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Benefits of a Nutrition Education Program on a Community of Developmentally Disabled Adults

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Abstract

The number of adults diagnosed with developmental disabilities in the United States is increasing; this population is underserved and underfunded, especially in the area of nutrition education. Health concerns for adults with developmental disabilities include obesity, type 2 diabetes, cardiovascular disease, and disordered eating, all of which could be alleviated or prevented with proper nutritional care and education.

The purpose of this study was to evaluate the effectiveness of a nutrition education program in a community of developmentally disabled adults. The intervention took place in an adult day center in Bergen County, New Jersey, where a group of adults with developmental disabilities (n=16, ages 21-29 years) participated in an 8-week, tailored nutrition education program based on the social cognitive theory. The comparison group (n=6, ages 21-31years) received instruction unrelated to nutrition education for the same time period. Both groups had a mixture of diagnoses and abilities. This study utilized a mixed-methods approach; primary outcome measures included changes in observed behavior, skills, and survey-reported cognitive knowledge.

Results showed a 44% increase in nutrition cognitive knowledge following intervention compared to baseline, whereas there was no observed change in the comparison group. Nutritional intervention also resulted in changes in lunch choices compared to baseline. A majority of center adults receiving nutritional intervention influenced the overall lunch choice environment. Three specific areas of importance to the basis of nutrition education in adults with developmental disability were identified: program knowledge, individual control of behavior, and staff and caregiver-based support.

This study demonstrated that adults with developmental disabilities have the ability to retain and understand nutritional knowledge, and make healthful choices about foods based on this knowledge. Furthermore, these behavior changes regarding food choices following intervention may encourage other individuals within the community to modify food choices, suggesting a broader impact of this program beyond the active participants. Overall, these results provide a valuable framework for designing and implementing community based nutrition education programs for adults with developmental disabilities.

MONTCLAIR STATE UNIVERSITY

BENEFITS OF A NUTRITION EDUCATION PROGRAM ON A COMMUNITY OF DEVELOPMENTALLY DISABLED ADULTS

BY

RORY KATHLEEN COLEMAN

A Master's Thesis Submitted to the Faculty of

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In Partial Fulfillment of the Requirements

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CHAPTER I: BACKGROUND AND INTRODUCTION

Developmental Disabilities in the United States

'Developmental disabilities' is an encompassing term for adults with autism and spectrum disorders, Down syndrome, fetal alcohol syndrome, intellectual disability, and other disabilities that cause either cognitive delays or differences or a combination of cognitive and physical differences. According to the "Developmental Disabilities Assistance and Bill of Rights Act of 2000," these cognitive and physical differences must be attributed to mental, physical, or a combination of mental and physical differences that are chronic, are apparent and diagnosed before the age of 22, and will continue indefinitely. These differences must affect at least three of the following areas of health and wellbeing: self-care, receptive and expressive language, learning, mobility, self-direction, capacity for independent living, and economic self-sufficiency. In addition, these areas of need must require specialized care and support, which include alternate schooling and learning requirements (Public Law 106-402).

As childhood prevalence and diagnosis increases, the population of adults with developmental disabilities in the United States correspondingly increases. The child developmental disability rate has risen from 2008 to 2017, from 13.87% to 17.1% (Staff, CDC, 2017). Under this heading of developmental disabilities, rates of specific diseases have been recorded. According to the Centers for Disease Control and Prevention (CDC), the prevalence of Down syndrome increased by 31% from 1979 to 2003 (Staff, CDC, 2017). Those with Down syndrome are also living longer, with the average lifespan of someone with Down syndrome increasing from only 25 years old in 1983 to 60 years old in 2017 (National Down Syndrome Society, 2017). The rate of autism diagnosis is also

increasing, with 1 in 150 children diagnosed in 2000, to 1 in 68 children being diagnosed in 2012 (Staff, CDC, 2017). This increased number of adults diagnosed with developmental disabilities suggests that there is a greater need for and understanding of appropriate support and care, including nutrition (Goldschmidt & Song, 2015).

Nutrition Concerns among Adults with Developmental Disabilities

Adults with intellectual or developmental disabilities often present with higher rates of obesity, disordered eating, underweight, cardiovascular disease risk factors, and atypical body composition than the non-disabled population (as reviewed in Humphries, 2009; Rimmer & Yamaki, 2006). At the same time, sensory processing problems, feeding concerns, and obsessive-compulsive disorders can contribute to undernutrition and extremely limited diets in the developmentally disabled population (Gravestock, 2010; Humphries 2009). Individuals with autism or related spectrum disorders often have limited food variety and depend heavily on sugar filled or processed food (Bandini et al, 2010). This could eventually result in obesity or related chronic diseases such as type 2 diabetes, cardiovascular disease, respiratory disease, cancers, and benign neoplasm. (Koritsas & Iacono, 2015).

Obesity among adults with developmental disabilities

In 2008, the CDC reported that among the developmentally disabled population, the prevalence of obesity has doubled (17.6% vs. 35%) from 1985 (Staff, CDC, 2008). Currently, obesity rates in developmentally disabled individuals range from 39% in those with autism only (Privett, 2016) to 78% of the overall developmentally disabled adult population cited as obese (Saunders, Saunders, Donnelly, Smith, Sullivan, Guilford & Rondon, 2011), higher than comparable rates reported in the typical population (Staff,

CDC, 2017). The higher numbers (>65%) that are seen are generally reported from populations diagnosed primarily with Down syndrome, where the metabolic biology in these individuals is not fully understood and tends towards weight gain (Asua, Parra, Costa, Moldenhauer & Suarez, 2014). However, the high prevalence of obesity among the developmentally disabled is not limited to those diagnosed with Down syndrome (Doody &Doody, 2012).

The increased risk for obesity in the developmentally disabled population starts in childhood and is likely heterogeneous, owing to metabolic, behavioral, and psychological differences, as well as the effects of various treatment regimens (Humphries, 2009; Rimmer and Yamaki, 2006). According to a 2010 study by the CDC, the obesity rate for adolescents with autism was 31.8%, compared to 13.1% in typically developing adolescents. However, it is likely that proper nutrition and exercise will be beneficial to this population to prevent the development of secondary chronic conditions related to obesity.

Health and Nutrition within Adults with Developmental Disabilities

In the past 10 years, nutrition and health related problems, often secondary conditions of poor nutrition, have been studied and observed. An article by Berry *et al*, (2015), discussed that children with autism were five times more likely to have at least one form of gastrointestinal upset (constipation, diarrhea, reflux, pain, decreased hunger, increased hunger, or irritable bowel syndrome) when compared to the typical population, and that those gastrointestinal upset problems are likely made worse by diets with many processed and/or nutrient-poor foods. Given the social, communication, and sensory

issues that are prevalent in children with autism, it is difficult to encourage those children with established poor eating habits to change them.

From a young age, feeding, eating, and sensory issues pervade the nutritional status of children with autism, spectrum disorders, and Down syndrome (Landskron, 2011). Children with Down syndrome and some other developmental disabilities may require tube feedings. Children with autism often practice fussy, restrictive eating and have multiple sensory issues related to the visual, olfactory, and textile nature of foods (Hubbard, 2014). Children with autism often grow to adults with similar food aversions, restrictions, or rituals (Yilmaz, Sari, Serin, Kisa and Aydin, 2014), and this contributes to health complications. Additionally, there is a lack of knowledge in the scientific community as to what growth chart implications are for healthy body mass index (BMI) in those with Down syndrome (Staff, CDC, 2016), 'normal' adipose tissue, and a lack of resources to concentrate on the nutritional status of those with developmental disabilities (Humphries, 2009).

Often adding to the nutritional complications already present are the medications taken by many with developmental disabilities. The medications can cause multiple forms of stomach upset and constipation or diarrhea, even changing the hunger factors of those taking them (Saunders et al, 2011). According to the literature review by Kathleen Humphries and colleagues, there are 14 conditions that could all be mitigated or alleviated with standard nutritional care including cardiovascular disease risk factors, obesity, blood pressure, gastrointestinal upset, anemias, bone health, vitamin deficiencies, and some hormone imbalances (Humphries, Traci & Seekins, 2009), all of which indicates a need for tailored nutritional intervention.

Services and living situations for adults with developmental disabilities

There are typically five situations in which adults with developmental disabilities may live:

1. At home with either parents or a caregiver.
2. At home with family, but also with a Direct Support Provider (DSP) who comes to help with daily tasks or provides specific care.
3. In a group residence home, where the adults are boarders and there are communal areas and a staff to help the adults.
4. On their own.
5. In an institution, where continuous supervision is provided because they represent a constant, severe danger to themselves and others. This is the least common case and is extremely rare (Personal Communication, Department of Developmental Disabilities, 2017).

In addition to these living situations, there are Day Programs that are similar to a school for those with developmental disabilities, but teach employability, decision making, and life skills.

For living situations that require special care or needs, the services that are commonly funded include a DSP, a place in a group home, or access to greater health benefits for medications or procedures. Additionally, personal care help, such as showering or laundry services, would receive funding as these services are considered

necessities. In contrast, in many states including New Jersey, neither nutrition counseling nor nutrition education is funded by the agency serving individuals with developmental disabilities (Support Programs Policies and Procedures Manual, State of NJ, 2017).

There are currently 860,000 households with caretakers over the age of 60 that claim to be underserved with primary/necessary care for adults with developmental disabilities (Fifield, Pew Charitable Trusts, 2016). The list for those with caretakers under 60 is not known; each state handles the requests under their own developmental disabilities umbrella. The waiting lists for resources and group homes include extensive numbers of families with adults over the age of 18 who are not able to care for themselves (Fifield, Charitable Trusts 2016). Quality of life for everyone in the household can be affected when families are waiting on these services, as the exact living situation that will become available is unknown, and families experience anxiety relating to this waiting process (Francis, Blue-Banning, & Turnbill, 2014). This anxiety and constant care process for adults with developmental disabilities can affect the caregivers in negative ways, with quality of life, life satisfaction, and health all consistently poorer than counterparts without caregiving responsibilities (Williamson & Perkins, 2014). This article shows that, in terms of nutritional health concerns and conditions, some of the same health problems, such as obesity, cardiovascular health, and overall nutritional health discussed in the literature regarding adults with developmental disabilities, is mirrored in their caregivers.

At the age of 18 years, disability resources may either cease to exist or are not as readily available or convenient (Division of Disability Services, NJ, 2016). This could be a contributing factor when looking at the amount of compounded health problems that

exist within the adult population with developmental disabilities (Orin, Cicirello, O'Donnel & Doty, 2012). Through the age of 18 most individuals with developmental disabilities are in schools and have access to dieticians, therapists, and other resources, which may help to address the secondary conditions related to nutrition. In children, while the rates of secondary conditions remain high, the children are most usually under the care of a physician or team of therapists that work with the child and the family. While the issues exist for children, management of those conditions is part of the services, but as adults, there are more pressing and urgent needs for families that may have had financial and emotional tolls for decades.

Nutrition and Health Intervention Programs in Adults with Developmental Disabilities

There have been few studies that have examined the effectiveness of nutrition and physical activity programs in adults with developmental disabilities. Of the studies completed, most have focused on physical activity as reducing barriers to weight loss (Subrach, 2015; Young, Erickson, Johnson, Johnson & McCully, 2015). These studies promote activity and wellness coaching in adults with developmental disabilities in order to promote weight loss through exercise. This is a popular approach to intervention with adults with developmental disabilities. More recent studies have looked at a form of nutrition intervention. One focused on adolescents and parents spending six weeks in nutrition education discussions to promote weight loss, and the adolescents had successes in decreasing cholesterol intake (Subrach, 2018). Another recent publication discussed cooking as a nutrition intervention for those with autism and others with developmental disabilities because of the multifaceted learning experience cooking provides (Goldschmidt, 2017). No results have yet been reported on this idea, but it is notable that,

until recently, with adults with developmental disabilities, a much higher emphasis has been placed on their disabilities rather than a whole person approach that includes nutrition management (Doody & Doody, 2014). While no adverse effects have been reported from exercise programs for the developmentally disabled, which is the most common intervention, there have only been small physical changes reported. It is unclear whether this is due to the effectiveness of the intervention or the way the program results were tracked and reported, as follow up periods for the exercise programs are short or lacking entirely. (Saunders, Saunders, Donnelly, Smith, Sullivan, Guilford & Rondon, 2011; Bazzano, Zeldin, Diab, Garro, Allevato & Lehrer, 2009).

Studies that had success teaching adults with developmental disabilities have used different methods depending on the location of the adults, such as in a group home or living with a caregiver. One method of teaching life skills to adults with developmental disabilities that specifically addressed this quandary was a study employing the TEACCH method, which stands for Treatment and Education of Autistic and Handicapped Children. The TEACCH method was implemented in an adult group home, and the pedagogy reflects a structured learning environment which is meant to reduce anxiety (Gerber, Baud, Giroud, & Carminiati, 2008). The structured environment also leaves less room for choice, but ultimately, the study concluded that the staff implementing the pedagogy had much more of an impact on the decision-making process and quality of life of the adults.

Studies highlight the challenges and need for tailored nutrition education in populations of adults with developmental disabilities. A qualitative study from 2011 found that there was a high intake of refined carbohydrates and generally poor nutritional

status in a population of developmentally disabled adults and that education programs are much needed (Johnson, Hobson, Garcia & Matthews 2011). Rates of obesity and type 2 diabetes among the typical population have been rising steadily, and adults diagnosed with these conditions are offered nutritional guidance and education tailored towards their cognitive and social needs (American Diabetes Association, 2017). However, for adults with developmental disabilities, it can be harder to tailor programs. Given their sensory, motor, and cognitive differences, the group can be difficult to instruct. Indeed, many research interventions that have been published focus on training the staff in group homes or the staff around the community to prepare healthier foods for consumption by the population (Humphries, Pepper, Tracey, Olson & Seekins, 2009). Staff turnover in places such as residential and group homes tends to be high which was noted as a specific struggle in the aforementioned study. Instead, those programs that showed to be the most successful in weight loss, changing of exercise, and eating habits often had high levels of inclusion by full time direct service providers or frequently visiting family and friends within the community of developmentally disabled adults (Kuijken, Naaldenberg, Nijhuis-van der Sanden MW & van Schrojenstein-Lantman de Valk, 2016). Programs that have included some aspect of nutrition education for adults with developmental disabilities have been successful and positive in terms of minor weight loss but have not recorded any long-term management effects (Yilmaz, Sar, Serin, Kisa & Aydin, 2014).

Teaching adults with developmental disabilities can also be challenging as they are neither expected nor able to conform to societal norms and can often exhibit unexpected behavior (Bowman & Plourde, 2012). Because much of the ability to function in standard schools and function in society depends on social development, and not just

intellectual development, teaching to adults with developmental disabilities must take into account the lack of life experience and social development (Bowman & Plourde, 2012). Independent living becomes a logical focus for research, as basic living skills such as self-feeding, showering, and doing laundry are all necessary for independence. Decision-making and leisure time activities are greatly stressed in adult day programs, since the inability to make decisions or fill time appropriately is considered a large-scale quality of life factor in adults with developmental disabilities (Eniola & Bonnie, 2015; Cocks, Williamson & Boaden, 2016). Adults with developmental disabilities are at a disadvantage when it comes to making decisions, as they are often viewed as different or less competent, and thus have decisions made for them (Badia, Carrasco, Orgaz & Escalonilla, 2016). All of these factors influence and affect the type and quality of the pedagogy of teaching to adults with developmental disabilities (Bowman & Plourde, 2012).

Social Learning

Of equal importance to the skills that are taught and the curriculum used, is the understanding of social learning that occurs when adults with developmental disabilities are together in community based programs. Social learning was first observed and studied in the 1960's by Bandura and McDonald who began an investigation into how individuals learn from each other (Bandura & McDonald, 1963). More recently, the phenomenon has been studied and applied to those with developmental and intellectual disabilities to teach children and adolescents with autism through the use of videos to promote observational learning (Ozen, Batu & Birkan, 2012). The study found that after watching children on the video interact, the children with autism were able to develop

play skills similar to those on the video, thus increasing abilities and changing the play environment of the small group. Adults with developmental disabilities continue to learn from peers, as shown in a study by Dotson, Richman, Abby, Thompson & Plotner (2013) where adults with developmental disabilities learned skills needed for employability more quickly and with greater understanding when working in pairs than when working as individuals. Adults with developmental disabilities are much more likely to copy behaviors and learn from those around them, in an effort to fit in and gain understanding of the world (Glennon, 2009). This effect is important when discussing food and nutrition, as even in typically developing communities, food choices can be socially based and influenced (Cruwys, Bevelander & Hermans, 2015). Therefore, social learning factors should be considered when designing nutrition education programs for adults with developmental disabilities.

Ethics and Obtaining Consent in Adults with Developmental Disabilities

There are many ethical concerns related to conducting research on adults with developmental disabilities (Iacono & Carling-Jenkins, 2012; Herron, Priest & Read 2015). The first barrier involves attempting to determine if the adult has enough cognitive awareness in order to understand that research is being conducted, and what that means for them (Loyd, 2013). It is unethical to perform research on an adult without their knowledge and consent or assent, but in this field, comprehension is often limited, despite other areas of function seeming quite high. Conversely, comprehension can be high, with limited ability to verbally or otherwise communicate (Conklin & Mayor 2012). A literature review on health promotion and intervention in adults with intellectual disabilities found that there were 11 interventions on health promotion within their search

parameters, strongly suggesting the need for more research on individuals with developmental disabilities in spite of increased challenges associated with the consent and assent processes (Naaldenberg, J, Kuikgen, Dooren, & van Schrojenstein Lantman de Valk, 2013). This includes when assent or consent must be obtained with mixed methods of communication, such as visual pictures, gestures, or verbal communication. The ethics of including or excluding this adult population can also center on whether creative communication techniques are valid, fear of institutional review board refusals, and ethics committees' scrutiny (Herron, D., Priest, H. & Read S, 2015).

The consent process for adults with developmental disabilities can be time consuming. The adult must first be determined to be their own guardian, or their guardians must be located. The adult must be deemed appropriately cognitively aware in order to either consent or assent (Loyd, 2013). If the adults are their own guardian they may consent for themselves, and if they have a guardian that person will have to consent and then assent will have to be obtained from the adult. Even in these cases, there will always be an underlying question of whether they truly assent. This phenomenon was studied in depth by Loyd in 2013 in a series of qualitative interviews with adolescents with autism and their families. The consent process included sending home pictorial material for the adolescents (aged 16-18) to look through, allowing the adolescent ample time to consider participation. The consent forms were then discussed with the participants on multiple occasions with multiple adults, thus giving the participant more of a chance to decline. The researchers discussed this form of consent as multimodal, and it was presented as one of the best ways to obtain assent from those with autism, as one incidence of participants refusing would be the end of the assent process (Loyd, 2013).

Along similar lines in terms of multiple discussions with multiple sources is the idea that only someone close to a person with developmental disabilities can determine whether or not that person truly assents, as many times a symptom of the diagnosis is a need to agree or please someone (Preece & Jordan, 2010). In summary, multimodal, multiple sessions of explanation, and extensive knowledge of the individual are all valid ways in which to acquire either consent or assent from an adult with developmental disabilities.

Importance of this Research Study for Adults with Developmental Disabilities

Adults with developmental disabilities in the United States are increasing in number due to higher childhood diagnosis and genetic incidence (Staff, CDC, 2017; National Down Syndrome Society, 2017; Goldschmidt & Song, 2015). These adults, because of their overall recorded nutritional status, are at higher risk for many chronic diseases compared to the typically developing population (Humphries, 2009; Rimmer & Yamaki, 2006; Gravestock, 2010; Humphries, 2010; Koritsas & Icano, 2015). There has been research into how to change the health status of individuals within the population (Kuijken, Naaldenberg, Nijhuis-van der Sanden MW & van Schrojenstein-Lantman de Valk, 2016), but this research has focused primarily on increased physical movement and education (Yilmaz, Sar, Serin, Kisa & Aydin, 2014; Saunders, Saunders, Donnelly, Smith, Sullivan, Guilford & Rondon, 2011; Bazzano, Zeldin, Diab, Garro, Allevato & Lehrer, 2009). Recent publications have shown an attempt at more nutrition based interventions for weight loss, but there have not been enough nutrition education studies to compare or gain an understanding of what nutrition education means for adults with developmental disabilities (Subrach, 2018). This shows an increased need for nutrition education in communities of adults with developmental disabilities, as the population has

high incidence of chronic disease, does not currently have substantial research into alleviating this problem through nutrition education, and does not offer a standard or proven long-term success strategy for reducing nutritionally based conditions and diseases.

There are benefits to working with adult populations, as developmentally, adults with developmental disabilities reach a stage that is easier to influence around the age of 20 (Colson, 2017). Contrary to the normal development of adolescents, where the age of reason is typically around the age of seven or eight (Eccles, 1999), it is the young adults with disabilities who are more open to new information and have a greater potential for behavior development. This is one reason why directing efforts towards adults with developmental disabilities is likely to see more promising and substantial results than in any childhood programs, despite the decreases in occupational therapies.

The proposed research study looks to begin laying some groundwork for questions regarding nutrition education and the effects on a community of developmentally disabled adults in an adult day program. This includes tailoring nutrition education to fit the needs of the individuals in the day program, and determining if knowledge retention and behavior change are possible through nutrition education.

Research Purpose, Question, and Aims

The goal of this study was to identify if the designed nutrition education program has any effect in the areas of: potential and desire to learn about nutrition and food choice, openness to changing their nutritional health, and retention and implementation of nutritional knowledge.

To achieve this goal, this study sought to answer the following research question: Can a nutrition education course tailored specifically to a community of developmentally disabled adults in Bergen County, New Jersey, increase nutritional knowledge and positive behaviors associated with new and healthful food?

This study had four aims, to which corresponding hypotheses were developed:

1. Increase knowledge of healthful foods and nutrition through an 8-week nutrition education course, as measured by an increase in individual and group scores on the pre- and post-intervention researcher-administered surveys.

   H_1: The 8-week nutrition education program will increase the participants' cognitive knowledge nutrition survey scores from pre-intervention to post-intervention.

2. Increase openness and awareness of new foods, as measured by qualitative analysis in each class session by observing reactions that students have in response to the new foods presented.

   H_2: There will be an increase in understanding of nutritional and health related facts within the population, observed through conversation and behaviors throughout the intervention.

3. Provide opportunities for students to try new foods and improve kitchen and food safety skills through the practical portion of the classes.

   H_3: There will be increased positive attitudes associated with trying new foods, as measured by weekly class scores and kitchen skill charts.

4. See a translation of increased knowledge to dietary behavioral change, measured by researcher observations in the 2-week follow up observation period when compared to the initial observations, and confirmed by staff interviews completed by the researcher following the intervention.

   H_4: There will be visible dietary behavior change during the intervention and after, as evidenced by lunch observations pre- and-post intervention.

