Gaining Independence: Cooking Classes Tailored for College Students with Autism (Practice Brief)

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Abstract

Self-care skills, especially food preparation skills, are essential for independence as young adults with autism spectrum disorder (ASD) transition to adulthood. This practice brief reviews the impact of a six-week course designed to teach cooking skills to college students with ASD. The goal was to increase confidence in cooking and frequency of cooking to enhance skills for independence and dietary habits. Designed and taught by a registered dietitian nutritionist, the course utilized nutritious, sensory-friendly recipes along with visual recipe guides to promote skill building. Pre-and post-tests were administered during the first and final sessions of the course to assess self-reported changes in methods of cooking, frequency of self-prepared meals, and meal preparation confidence. Data were collected over a two-year period. Results from pre-and post-tests questionnaires showed significant increases in cooking frequency and confidence in cooking ability compared with baseline.

Keywords: autism spectrum disorder, cooking course, independence, transition to adulthood

The number of children diagnosed with autism spectrum disorder (ASD) has more than doubled over the past 15 years (Centers for Disease Control and Prevention, 2015). This upward trend magnifies the need for continued research and improved educational interventions across all areas of functioning for those affected by ASD. Thus far, ASD research, treatment, and government aid has had a pediatric focus, while research pertaining to adults and seniors living with the disorder is lacking (Goldschmidt & Hee-Jung, 2015).

When considering the nutritional needs of people with ASD and the skills required for independence as adults, there are currently unmet opportunities for education and intervention. In order to assist in the transition to adulthood, necessary skills, such as safe food handling and storage, cooking, and grocery shopping, must also be taught. Given the current burden of chronic disease among all adult Americans (i.e., diabetes, heart disease, cancer), educational materials should also be encouraging a healthful varied diet that includes plant-based and heart-healthy foods (Carlson & Frazão, 2014).

Literature Review

Several factors must be considered when developing an educational curriculum for college students with ASD, especially in a course focused on food preparation. These factors include learning preferences, motor skill deficits, strong foods preferences, rigidity, difficulty with change, food neophobia (refusal to try unfamiliar food), and nutritional appropriateness of foods. It is important to address these concerns to reduce the student's anxiety and extreme feelings of discomfort (Huemer, 2015).

First, students with ASD tend to be visual learners (Huemer, 2015; Shepley et al., 2019). A study analyzing the use of video prompting in the efficacy of teaching cooking skills to students with ASD showed

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a clear increase in the percentage of cooking steps (in a recipe) completed independently when the video-prompting was utilized (Johnson et al., 2013). In the event that video prompting is not an available resource, picture-based systems have been shown to be effective in cueing multi-step tasks for students with ASD (Mechling et al., 2009). When presented with visual stimuli in a learning setting, one study showed that participants paid more attention, showed more interest, and displayed more on-task behaviors than when presented with printed text with no pictures (Banire et al., 2015).

When handling and preparing food, gross motor delays and poor fine motor skills among people with ASD must also be considered (Jasmin et al., 2009). One study examining motor skill scores of children with ASD demonstrated that 63% of subjects displayed a significant gross motor delay, and 53% had a significant fine motor delay. These findings are noteworthy due to their implications for effectively mastering cooking skills, which include both gross (i.e., navigating the kitchen) and fine (i.e., grasping food, knife handling, etc.) motor skills. Thus, an instructor must be cognizant of potential challenges and either modify the recipes or take extra time to ensure all students are comfortable with their mastery of basic skills before moving onto more advanced skills.

Atypical sensory functioning among people with ASD can lead to sensory processing differences that can present as extreme food selectivity and provide unique challenges that must be addressed to implement effective interventions (Luisier et al., 2015; Tavassoli & Baron-Cohen, 2012). Since many senses are involved in eating (i.e., taste, smell, sight, texture) it is understandable many people with ASD have very specific, narrow food preferences and extreme food selectivity (as few as 5-20 foods) as described in the literature (Cermark et al., 2010; Chistol et al., 2018; Luisier et al., 2015; Tavassoli & Baron-Cohen, 2012). A study on food selectivity in adolescents and young adults found those with ASD were more likely to be classified as food neophobic (afraid of eating new/unfamiliar foods) in comparison to typically developing peers (Kuschner, et al., 2015).

