
 - c. Never
4. I eat fresh fruit at home
 - a. Always
 - b. Sometimes
 - c. Never
5. I eat fresh vegetables at home
 - a. Always
 - b. Sometimes
 - c. Never
6. I am confident about cooking
 - a. Always
 - b. Sometimes
 - c. Never
 - d. Not Sure?
7. I enjoy cooking
 - a. Always
 - b. Sometimes
 - c. Never
 - d. Not sure
8. I am confident experimenting with new flavors when I cook
 - a. Always
 - b. Sometimes
 - c. Never
 - d. Not Sure?
9. I feel confident using knife skills in the kitchen
 - a. Always
 - b. Sometimes
 - c. Never
 - d. Not sure?
10. I know what mindful eating is
 - a. Yes
 - b. No
 - c. Maybe
11. I have practiced mindful eating
 - a. Yes
 - b. No
 - c. Maybe
12. I'm curious to know more about mindful eating
 - a. Yes
 - b. No
 - c. Maybe

Name:

Age:

Grade:

13. When I am at school, I notice...

	Almost never	Rarely	Sometimes	Almost Always
A. When my feelings change from good to bad				
B. How other people feel and act				
C. The many things that happen around me				
D. When my thoughts come and go				
E. How other people react to what I do				

14. When I am feeling bad at school, I still...

	Almost never	Rarely	Sometimes	Almost Always
A. Have a good attitude				
B. Am kind to myself				
C. Think nice thoughts				
D. Stay calm				
E. Am friendly to others				

15. When I am doing something hard at school, I try to...

	Almost never	Rarely	Sometimes	Almost Always
A. Work and work to get it right				
B. Do the best I can				
C. Focus on doing a good job				
D. Keep going until I finish				
E. Do everything I can to do well				

Appendix B

Midway Survey

Name: _____ Age: _____ Grade: _____

Washington Nationals Youth Baseball Academy

Mindful Student Questionnaire



1. How do you practice mindful eating outside of class? (circle all that apply)
 - a. Looked at where your food came from
Where? _____
 - b. Limited distractions while you ate
How? _____
 - c. Used your senses
 - i. Eyes
 - ii. Touch
 - iii. Hear
 - iv. Smell
 - v. Taste
 - d. Realized when you were hungry and full
How? _____
 - e. Additional info to share _____

2. Have your food choices changed since learning about mindful eating?
 - a. Yes
How? _____
 - b. Maybe
How? _____
 - c. No

3. What or Who encourages you to practice mindful eating?
 - a. _____

4. What or Who prevents you from practicing mindful eating?
 - a. _____

January 26, 2023

Appendix C

Post Intervention Survey

Name:

Age:

Grade:

Washington Nationals Youth Baseball Academy

Mindful Student Questionnaire



1. I have attended cooking class at Nationals Baseball Academy before
 - a. Yes
 - b. No

2. I like to try new fruits
 - a. Always
 - b. Sometimes
 - c. Never

3. I like to try new vegetables
 - a. Always
 - b. Sometimes
 - c. Never

4. I eat fresh fruit at home
 - a. Always
 - b. Sometimes
 - c. Never

5. I eat fresh vegetables at home
 - a. Always
 - b. Sometimes
 - c. Never

6. I am confident about cooking
 - a. Always
 - b. Sometimes
 - c. Never
 - d. Not Sure?

7. I enjoy cooking
 - a. Always
 - b. Sometimes
 - c. Never
 - d. Not sure

8. I am confident experimenting with new flavors when I cook
 - a. Always
 - b. Sometimes
 - c. Never
 - d. Not Sure?

April 22, 2024

Name:

Age:

Grade:

9. I feel confident using knife skills in the kitchen

- a. Always
- b. Sometimes
- c. Never
- d. Not sure?

10. I know what mindful eating is

- a. Yes
- b. No
- c. Maybe

11. I have practiced mindful eating

- a. Yes
- b. No
- c. Maybe

12. I eat healthier food after learning about mindful eating

- a. Yes
- b. No
- c. Maybe

13. List 3 senses you use while eating

14. How can I find out where my food comes from?

- a. The grocery store
- b. My pantry
- c. Food packaging label
- d. My backyard

15. How can I reduce distractions when I eat?

- a. Watching TV
- b. Texting friends
- c. Listening to music
- d. Putting away electronic devices

16. List 2 ways you know when you are hungry:

April 22, 2024

Name:

Age:

Grade:

20. When I am at school, I notice...

	Almost never	Rarely	Sometimes	Almost Always
A. When my feelings change from good to bad				
B. How other people feel and act				
C. The many things that happen around me				
D. When my thoughts come and go				
E. How other people react to what I do				

21. When I am feeling bad at school, I still...

	Almost never	Rarely	Sometimes	Almost Always
A. Have a good attitude				
B. Am kind to myself				
C. Think nice thoughts				
D. Stay calm				
E. Am friendly to others				

22. When I am doing something hard at school, I try to...

	Almost never	Rarely	Sometimes	Almost Always
A. Work and work to get it right				
B. Do the best I can				
C. Focus on doing a good job				
D. Keep going until I finish				
E. Do everything I can to do well				

April 22, 2024