CHAPTER II: THEORETICAL FRAMEWORK

Nutrition education programs have been an important part of both health and disease management for many years (Sun, You, Almeida, Estabrooks, Davy, 2017). It has been found that programs and interventions that base their lessons and implementations on educational theories are more effective and show more lasting results (Murimi, Kanyi, Mupfudze., Amin, Mbogori, & Aldubayan 2017). Also, Murimi *et al.* (2017) revealed in their literature review of over 240 educational programs, that the benefit was especially true for nutrition education, since the behavior change aspect of nutritionally related programs was the hardest to maintain. For example, a study of school lunch programs that worked to change eating behaviors in adolescents to increase their fruit and vegetable consumption showed that behavior change was more likely and more lasting during a nutritional educational intervention when used in conjunction with an educational theory versus teaching a nutrition education program outside of an educational framework (Gaines & Turner, 2009).

Social Cognitive Theory

Origins and constructs

In 1977, psychologist Albert Bandura created a method to help his patients overcome phobias. He published *Social Foundations of Thought and Action: A Social Cognitive Theory* in 1986, in which he stresses the importance of observational and peer learning as instrumental in enacting behavior change. The book also introduced the reciprocal determinism triad, which consists of three main factors: behavior, personal cognition, and environment. Reciprocal determinism is the interplay of these three factors to affect change. Figure 1 gives a visual representation of this idea, showing that

if both cognition (person) and environment change, behavior will be the third point and will change naturally.

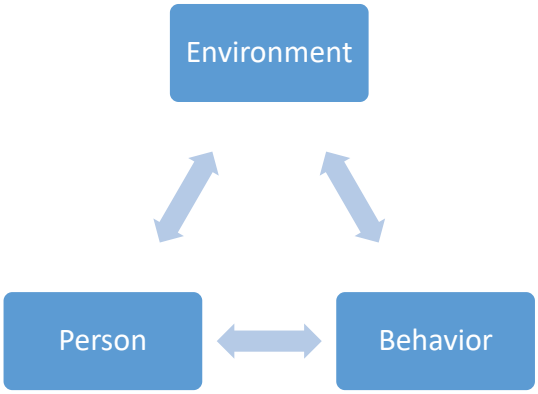


Figure 1: Reciprocal Determinism

The social cognitive theory also uses several different constructs (Bandura, 1986) to both teach and reinforce the idea of behavioral change (see Table 1). The first construct is the expectation that the participant has regarding what the behavior change will do for them, whether it be more energy, weight loss, or making them happier. The second is observational learning. This construct discusses the direct interaction between observing others, generally peers, performing a behavior and seeing their results. The observation of positive results influences a positive or desired behavior change. Reinforcement is a third construct of the theory that is important to the success of the educational program, and provides a means of reward for completing the desired behavior change. Self-efficacy is key, not only in social cognitive theory but in many educational theories (Glanz, Rimer & Viswanath, 2015), as this construct addresses the ability of a participant to complete the tasks and behaviors asked of them. For example, if the participants have low confidence surrounding their ability to properly select and wash

fruit, they are much less likely to perform the behavior. Self-efficacy can be closely related to confidence in self-ability. Finally, behavioral capability is a construct that addresses the knowledge and skill level of a participant, and an increase in behavioral capacity is the goal throughout any educational program based in social cognitive theory (Bandura, 1986).

Table 1: Social Cognitive Theory Constructs and Barriers

Construct	Definition	Barriers to Use Within Populations of Adults with Developmental Disabilities
Expectation	Belief about the outcome	Must obtain knowledge before an opinion is formed.
Observational Learning	Seeing and/or hearing others being taught or displaying desired behavior	Others must display the desired behavior.
Reinforcement	Reward for desired behavior	No obvious barriers.
Self-Efficacy	Confidence in the ability to perform the behavior	Must be taught skill and review frequently.
Behavioral Capacity	Knowledge and skills about desired behavior	Must retain knowledge and skills.

Source: Liou, 2015

Application of the social cognitive theory

Social cognitive theory has been applied successfully to many nutrition education programs across a multitude of topics, e.g. increasing breastfeeding rates, helping cancer survivors change their diet, and influencing eating behaviors in children in farm to table and other school education programs (Berlin, Norris, Kolodinsky, & Nelson, 2013; McKinley & Turner, 2017; University of Newcastle, 2015).

Social cognitive theory has the potential to be extremely powerful when used in nutrition education in a community of adults with developmental disabilities because of its fundamental constructs. When these adults form communities, the communities tend to be extremely close-knit and hyper-aware of each other (Stumbler, Wilder, Ross et al 2015). As well, adults with developmental disabilities can be set in their routines, and for these adults with selective and restrictive eating, adding a new food to their plate can be disconcerting for them (Sharp, Jacquess, Morton, & Herzinger, 2010), resulting in food refusals and challenging behaviors such as spitting and throwing. The constructs of social cognitive theory address these problems and concerns by relying on the social interaction within communities through the environmental and observational learning constructs. Because communities are close-knit, adults with developmental disabilities are likely to mimic each other, pay attention to each other, and find new experiences and foods more appealing when friends are also involved (Walton, K. M., & Ingersoll, 2013). Through the self-efficacy construct, they may have the opportunity to increase independence, confidence to complete tasks, and form more positive associations with foods, thus alleviating preconceived fears and concerns.

Therefore, it is not surprising there is precedent for use of social cognitive theory specifically in adults with developmental disabilities. One of the very few health and nutrition workbooks available to adults with developmental disabilities was designed by Heller, Marks, and Ailey (2013) using both social cognitive theory and the transtheoretical model. The textbook was used in an intervention for 22 participants who were between the ages of 18 and 35, obese, living at home, and diagnosed with mild to moderate intellectual disabilities. The intervention took place through a recreation center

for young adults with intellectual and developmental disabilities located in Salt Lake City, Utah. The program lasted 12 weeks and looked to assess "blood, nutrition, anthropometric, and fitness measures at pre, post, and 3-month" (Pett et al., 2013, 224). Social cognitive theory was applied in the intervention by using a peer mentor, who was responsible for taking the participant out to events and shopping, and for modeling behaviors that would benefit a healthy lifestyle. This addressed the observational and peer learning constructs of social cognitive theory. The group was introduced to fruits, vegetables, healthy habits, exercise, and lifestyle changes through the interactive and flexible model. The results reported higher self-efficacy, life satisfaction, social environmental support, and reduction of barriers to exercise. Physically, there was weight loss observed throughout the study, with participants losing an average of 6 pounds. Participants did not lose weight once the intervention ended, but they did sustain the weight lost at the 3-month follow-up (Pett et al., 2013). These results are promising, as they showed that observational learning and peer modeling aspects of the social cognitive theory could potentially lead to lasting lifestyle changes in terms of physical activity.

Additionally, social cognitive theory was used in another lifestyle change successfully in residence homes in Sweden (Bergstrom, Hagstromer, Hagberg & Elinder, 2013). Social cognitive theory was employed by increasing the knowledge and skills of healthy living, and improving self-efficacy in relation to healthy living among the participants. In this study, the adults began increasing physical activity, with adults increasing their step count, as measured by a pedometer, by an average of 1608 steps per day.

Health Belief Model

Origin and constructs

The health belief model was developed by Hochbaum, Rosenstock & Kegels (1952) in the 1950's as an effort to predict behavior and to examine why people do or do not change their behavior in association with their health problems and resources (Rosenstock, 1988). The model is based on six main constructs which break down likelihood of taking action into the following categories: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (Glanz, 2015). As Glanz and Bishop (2010) explain in depth, Rosenstock's constructs detail that in order for a person to change their behavior, the person must first understand that the person is, indeed, susceptible to the disease (perceived susceptibility). Perceived severity is illustrated as the understanding and belief a person has as to what degree a disease may affect daily living of the individual. Perceived benefits begin to outline the behavior changes that could positively alter the susceptibility and severity of a condition, where perceived barriers detail the individual circumstances that are believed, by the individual, to inhibit or render behavior change inaccessible. Cues to action can be either inspirational events or realities of the ramifications of an unchanged situation (Glanz & Bishop, 2010). Self-efficacy, as in social cognitive theory, is the confidence and belief an individual has to accomplish the behavior change desired. Table 2 explains each of these constructs, along with the barriers to use within populations of adults with developmental disabilities.

Table 2: Health Belief Model Constructs and Barriers

Construct	Definition	Barriers to Use Within Populations of Adults with Developmental Disabilities
Perceived susceptibility	Belief regarding of likelihood of getting condition	Must understand health conditions, e.g., obesity, diabetes, high cholesterol
Perceived severity	Belief regarding how serious condition could be	Must be able to quantify risk factors of the medical conditions
Perceived benefits	Belief about condition that could be improved or avoided	Must analyze cost/ benefit ratio
Perceived barriers	Believed factors that impede change	Must comprehend their limitations
Cues to action	Factors to inspire change	Must have a motivation to perform
Self-efficacy	Confidence to begin and follow through behavior changes	Must have confidence in their own abilities

Source: Liou, 2015

Applications to nutrition education

The health belief model has been successfully used repeatedly in nutrition education (Liou, 2015), and is a common framework for inducing behavior change in chronic disease patients, such as those with type II diabetes (Bayat, Akhoundan, Shadman, Faraji., & Nikoo, 2017). For example, the health belief model was applied over

the course of two educational sessions where perceived severity, perceived benefits, and cues to action were stressed. The outcomes for behavior change in those with chronic conditions, according to Bayat *et al* (2017), have been favorable and resulted in lasting and effective changes in areas of the constructs of the health belief model (perceived susceptibility, intensity, barriers, and increased self-efficacy), as measured by follow up questionnaires at 3 and 6-month intervals where perceived susceptibility, intensity, and increased self-efficacy were all higher, and barriers were perceived as decreased.

The health belief model, like social cognitive theory, uses self-efficacy as a cornerstone, which makes it a possible choice for a hands-on educational program. However, as shown in Table 2, the implications for designing a program for adults with developmental disabilities make the use of the health belief model impractical. The 'barriers to change' may be physical, mental, or emotional, but these adults are sometimes keenly aware of their personal limitations and barriers, and often classify this as a lack of time for change (Taliaferro & Hammond, 2016). Also, adults with cognitive delays may not understand the nuances of some diseases, and perceived severity could be an upsetting concept. Therefore, although the health belief model may be appropriate for other populations, it was not selected for use in this study of adults with developmental disabilities.

Theoretical Framework Choice for Nutritional Intervention

Social cognitive theory, by inducing behavior change through tangible changes, simple concepts, and observational learning (Bandura, 1986), was the foundation for the program developed. It is the appropriate choice for adults with developmental disabilities, given the limitations of the health belief model when working with adults with cognitive

comprehension differences and the barriers listed in Table 2. Figure 2 shows the educational theoretical framework based on social cognitive theory that served as a roadmap for the intervention, and the expected interaction of constructs on participant behavior. This diagram indicates reciprocal determinism between personal, behavioral, and environmental factors, and highlights how the constructs are anticipated to work together to create a behavioral change. The inner square states the anticipated nature of the behavioral change, which would be openness to new foods, increased kitchen skills, and interest and retention of nutritional knowledge. These behavior changes would be influenced by an increase of healthful foods in the kitchen (environmental), the ability and self-efficacy to prepare, taste, and feel these foods (behavioral), and knowledge to understand the importance of nutrition and feel connected to the new ingredients based on new knowledge (personal).

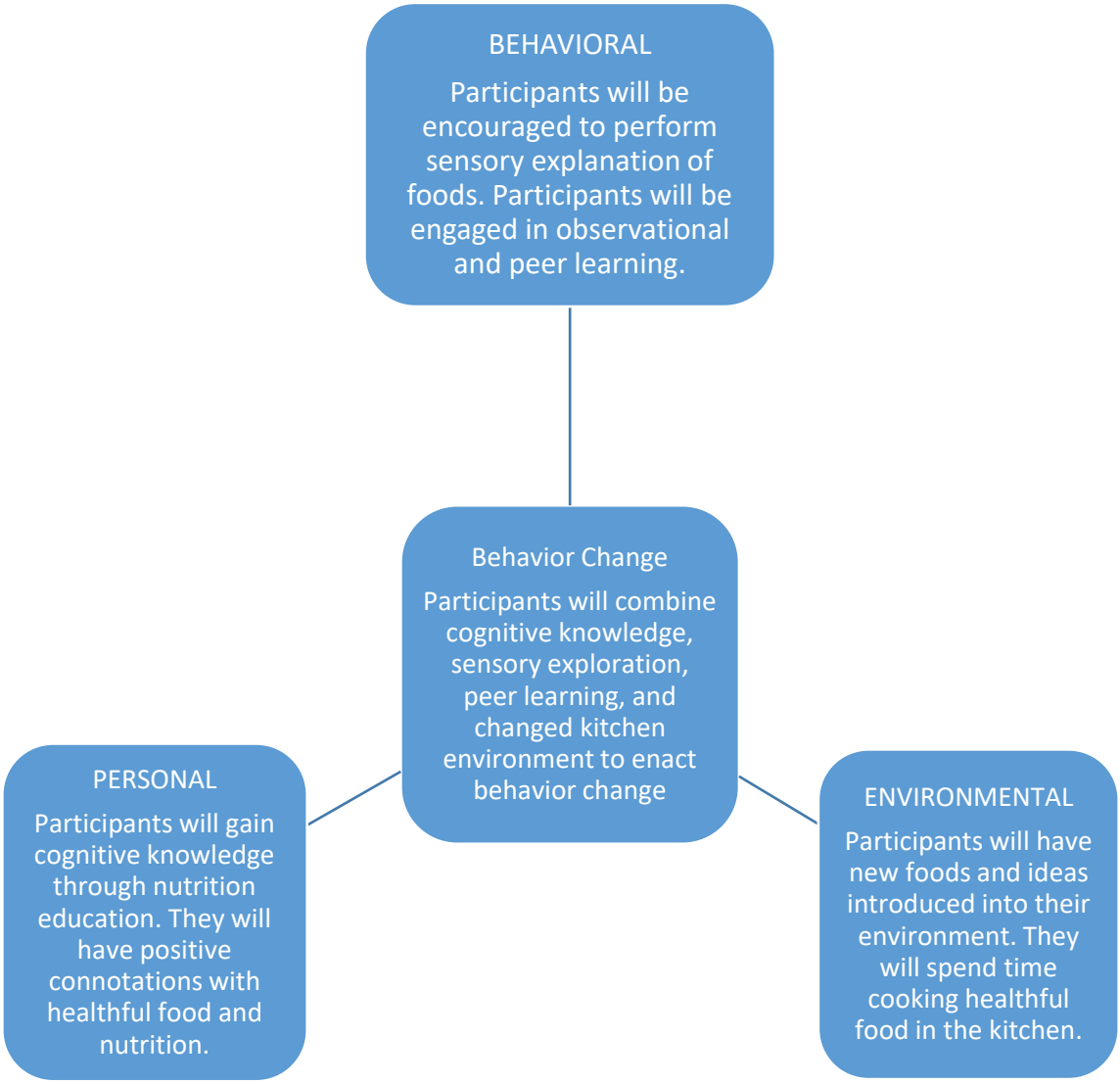


Figure 2: Theoretical Framework For Education Intervention using Social Cognitive Theory

CHAPTER III: METHODS

The purpose of this study is to determine if a nutrition education program can be effective at increasing nutritional knowledge and changing behaviors related to food among a sample of adults with developmental disabilities. A mixed methods research design is most appropriate for exploring multiple factors in one study when each of those factors benefits from a different type of data collection (Creswell, 2014). The quantitative portion of the study included a survey administered on the first and last day of the intervention, which tested the knowledge of nutrition and health topics in the group of participants. The qualitative portion consisted of observations recorded by the participant observer before, during, and after the intervention. This chapter describes the methods used to conduct the study, including research design, intervention development, and data collection and analysis techniques.

Setting

This research study was an education intervention that was conducted over a 12-week period at Promoting Responsibility, Independence, Decision-making and Employability (P.R.I.D.E.), Bergen County, in northern New Jersey, an adult day program for adults with developmental disabilities. P.R.I.D.E. Bergen County is one of three centers associated with the P.R.I.D.E. program. The adults at the day program learn independent living skills such as social skills, money skills, laundry skills, and how to spend leisure time. In addition to classes, there is P.R.I.D.E.CO, a shredding and copying operation that supplies its services to surrounding businesses. Working in the P.R.I.D.E.CO room during the day allows the adults to earn an income and increase their employability. The center has regular outings to restaurants and to the Boys and Girls

club for basketball, as well as special activities to help the adults interact in a socially acceptable manner while giving them a community in which to be themselves. The center employs six staff members who teach and assist the adults in their day-to-day activities. There are currently 26 adults who spend their days at the center from 9am to 3pm and participate in scheduled activities. More precise demographics are not available for the adults with developmental disabilities due to limitations in the scope of data collection as regulated by the Montclair State University Institutional Review Board. However, it can be said that the intervention group, divided into two classes that each met once per week, consisted of adults with several different types of diagnosed developmental disabilities, and were mixed in terms of cognitive ability and function. The comparison group was also from the adult day center and consisted of adults with several types of diagnosed developmental disabilities and was mixed in terms of cognitive ability and function.

Recruitment

The recruitment process was complicated given the federally protected status of the participants involved. There are additional requirements in place for those who work within communities of adults with developmental disabilities due to the vulnerable nature of this population. The precedent when working with these adults is to have someone close to the adults and familiar with their mannerisms and abilities choose the participants for research studies (Johnson, 2011). The Center Director, who has worked with these adults for several years, chose 16 adults that she felt would be able to participate and benefit from the study. Letters and consent forms (Appendices A and B, respectively) were sent home to their guardians. Those adults who had consenting guardians were allowed to choose the Nutrition Education and Cooking class for their

schedules. The center runs on two-month schedules, where every two months the adults meet individually with the Center Director to select their weekly schedule. The Nutrition Education and Cooking class was offered as one of the four options for those adults whom the Center Director chose and whose guardian gave consent. If the adult wanted to take the class, the researcher met with the adult and told them it was a research project and read them an assent form. On completion of the assent form (Appendix C), the adult was enrolled in the study and became a participant in the intervention group, and each adult had one session of Nutrition Education and Cooking per week. Of the 16 consent forms sent home to guardians, 16 returned with consent, and all 16 adults assented and were enrolled as participants. The Center Director confirmed the adults in the center have always enjoyed being in the kitchen, therefore, when a cooking class was offered, they all wanted to take part in it.

Due to the high number of positively responding participants and guardians, the group had to be broken into two sections. These sections were randomly assigned and had no qualifying factors. Therefore, there were two classes per week with eight participants each, and they were taught the same curriculum in the same manner, with identical materials, time, and equipment. The comparison group was recruited in a similar manner. The Center Director reviewed the remaining adults in the center and selected the six participants who were able to sit still, understand simple instructions, and hold a pencil.

This study was approved by the Montclair State University Institutional Review Board and given approval number IRB-FY16-17-607. Approval was also given by the

Director of P.R.I.D.E. for the researcher to conduct her study in the program. The researcher already worked as a consultant to the program, and knew the adults.

Intervention

The nutritional education intervention was based on social cognitive theory, as discussed in Chapter 2. After the administration of the nutrition knowledge and activity survey, the class was brought into the kitchen at the beginning of each session.

Classes began with a discussion of food groups. This was accomplished by emptying the pantry closet and refrigerator onto metal countertops and asking the adults to sort the food into food groups. The researcher and staff helped the participants with any unknown items. The participants were then introduced to the recipe and ingredients for the week, and were encouraged to taste, smell, and feel each food individually. Kitchen equipment, washing hands, and food safety were also emphasized through the creation of each recipe. At the conclusion of each session, the food was portioned and offered to the participants.

The ingredients used in the recipes provided the framework for learning about nutrition. Table 3 outlines the recipes and topics covered each week. Portion control, calories, and lower sugar options were all discussed during the cooking process. The researcher attempted to only demonstrate a procedure, and not complete any of the food preparation directly, apart from those participants that required hand-over-hand assistance. Every participant was given a portion of the finished food to try, and the remainder of the food was left in a common area of the kitchen for other P.R.I.D.E. adults and staff to try. Again, this method followed the constructs of social cognitive theory by changing the environment through the addition of food samples that were easy to prepare

and healthful. Additionally, by watching staff and peers eat, the observational learning construct was employed. Table 4 explains how each construct derived from the social cognitive theory was addressed in the development of the nutrition education program for adults with developmental disabilities. A complete timeline of the intervention project can be found in Appendix D.

Table 3: List of Recipes and Topics Covered Each Week

Week	**Recipe and Activities**	**Topics Covered**
1	No recipe, baseline survey and exploring the kitchen	Food groups
2	Frushi (Sushi with fruit instead of fish)	Vitamin C, fruit, grains
3	Hummus and Veggie Plate	Legumes, seasonings, whole grains, vegetables, vitamin A, using the food processor
4	Eggs and Omelets	Food Safety, protein, working with the stovetop, review of vegetables, whole grains
5	Granola	Whole grains, how to turn on an oven, how to store food appropriately, how to use natural sweetener
6	Yogurt Parfaits	Dairy, fruit, food safety, breakfast ideas, portion control, calories
7	Quinoa Crunch Granola Bars	Baking basics, calories and portion control, additives, nutrients, whole grains
8	Oatmeal Raisin Cookies, post-intervention survey	Whole grains and portion control

Table 4: Social Cognitive Theory Constructs and Implementation in Nutrition Education Intervention

Construct	**Method of Implementation**	**Desired Outcome Throughout Nutrition Education Program**
Behavioral Capability	Participants were educated on basic nutrition topics, and basic cooking skills were used in conjunction with the nutrition lessons.	Participants increase their knowledge of nutrition and skills in the kitchen in order to help them expand their food preferences and create more varied and healthful diets.
Expectations	Participants were told that by trying new foods and learning about nutrition they may find more things they like to eat, and would be able to do more things for themselves in the kitchen.	Participants will become more open to trying new foods and slowly change their diet to reflect a more balanced and nutritious diet.
Self-efficacy	Participants were taught using hands-on methods as they handled and prepared food themselves. They also practiced kitchen hygiene and safety. Skill level was assessed as participants worked to improve each week.	Participants will feel confident in their ability to try new recipes and food in the kitchen and do not always rely on the same processed and pre-prepared meals.

Reinforcements	Participants were offered healthful versions of favorites like granola bars and cookies, to provide an incentive to improve kitchen skills and knowledge.	Participants will feel confident and able to make more homemade healthful treats.
Observational Learning	Participants saw peers eating and enjoying food since recipes were carefully selected to include choices that some participants in every class were likely to eat. Additionally, the researcher and staff demonstrated and tried all foods, and all foods were left in the open for other staff to try. In this way, participants observed others eating and enjoying foods that were new and different.	Participants will observe and learn that trying new foods can be fun and not intimidating.
Reciprocal Determinism	The kitchen environment in the center was changed to reflect new ingredients, and the food made in class was left in the fridge and in the open for all to sample. In depth explanation and repetition of nutrition concepts was stressed in each class. In this way, personal knowledge and environment was changed. These two factors changing will influence behavior change.	By changing personal knowledge and environment during the nutrition education program, behavioral change is more likely.