Thus, sensory processing issues must be considered when choosing the learning environment and the types of foods to prepare. Minimizing sensory distractions (i.e., loud noises, flickering lights, synthetic odors) within the learning environment can help set the student up for success (Huemer, 2015). Additionally, selecting foods that are more “mainstream” and well accepted (e.g., avoiding mushy foods with low visual appeal) is likely to increase potential food acceptance. Young adults with ASD were more likely to report disliking such textured foods as applesauce, cottage cheese, or chunky peanut butter and less likely to enjoy strong tastes, such as spices in foods or strong mints (Kuschner et al., 2015). Having a variety of acceptable food options is important because children with ASD are more food neophobic, which may lead to long-term health issues (Wallace et al., 2018).

Depiction of Problem

Based on the above literature review that identifies a connection between ASD traits and feeding behavior that impacts health and daily living skills, it is important to provide interventions that address these concerns. A hands-on cooking course can enhance the food experience for people with ASD, while simultaneously building independence skills. Temple Grandin (2013) wrote, "The other day I met a mother who said her grown-up daughter had never gone grocery shopping…How will she be prepared to live on her own, if she can't go to the store?" (p. 190). In fact, the cooking course described in this brief was created in response to a college student with ASD who experienced the death of his single–mother/caretaker and was left unequipped to shop, prepare, and cook for himself. Such encounters depict a deficit in independence-training provided to young adults with ASD, which can have a negative impact on growth and development past adolescence. Teaching topics that increase independence such as grocery shopping and food preparation can help address the aforementioned encounters.

Learning, however, by its nature, requires the student to experience change and move away from what they already know. Therefore, making class time predictable by using a visual schedule of the topics to be covered, including the number of tasks to be completed, and time frames required to complete them can also help increase the student's comfort level and reduce anxiety (Huemer, 2015).

When teaching cooking courses to students with ASD, it is important to ensure that the foods chosen are nutrient-dense, include a variety of fresh fruits and vegetables, have attractive odor and visual appeal. Current research supports the use of nutrition interventions for people with ASD that address nutritional and biochemical irregularities affecting health outcomes (Wallace, et al., 2018). Thus, since many people with ASD are often on specialized diets (e.g., gluten-free options); recipes selected for a cooking course must consider the preferences (diet needs and food neophobia) of the students.

Despite the potential challenges that may exist in effectively administering a cooking intervention

among young adults with ASD, there is evidence that exposure to new skills and foods can result in positive outcomes. A study by Silbaugh and Swinnea (2018) found that behavioral interventions can have positive effects on feeding challenges among children with ASD and food selectivity, primarily related to increased exposure. Among neurotypical college students, cooking demonstrations have been shown to improve confidence in cooking as well as fruit and vegetable consumption (Brown & Herman, 2005; Levy & Auld, 2004). This practice brief describes the impact of a six-week cooking course on college students with ASD. The goal is to increase confidence in and frequency of cooking to enhance dietary habits and skills for independence.

Participant Demographics and Institutional Partners/Resources

Participants in the study were students enrolled at a large urban state school in southern California who were members of the Learning Independence for Empowerment (LIFE) Project group provided on campus through the campus office serving students with disabilities. The LIFE Project is a comprehensive program serving nearly 200 undergraduate students with ASD that facilitates opportunities for independent living skills through a variety of interactive lessons (LIFE Project, 2019). Through weekly meetings and workshops, LIFE Project provides students with essential tools needed to interact with peers, family, and friends as well as promoting independence and autonomy. Weekly meetings foster social skills, team building exercises, interactive games, and more. Workshop topics encompass a more comprehensive focus on such topics as navigating campus, money management skills, dating, handling frustration, anger and anxiety, job skills, independent living skills, and many more. The cooking course was an option under the independent living skills workshops.