Each participant entered the class with a different cognitive, knowledge, comfort, and ability level. Because the adults needed close supervision, all qualitative observations

were recorded by the researcher at the end of each class. These observations identified which food handling skills the participants used, kitchen equipment used, the level of success in both these areas, and what new foods were tried, accepted, and rejected. In order to eliminate researcher bias, each food item was offered only once, and although participants could change their mind, their initial reaction was recorded. The P.R.I.D.E. staff were extremely valuable in helping to keep track of these activities and in assisting those participants that required hand-over-hand help. The data was collected and categorized using a 1-10 scoring rubric, with 1 the lowest score (demonstrates no skill, does not show comprehension) and 10 the highest (has mastered skill or retention, could perform skill without help, could explain nutritional term without any help or prompting). For a complete scoring rubric, see Appendix E.

One reason the researcher was given entry to complete the study in the specific community was the researcher's status as a consultant who was known to the adults. However, this also created a level of bias. The researcher attempted to eliminate this bias through the use of data collection tools and rubrics that allowed for specific steps in collection of data. During the intervention, each participant was rated (Appendix E) based on their initial reaction, and the researcher followed a strict "ask once only" protocol that ensured that participants did not receive greater or fewer opportunities for skill development than any other participant.

Data Collection

Cognitive knowledge

One primary outcome of the study was cognitive knowledge. To assess knowledge, participants were surveyed using a pre-test, post-test design. For this study,

the intervention group was given a baseline pre-test and a post-intervention test. The comparison group was given the same pre-test followed by a retest eight weeks later. Due to the functional status of the participants, a pictorial survey adapted from the Nutrition and Activity Knowledge Scale (Illingworth, Moore, & McGillivray, 2010) was used to measure knowledge and determine if any change was statistically significant. Permission from Jane McGillivray at Deakin University was sought and granted to use and update the scale, provided the original authors were referenced appropriately. The scale was originally meant to test exercise, health, and nutrition knowledge. The graphics were outdated, therefore all pictures and approximately 85% of the questions were altered to reflect nutritional knowledge such as food groups and basic nutrients, using more current and familiar artwork. Cronbach's alpha was calculated on the pretest scores of the intervention and comparison groups to determine the reliability of the adapted scale. Cronbach's alpha was determined to be .694, which gives the adapted scale reliability.

Two professors at Montclair State University provided expert review of the questions and multiple-choice answers; one is a Registered Dietitian and has a Doctorate of Public Health; the other is the chairperson of the Nutrition and Food Studies Department and is an expert in quantitative research. The result was a 26-question pictorial survey. Each question was simply worded and followed by bright, colorful multiple-choice picture answers. The method for delivering the survey used a script that explained each picture before the question was asked. During the administration of the survey at P.R.I.D.E. of Bergen County, the test and retest conditions for the intervention and comparison groups were kept the same. This included the physical space, lighting, personnel, and seating. Study carrels were erected between participants in order to

eliminate copying from each other's papers. A copy of this survey can be found in Appendix F.

Behavior Changes

An additional outcome of interest was behavior change regarding food choice and food consumption. Two, two-week lunch observation periods during the study were established for the researcher to see how the lunch times were approached before and after the intervention, the food choices that were made, what lunches were packed from home, and to obtain a better understanding of eating habits in the population. The researcher attended P.R.I.D.E. during lunch hours and wrote down what each adult in the center was eating, and when possible, the order in which it was eaten and which food items were disposed. At P.R.I.D.E. the lunch program is divided into three options:

1. Packed lunches from home, where the guardians send in what the adults may eat for the day.
2. Order in or luncheon outings, where the group that is eating together decides on the restaurant by majority vote after several options are suggested by the members of the group.
3. P.R.I.D.E. lunch, where the center members come up with recipe ideas and the group then votes on a lunch menu. The adults at P.R.I.D.E. help find a recipe and assist in the preparation and serving of the lunch. When the lunch is served, everyone has the option to try the food, although some adults still decide to bring lunch from home in case they do not care for what is offered.

During each observation period the researcher was able to record a minimum of two of each of the possible lunch scenarios. The lunch observations were made with as little intrusion as possible into the daily workings of the facility by not commenting or asking questions about food included in lunches, and gently changing the topic if conversations developed regarding food or what the researcher was writing.

The P.R.I.D.E. staff was enlisted for the purpose of recording lunches when the researcher was unavailable because there were participants in multiple locations. Each weekday, the Center Director would send out a text message to staff requesting data, pictures, and explanations, and then consolidate the information to send to the researcher. Additionally, the staff was extremely helpful in looking around the lunch room and providing details that occurred while the researcher was observing another adult. When P.R.I.D.E. lunch was served in the center (option 3 above), the researcher counted the number of adults who ate P.R.I.D.E. lunch, and took note of what was eaten, the order of foods consumed, and approximate plate waste. Because everyone was given the same food and portion sizes on P.R.I.D.E. lunch days, plate waste estimates were available and could be compared to the post intervention observations. On outing days (option 2 above), the researcher relied entirely on the P.R.I.D.E. staff to remember and record through photographs and text messages who ordered what, and plate waste was not available for the adults on the outing. However, this was not problematic for the purposes of these observations, as the adults' choices of where and what to eat when given a menu full of options was more pertinent to the research than how much they ate of the food they ordered.

The research project ended with the second two-week observation period. This was a time when the researcher looked to see if any of the adults attempted to incorporate skills and foods from the Nutrition Education and Cooking class into daily life in the center, specifically during cooking and lunch periods. This two-week observation period encompassed 10 lunch sessions, and incorporated all three lunch options (bagged lunch, lunch outing, and P.R.I.D.E. lunch). The researcher focused on food choice from menus for both the lunch outing and ordering and participation in P.R.I.D.E. lunch. The order in which food was consumed was also observed when possible, along with food waste, as in the initial observation period.

Intervention Data Collection

During the intervention, each participant was given a daily kitchen score based on a rubric assessment of their skills (Appendix E). In addition to this rating, they were given a score based on their retention of nutritional knowledge and whether they tried a new food when offered. These scores combined to create a weekly class score for each of the participants. Further explanation of weekly scores is in Data Analysis: Behavior Change: Intervention. Behaviors demonstrated by each individual were kept track of in a behavior change chart, examples of which are in Table 11.

Data Analysis

Cognitive knowledge

Changes between the pre-post surveys were analyzed for the intervention and comparison groups using IBM SPSS Statistics 24. A paired sample t-test was performed on the pre- and post-surveys to determine the statistical significance of the change for both comparison and intervention groups. Significance was determined at $p<0.05$. The t-

test scores were then used to calculate the magnitude. Magnitude was calculated by eta squared, to determine the effect size. Magnitude was considered significant at 0.50 (Ross & Shannon, 2008).

Behavior changes: Intervention

Initially, each participant was observed and rated to determine baseline behaviors and skills. Then each week, the participant was rated on basic kitchen skills, nutritional knowledge interest and retention, and if a new food was tried, Yes or No was indicated. These areas of study were each rated on a rubric scale, and then combined by the researcher to create a score of 1-10 (Appendix E). For example, if a participant used a food processor one week, but refused the next, the class score was lower the week the food processor was not used, as skills were rated independently each week. However, integration of the previous week's knowledge did affect the current week's score. This was accomplished by reviewing the previous week's nutritional topics with each participant in the group and asking questions such as "What food has a lot of Vitamin C?" and allowing participants each a chance to answer. If a participant was using the term Vitamin C on their own, appropriately, they would have a 10 for nutritional retention for the week. If they were asked what food had Vitamin C and the participant made no attempt to answer or engage with the question, he or she would have a 1 as that portion of their weekly score. For participants who thought about their answer and came back to the researcher, or were able to get the right answer on a second or third try when asked the question, they received a middle-ground score. Nutrition questions were asked a maximum of three times. Detailed scoring requirements are found in Appendix E. It was also noted which participants were engaged in the food group sorting at the beginning of

class. The kitchen skills score, nutrition retention and engagement, and the initial reaction to food combined to create a weekly class score by using the scoring rubric twice, once for kitchen skills, once for nutrition retention, averaging the two, and then using the Yes or No to initial food tasting to determine the final weekly score. This score tracked the progress of the participants and trends in the data.

Behaviors of the participants were recorded on a separate document in order to track changes in openness towards food and new experiences. If a participant initially refused to try or do something, this was recorded on the class rubric, but if they came back and had something later, unprompted, it was recorded for the behavior change chart. Using this data collection and analysis method also aided the researcher in remaining objective and helped eliminate bias by requiring the researcher to follow specific guidelines when offering foods, skills training, or recording notes specific for the weekly score. The observational data from the pre- and post- intervention observations were compared in order to discern changes in behavioral patterns concerning food choice and consumption.

Intervention effect

The quantitative and qualitative data were analyzed conjointly to evaluate the effectiveness of the nutrition education intervention. The pre- and post-intervention surveys provided the quantitative cognitive knowledge score to assess the intervention and comparison group cognitive knowledge gains. The qualitative data included the baseline and weekly annotations and rubric scores, along with behavior change charts recorded during the intervention, and observations pre- and post- intervention. The knowledge scores are the personal factors on the reciprocal determinism triad. The

environmental factors of the triad are the new foods offered during the lunches at P.R.I.D.E. either on or off campus. The behavior of interest is the choice to eat any particular menu item. If a participant's eating behavior changed along with a concurrent increase in nutrition cognition, then the behavior change was more likely a result of the increase in knowledge and not by chance.

The class scores, cognitive knowledge survey scores, and pre-and post-intervention observations demonstrated the participants could be divided into four distinct categories of individuals. One participant was chosen from each category and a vignette was written to illustrate the individual's experience as an example of that group.

CHAPTER IV: RESULTS

Demographics

The race, ethnicity, living situations, and specific diagnosis of the participants could not be included, as a review of medical records was neither permissible under the Institutional Review Board approval nor were guardians requested to disclose medical or other personal information for publication. The mean age of both intervention and comparison group participants was 26 years old.

Cognitive Knowledge

The quantitative portion of the mixed methods results came from the survey that was administered, although, in order to standardize the scores, the question on omega-3 fatty acids was removed from the survey results analysis because the lesson plan for omega-3 fatty acids was unable to be taught in the timeframe. (For a complete survey, see Appendix F). This question could not reflect an increase in knowledge due to the nutritional intervention if the knowledge was not provided.

The mean baseline score of the intervention group (n=16) prior to the series of Nutrition Education and Cooking classes was a 51% (Table 5). Only 15 participants were included in the analysis, as one intervention group member did not feel comfortable taking the baseline survey, although she did take the post-intervention survey. For consistency, her post-intervention score was not included. The comparison group (n=6) had a mean baseline score of 58% (Table 5). Due to privacy requests on the part of the participants, information on specific cognitive level and functionality is not able to be provided on a participant basis, or in chart form.

A paired sample t-test was conducted to evaluate the impact of the intervention on students' scores on the Nutrition and Health Knowledge survey (Table 5). The survey was graded on a percentage of 25 questions correct, with the highest possible percentage as 100%, which would equate to 25 out of 25 questions correct. There was a statistically significant increase in scores among the intervention group from baseline (Mean=51.73%, SD=18.48) to post-intervention (Mean=95.73%, SD=3.84), $p<.001$ (two-tailed). The mean increase in survey scores was 44%, with a 95% confidence interval ranging from 34.2 to 53.3. The eta squared statistic is .87, indicating a large effect size (Ross & Shannon, 2008).

Table 5: Paired Sample Statistics for Intervention and Comparison Groups

		N	**Mean**	**Std. Error Mean**	**Std. Deviation**	**T**	**Df**	**Sig (2-tailed)**
Pair One: Intervention Group	Baseline	15	51.73	4.77241	18.48345			
	Post-Intervention	15	95.7333	.99267	3.84460			
	Paired Sample T-test		-44%	4.39913	17.03	-10.0	14	.000
Pair Two: Comparison Group	Baseline	6	58.00	5.63323	13.79855			
	Follow-up	6	53.67	6.24856	15.305			
	Paired Sample T-Test		4.333	1.08525	2.65832	3.993	5	.010

The paired sample t-test for the comparison group was also conducted (Table 5). The mean scores for the comparison group displayed a statistically significant decrease from the initial test (Mean= 58.0%, SD= 13.79) to the repeat test (Mean=53.6%, SD=15.03) eight weeks later. The mean decrease in score from initial to follow up was

4.33% with a 95% confidence interval ranging from 1.5 to 7.1, p=.010 (two-tailed). The eta squared statistic (.76) here also indicated a large effect size. (Ross & Shannon, 2008).

Table 5 indicates that the standard deviation decreased by 14.6 points among the intervention group between pre-test and post-test, whereas the comparison group standard deviation increased by 1.5 points.

For the 15 participants who had both baseline and follow up cognitive knowledge scores, the breakdown of number of answers correct at baseline to number of answers correct post- intervention are listed in Table 6 according to the categories of nutrition content. This number represents the number of participants answering each question correctly, with the exception of the one participant who declined to take a baseline survey. Her follow up score has been excluded for continuity.

Table 6: Baseline and Post-Intervention Questions correct According to Category: Intervention Group

Food Groups			Food Safety		
Question:	Correct Baseline:	Correct Post-Intervention:	Question:	Correct Baseline:	Correct Post-Intervention:
2	8 (53.3%)	15 (100%)	17	8 (53.3%)	13 (86.7%)
5	14 (93.3%)	15 (100%)	18	7 (46.7%)	15 (100%)
8	7 (46.7%)	15 (100%)	22	9 (60%)	15 (100%)
23	10 (66.7%)	15 (100%)			
24	5 (33.3%)	15 (100%)			

General Healthy Habits			Food Preparation		
Question:	Correct Baseline:	Correct Post-Intervention:	Question:	Correct Baseline:	Correct Post-Intervention:
1	14 (93.3%)	15 (100%)	3	7 (46.7%)	14 (93.3%)
4	10 (66.7%)	14 (93.3%)	12	1 (6.7%)	15 (100%)
Portion Sizes, Calories, Healthful Foods			Nutrients and Food Properties		
Question:	Correct Baseline:	Correct Post-Intervention:	Question:	Correct Baseline:	Correct Post-Intervention:
6	7 (46.7%)	14 (93.3%)	9	3 (20%)	15 (100%)
7	10 (66.7%)	13 (86.7%)	21	7 (46.7%)	15 (100%)
10	9 (60%)	11 (73.3%)	16	8 (53.3%)	15 (100%)
13	13 (86.7%)	15 (100%)	19	7 (46.7%)	14 (93.3%)
14	5 (33.3%)	14 (93.3%)	20	12 (80%)	15 (100%)
15	6 (40%)	15 (100%)			
25	1 (6.7%)	13 (86.7%)			
26	5 (33.3%)	14 (93.3%)			

There was clear improvement in every content category, and every question had more participants answering correctly post-intervention compared to baseline.

For the six participants in the comparison group, the breakdown of number of answers correct at pretest to number of answers correct at retest are listed in Table 7 according to the categories of nutrition content. This number represents the number of participants answering each score correctly, with the percentage in parentheses.

Among the intervention group, several questions had higher frequencies of correct answers during the baseline test than other questions, such as 93% correctly identifying

an apple as a fruit (Q5), whereas only 50% correctly identified the protein food group, represented by fish (Q8). The comparison group (Table 7) scored similarly in the initial test. The general nutrition questions with the highest scores at baseline and test, as measured by more than 66% of both intervention and comparison groups answering correctly, included: identifying an apple as a fruit (Q2), identifying water as the best choice for hydration (Q1), running as the choice of activity requiring the most energy (Q20), and cake as the food option containing the most sugar (Q13). Questions answered by 33% or less of participants scoring correctly at baseline (intervention group) or test (comparison group), included: identification of oats as whole grains (Q24), identifying which food has the most calories (Q25), and which preparation of fish was the most healthful (Q12). These questions were spread over three content categories, but in this case, two of the questions represented the more abstract concept of calories or what contributes to healthful food preparation. In the intervention group, Q12 and Q25, the questions related to abstract calories, had improvements of 14 (87.5%) and 12 (80%) more participants answering correctly, respectively. The comparison group had no improvement or a decrease in these scores.

Table 7: Questions Correct According to Category: Comparison Group

Food Groups			Food Safety		
Question:	Correct Test:	Correct Re-Test:	Question:	Correct Test:	Correct Re-Test:
2	3 (50%)	0 (0%)	17	3 (50%)	2 (33.3%)
5	6 (100%)	5 (83.3%)	18	3 (50%)	3 (50%)

8	5 (83.3%)	5 (83.3%)	22	4 (66.7%)	4 (66.7%)
23	5 (83.3%)	5 (83.3%)			
24	0 (0%)	1 (16.7%)			
General Healthy Habits			Food Preparation		
Question:	Correct Test:	Correct Re-Test:	Question:	Correct Test:	Correct Re-Test:
1	6 (100%)	6 (100%)	3	2 (33.3%)	3 (50%)
4	6 (100%)	5 (83.3%)	12	2 (33.3%)	1 (16.7%)
Portion Sizes, Calories, Healthful Foods			Nutrients and Food Properties		
Question:	Correct Test:	Correct Re-Test:	Question:	Correct Test:	Correct Re-Test:
6	3 (50%)	3 (50%)	9	2 (33.3%)	1 (16.7%)
7	4 (66.7%)	5 (83.3%)	21	2 (33.3%)	2 (33.3%)
10	4 (66.7%)	3 (50%)	16	0 (0%)	0 (0%)
13	6 (100%)	6 (100%)	19	1 (16.7%)	1 (16.7%)
14	5 (83.3%)	4 (66.7%)	20	5 (83.3%)	4 (66.7%)
15	5 (83.3%)	4 (66.7%)			
25	2 (33.3%)	2 (33.3%)			
26	2 (33.3%)	1 (16.7%)			

Behavior Changes through Lunch Observations

Lunch was observed for the entire P.R.I.D.E. population for two weeks prior to the intervention, and for two weeks after the intervention ended. The majority of lunches observed consisted of lunches that were brought from home for the adults in the center. However, every adult in the program also has the option to choose to have P.R.I.D.E. lunch once a week, which is a lunch made on site by the adults with P.R.I.D.E. staff. The menu is voted on in advance. There is also an opportunity to go on an outing during the week. A local restaurant is nominated and then elected by the adults for eat-in or take-out orders.

When observing packed lunches in the pre-intervention period, there was a substantial amount of repetition. Of the members that were observed daily, 18 brought the same foods for lunch every day over the course of two weeks, with slight variation. Sandwiches and frozen food were regular staples in the adult lunch boxes, as were juice boxes, chocolates, cookies, dessert foods, and yogurts. Out of the 12 adults who regularly brought in sandwiches, five of the sandwiches were consistently made with whole grain bread. The fillings for the sandwiches were varied, with peanut butter, turkey, chicken, roast beef, and bologna all making appearances. The fillings generally did not change from day to day. For example, one adult always had peanut butter on a hot dog roll and Kool-Aid, with varying types of chips on the side. Another adult always had leftovers from dinner the night before in a lunch container-with fruit on the side. Three participants had identical meals each day with no daily variations at all. An example lunch from one adult in the center was two slices of pizza with a side of broccoli. Another adult

repetitively ate a gallon-size bag of buttered popcorn, half a gallon-size bag of pretzels, and a microwave container of french fries.

Each person had the option to eat their own bagged lunch every day, if they did not want to try something new or order food. The post-intervention observations showed that, in terms of the packed lunches from home, there was no change.

P.R.I.D.E. lunches, which are made on-site by participants and staff, were offered once per week. The lunch menu is decided on by a vote in the center, with both staff and adults contributing suggestions for meals. P.R.I.D.E. lunch options were ham and cheese sliders on white rolls with chips, and chicken and rice cheesy casserole during the pre-intervention observations (Table 8). The post-intervention choices included items with many more vegetables, whole grains, and food items not found in P.R.I.D.E. lunches before the intervention.

Table 8: Selected P.R.I.D.E. lunch offerings pre- and post-intervention

	P.R.I.D.E. Lunch Pre-Intervention	**P.R.I.D.E. Lunch Post Intervention**
Week 1	Ham and cheese sliders on white buns with chips	Broccoli, chickpea, and avocado whole wheat wraps
Week 2	Cheesy chicken and rice casserole	Asian chopped salad with soy-sesame vinaigrette

Restaurant choices were also different in the pre- and post-intervention observations (Table 9). In the pre-intervention observations, many of the restaurants were either in the mall or were fast-food chains. Popular choices for each group included Pancho's Burritos, Chinese take-out, pizza, and Subway. In the post-intervention observations, the restaurant selection was more diverse. Small, local restaurants, bagel delis, and salad bars were some new options. For example, instead of a burrito chain, the

group tried a Mexican restaurant where fresh produce was featured in salads, guacamole, and salsa.

Table 9: Selected restaurant choices pre- and post-intervention

	Restaurant Choice Pre-Intervention	**Restaurant Choice Post-Intervention**
Week 1	Mall Food Court; Chinese delivery; Pizzeria; Pizza Delivery	Daily Bagel; Grasshopper Pub; Italian Restaurant
Week 2	Mall Food Court; Chinese; Pancho's Burrito Delivery	Shake Shack, The Barrow House Pub, Applebee's

Intervention Analysis and Behavior Change

At baseline, only 3 out of the 16 participants (19%) in the intervention group were able to enter the kitchen, wash their hands, and successfully locate and sort food into food groups. By the end of the intervention, 100% of the participants could complete these tasks. Each participant cracked an egg, used new kitchen equipment, and tried at least one new food. The participants did not always care for the new food that they tried, whether it was due to personal taste or a textural reason. Those with limited verbal communication skills most frequently spit out foods they did not like.

Table 10 outlines the categories in which each intervention participant received scores after each weekly class. The table provides information for baseline (week 1), midway through the intervention (week 4), and the last week of the intervention (week 8). The goal of the researcher was to have continuous improvement throughout the intervention, but as the table shows, not every participant started from the same benchmark, and not every participant continuously improved.

Table 10: Baseline, Mid and Post Intervention Qualitative Scores based on a Scale of 1-10 where 1 indicates little or no ability and 10 reflects high ability

Adults' Names and Scored Categories (Names changed for anonymity)			**Baseline Week 1**	**Mid Intervention Week 4**	**Post Intervention Week 8**
1	Annie	Class Scores	1	2	5
		Kitchen Skills	1	1	5
		Nutrition Information	1	2	4
		Tried new foods? (Y/N)	N	N	Y
2	Leah	Class Scores	1	4	7
		Kitchen Skills	1	2	6
		Nutrition Information	1	3	5
		Tried new foods? (Y/N)	Y	Y	Y
3	Brian	Class Scores	1	5	8
		Kitchen Skills	1	3	6
		Nutrition Information	1	4	8
		Tried new foods? (Y/N)	Y	Y	Y
4	Jenna	Class Score	6	6	6
		Kitchen Skills	5	7	6

		Nutrition Information	1	4	6
		Tried new foods? (Y/N)	Y	Y	Y
5	Vincent	Class Score	5	2	7
		Kitchen Skills	5	3	6
		Nutrition Information	4	2	8
		Tried new foods? (Y/N)	Y	N	Y
6	Carlos	Class Score	4	3	7
		Kitchen Skills	5	4	8
		Nutrition Information	2	2	7
		Tried new foods? (Y/N)	Y	Y	Y
7	Chelsea	Class Score	1	4	8
		Kitchen Skills	1	4	8
		Nutrition Information	1	4	8
		Tried new foods? (Y/N)	Y	Y	Y
8	Xin	Class Score	6	1	8
		Kitchen Skills	7	2	8
		Nutrition Information	5	1	8

		Tried new foods? (Y/N)	Y	N	Y
9	Barbie	Class Score	3	5	8
		Kitchen Skills	2	6	9
		Nutrition Information	2	4	7
		Tried new foods? (Y/N)	Y	Y	Y
10	Will	Class Score	6	6	6
		Kitchen Skills	5	5	5
		Nutrition Information	4	5	5
		Tried new foods? (Y/N)	Y	Y	Y
11	Glenda	Class Score	4	6	8
		Kitchen Skills	3	5	8
		Nutrition Information	5	7	8
		Tried new foods? (Y/N)	N	Y	Y
12	Tommy	Class Score	1	8	4
		Kitchen Skills	1	7	5
		Nutrition Information	1	7	2

		Tried new foods? (Y/N)	N	Y	Y
13	Donnie	Class Rating	1	4	7
		Kitchen Skills	1	4	7
		Nutrition Information	1	4	7
		Tried new foods? (Y/N)	N	Y	Y
14	Max	Class Score	6	3	6
		Kitchen Skills	7	5	5
		Nutrition Information	5	3	5
		Tried new foods? (Y/N)	Y	N	Y
15	Christie	Class Score	8	8	8
		Kitchen Skills	8	8	8
		Nutrition Information	5	7	8
		Tried new foods? (Y/N)	Y	Y	Y
16	Jill	Class Score	9	10	10
		Behaviors	9	9	10
		Nutrition Information	9	9	10

		Tried new foods? (Y/N)	Y	Y	Y

The results of the Nutrition and Cooking Education class fell into three categories: those who maintained a consistent score on the rubric scale each week, those who started at a low level on the scoring rubric and improved consistently throughout the intervention, and those whose weekly score fluctuated. Each of the weekly class score groups represents significant increases in cognitive knowledge, as every participant received a higher percentage on the post-intervention survey. The weekly class score groups broke down to include the following participants:

- Inconsistent Scores: Max, Tommy, Xin, Carlos, Vincent
- Consistent Scores: Jill, Christie, Will, Jenna
- Steady Improvement: Donnie, Glenda, Barbie, Chelsea, Brian, Annie, Leah

These differences in scores can be represented by following three participants' journeys and behaviors (Table 11) throughout the intervention: Tommy, Jill, and Donnie. Tommy's score fluctuated from week to week. Jill was consistently a 9 and 10 throughout the intervention. Donnie started with a very low rating and steadily improved.

Case Study One: Tommy (inconsistent scores over time)

Tommy was an interesting participant in that he started from a place of rejection of most foods. Tommy was referenced in the pre-intervention observations as someone who eats the same lunch every day: a gallon-size bag of popcorn, a half-gallon bag of pretzels, and a container of microwave french fries. Tommy was reluctant to try new

foods at first, but was observed to smile and laugh while squishing the rice for frushi (sushi made with fruit). He seemed to enjoy the sensory exploration of the fruit and rice textures with his hands, but when he put rice in his mouth, he spat it out, as he did not like the texture at all. The next week, the class made three types of hummus with multigrain pita chips, and he did like the multigrain chips enough to dip them in the hummus. He tried one bite of each, and did not spit those out. Each week, Tommy was willing to try slightly larger portions or multiple bites of new foods. During the final week, participants made homemade granola style bars using fresh dates. Tommy ate an entire date and came back for seconds. Tommy was interested in the finished bars, and did try them, even though they contained quinoa and oats, two things would not initially eat. Tommy tried eight foods and 21 ingredients during weekly classes.

Tommy's caregiver was told that he tried new food and enjoyed it during the program, but she was either not willing or able to change her lunch packing habits. Tommy's lunch did not change, and whether or not he retains the knowledge from the program is yet to be determined. He did try several foods during P.R.I.D.E. lunches, such as the broccoli, chick pea, and avocado wrap. Tommy had gained new knowledge, demonstrated by a 64% increase in cognitive knowledge survey score, and when he had individual control, he tried new things. What Tommy lacked was control of his packed lunches and support in adapting to those changes. He also had problems communicating his new food preferences as he has limited verbal ability.

Case Study Two: Jill (consistent scores over time)

Jill was one of the higher functioning adult participants in the intervention. Jill has a great memory and has a high cognitive functioning level, as evidenced by receiving the

highest baseline survey score among all participants and the comparison group. Throughout the intervention she asked questions and tried many new foods. She was especially interested in substitutions and how to cut down on fat and calories in food. She understood the concept of processed and liked the idea of replacing refined white grains with whole grains. In the pre-intervention packed lunch observations, she ate two hamburgers for lunch every day on standard hamburger buns. In the post-intervention observations, she ate a turkey burger on a whole wheat bun and a veggie burger on a whole wheat bun. She routinely tried new restaurants and foods when she ordered from restaurants. The staff at the center supported those choices and helped point out new foods to her. Jill's caregiver was able to listen to her interests and desires, and changed her grocery shopping and packed lunches accordingly.

In Jill's case, she has increased knowledge of calories and portion size. Her survey score went from a 96%, with her incorrect answer in the category of calories and healthful preparations, to a 100%. The support of her family and the staff at the center allow a high level of individual control of her food choices. This led to her changing her daily lunch and thinking about nutrition. The behavior change, such as trying new foods at restaurants and reducing fat and calories in her day, may remain in effect if her supporting factors are also consistent and she can retain program knowledge and individual control.

Case Study Three: Donnie (steady improvement)

Donnie is a non-verbal young man who expresses what he likes and does not like through gestures, noises, and some partially formed words like 'hep' for help. Donnie, in the pre-intervention observations, ate most things that his guardians packed him, but

preferred french fries and refined white bread. He loves cake, cupcakes, and chips, and would eat some every day for snack. Donnie generally refused new foods, according to staff and those who know him.

Donnie started the intervention laughing at the idea of putting his hands on food, or smelling or tasting new foods. Donnie became interested in multigrain pita chips when the class made different types of hummus and a multigrain chip and vegetable platter. Donnie expressed interest in making Everything White Bean Hummus (a hummus made with a popular bagel seasoning flavor) and pointed to show he wanted to try some. Donnie ended up eating almost the whole bowl of bean dip and attempting to take the bag of multigrain chips with him after class. Donnie tasted every food after that day and tried multiple times to crack eggs successfully, until he mastered it. He wanted to learn the skill, and that behavior was shown through his patience and pointing at a new egg every time the one he was holding did not make it in the bowl or exploded when he tried to crack it.

Donnie tried new foods at the center, and ate the P.R.I.D.E. lunch that included vegetables that he would not have previously tried, but still ordered chicken fingers and fries when he went out for lunch, albeit from a different venue. Donnie's survey score increased from a 52% to a 96%.

Behavior Change

Every participant, as the vignettes which represent all weekly class score groups show, evidenced behavior change, as described in Table 11. Participants' baseline behavior is an action from the first class or several weeks of the intervention to some significant change in behavior towards a new food or cooking process during the

intervention. Behavior shifts could be as early as the first class, while for other participants it took weeks for a noticeable change. Willingness to try new foods and be receptive to the class and information would vary week by week, as discussed in Table 10.

Table 11: Participant-Specific Behavior Changes from Baseline to Final Day of Intervention

Participant Number	**Baseline Behavior**	**Evidence of Change**	**Timeframe: Weeks until Consistency Achieved**
Annie	Refused to take survey, refused to look at food or table or participate in any way	Slowly started talking to members during intervention, by end was mixing food and taking survey	4-6 weeks
Leah	Would not touch food with her hands during first class	Tried all foods in all classes and participated	2 weeks
Brian	Wandered during class talking to himself, would not focus on the food	Successfully sorted food into food groups with other participants	3 weeks
Jenna	Told researcher all food presented was 'yucky'	Referred to all food made, when asked to recap her favorite recipe, as 'yummy'	3-4 weeks

Vincent	Told researcher there were foods that he did not like and would not eat	Ate every food he claimed to not like or wish to try	First week
Carlos	Would not eat anything green	Ate spinach hummus and liked it	2 weeks
Chelsea	Said ‘no thank you’ to every new food	Asked another participant if they could hand her food, eventually began serving herself	2-6 weeks
Xin	Enjoyed the cooking process but was nervous about trying new foods	Began by smelling new foods, then ate everything	2 weeks
Barbie	Said “no no no” to all new foods	Began by smelling and touching the new foods, then chewing and spitting them out, then eating them	7 weeks
Glenda	Nervous about being in the kitchen, did not want to touch or taste anything	Used the food processor successfully	2 weeks
Will	Excited about the kitchen but with definite opinions about all foods	Tried new things and liked them- notably southwest breakfast burritos with zucchini and peppers	2 weeks

Tommy	Refused to touch or taste anything	Tried everything and came back for a second date	8 weeks
Donnie	Would not look at new foods and shook head in negative for any question asked	Cracked eggs until successful and took the bag of multigrain chips from the researcher	3 weeks
Max	Would not enter the kitchen	Entered the kitchen and asked questions about food	3 weeks
Christie	Scared to handle food or use equipment	Used the stovetop and the oven, as well as the food processor	4 weeks
Jill	Very opinionated regarding foods offered	First thing said at beginning of class "Today I will try something new"	3 weeks

Table 11 catalogues behavior changes in the participants, but attitude proved harder to measure for the researcher. Participants were asked if they liked things or if they were excited about a new food, however, their responses were limited by communication abilities and not regularly recorded in a way that could be objectively presented.

Continued behavior change was apparent in the group when they were asked to choose restaurants after their participation in this Nutrition Education and Cooking class. The participants and staff suggested new foods and restaurants resulting in expanded options. As decisions for restaurants is a democratic process in the P.R.I.D.E. Center, the nutritional environment for every adult in the center changed, not just for those who took

the Nutrition Education and Cooking class. A fourth case study can therefore be put forward, and this individual is from the comparison group. His example represents someone who did not have nutritional intervention and did not have cognitive knowledge gains, but did have a changed environment resulting from a nutritional intervention taking place within his community.

Case Study Four: Paul (comparison group member)

Paul did not take the nutrition education intervention since he was enlisted as a comparison group member. His cognitive knowledge survey score, which was 64% at test and 60% at retest, showed he did not gain cognitive knowledge during the time that the intervention group took Nutrition Education and Cooking. However, his eating habits were altered post intervention as a result of a social cognitive theory-supported environmental change. His friends at the center were eating different foods at lunchtime. Paul was given the more healthful post-intervention offerings during P.R.I.D.E. lunch and when he saw his friends eating, he tried it, finished it, and was overheard proclaiming that the meal was "good." He did not vote for the foods that he consumed, showing that the environment changes shifted his behaviors despite no change in knowledge.

CHAPTER V: DISCUSSION

Summary of Findings

Several hypotheses developed for the research project were supported: there was a 44% increase in cognitive knowledge as measured through survey scores (H_1); understanding of nutritional topics and kitchen skills was demonstrated on weekly class rubrics (H_2); behaviors of participants in the nutritional intervention changed (H_4); and there was a shift in food choices in the post-intervention P.R.I.D.E. lunches and restaurant choices representing visible dietary change (also H_4). The results of this research study show that a community of developmentally disabled adults was able to learn basic cooking functions, nutrition information, and food safety. Perhaps most importantly, the adults were able to make substantial food choice and consumption changes that were not limited to time spent in the kitchen. They also enjoyed being in the kitchen, as evidenced by voluntary behavior changes recorded by the researcher throughout the study (Table 11). The changes extended to the lunch observation periods beyond the intervention in the form of healthier P.R.I.D.E lunch menus and more varied restaurant choices (Tables 8 & 9). The comparison group had a mean decrease of 5% in cognitive knowledge scores, from 58% to 53%. The combination of behavior changes, group lunch choice changes, and cognitive knowledge increases in the intervention group show a situation in which nutritional knowledge was included into aspects of daily activity in the P.R.I.D.E. Bergen County center.

The result of analyzing these observations led to the creation of a new diagram. The initial theory was that the social cognitive theory framework diagram (Figure 2) would have all constructs and reciprocal determinism working together seamlessly to

create a behavior change in the adults. However, after observing the intervention group, pre- and post-lunches, and general behaviors in this sample of adults with developmental disabilities, it became clear the three main constructs that influenced significant behavior change were: the personal control the adults had over their behavior, the support within their environment they received in their efforts to change, and the knowledge they gained from the intervention. These ideas still follow the constructs of social cognitive theory, but show the most important factors for this community interacting in a dynamic, behavior changing trio (Figure 3).

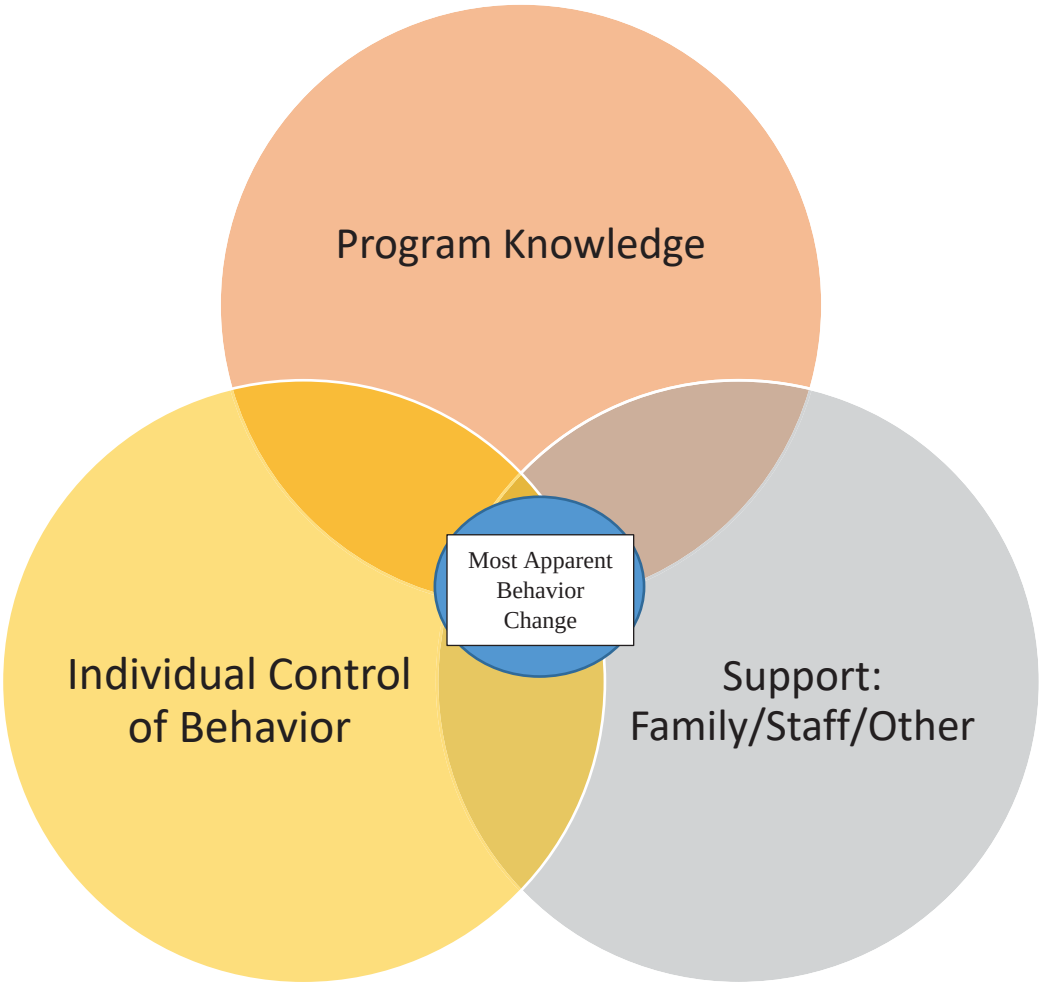


Figure 3: Sphere of Influence Diagram

Understanding the Difference in Projected and Actual Social Cognitive Theory Diagram

The refined diagram, Figure 3, shows the interaction of knowledge gained from the intervention; the control the individual has over their lunch choices; and the support that the family, staff, or peers provide when the adults are trying to change their eating behaviors. The original diagram that predicted the interaction of constructs within social cognitive theory was altered, as the previous diagram did not predict the level of importance that support would provide. This diagram represents the three points of the reciprocal determinism triad from social cognitive theory: environment, personal factors, and behavior change, and also pinpoints which aspects of those broader constructs, specifically, had the largest impact on the behavior changes of the adults.

In the analysis of which factors should be used when creating a nutrition education program for adults with developmental disabilities it became apparent that support was the key component of success. Support from the staff throughout the intervention itself was critical, as the staff were a piece of the observational learning construct that social cognitive theory promotes. The staff in this center asked questions, learned kitchen skills, and tried new foods along with the intervention participants which aided the observational learning construct. In addition, the staff continued to encourage the entire group by researching new and healthier recipes to present to the P.R.I.D.E. center, and promoting variety in restaurant choices. In this way, support from the staff was integral to the intervention and behavior change. Another type of support could come from the participants' caregivers. The adults with developmental disabilities cannot food shop or prepare meals on their own. If the caregivers support nutritional changes, the

adults will have a better chance of success should they wish to explore new foods or even recreate recipes from the intervention.

The next critical sphere found in this study was the program knowledge that the adults gained. The adults with developmental disabilities learned enough to understand basic nutrition and how to make more healthful food choices, and were able to have a deeper understanding of the foods they consume. Rather than simply identifying positive connotations with healthful food, adults were able to gain a deeper understanding of complex ideas such as variety, calories, and portion, as shown by their improved cognitive knowledge scores and their weekly class scores where participants at times explained concepts back to the researcher.

The final sphere is the amount of individual control that each participant had over their choices. Individual control could be one's ability to communicate either verbally or nonverbally one's wants or needs. This sphere, as the diagram shows, is linked with knowledge and support. During the study, when participants were given the individual choice and opportunity to make personal choices, they did so. The original diagram showed that behavioral factors such as sensory exploration would be key in changing overall behavior, but instead, it was the control the individual had over their behavior, as shown in Figure 3.

Therefore, the most conspicuous behavior change can be seen at the center of the diagram, where knowledge gained from the program combines with the individual's control over their behavior along with support to help the participant make the choices and changes he or she would like. Without any one of those pieces, behavior change is not impossible, but less likely.

Overall Successes of Research Project

The intervention observations showed a group of adults with developmental disabilities learning from each other and making incremental progress towards substantial kitchen skills and improved openness to a variety of foods. There was a significant increase in the cognitive knowledge of the participants, with survey scores increasing by 44%. Improvements were not only in one category of learning and this showed that participants were capable of short-term memory retention of information regarding nutrients, food safety, health, and food preparation as evidenced by 100% of intervention participants answering more questions correctly at post-intervention test. The magnitude calculation of the intervention through the surveys, eta squared, was measured at 0.87 on a scale where 0.8 is considered a large effect size (Ross & Shannon, 2008). The standard deviation decrease from the baseline survey to the post-intervention survey also suggests that the participants learned and retained a large amount of information. The baseline score standard deviation of 18.48 demonstrated the large variety of abilities and knowledge at baseline, representing a group of extremely mixed ability. The tight standard deviation at the post-intervention survey, 3.8, shows that even in this mixed group the intervention was able to affect all skill and knowledge levels and bring the class scores closer together, representing a large increase in knowledge across the entire group, even those participants who started with extremely low scores.

Of note is the decrease in the comparison group mean survey score. The calculation for the change in scores suggests that the decrease in score was statistically significant, but upon closer examination, the magnitude effect size was .36 smaller than the intervention group, and the change in standard deviation between test and retest was

1.5 This combination of factors, combined with the group size of only n=6, suggest that perhaps the decrease was not as statistically significant as the calculations would suggest; rather, the mixed ability comparison group most likely had some knowledge and some guesses which would keep their scores in the same percentage range, 50%-60%, but would cause some variation.

This ability to learn about food was an important outcome for this research program. While published literature that includes nutrition education for adults with developmental disabilities has had recorded weight loss effects and healthy lifestyle changes in a general manner (Humphries, 2009), nutrition education programs for adults with developmental disabilities have not fully shown that nutrition education alone can affect changes. The behavior changes that were documented in the program show a rapid willingness for change. The program was eight weeks including the baseline and follow up survey, and yet the adult participants increased their cognitive knowledge scores and displayed behavior changes.

Case studies painted interesting and informative vignettes of participants engaged in the intervention, and while each benefitted in their own way, vignettes highlight the spheres of influence discussed in Figure 3. For example, Tommy gained the new knowledge and experiences from the intervention (program knowledge), but his support level (support) and control over individual behavior (individual control) was not as high, as he was not able to choose his foods outside of his vote during group lunch decisions in the center. This indicates that he will have only the occasional new food, and may discontinue this behavior quickly. Since he cannot control what goes in his packed lunch, Tommy will eat what his caregiver purchases and/or prepares. His choices will depend on

the dietary habits, nutritional beliefs, cooking skills, finances, and taste preferences of his caregiver while he is in the environment of his home. This could be a common occurrence for adults with developmental disabilities since their caregivers' behaviors are also set in place. They may have been caretaking for decades using patterns of food habits that are guided by their own complex emotions, occurrences, and interactions with the adult with developmental disabilities.

Jill had a high level of individual control (individual control) over her actions as she was able to verbalize her questions, concerns, and lunch choices based on her increased knowledge from the program (program knowledge), and her support system inside and outside of P.R.I.D.E. listened to her and allowed her to make her own choices (support). Jill's guardian fostered her independent food choices and encouraged her interest in altering her food repertoire. As a result, the behavior changes witnessed in Jill are comparatively more likely to last and continue to expand.

Donnie had a slightly different case. Donnie gained knowledge from the program and began trying more foods during lunch (program knowledge). He had the support of the staff, but he also had a support system in place at home that allowed for his caregiver to be open to packing new foods, as expressed to the Center Director (support). His exact level of individual control over his behavior is unknown (individual control). Donnie's behavior change was greater than Tommy's, but less than Jill's because his support system and control over individual choice extended further.

The behavior changes that this group of participants achieved were notable. Tommy, Jill, and Donnie all started in different places in terms of skill and knowledge. The case studies not only demonstrate the application of the social cognitive theory

constructs in behavioral change but also show the journey of people that were involved in an experiential learning opportunity.

Paul was a separate case. He did not have the nutritional intervention, therefore did not gain cognitive knowledge (program knowledge). He did have support of the staff (support) when they made suggestions for lunch and restaurant choices, and he had individual control of his actions (individual control). Paul was able to choose the new foods in the post-intervention environment, which led to behavior change for Paul, which would not have happened had the social learning environment of the center remained unchanged. This comparison group example demonstrates how introducing nutrition education into communities of developmentally disabled adults can benefit more adults than simply the participants when the education is based on social cognitive theory and specifically supported through environmental shifts.