The cooking course instructor went to a LIFE Project meeting to introduce herself and invite participation. Then the LIFE Project director and staff encouraged students most likely to enjoy and succeed in the class to sign up. The Department of Family Consumer Sciences donated use of the kitchen space, the Access Center (AC) payed a small stipend to the instructor and paid for groceries. All instructors were registered dietitian nutritionists (RDNs). Aides were assigned by the AC as part of their job duties and therefore were paid as part of their regular salary. They did not receive additional compensation. There was no fee for students registered through the AC. Although the course focused on undergraduate students enrolled in the LIFE project, it could easily be replicated for any young adult with ASD (not just degree seeking college students) needing to learn vital skills to developing independence. It could also be offered within an adult transition program (post high school) for students with a variety of disabilities.

The cooking course was designed to improve the food experience, exposure to varieties of food, and independence skills through a non-credit six-week introductory level cooking course. Based on the capabilities of the space, there were eight students enrolled during each session that was taught annually over two years.

During the two sessions, 69% (11/16) of students completed both the pre-and-post tests and were present for the entirety of the course. Eighty-two percent of students were male (n = 9), and 18% of the sample group was female (n = 2). Ages ranged from 19-26, with a mean age of 21. All students were enrolled as undergraduate students at the university, part of the LIFE Project program, registered with the AC and voluntarily enrolled in the cooking course.

Description of Practice

The current study assessed the impact of a cooking course, specifically methods of cooking, frequency of self-prepared meals, and confidence in ability to prepare meals independently among young adult college students with ASD. The course consisted of six cooking modules, which are outlined in Table 1, *The LIFE Project Cooking Course Curriculum*. The course was offered on Fridays from 2-4 p.m. in a multi-station kitchen laboratory located on the university campus. The stations allowed students to work independently as if in their own kitchen while the instructor and student aides were available to assist whenever the students requested help or required more or continuous assistance.

To impart healthy food habits and improve the nutritional status of course participants, the curriculum for the cooking course was developed by one of the authors who holds a Master of Science degree in Nutrition and is a RDNs. The recipes included nutrient-dense foods to promote a varied, balanced diet reflecting a variety of textures, flavors, and colors. The recipes were also designed to teach as many basic cooking techniques as possible while being careful not to overwhelm the participants (e.g., knife skills, baking, cooking on a stove top, using a blender). In addition, all recipes used could easily be modified to be gluten or dairy free if needed.

The curriculum included a detailed recipe book that was developed in accordance with the learning

needs of students with ASD. The recipe materials incorporated visual reference/photos for each step, numbered tasks, and specified time frames for the steps. Each student received this recipe book on the first day of the course. The first week covered basic cooking skills and food safety, while the second, third, and fifth week focused on preparing specific dishes. During the fourth week, students learned how to make dessert and shop for food.

Evaluation of Outcomes

To measure the impact of the cooking class, a pre-and-post-intervention questionnaire for the cooking skills program was administered (adapted from Barton et al., 2011). A baseline of cooking levels/skills was obtained at the beginning of the course to assess whether or not the students took on more challenging cooking methods after completing the course. Frequency of cooking measured how often, during a normal week, participants cooked a main meal from basic ingredients. Making spaghetti and meatballs from raw ground beef and raw noodles was provided as an example to clarify the meaning of basic ingredients. The confidence scale measured students' confidence in cooking and tasting new foods. Each variable used a scale to capture the unique characteristics of that variable, which is shown in Table 2, *Variable Scales*.

Two years of data were combined for a total of 11 students. The data were entered into SPSS statistical analysis program and used a significance level of $p \leq 0.01$. The results showed strong evidence of improvement in the frequency of meals prepared by students before and after participation in the LIFE Project cooking course (significant at p=.005). Students on average increased the number of times per week that they cooked meals for themselves after completing the course. The most promising finding was a significant increase in the frequency of meals prepared from basic ingredients, by about one meal per week. Since preparing meals requires independence, the intervention might also have increased some students' level of independence. This indicates that the intervention may have translated into behavior change in weekly habits over a very short time period. Table 3, *Paired Samples t-Test for Participants*, shows the significant improvement in frequency of meals prepared from the pre-test to the post-test.