Of the four hypotheses that were developed for the research study, three of them were supported by the findings. H_1 stated that participant cognitive knowledge survey scores would increase. The mean score significantly increased by 44%. This also supports hypothesis H_2, which proposed an increase in nutritional and health related facts within the population. H_4, a visible dietary behavior change during the intervention and after, was also successfully documented through the behavior change chart. Post-intervention, there was a change in ordering, eating out, and P.R.I.D.E. lunches. H_3, attitudinal change, was more elusive. The participants did appear to enjoy the program, as evidenced by their behavior changes, which showed increased willingness to try new skills and foods, but attitude was not formally measured in this study and thus the hypothesis was not met.

What this picture of the intervention classes provides, in conjunction with Figure 3, is evidence of change in each participant. The improved survey scores and change of meal planning in the two weeks after the intervention shows that behavior change was present and noticeable, some behaviors carried over into the lunch observations post-intervention. These three factors provide support to the hypotheses and combine to classify this project as a success.

Part of this success is due to the use of social cognitive theory as the basis for the nutritional intervention. As adults in the center watched their peers eat new foods, they often ate the foods themselves thus benefiting by observational learning. Group learning is an important concept when working with populations with developmental disabilities (Walton & Ingersoll, 2013). Adults with developmental disabilities are particularly prone to examining what others are doing and copying it (Shedlack & Chapman, 2004), and this was the case both in the lunch observations and in the intervention. In the lunch observations, P.R.I.D.E. lunch was consumed, not thrown out, by those who did not take the program. In the intervention, those who would not approach the food, table, or take the baseline survey eventually were enticed into the group through social learning constructs. This validates the use of social cognitive theory as the theoretical framework and sets the groundwork for the new sphere of influence diagram to explain how each point of the reciprocal determinism triad work together. This information is vital for the framework of any new nutrition education program for adults with developmental disabilities.

Unexpected Outcomes

There were several unexpected aspects and side effects of the intervention. The research project was looking only at knowledge and behavior changes in adults who participated in the intervention yet, as previously mentioned, there were behavior changes within the larger group. This occurred due to the democratic food choice process. Since the majority of the group participated in the Nutrition Education and Cooking class, they became a 'voting block' that influenced the selection of restaurants and lunches. Therefore, the adults with developmental disabilities who did not take nutrition education were served the newer food choices with healthier varieties of food. Although they did not vote for that food, they ate it and expressed their enjoyment of the lunch through conversations and facial expressions. There was very little plate waste on the P.R.I.D.E. lunch days during the second observation period.

The staff at the P.R.I.D.E. center was noteworthy, as they were a necessary part of the intervention, which, as Figure 3 suggests, was unexpected, as this figure was a shifted version of the theoretical framework initially presented. With their encouraging words, actions, and modelling behaviors, the staff were crucial to the observational learning construct of social cognitive theory. The adults are encouraged to come up with the options to vote on for lunches and restaurant choices, but new options would not have been possible without the support of the staff. The intervention would not have been successful if the staff had expressed negativism or reluctance to change. While this does return the discussion to the support factor of the new triad interaction diagram (Figure 3) it is important to find such deep support for an intervention in a program in which nutrition education is being offered.

The intervention had an unexpected 100% acceptance rate and a 100% retention rate. While this may be unusual in most research studies, a simple and logical explanation for this occurrence rests in the P.R.I.D.E. Bergen County center. The adults would attend the center and its classes every day with or without the intervention, and the policy at the center is that once you sign up for a class, you must remain in it for the two months until the schedule switches. Therefore, when the participants were offered a class in a venue that is always popular, i.e., the kitchen, they all accepted the opportunity. There were 16 participants who were offered the Nutrition Education and Cooking class, and 16 joined the class and none of them dropped out. Even though they were told they could leave this class because it was offered as part of a research study, habit may have negated this offer, but no participants expressed a desire to leave at any point and all participants stayed.

Another unexpected outcome was the lack of caregiver excitement and participation. When caregivers were contacted by the Center Director to share news of what a participant tried or accomplished, most reacted calmly and with some disinterest. There were no indications that this would change nutritional habits in their home, or that they would pursue nutritional changes further. This suggests a need for caregiver involvement and education in addition to participant education.

Strengths of the Research Study

There were several strengths to this intervention. The mixed methods approach, in order to determine both knowledge increase through quantitative measurements, and behavior and food choice change through qualitative measurements, formed a strong

argument for validity of the data. This combined validity supported a successful intervention. A sphere of influence diagram (Figure 3) was also created based on the intervention and grounded in social cognitive theory, which could prove useful in the creation of further nutrition education programs in communities of adults with developmental disabilities by identifying those factors that should be given the most consideration in future programs.

One particular strength of this study was the unique status of the participant researcher. The researcher was well known to the participants for two years prior to the implementation of the observation period. This is notable because the adults were at ease with a familiar instructor; each adult acted, ate, and interacted in their usual manner during observation periods. The researcher knew the habits and communication styles of the adults with developmental disabilities prior to the intervention so that she was able to confidently communicate with and observe them, whereas, someone new to the community would not have similar insight.

Another strength was the use of this intervention to a specifically mixed diagnosis group. Because the group all had diagnosed developmental disabilities, which, while not reported, are medically known and diagnosed as an eligibility requirement for participation at the P.R.I.D.E. center, this intervention was able to reach a wide range of ability, functionality, and diagnoses, making it practical for wide-spread use rather than limited to a small percentage of diagnoses of the developmentally disabled population.

Weaknesses and Limitations of the Research Study

The weaknesses of this study became apparent in the lack of caregiver participation. As the results were analyzed, it became apparent that support was such an integral part of the revised model for behavior change and that greater caregiver involvement would have been extremely helpful. There was no material exchange or information provided to caregivers outside of the initial consent forms and letter informing the guardians that the research study was taking place. If the caregivers had received recipes, joint or videoed classes, or ways that they could support their adults through behavior changes, there may have been more apparent and larger behavior changes. Limitations in communication with caregivers possibly caused the behavior change aspect of the intervention to have less impact. Future nutrition education interventions for adults with developmental disabilities should incorporate more caregiver communication and education.

Additionally, the program was eight weeks in length, including first and second survey administration, which may not be a substantial amount of time for determining lasting behavior change (Ory, Smith, Mier & Wernicke, 2010). Limitations on funding also prevented the survey from being administered at a later time in order to evaluate retention of knowledge gained and skill areas mastered.

The lack of additional researchers was an occasional limitation to the survey administration and intervention observations. There were times during the administration of the survey, during the first or second question, when a participant would start to say their answer out loud, which may have influenced those around them who were taking the survey. These participants were gently reminded not to speak out loud, and the

situation was rectified. This did not occur during the retests, as the researcher was prepared for such possibilities and reminded participants more frequently not to say the answer out loud. Participants worked at different paces, making administration difficult. Study carrels had to be erected to dissuade members from copying each other's answers. While the survey was administered, it would have been smoother and neater with additional support for the researcher present. However, with only one researcher on site, the P.R.I.D.E. staff was utilized to provide observations when the intervention participants were off site at a restaurant or in another dining venue. The Center Director requested visual aids from restaurant visits, such as pictures of the food chosen and eaten by the participants. Although the staff attempted to be thorough in their data collection, the researcher could not always obtain information about the plate waste or the order in which food was eaten.

The researcher was known to the sample of adults with developmental disabilities and has working relationships with them. While this was a strength in the study, it is important to note that a level of bias could exist. The researcher took steps to eliminate this bias, such as offering a food only once with no coaxing, and recording that first response as the class score. The researcher also scored each kitchen skill level objectively. The high level of participation and cooperation received from the participants may have been influenced by the established positive relationship between the researcher and the adults with developmental disabilities.

An interesting limitation was the process of determining reliability of the survey instrument used to measure nutrition and health knowledge. By comparing the pretest survey scores of the intervention and comparison groups, the reliability was measured as

0.694. Generally, 0.7 is considered reliable (Ross & Shannon, 2008), and therefore this survey instrument was extremely close, but it is possible that the lower reliability score is in part due to the mixed diagnosis group (for which the study may not disclose information regarding specific diagnosis) and varying levels of cognitive function and communication in the particular group within which it was tested.

Implications for Further Research

There are multiple avenues for further research within this study. Immediately, the adults that received this nutrition education intervention could, without further intervention, take the survey at three-month intervals to determine level and length of retention over time. The intervention method developed could be used to teach information beyond what was covered in this study, and this information could also be measured over time with a similar cognitive knowledge survey. This study can also be repeated to determine a pattern of increased nutrition and health knowledge and changed behaviors within other communities of adults with developmental disabilities. Included in repeating this study is the use of the refined theoretical diagram, which outlines the constructs which should receive the most attention and be developed the most in future applications of this nutrition education program. For example, establishing a level of support among the staff in a center where the study will be repeated would be an important construct to develop, as would refining the research study by including guardians. Caregivers are not given attention in this study, and given the implications for support structure and the pivotal role caregivers could play in furthering nutrition education, a future research project should include a study of what would excite and motivate caregivers to tackle nutritional changes for their dependent. Caregivers could be

a source of support and encouragement, as well as a necessary link for adults with developmental disabilities who want to change nutritional habits, and finding out the best way to involve caregivers would be an extremely beneficial use of research resources.

In order to test this diagram and suppositions put forth in this research project, a controlled trial that compares combining nutrition and cooking with a nutrition only program would add to the knowledge regarding how adults with developmental disabilities learn and provide research regarding sensory learning and nutrition. This research project relied heavily on sensory input. Other ways to determine what method of learning would best help retention would be to provide different types of nutrition information and visual aids and measure their comparative effectiveness.

Yet another avenue of research is to refine the data collection method that was used, with special attention paid to the collection and rating of attitude changes. This study attempted to measure behavior and attitude changes, but in adults with developmental disabilities, this can be highly individualized and is not always clear. Therefore, a scoring rubric and more reliable way to measure attitudes in adults with developmental disabilities in the context of nutrition education would be a useful and logical step in furthering this research and validating the observations collected as a result.

Conclusion

This nutrition education intervention led to increased cognitive knowledge survey scores and substantial behavior changes, as well as changes that were noticeable in the choices of lunches in the post-intervention observations. The combination of these three areas of data support the notion that the intervention was responsible for increased

knowledge scores, altered behavior, and changing choices in a way that suggests similar results if repeated in another center for adults with developmental disabilities. This intervention showed improvements in a population that is both challenging to work with and increasing in number. Nutrition education must be a part of the solution. What this project provided is a format for teaching nutrition concepts to adults with developmental disabilities in a way that is accessible and effective. While this research study would benefit from refinement before implementing in other centers for the developmentally disabled, it clearly shows that adults with developmental disabilities have the capacity and willingness to embark on changes in their lifestyle and eating habits. With proper instruction and motivation, adults with developmental disabilities retain nutrition information in the short-term and to act on that information to make choices and promote change in their own lives.

References

American Diabetes Association. www.diabetes.org.

Bandura, A. (1986). *Social foundations of thought and action: a social cognitive theory*. United States of America: Prentice-Hall.

Bandura, A., & McDonald, F. J. (1963). Influence of social reinforcement and the behavior of models in shaping children's moral judgment. The Journal Of Abnormal And Social Psychology, 67(3), 274-281. doi:10.1037/h0044714

Bandini, L. G., Anderson, S. E., Curtin, C., Cermak, S., Evans, E. W., Scampini, R., et al. (2010). Food selectivity in children with autism spectrum disorders and typically developing children. Journal of Pediatrics, 157(2), 259–264.

Barahona, C., DuBard, M., Luiselli, J. K., & Kesterson, J. (2013). School-based feeding intervention to increase variety and quantity of foods consumed by an adolescent with autism. *Clinical Practice In Pediatric Psychology*, *1*(4), 361-368. doi:10.1037/cpp0000035.

Bayat, F., Shojaeezadeh, D., Baikpour, M., Heshmat, R., Baikpour, M., & Hosseini, M. (2013). The effects of education based on extended health belief model in type 2 diabetic patients: a randomized controlled trial. Journal of Diabetes and Metabolic Disorders, doi:10.1186/2251-6581-12-45

Bazzano, A. T., Zeldin, A. S., Diab, I. S., Garro, N. M., Allevato, N. A., & Lehrer, D. (2009). Research article: The Healthy Lifestyle Change Program. A Pilot of a Community-Based Health Promotion Intervention for Adults with Developmental Disabilities. *American Journal Of Preventive Medicine*, *37*(Supplement 1), S201-S208. doi:10.1016/j.amepre.2009.08.005.

Bergström, H., Hagströmer, M., Hagberg, J., & Elinder, L. S. (2013). A multi-component universal intervention to improve diet and physical activity among adults with intellectual disabilities in community residences: A cluster randomised controlled trial. *Research In Developmental Disabilities*, *34*3847-3857. doi:10.1016/j.ridd.2013.07.019.

Berlin, L., Norris, K., Kolodinsky, J., & Nelson, A. (2013). The role of social cognitive theory in farm-to-school-related activities: implications for child nutrition. *Journal Of School Health*, (8), 589.

Berry, R. C., Novak, P., Withrow, N., Schmidt, B., Rarback, S., Feucht, S., & ... Sharp, W. G. (2015). Nutrition Management of Gastrointestinal Symptoms in Children with Autism Spectrum Disorder: Guideline from an Expert Panel. *Journal Of The Academy Of Nutrition & Dietetics*, *115*(12), 1919-1927. doi:10.1016/j.jand.2015.05.016.

Bowman, S. L., & Plourde, L. A. (2012). ANDRAGOGY FOR TEEN AND YOUNG ADULT LEARNERS WITH INTELLECTUAL DISBABILITIES: LEARNING, INDEPENDENCE, AND BEST PRACTICES. *Education*, *132*(4), 789-798.

Burk, B. N., & Sharaievska, I. (2017). Health and Recreation Perceptions of Adults With Developmental Disabilities. *Therapeutic Recreation Journal*, *51*(3), 179-192.

Cobigo, V., Martin, L., Lysaght, R., Lunsky, Y., Hickey, R., & Ouellette-Kuntz, H. (2014). Quality Improvement in Services for Adults with Intellectual and Developmental Disabilities: Guiding Principles. *Journal On Developmental Disabilities*, *20*(2), 89-102.

Cocks, E., Thoresen, S., Williamson, M., & Boaden, R. (2014). The individual supported living (ISL) manual: a planning and review instrument for individual supported living arrangements for adults with intellectual and developmental disabilities. *Journal Of Intellectual Disability Research*, *58*(7), 614-624. doi:10.1111/jir.12059.

Conklin, C. G., & Mayer, G. R. (2011). Effects of Implementing the Picture Exchange Communication System (PECS) with Adults with Developmental Disabilities and Severe Communication Deficits. *Remedial And Special Education*, *32*(2), 155-166.

Cruwys, T., Bevelander, K. E., & Hermans, R. C. (2015). Research report: Social modeling of eating: A review of when and why social influence affects food intake and choice. *Appetite*, *86*(Social Influences on Eating), 3-18. doi:10.1016/j.appet.2014.08.035

Doody, C. M., & Doody, O. (2012). Health promotion for people with intellectual disability and obesity. *British Journal Of Nursing*, *21*(8), 460-465.

Eniola, S., & Bonnie, L. (2015). More than meets the eye: relational autonomy and decision-making by adults with developmental disabilities. *Windsor Yearbook Of Access To Justice, Vol 32, Iss 2, Pp 91-113 (2015)*, (2), 91.

Fifield, J. (2016, August 10). What happens to developmentally disabled as parents age, die? The PEW Charitable Trusts.

Findings from University of Newcastle Broaden Understanding of Diet and Nutrition (A systematic review and meta-analysis of social cognitive theory-based physical

activity and/or nutrition behavior change interventions for cancer survivors). *Obesity, Fitness & Wellness Week*, 20 June 2015, p. 2591.

Food and Nutrition Service Office of Policy Support. (December 2013). Supplemental Nutrition Assistance Program Education and Evaluation Study (WAVE II). Washington DC: USDA.

Francis, G. L., Blue-Banning, M., & Turnbull, R. (2014). Variables within a Household That Influence Quality-of-Life Outcomes for Individuals with Intellectual and Developmental Disabilities Living in the Community: Discovering the Gaps. *Research And Practice For Persons With Severe Disabilities*, *39*(1), 3-10.

Gaines, A., & Turner, L. (2009). Improving fruit and vegetable intake among children: a review of interventions utilizing the Social Cognitive Theory. *Californian Journal Of Health Promotion*, *7*(1), 52-66.

Gerber, F., Baud, M., Giroud, M., & Carminati, G. (2008). Quality of life of adults with pervasive developmental disorders and intellectual disabilities. *Journal Of Autism & Developmental Disorders*, *38*(9), 1654-1665.

Goldschmidt, J., & Song, H. (2015). Practice Applications: At-Risk and Underserved: A Proposed Role for Nutrition in the Adult Trajectory of Autism. *Journal Of The Academy Of Nutrition And Dietetics*, *115*1041-1047. doi:10.1016/j.jand.2015.02.013.

Goldschmidt, J., & Song, H. (2017). Development of Cooking Skills as Nutrition Intervention for Adults with Autism and Other Developmental Disabilities. Journal Of The Academy Of Nutrition And Dietetics, (5), 671. doi:10.1016/j.jand.2016.06.368.

Goorabi, M. S., Akhoundan, M., Shadman, Z., Hajifaraji, M., & Nikoo, M. K. (2017). The Effect of Nutritional Education Program Based on Health Belief Model (HBM) on the Knowledge of Fasting Type 2 Diabetic Patients. *Nutrition & Food Sciences Research*, *4*(2), 15. doi:10.18869/acadpub.nfsr.4.2.3.

Glanz, K., & Bishop, D. B. (2010). The Role of Behavioral Science Theory in Development and Implementation of Public Health Interventions. *Annual Review Of Public Health*, *31*(1), 399. doi:10.1146/annurev.publhealth.012809.103604.

Glanz, K., Rimer, B., & Viswanath, K. (2015). *Health Behavior; Theory, Research, and Practice.* San Francisco, CA: Jossey-Bass. 5th ed.

Gravestock, S. (2000). Eating disorders in adults with intellectual disability. *Journal Of Intellectual Disability Research*, *44*(6), 625-637.

Holford, Patrick & Deborah Colson. Optimum Nutrition for Your Child's Mind: Maximize Your Child's Potential. *Library Journal*, (13). 106.

Hubbard, K. L., Anderson, S. E., Curtin, C., Must, A., & Bandini, L. G. (2014). Research: A Comparison of Food Refusal Related to Characteristics of Food in Children with Autism Spectrum Disorder and Typically Developing Children. *Journal Of The Academy Of Nutrition And Dietetics*, *114*1981-1987. doi:10.1016/j.jand.2014.04.017.

Humphries, K., Traci, M., & Seekins, T. (2009). Nutrition and adults with intellectual or developmental disabilities: systematic literature review results. *Intellectual & Developmental Disabilities*, *47*(3), 163-185. doi:10.1352/1934-9556-47.3.163.

Humphries, K., Pepper, A., Traci, M. A., Olson, J., & Seekins, T. (2009). Research Article: Nutritional intervention improves menu adequacy in group homes for

adults with intellectual or developmental disabilities. *Disability And Health Journal*, *2*136-144. doi:10.1016/j.dhjo.2009.01.004.

Iacono, T., & Carling-Jenkins, R. (2012). The human rights context for ethical requirements for involving people with intellectual disability in medical research. *Journal Of Intellectual Disability Research*, *56*(11), 1122-1132. doi:10.1111/j.1365-2788.2012.01617.

Illingworth, K., Moore, K. A., & McGillivray, J. (2003). The Development of the Nutrition and Activity Knowledge Scale for Use with People with an Intellectual Disability. *Journal Of Applied Research In Intellectual Disabilities*, *16*(2), 159-166. doi:10.1046/j.1468-3148.2003.00158.x

Horner-Johnson, W., & Bailey, D. (2013). Assessing Understanding and Obtaining Consent From Adults With Intellectual Disabilities for a Health Promotion Study. *Journal Of Policy And Practice In Intellectual Disabilities*, (3), 260.

Johnson, C., Hobson, S., Garcia, A. C., & Matthews, J. (2011). Nutrition and food skills education for adults with developmental disabilities. *Canadian Journal Of Dietetic Practice & Research*, *72*(1), 7-13. doi:10.3148/72.1.2011.7.

Koritsas, S., & Iacono, T. (2016). Weight, nutrition, food choice, and physical activity in adults with intellectual disability. *Journal Of Intellectual Disability Research*, *60*(4), 355-364. doi:10.1111/jir.12254.

Kuijken, N. J., Naaldenberg, J., Nijhuis-van der Sanden, M. W., & Schrojenstein-Lantman de Valk, H. J. (2016). Healthy living according to adults with intellectual disabilities: towards tailoring health promotion initiatives. *Journal Of Intellectual Disability Research*, *60*(3), 228-241. doi:10.1111/jir.12243.

Landskron, S. (2001). *Feeding Disorders in Children with Developmental Disability*. University of Nottingham.

Liou, D. (2015). *Nutrition Education: Keys to Success.* Publisher: Author.

Loyd, D. (2013). Obtaining consent from young people with autism to participate in research. *British Journal Of Learning Disabilities*, *41*(2), 133-140. doi:10.1111/j.1468-3156.2012.00734.x

McKinley, E., & Turner, L. (2017). Increasing breastfeeding rates among African-American women enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children: application of Social Cognitive Theory. *Journal Of Children & Poverty*, *23*(1), 95. doi:10.1080/10796126.2017.1281795.

Mesibov, G., & Schopler, E. (1983). The development of community-based programs for autistic adolescents. *Children's Health Care*, *12*(1), 20.

Murimi, M. W., Kanyi, M., Mupfudze, T., Amin, M. R., Mbogori, T., & Aldubayan, K. (2017). Systematic Review: Factors Influencing Efficacy of Nutrition Education Interventions: A Systematic Review. *Journal Of Nutrition Education And Behavior*, *49*142-165.e1. doi:10.1016/j.jneb.2016.09.003.

Naaldenberg, J., Kuijken, N., van Dooren, K., & van Schrojenstein Lantman de Valk, H. (2013). Review article: Topics, methods and challenges in health promotion for people with intellectual disabilities: A structured review of literature. *Research In Developmental Disabilities*, *34*4534-4545. doi:10.1016/j.ridd.2013.09.029.

National Down Syndrome Society. *Down Syndrome Facts*. http:www.ndss.org/index.php. (2017).

New Jersey Department of Human Services: Division of Developmental Disabilities.(2017). Supports Program Policies & Procedures Manual. Trenton, N.J..

Orlin, M. N., Cicirello, N. A., O'Donnell, A. E., & Doty, A. K. (2014). The Continuum of Care for Individuals With Lifelong Disabilities: Role of the Physical Therapist. Physical Therapy, 94(7), 1043-1053. doi:10.2522/ptj.20130168

Pett, M., Clark, L., Eldredge, A., Cardell, B., Jordan, K., Chambless, C., & Burley, J. (2013). Effecting Healthy Lifestyle Changes in Overweight and Obese Young Adults with Intellectual Disability. *American Journal On Intellectual And Developmental Disabilities*, *118*(3), 224-243.

Preece, D., & Jordan, R. (2010). Obtaining the views of children and young people with autism spectrum disorders about their experience of daily life and social care support. *British Journal Of Learning Disabilities*, *38*(1), 10-20. doi:10.1111/j.1468-3156.2009.00548.x

Privett, D. (2013). AUTISM SPECTRUM DISORDER. *Today's Dietitian*, *15*(1), 46.

Public Law 406-102. https//www.acl.gov./sites/default/files/about/-acl/2016-12/dd.act.2000.pdf.

Public Participation in Medical Screening Programs: A Sociopsychological Study. Public Health Serv Publ, No.572.(Brochure). Hochbaum, G:Author.

Real de Asua, D., Parra, P., Costa, R., Moldenhauer, F., & Suarez, C. (2014). Evaluation of the impact of abdominal obesity on glucose and lipid metabolism disorders in adults with Down syndrome. *Research In Developmental Disabilities*, 352942-2949. doi:10.1016/j.ridd.2014.07.038

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social Learning Theory and the Health Belief Model. *Health Education & Behavior, 15*(2), 175. doi:10.1177/109019818801500203

Ross, M., Shannon, D. (2008) *Applied Quantitative Methods in Education.* Dubuque, Iowa:Kendall/Hunt Publishing.

Saunders, R. R., Saunders, M. D., Donnelly, J. E., Smith, B. K., Sullivan, D. K., Guilford, B., & Rondon, M. F. (2011). Evaluation of an Approach to Weight Loss in Adults with Intellectual or Developmental Disabilities. *Intellectual And Developmental Disabilities*, *49*(2), 103-112.

Sharp, W. G., Jaquess, D. L., Morton, J. F., & Herzinger, C. V. (2010). Pediatric Feeding Disorders: A Quantitative Synthesis of Treatment Outcomes. Clinical Child & Family Psychology Review, 13(4), 348-365. doi:10.1007/s10567-010-0079-7.

Shedlack, K. J., & Chapman, R. A. (2010). Social Learning Interventions in a Developmental Disabilities Partial Hospital Program. *American Journal Of Psychiatric Rehabilitation*, *7*(1), 7-25. doi:10.1080/15487760490464942

Staff, A. (2017), *Autism and Associated Medical and Behavioral Conditions*. https://www.autismspeaks.org/what-autism/learn-more-autism/associated-health-conditions.

Staff, C. (2014, October 21). *Down's Syndrome*. https://www.cdc.gov/ncbddd/birthdefects/downsyndrome/data.html.

Staff, C. (2016). *Key Findings: New Growth Charts for Children with Down Syndrome in the United States.* https://www.cdc.gov/ncbddd/birthdefects/features/key-findings-new-down-syndrome-growth-charts.html.

Staff, C. (2017, March 10). *Autism Spectrum Disorder*. https://www.cdc.gov/ncbddd/autism.html.

Staff, C. (2017, October). Trends in the Prevalence of Developmental Disabilities in U.S. *Children*. https://www.cdc.gov/ncbddd/developmentaldisabilities/features /birthdefects-dd-keyfindings.html.

Stumbo, N. J., Wilder, A., Zahl, M., DeVries, D., Pegg, S., Greenwood, J., & Ross, J. (2015). Community integration: showcasing the evidence for therapeutic recreation services. *Therapeutic Recreation Journal*,(1), 35.

Subach, R. M. (2018). Brief Report: Improving food choices and nutrient adequacy in adolescents/young adults with developmental disabilities. Disability And Health Journal, 11139-142. doi:10.1016/j.dhjo.2017.05.00.3

Sun, Y., You, W., Almeida, F., Estabrooks, P., & Davy, B. (2017). Research: The Effectiveness and Cost of Lifestyle Interventions Including Nutrition Education for Diabetes Prevention: A Systematic Review and Meta-Analysis. *Journal Of The Academy Of Nutrition And Dietetics*, 117404-421.e36. doi:10.1016/j.jand.2016.11.016.

Taliaferro, A. R., & Hammond, L. (2016). "I Don't Have Time": Barriers and Facilitators to Physical Activity for Adults With Intellectual Disabilities. *Adapted Physical Activity Quarterly*, *33*(2), 113-133. doi:10.1123/APAQ.2015-0050.

USDA.(2016). Definition of Food Security. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security/.

Walton, K. M., & Ingersoll, B. R. (2013). Improving Social Skills in Adolescents and Adults with Autism and Severe to Profound Intellectual Disability: A Review of the Literature. *Journal Of Autism And Developmental Disorders*, *43*(3), 594-615.

Williamson, H. J., & Perkins, E. A. (2014). Family Caregivers of Adults With Intellectual and Developmental Disabilities: Outcomes Associated With U.S. Services and Supports. *Intellectual & Developmental Disabilities*, *52*(2), 147-159. doi:10.1352/1934-9556-52.2.147.

Yilmaz, M., Sari, H. Y., Serin, G. Ç., Kisa, S. S., & Aydin, Ö. (2014). The Effectiveness of Nutrition and Activity Programmes for Young Adults with Intellectual Disabilities. International Journal Of Caring Sciences, 7(2), 449-459.

Young, H., Erickson, M. L., Johnson, K. B., Johnson, M. A., & McCully, K. K. (2015). Research Paper: A wellness program for individuals with disabilities: Using a student wellness coach approach. Disability And Health Journal, 8345-352. doi:10.1016/j.dhjo.2014.12.003.

Appendix A: Letter to Parents regarding Nutrition and Cooking Class
Re: Nutrition Education

Hi Parents! My name is Rory, and while some of you know me as the yoga teacher, I will be adding to my schedule a little in upcoming weeks.

I am currently completing a Master's of Science in Nutrition Research and Education at Montclair State University, and I have written a Nutrition Education and Cooking class specifically for Bergen PRIDE. It will consist of 10 weeks of once a week class that is divided into a learning unit and then cooking or food skills lesson, and there will be a picture survey that consists of simple nutrition questions and pictures to choose from administered on the first and last day. The survey does not ask about personal habits or information, but just basic nutrition topics so that I can plan the classes. This is so I know what to teach, and then we can all see how much we learned together.

My class will be offered in July/August, and I'll be around looking at food choice for a couple weeks after to see how I did. I am doing this for two reasons: I really care about nutrition in our community, and I am working on research project for school, and I will be writing up the results of the program (no names or personal information of any kind) so that other centers and communities can benefit from the program if it is a success.

In order for your adult to take this class, I need you to sign the form that says you understand that this class is completely optional, it is a research project, and your adult can leave at any time if they want to.

If it is ok with you if your adult takes the class, please fill in a copy of the attached form and send it back, and the class will be made available for them to pick for their schedule. If you do not consent, that's fine, they will have other things they can choose just like normal, and they will not be offered this class. If they do choose the class, I'll let them know the same things I wrote in this letter and make sure they are ok with it all by reading them an assent form similar to the one attached here and making sure they understand that, while it will be a fun class, it is also part of a research project, and they do not have to participate and they can pick something else.

I am putting my phone number and email at the bottom- please feel free to reach out to me with any questions you have.

Thank you so much,

Rory Coleman

Colemanr3@montclair.edu

908-229-3165

Appendix B: Parent Consent Form

MONTCLAIR STATE UNIVERSITY

College of Education and Human Services
Department of Nutrition and Food Studies

Voice: 973-655-5395

Parent/Guardian Consent Form

for Participants Under 18 Years of Age or Dependent Adults

Please read below with care. You can ask questions at any time, now or later. You can talk to other people before you fill in this form.

Study's Title: Benefits of a Nutrition Education Program for Adults with Developmental Disability

Why is this study being done? This study is being done because all adults deserve to have nutrition education that is tailored to their learning environment and style, and by completing this study and seeing if there is an increase in knowledge and ability, we could make changes to the way nutrition education is taught in ad ult programs. Adults with developmental disability learn differently and at a different rate than other adults and could be at risk for health problems associated with diet. This education and cooking program will aim to increase knowledge and aide in healthful food choices and preparation.

What will happen while your dependent is in the study? Your adult will have the opportunity to pick Nutrition Education and Cooking for their schedule. They will have nutrition education as a class, where the first part of each session is basic knowledge, and the second part of each session is a practical in the kitchen. They will take two surveys consisting of simple pictures to circle based on simple, read aloud question; one in the beginning of the program, and one at the end. The questions will only be related to basic nutrition and health topics, not personal information or habits. I will be around during lunch for two weeks after the nutrition education program ends to see if anyone uses their new information.

Time: The study will be taught in July and August, and will take up to two activity sessions per week.

Risks: The risks are no greater than those in ordinary life.

Benefits: Your adult may benefit from this study because they will increase their nutrition knowledge, food prep skills, and maybe feel brave enough to try new foods!

Others may benefit from this study because if it is successful here, we could look at expanding the program to be offered again or in other places for other adults.

Who will know that your child or dependent is in this study? Your child or dependent will not be linked to any presentations. We will keep who your child or dependent is confidential according to the law.

Does your adult have to be in the study?

Your adult does not have to be in this study. She/he is a volunteer! It is okay if she/he wants to stop at any time and not be in the study. She/he does not have to answer any questions that she/he does not want to answer. Nothing will happen to your child or dependent. Their participation or non-participation in this research study will have no effect on their relationship with the PRIDE organization.

Do you have any questions about this study? Phone or email Rory Coleman, (908) 229-3165, colemanr3@montclair.edu or her Faculty Sponsor: Dr. Lauren Dinour, 973-655-5395, dinourl@montclair.edu, 1 Normal Ave., Montclair, NJ 07043-1624.

Do you have any questions about your rights as a research participant? Phone or email the IRB Chair, Dr. Katrina Bulkley, at 973-655-5189 or reviewboard@mail.montclair.edu.

Study Summary:

I would like to get a summary of this study:

Please initial: _____ Yes _____ No

If you have indicated you would like a summary of the study, it will be sent home to you in your adult's folder approximately 3 months after the conclusion of research.

The copy of this consent form is for you to keep.

Statement of Consent

I have read this form and decided that I agree to my adult's participation in the project described above. Its general purposes, the particulars of involvement, and possible risks and inconveniences have been explained to my satisfaction. I understand that my adult can withdraw at any time. My signature also indicates that I have received a copy of this consent form.

If you choose to give your adult the option to be in the study, please fill in the lines below.

Adult's Name: _____

Name of Parent/Guardian	Signature	Date
Name of Principal Investigator	Signature	Date

Name of Faculty Sponsor	Signature	Date

Appendix C: Participant Assent Form

MONTCLAIR STATE UNIVERSITY

College of Education and Human Services
Department of Nutrition and Food Studies

Voice: 973-655-5395

ASSENT FORM

Please read below or listen with care. You can ask questions at any time, now or later. You can talk to other people before you fill in this form.

Who am I? I am Rory Coleman. I'm a Master's student at Montclair State University in the Nutrition and Food Studies department.

Why is this study being done? We want to teach you about nutrition and cooking skills and see if I can teach in a way that helps you learn. I want to find out how to best to teach nutrition that will help make healthy food choices.

What will happen while you are in the study? If you want to be in this study, we will have nutrition and cooking classes. I'll ask you to take two surveys. The surveys are questions about nutrition with pictures to circle. I won't ask you about anything you eat or what you do. The survey is only to help me know if I did a good job teaching. It will have no impact on you. Also, I'll be around during lunch a couple times after the study to see if we can put our new information and ideas to use.

Time: This study will take the normal class time.

Risks: There are no risks greater than those in ordinary life.

Benefits: You may benefit from this study because you may learn some new facts about food, learn to prepare some new foods, and make new food choices that could help your health.

Others may benefit from this study because if I teach in way that you like or that helps you, we could continue teaching this way, or have other people learn from the program.

Who will know that you might be in this study? You and your parents and classmates will know that you are in this study. I will know that you are here, but we won't tell anyone else.

Do you have to be in the study?

You do not have to be in this study. We won't get mad with you if you say no. It is okay if you change your mind at any time and leave the study. You do not have to answer any questions you do not want to answer. You do not need to try any foods you do not want to try. Nothing will happen to you.

Do you have any questions about this study? Phone or email Rory Coleman, (908) 229-3165, colemanr3@montclair.edu or her Faculty Sponsor: Dr. Lauren Dinour, 973-655-5395, dinourl@montclair.edu, 1 Normal Ave., Montclair, NJ 07043-1624.

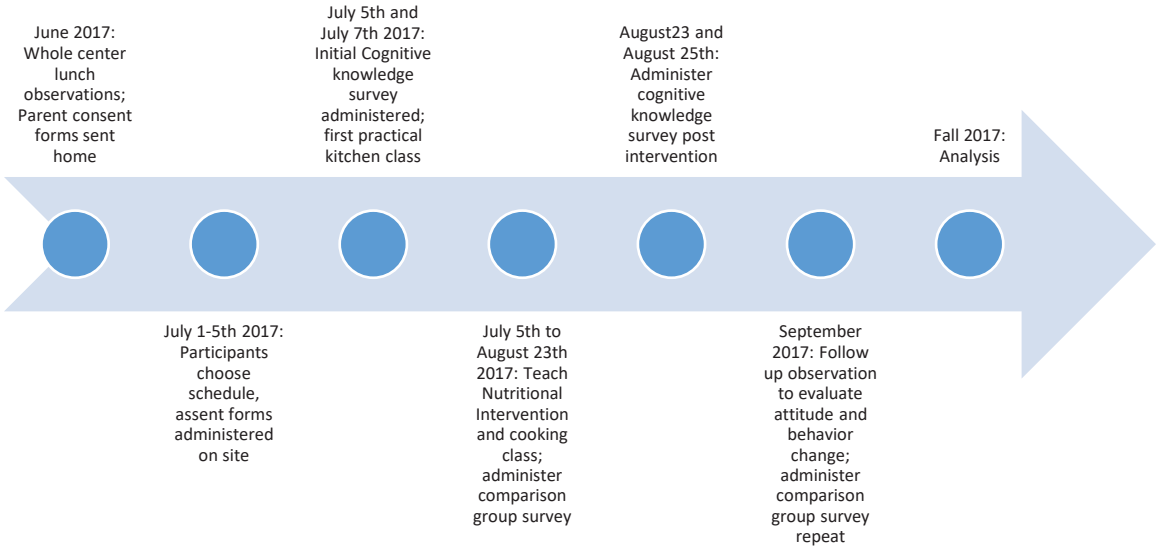
Do you have any questions about your rights as a research participant? Phone or email the IRB Chair, Dr. Katrina Bulkley, at 973-655-5189 or reviewboard@mail.montclair.edu.

Name of Research Participant	Signature	Date

Name of Witness	Signature	Date
Name of Principal Investigator	Signature	Date
Name of Faculty Sponsor	Signature	Date

Appendix D: Timeline of Project

Benefits of a Nutritional Education Program in Adults with Developmental Disabilities: Timeline



Timeline for Research Project. The first observation period began in June 2017, and the study concluded with the second observation in September 2017.

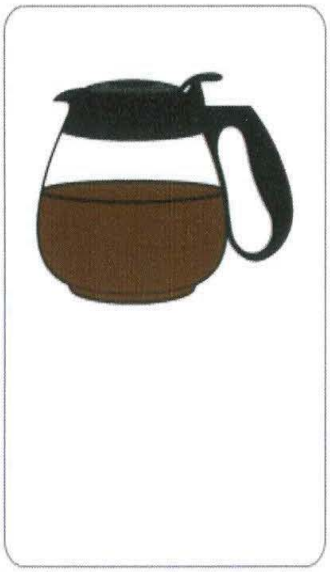
Appendix E: Scoring Rubric

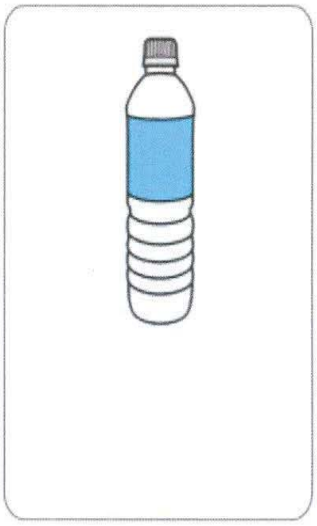
Nutritional Knowledge and Class Behavior Scores

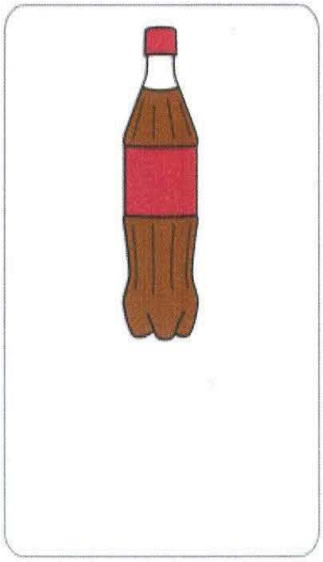
Scoring Rubric	General Criteria
1	Demonstrates no skill, does not show comprehension, makes no attempt to answer nutrition related questions or engage in conversation
2	May look over at food table; does not engage; does not answer nutrition questions
3	Engagement; does not have skill or retention of information without constant assistance
4	Has some skill or retention; looking to build new skills, attempts to answer nutrition related or other questions
5	Has skill but needs some guidance. Not ready for independence in the kitchen. Has some nutritional knowledge, but does not answer correctly every time. Is still distracted.
6	Building skills, Learning, able to explain basic nutritional terms
7	Asking questions on information not yet brought up, asks to use new kitchen equipment with specific purpose, can remember nutritional topics from previous weeks
8	Working towards independence in kitchen skills, can answer nutritional questions and is beginning to explain them back to researcher
9	Can connect classes that have been taught, can use all equipment covered in classes with supervision; demonstrates in depth understanding of nutritional topics
10	Has mastered skill or retention, could perform skill without help, could explain nutritional term without any help or prompting

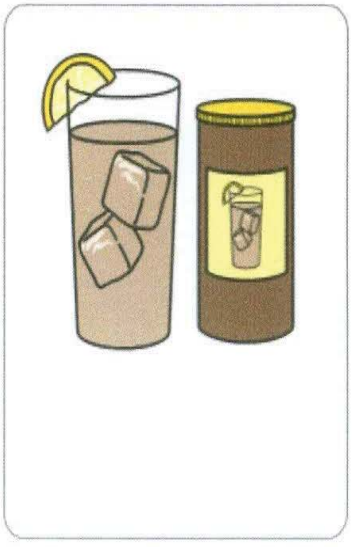
Appendix F: Nutrition and Health Survey

Which drink is it ok to have all the time?

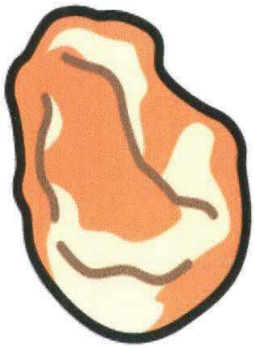


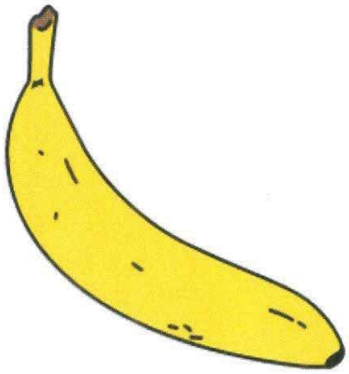


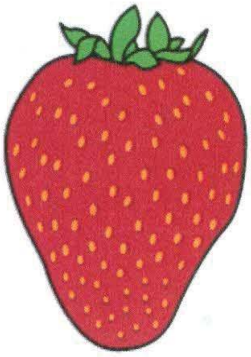


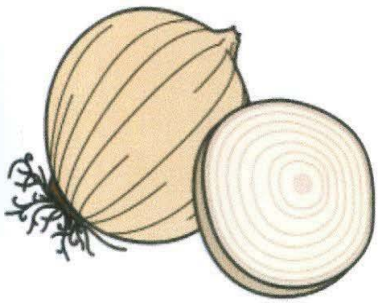


Which food is a vegetable?

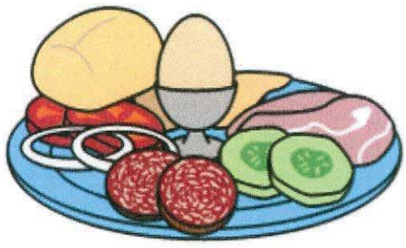


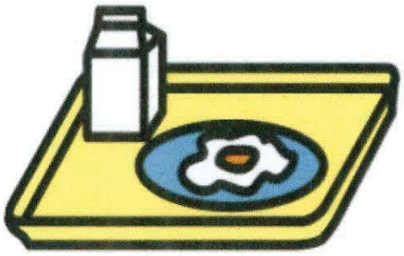


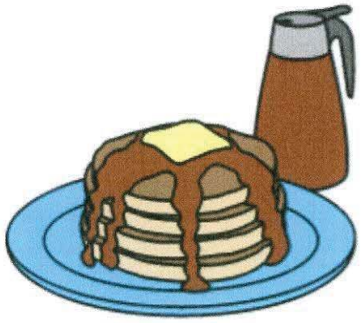


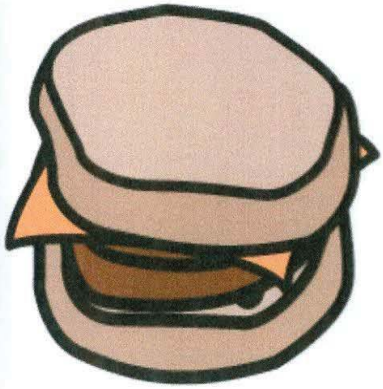


Which is the healthiest breakfast?

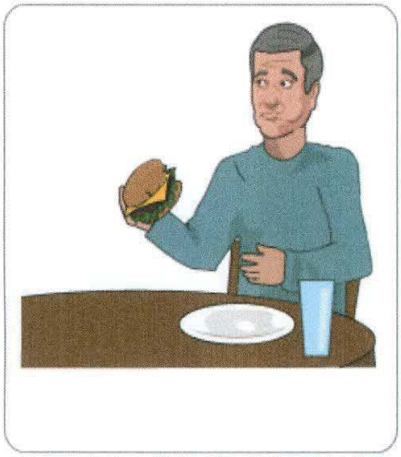


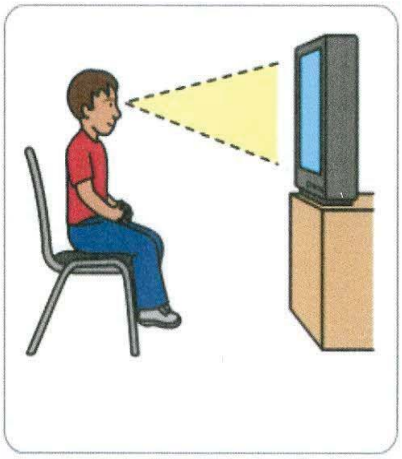


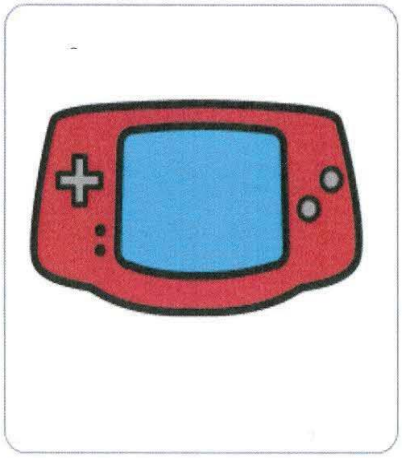


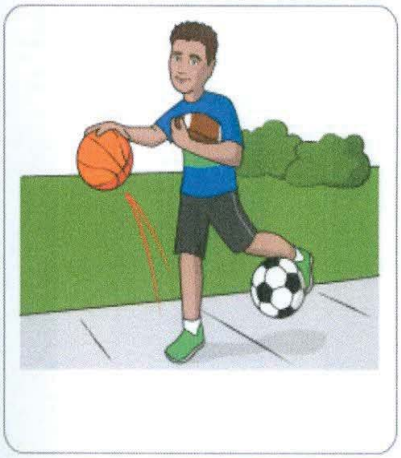


If you want to stay healthy which should you do?