The type of cooking methods used by students before and after participation in the LIFE Project cooking course show a 21% advancement in cooking methods used by the participants after the completion of the course. The results indicate a shift from convenience ready prepared meals to putting meals together from ready-made ingredients. Table 3, *Paired Samples t-Test for Participants*, shows the participants' change in cooking methods used. Anecdotally, students enjoyed cooking, as observed during the preparation of dishes even when they did not necessarily like to eat dishes such as chicken salad, yogurt parfaits, and salads. Teaching students with ASD cooking skills requires very patient teachers because the students get anxious easily and can be very particular about following directions exactly as written. For example, during module 2, teaching scrambled eggs took well over an hour. To ease the students' anxiety and encourage teacher's patience it is recommended to have adequate time to prepare recipes so no one feels rushed.

Students' confidence in their ability to prepare meals before and after participation in the LIFE Project cooking course showed a significant increase after completing the course, from an average confidence score of 11 to 16 (significant at p=.004). Table 3, *Paired Samples t-Test for Participants*, shows the participants increase of confidence in cooking ability. It is interesting to note that within the confidence scale questions, confidence in cooking from basic ingredients showed the largest increase (75%), and tasting foods not eaten before exhibited the second largest increase (34%). An important behavioral observation learned during the first year is changing the visual perception of the same ingredients can have an effective impact on students with ASD's acceptance of new food. For example, none of the students would touch the rainbow salad, however replacing the recipe with tacos or build-your-own nachos using a lot of the same foods as the salad lead to acceptance of the food. Acceptable food presentation during the intervention led to an increase in tasting new foods, helped reduce food neophobia, and enhanced acceptance for some of the students.

Building confidence in the kitchen can create a more positive cooking experience and encourages new cooks to continue developing their culinary skills. The increased confidence in tasting foods impacts longer term dietary diversity, which is important for health and for socializing (e.g., eating out or at a party). These findings align with studies that increased neurotypical participant confidence in cooking abilities after completing a hands-on cooking lesson (Levy & Auld, 2004).

Implications and Portability

The cooking class increased student's exposure to a variety of food recipes and cooking styles, which

they otherwise may not have been willing to explore themselves. Although the sample size for this study was small (n=11), the class significantly increased the number of times per week the students cooked for themselves, increased students' confidence in their cooking ability, tasting new foods, and slightly increased students' meal preparation method. Perhaps most importantly, this intervention was successful in creating confidence in a population that often demonstrates hesitancy in the adopting new skills or interests. Since cooking skills continue to evolve with more practice over time, it is especially important that the students left with the confidence and encouragement to continue building upon what they learned. Teaching cooking skills is an intervention worth replicating because it honors the autonomy of adults with ASD while promoting self-efficacy, health, and well-being. Findings also indicated potential areas of improvement for the course, such as enhanced opportunities for follow-up skills and more repetition in foods used.

Preparing meals at home increases independence and allows food to be prepared to meet specific sensory needs (e.g., tender, crisp broccoli versus mushy broccoli). Furthermore, independence in the kitchen allows for more control over the nutritional quality of meals, as a home cook can moderate the amount of added salt and sugar, use of nutritious ingredients, and better control portion sizes. Given the financial considerations of independent living with a disability, being able to cook from basic ingredients is essential to keeping on a fixed budget, as compared with dining out or buying pre-prepared/highly processed foods (Murray et al., 2017; Robson et al., 2016).

When considering ways to improve upon the existing curriculum, one welcome addition would be some form of reinforcement to encourage the participants to continue exploring new foods and cooking skills after the conclusion of the course. Some examples of follow-up activities could be sequential courses to build upon skills or a video series or blog for the students to follow. Another area of improvement would be to add a component to the survey about specific food choices and dietary changes to help inform recipe development. Finally, although many students were eager to try new dishes, some foods (i.e., salad, chicken, yogurt for parfaits) were avoided by many students who were eager to prepare, but not taste them. Having opportunities to taste test (e.g., yogurt brand tasting test), repeating an ingredient in multiple dishes, or simply handling or smelling certain foods could be a way to increase acceptance.