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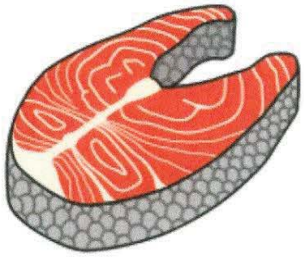
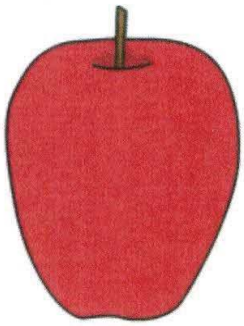
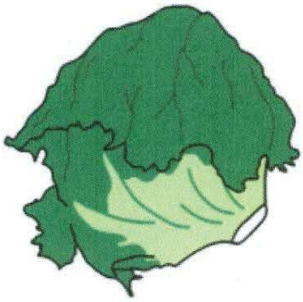
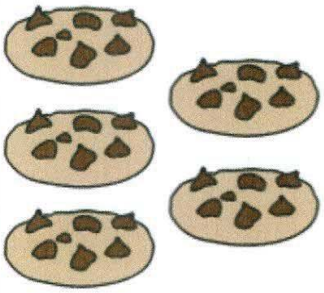
Which food is part of the fruit food group?

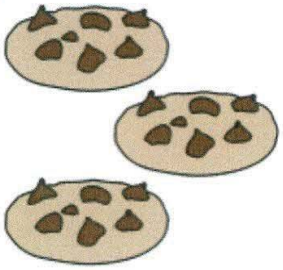


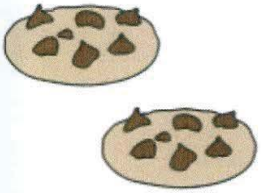




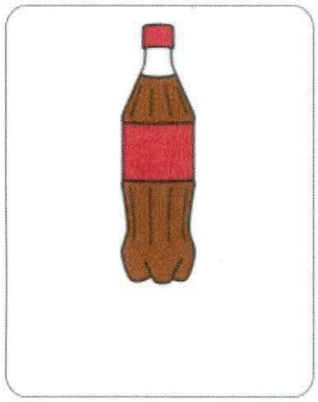
Which option has the most calories?

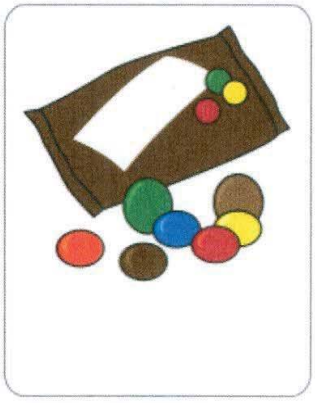


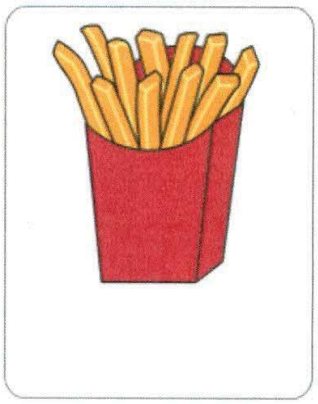


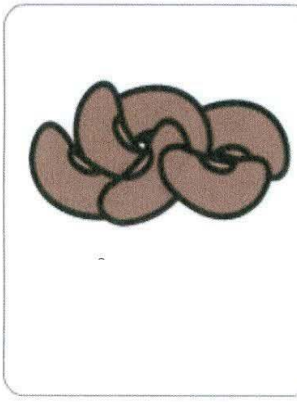


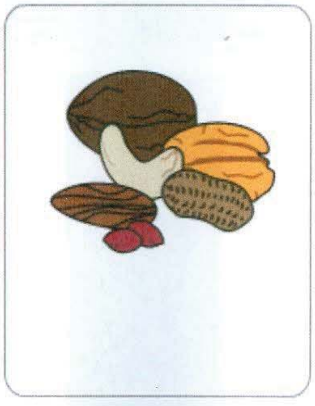
Which group of foods are only for "once in awhile"?

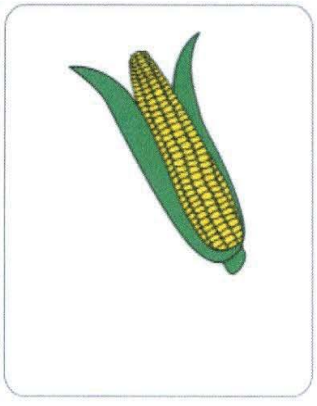


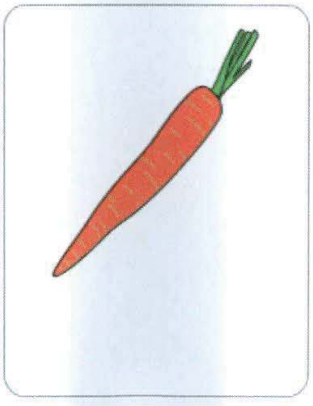


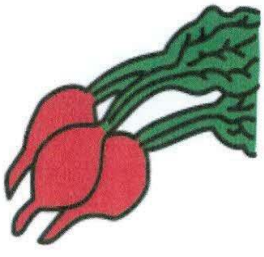




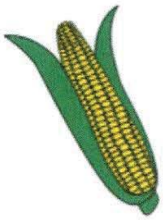


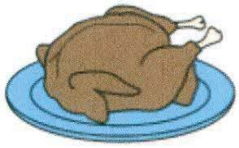


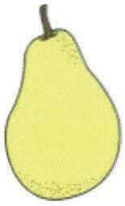




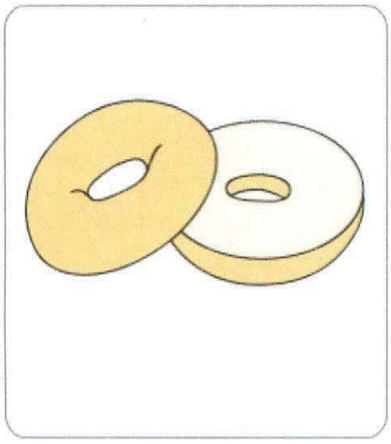
Which of the following is a protein?

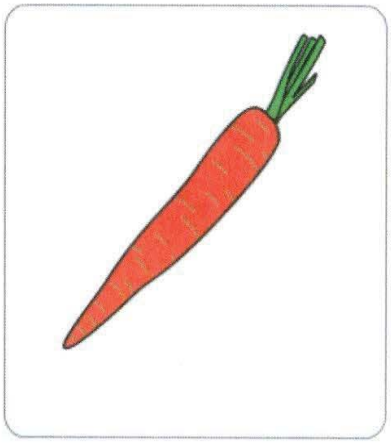


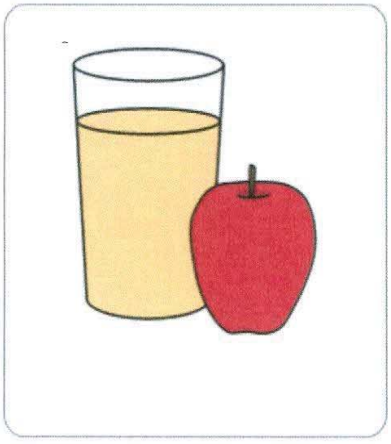


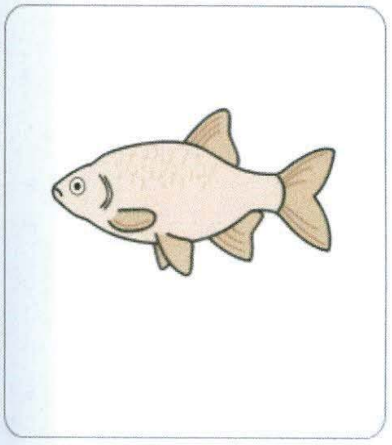


Which food has the most Vitman A?

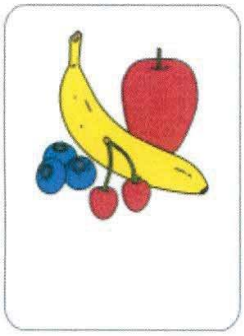
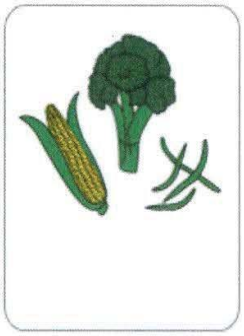
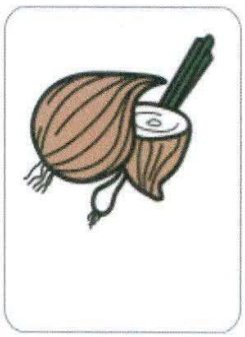


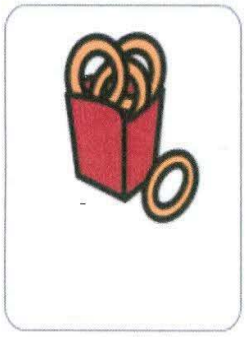
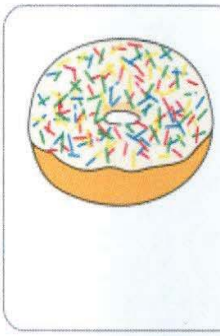


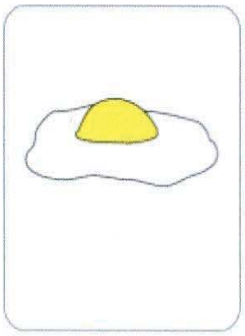
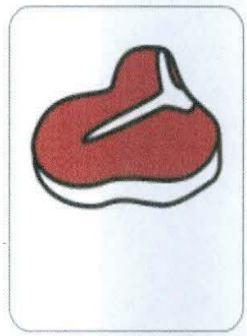
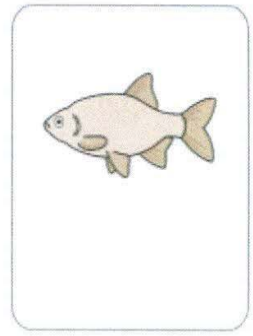




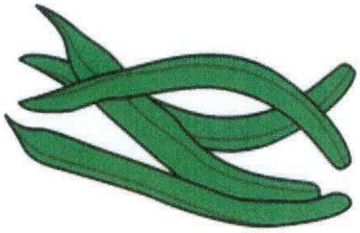
Which group of foods would cause you to gain the most weight?

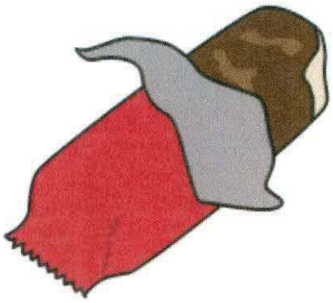




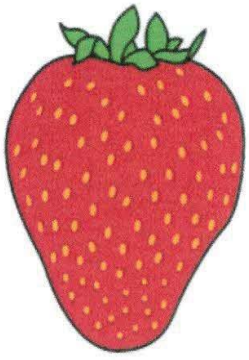



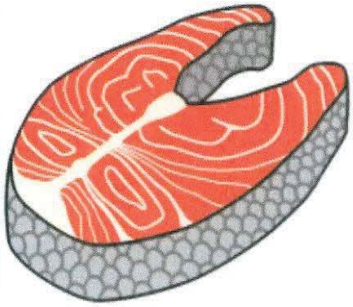





Which food is high in Omega-3 fatty acids?

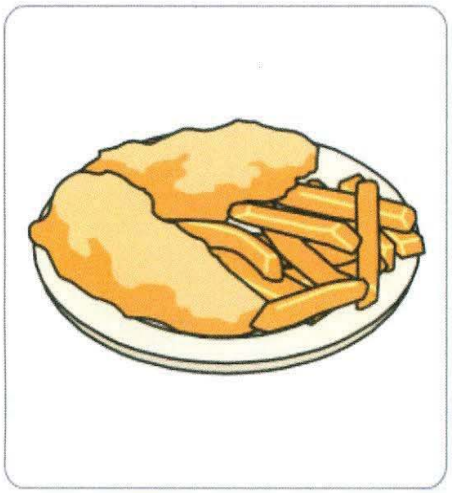


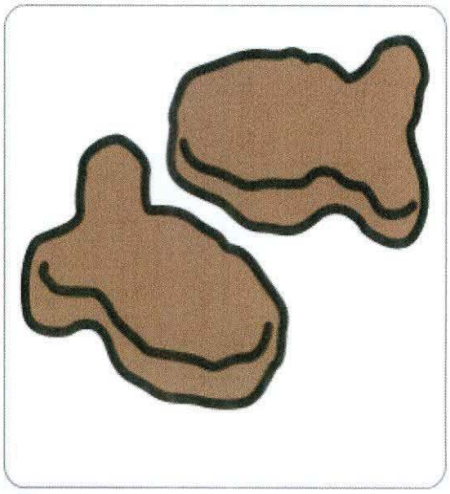


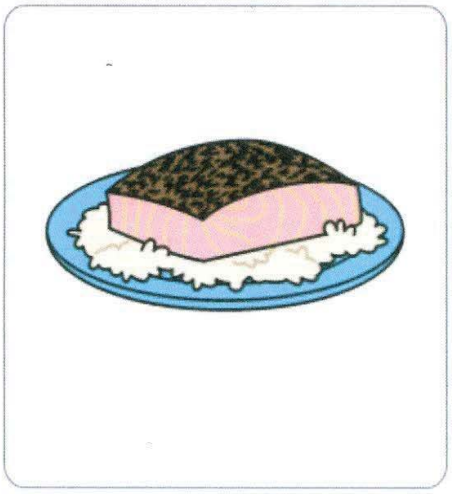


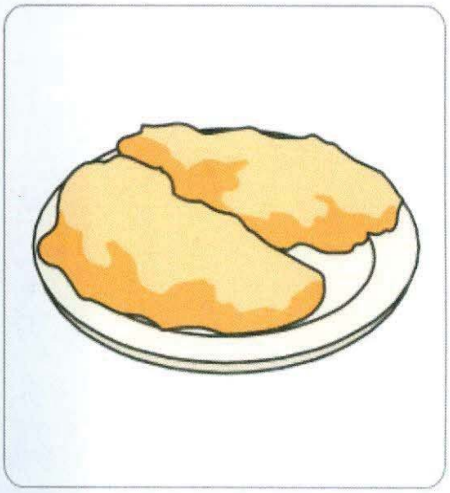


Which food has the healthiest preparation?

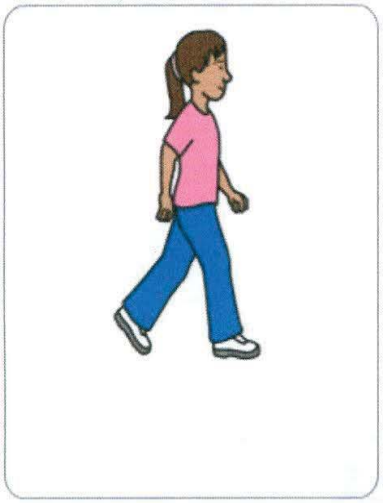


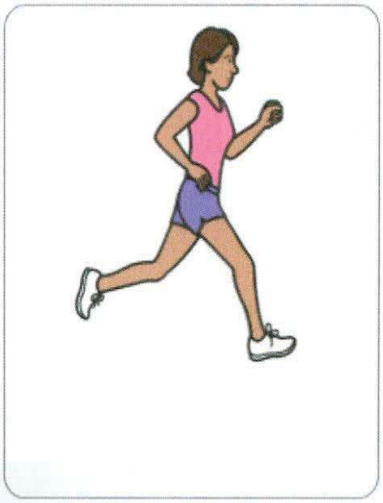


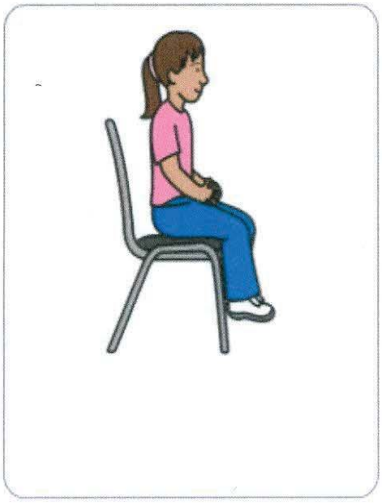




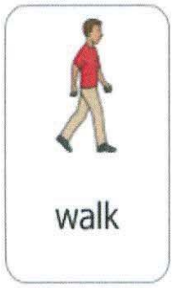
Which activity needs the most energy?

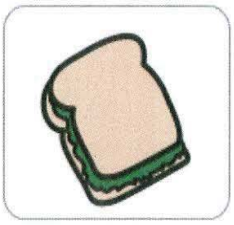


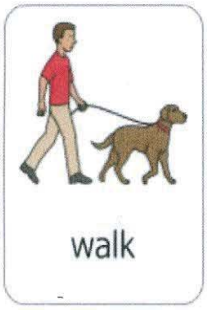


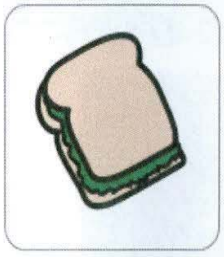


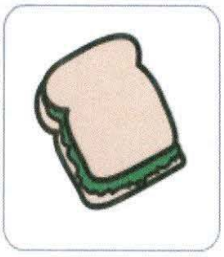
Which man will put on the most weight?

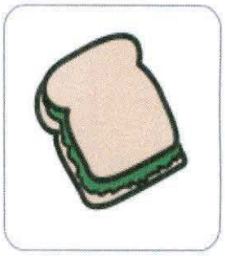


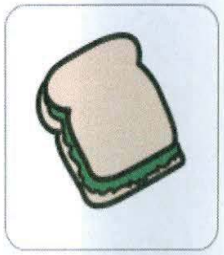


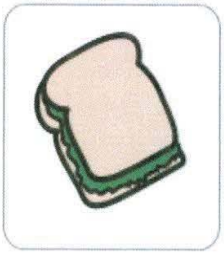




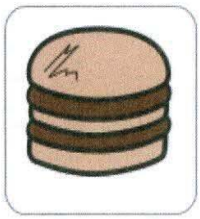
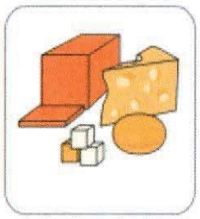
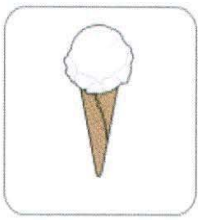
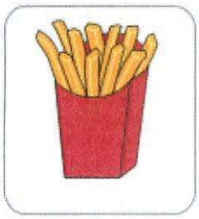


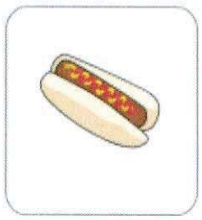


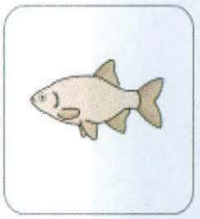


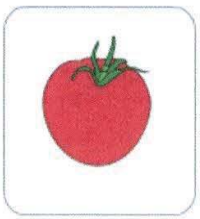
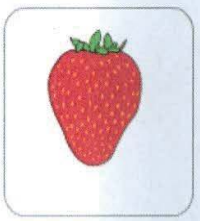
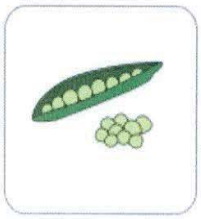


Which group of foods is better to keep your heart healthy?

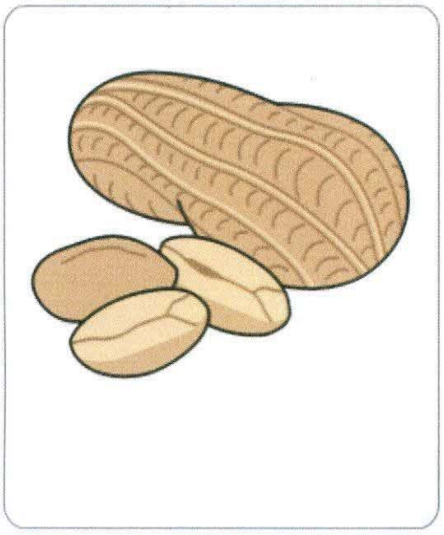





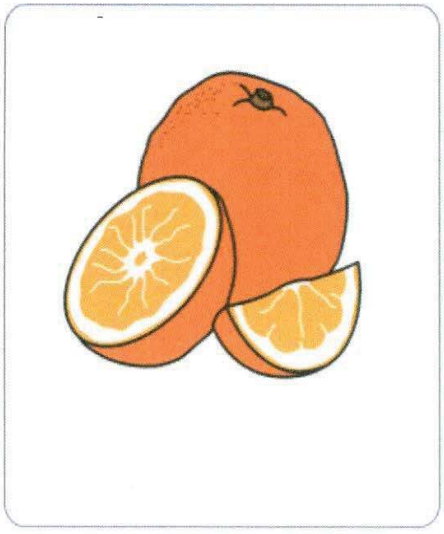


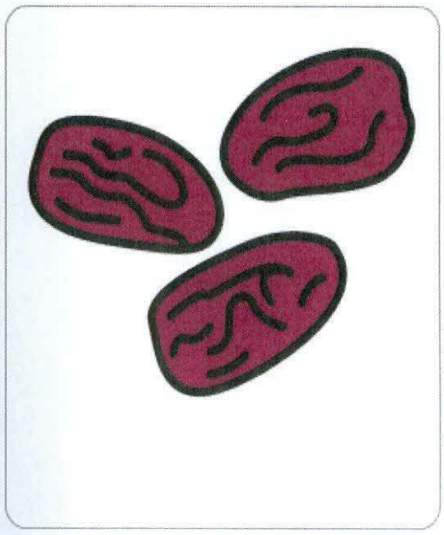



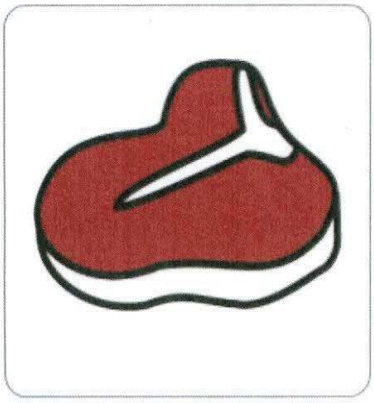
Which food has the most vitamin C?

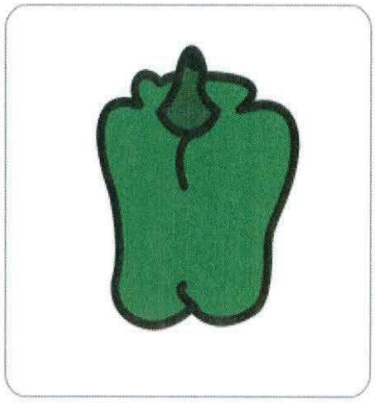


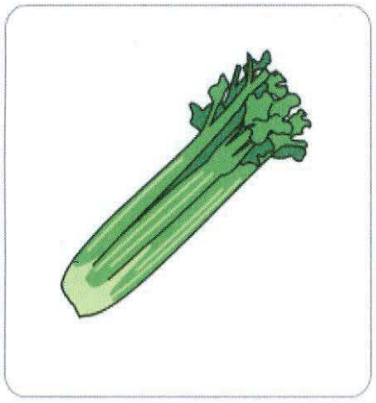


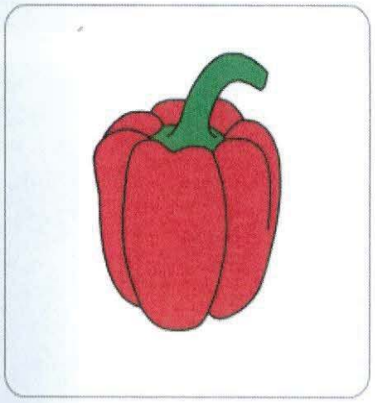


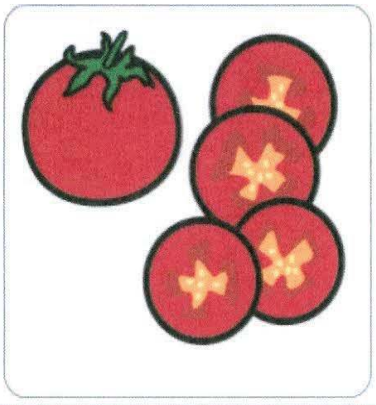
Which pair of foods can use the same cutting board and knife?

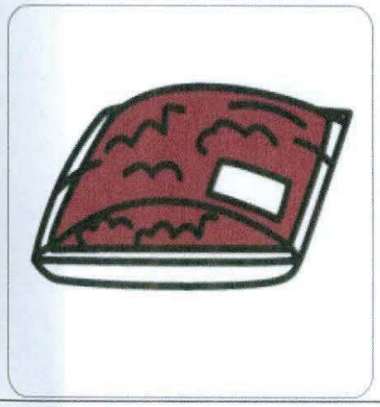




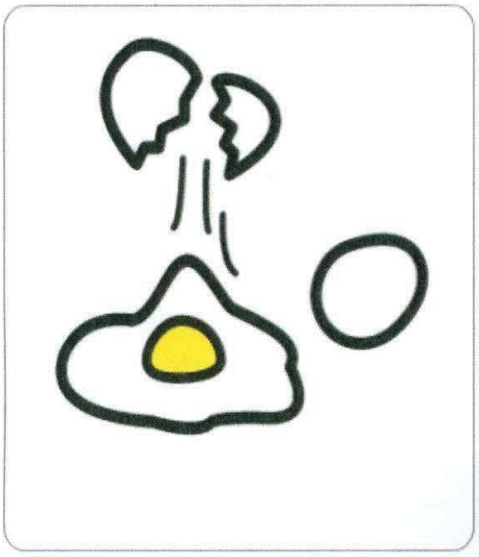


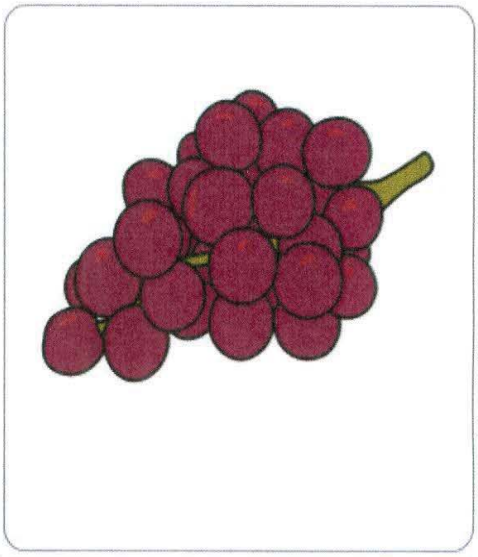


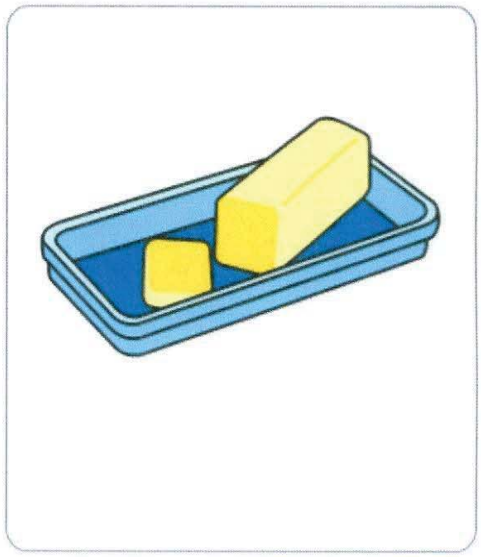




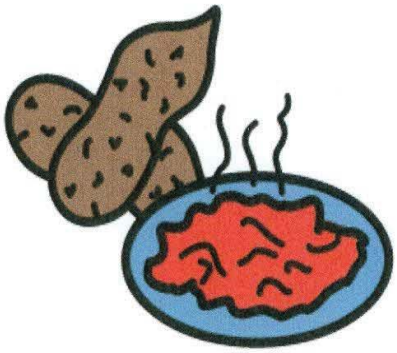
Which food could contaminate other foods if hands are not washed after touching?

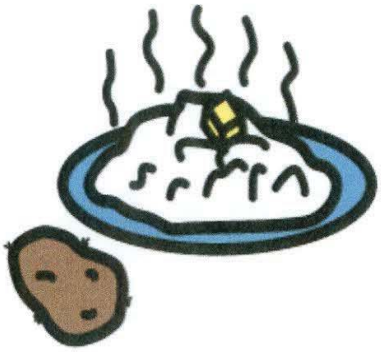


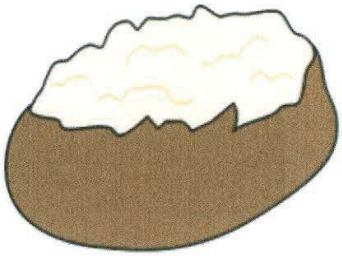


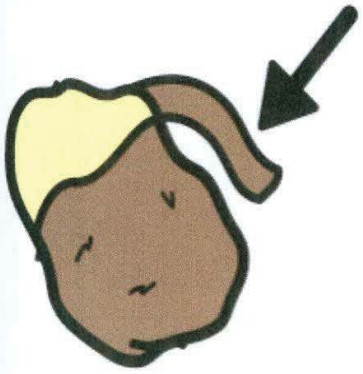


Which food has the most fat?

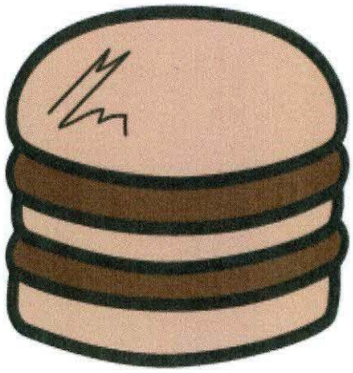


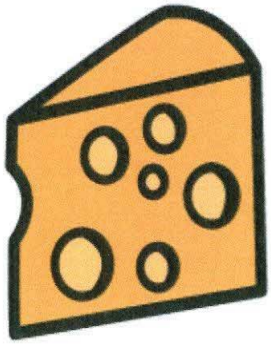




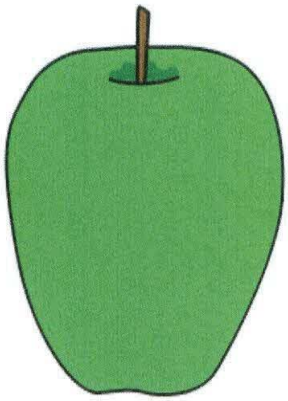


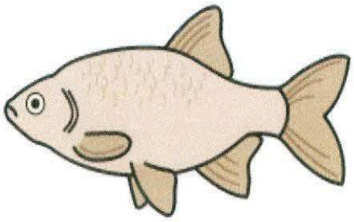
Which food has the most sugar?

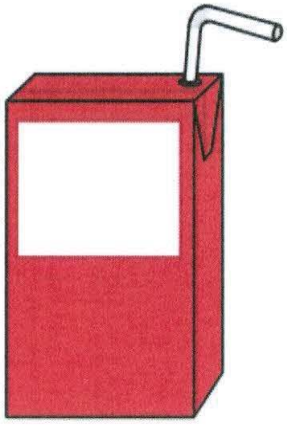


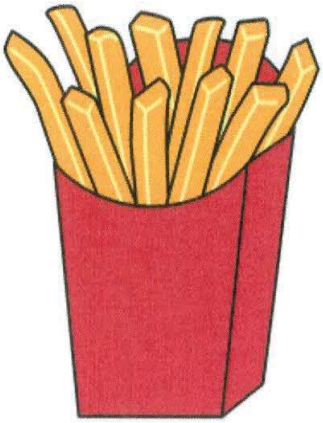


Which food has the most protein?

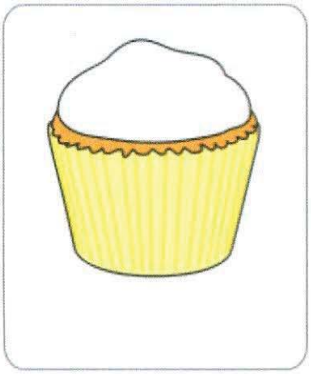


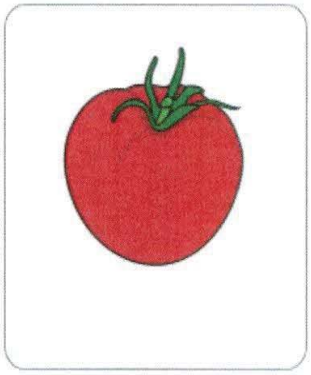


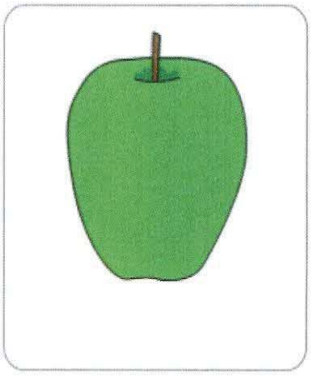


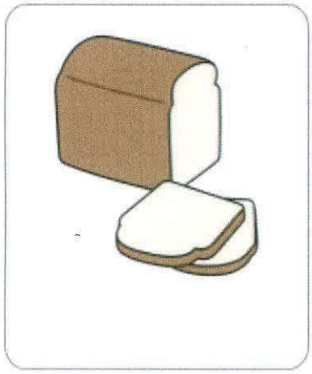


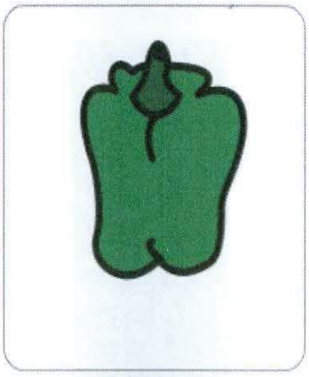
Which group of foods must be refrigerated?

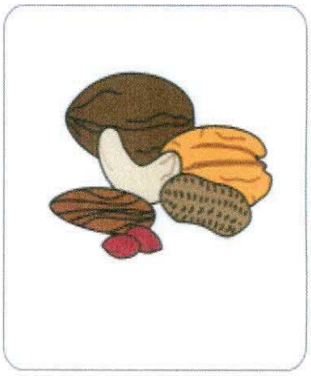


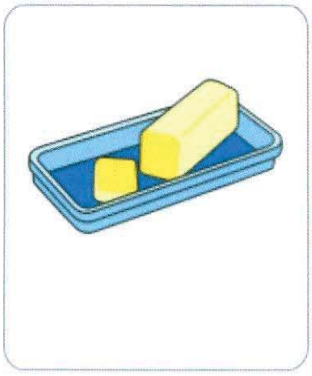


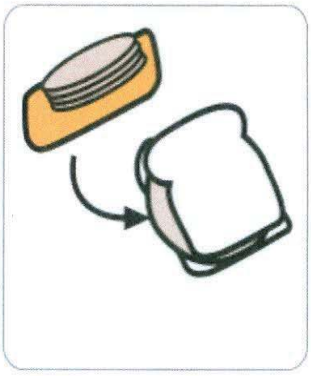




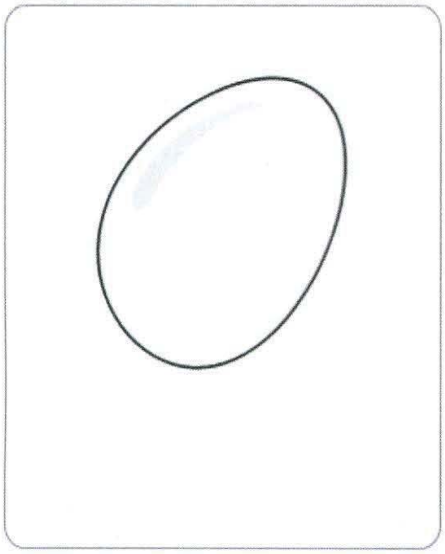


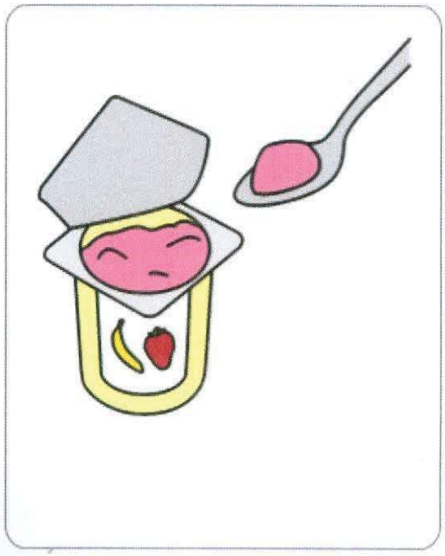


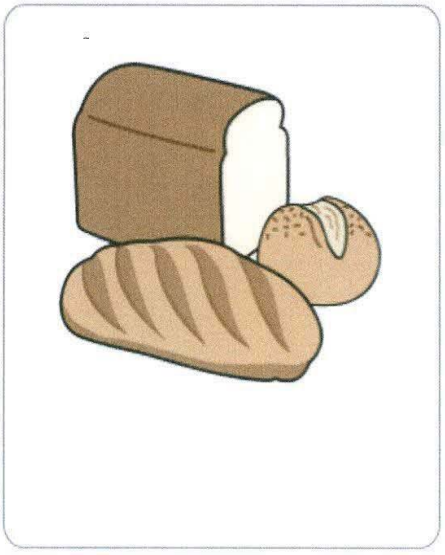


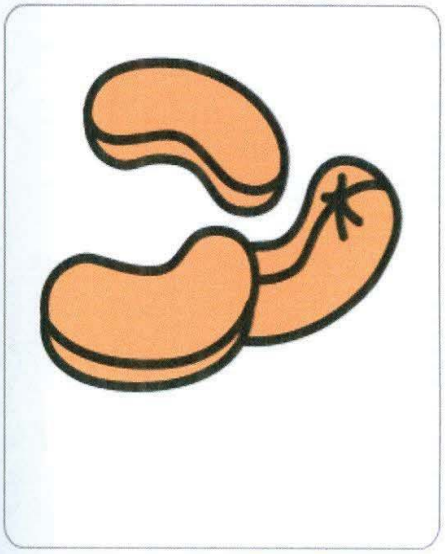


Which food is in the dairy food group?

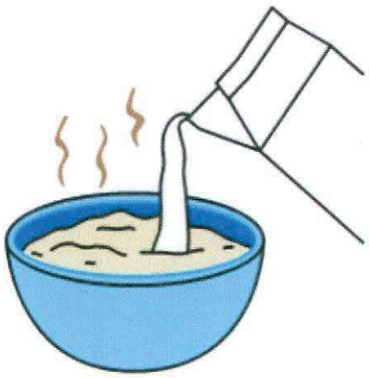


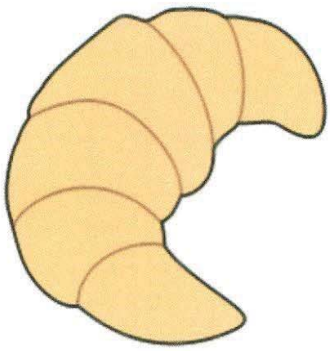


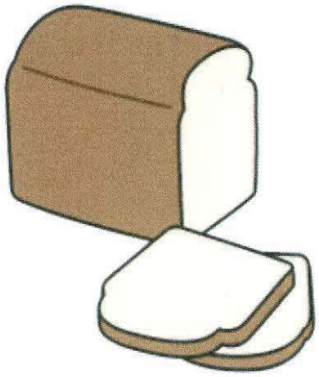


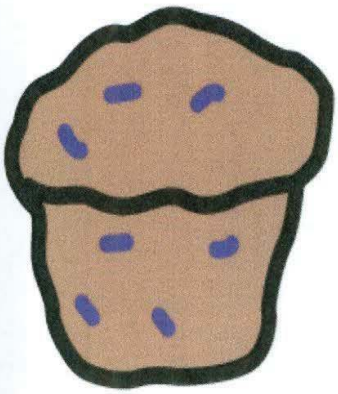


Which food contains whole grains?

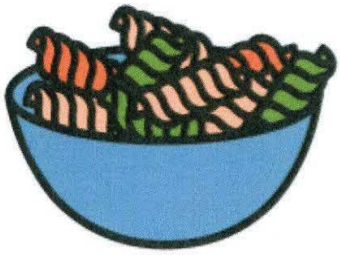


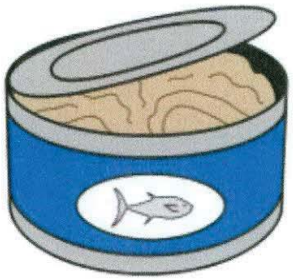


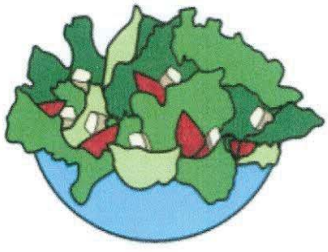


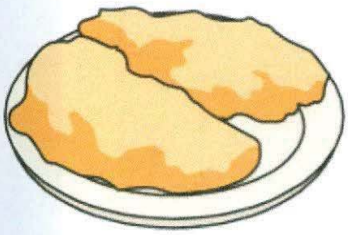


Which food has the most calories?

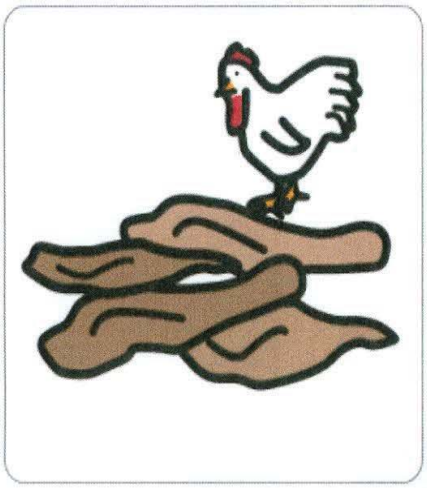


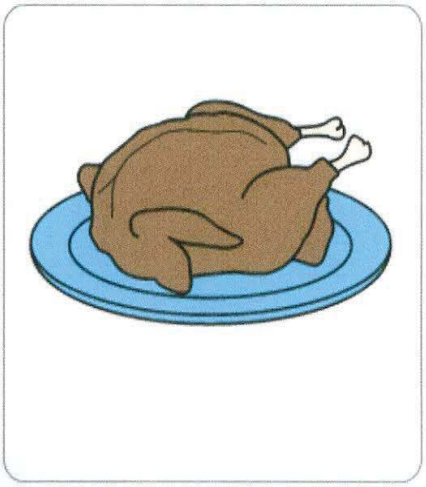


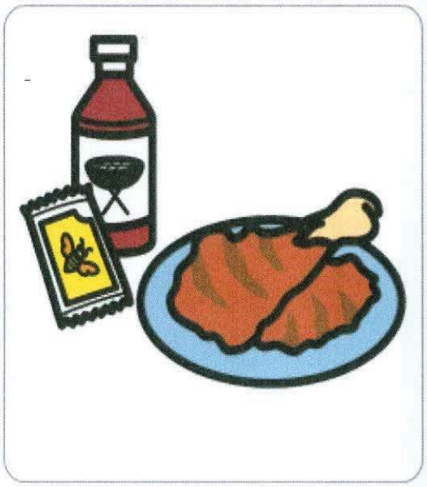


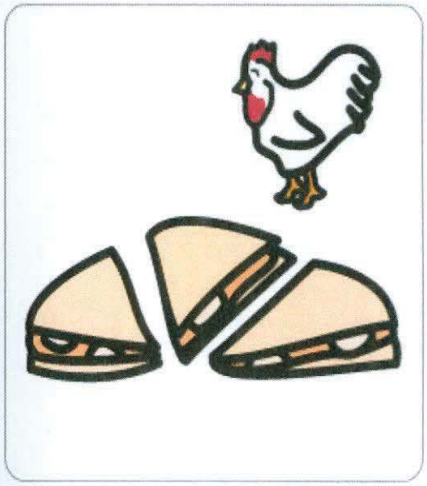


Which food has the healthiest preparation?









Appendix G: Lunch Observation Charts (Sample)

	19-Jun		
	Packed Lunch		
Lunch:	included	Eaten First	Food Waste
Name	2 slices pizza with broccoli (medium lunch container)	pizza	none

9/6/2017			
Pride Lunch			
NAME	Eaten First	Plate Waste	Special Observations
Jill	Bread	1/4 food	Will not eat anything green

Appendix H: Key Definitions and Terms

Key Definitions and Terms: as used in this Thesis

Adult: An adult at the P.R.I.D.E. center, not enrolled in intervention

Autism/Autism Spectrum Disorder: Medically diagnosed case of all aspects of autism and autism spectrum disorder. Refers to a range of conditions characterized by challenges with social skills, repetitive behaviors, speech and nonverbal communication (Autism Speaks, 2017).

Center Director: The individual responsible for day to day activities, adults, and staff members at P.R.I.D.E. Bergen County

Down Syndrome: Individual possesses three instances of chromosome 21.

Multiple Delays: More than one medically diagnosed developmental delay may be present

Nutrition Education and Cooking: The title of the class for the P.R.I.D.E. center schedule, which was the nutrition education intervention

Participant: A member of P.R.I.D.E. actively enrolled in the intervention

P.R.I.D.E.: Here means P.R.I.D.E., Bergen County, a branch of P.R.I.D.E., an adult day program for adults with developmental disabilities

Staff: A paid employee of P.R.I.D.E. Bergen County

Trisomy: Three instances of a chromosome; may be Down Syndrome or may be Trisomy of different kind such as 18, 20, etc.