Preparing food can be a positive social experience (i.e., cooking meals for others, helping in the kitchen during holiday meal preparations), which can enhance the lives of the adult with ASD and their family or friends. Students also had an opportunity to attempt new skills alongside their peers, which provided opportunities for positive social experiences both while cooking and during "meals" when the final products were enjoyed together. Anecdotally, students in the course reported a great deal of satisfaction in socially cooking and trying new foods with their peers, as well as positive affirmation from parents about their newly adopted skills. Social communication deficits and the presence of restricted/repetitive behaviors (i.e., food neophobia) has been linked with feeding-related problems (Wallace et al., 2018). Therefore, social support and modeling to try new foods may be an important contributor to expanding the dietary diversity of those with ASD.

This study identifies opportunities for further investigation. Although, confidence in cooking from basic ingredients showed the greatest increase (75%), the frequency of cooking from basic ingredients only showed a slight change. Given that cooking from basic ingredients requires the use of both gross and fine motor skills, six weeks may not be enough time for many of the students to acquire the needed skills or generalize them in their daily lives. Therefore, extending the length of the course or adding sequential courses might further enhance the impact of change on weekly cooking habits. For example, adding a final course in which the students selected their own food dish might give them the confidence to cook more often at home. Also, incorporating a longitudinal component in future studies could provide insightful observations through interviews with aides and/or participants as well as potentially inform long-term mastery.

Challenges proposed by the course include the number of student aides or instructors needed to monitor the students, financial funding, and the space limitations of the facility, which allowed only a small number of students to enroll in each course. As a result of the increased confidence in the short-term course, the sequential courses could be a video series since it supports the visual learning style of ASD students and provides an opportunity for repetition.

Learning how to prepare food safely is critical to attaining independence in adulthood, as well as increase opportunities to make healthier food choices that align with individual specific diet needs. Given the results of our short-term cooking course, interventions tailored for students with ASD can have a positive impact on cooking skills and confidence, which in turn could impact nutritional choices and ability to live independently. One cost-effective way

to sustain newly learned skills would be to create an on-going video series as support beyond the basic six-week cooking class. As the population of children on the spectrum enters into adulthood, opportunities for positive food experiences, such as exposure to a wider variety of nutritious foods through a multi-level cooking course, are promising practices that can lead to long-term health and well-being.

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Table 1

The LIFE Project Cooking Class Curriculum

Weeks	Topic
1	Home Food Safety Food Safety, Sanitation, and Knife Skills Dress Code for the LIFE Project Cooking Classes
2	Scrambled Eggs Old Fashioned Oatmeal
3	Fruit Smoothie Rainbow Salad (replaced after 1st year with tacos or nachos)
4	Chocolate Dipped Strawberries Grocery Shopping
5	Baked Potatoes Crunchy Chicken Fingers Sautéed Zucchini
6	Banana Bread with Orange Zest

Table 2

Variable Scales

Variable	Scale
Cooking Method	1. Convenience, ready-made meals 2. Put together ready-made ingredients to make complete meals 3. Prepare dishes from basic ingredients 4. Other 5. Do not cook at all
Frequency of Self-Prepared Meals	1. Never 2. Less than once a week 3. Once a week 4. 2-3 times 5. 4-6 times 6. Daily
Confidence in cooking from basic ingredients, following simple recipe, tasting new food, preparing/cooking new foods	Not at all confident 1 2 3 4 5 6 7 Extremely confident

Table 3

Paired Samples t-Test for Participants

Variable	Mean	*n*	*SD*	*t*	sig.
Frequency of Meals Prepared					
Pre-test	2.00	11	1.83	-3.627	0.005
Post-test	2.91	11	0.944		
Cooking Methods					
Pre-test	1.64	11	0.809	-1.614	0.138
Post-test	2.09	11	0.944		
Confidence in Cooking Ability					
Pre-test	11.36	11	3.776	-3.650	0.004
Post-test	16.18	11	3.281		

Note. Significant at $p \leq 0.01$.